



DETAILED DECOMMISSIONING AND RECLAMATION PLAN

Minto Project, Yukon Territory



Revision 1

June 2007

Prepared by





Minto Project, Yukon

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Prepared for Minto Explorations Ltd.

Prepared by:



www.accessconsulting.ca

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Submitted by:

Minto Explorations Ltd.

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CONTEXT OF THIS DOCUMENT

This Detailed Decommissioning and Reclamation Plan (the “Plan”) was initially presented for review by affected stakeholders in November 2006. Energy, Mines and Resource (EMR) has since compiled each stakeholder’s review comments and provided Minto Explorations Ltd. with a request for further information. This Plan has now been revised by MintoEx to incorporate responses to review comments and the following additional information:

- Summary of Revisions – as required under Section 14.3 of Quartz Mining License QLM-0001, MintoEx must update and submit an update of this Plan every two years. A summary table will be included at the forefront of each revision, which will summarize all update changes;
- Closure costs – addition of Yr 0 and Yr 2 cost estimates, progressive reclamation cost estimates, and revised final closure costs. Amended closure costs have resulted from discussions with YG EMR and their independent consultant;
- Revised interim closure section, including new tables, map and details; and
- Inclusion of progressive reclamation and adaptive management as primary tenets of mine operations.

This Plan is now considered to be Revision 1, and represents a culmination of negotiations and planning sessions between MintoEx and YG EMR. The following summary table (Table A-1) presents the reader with a summary of changes to the original November 2006 document presented here in Revision 1 (June 2007).

Table A-1
Section-Specific Summary Table for June 2007 DDRP Revisions

Section Number	Section Heading	Revision Comments
1.0	INTRODUCTION	No changes.
1.1	Closure Philosophy	No changes.
1.2	Scope of Plan	No changes.
1.3	Statutory and Regulatory Responsibilities	No changes.
1.3.1	Government Environmental Assessment and Permitting Regime	No changes.
1.3.2	Initial Project Assessment and Licensing	No changes.
1.3.3	Existing Permits and Licenses	No changes.
1.3.4	Remaining Permitting Schedule	No changes.
1.4	Document Organization	No changes.
1.5	Acknowledgements	No changes.
2.0	PROJECT DESCRIPTION	No changes.
2.1	Project Background and Location	No changes.
2.2	Current Status	No changes.
2.3	Planned Mining Operations	No changes.
3.0	ENVIRONMENTAL SETTING	No changes.
4.0	RECLAMATION PLANNING	No changes.
4.1	Reclamation Objectives	New information added to further indicate how the Selkirk First Nation will be involved in developing these closure and reclamation objectives.
4.2	Reclamation to Date	No changes.
4.3	Natural Vegetation	No changes.
4.4	Reclamation Research	No changes.
4.4.1	Growth Media	No changes.
4.4.2	Revegetation Trials	No changes.
5.0	CLOSURE MEASURES FOR RECLAMATION COMPONENTS	No changes.
5.1	Waste Rock and Overburden	No changes.
5.1.1	Maine Waste Rock Dump	No changes.
5.1.1.1	Closure Issues	No changes.
5.1.1.2	Closure Measures for Reclamation components	No changes.
5.1.2	Ice-Rich Overburden Dump	No changes.
5.1.2.1	Closure Issues	No changes.
5.1.2.2	Closure Measures	No changes.
5.1.3	Ore Stockpiles and Pads	Retitled and updated to include measures for reclamation of low and high grade ore stockpiles in the event that this material is not milled prior to mine closure.
5.1.3.1	Closure Issues	See above
5.1.3.2	Closure Measures	See above
5.1.4	Contractor's Shop and Work Area	No changes.
5.1.4.1	Closure Issues	No changes.
5.1.4.2	Closure Measures	No changes.
5.2	Open Pit and Haul Roads	No changes.
5.2.1	Open Pit	No changes.
5.2.1.1	Closure Issues	No changes.
5.2.1.2	Closure Measures	No changes.
5.2.2	Haul Roads	No changes.
5.2.2.1	Closure Issues	No changes.
5.2.2.2	Closure Measures	No changes.
5.3	Tailings Area and Diversion Structures	Amended to clarify differences between Tailings Management Plan and Closure Plan with respect to Tailings Facility, including construction specifics, monitoring and stability of stack, and ABA testwork.
5.3.1	Closure Issues	See above
5.3.2	Closure Measures	See above
5.4	Main Water Dam	No changes.
5.4.1	Closure Issues	No changes.
5.4.2	Closure Measures	No changes.

Section Number	Section Heading	Revision Comments
5.5	Mill and Ancillary Facilities	No changes.
5.5.1	Closure Issues	No changes.
5.5.2	Closure Measures	No changes.
5.5.3	Mill Building	No changes.
5.5.4	Generator Buildings	No changes.
5.5.5	Concentrate Shed	No changes.
5.5.6	Tailings Filter Building	No changes.
5.5.7	Mill Water Pond	No changes.
5.5.8	Fuel Storage Area	No changes.
5.5.9	Mill Reagents and Chemical	No changes.
5.6	Main Access Road	No changes.
5.6.1	Closure Issues	No changes.
5.6.2	Closure Measures	No changes.
5.7	Miscellaneous Sites and Facilities	No changes.
5.7.1	Closure Issues	No changes.
5.7.2	Closure Measures	No changes.
5.7.3	Mine Camp and Related Infrastructure	No changes.
5.7.4	Airstrip	No changes.
5.7.5	Explorations Sites and Trails	No changes.
5.7.6	Land Treatment Facility	No changes.
5.7.7	Solid Waste Facility	No changes.
5.7.8	Explosive Plant Site	No changes.
5.7.9	Mine Roads	No changes.
5.8	Summary of Closure Methodology	No changes.
5.9	Adaptive Management Planning	New section to present adaptive management planning to achieve desired performance conditions and as required by the Yukon Mine Site Reclamation and Closure policy.
6.0	IMPLEMENTATION SCHEDULE	Table 6-1 added outlining the progressive reclamation schedule of activities by mine component.
7.0	POST CLOSURE SITE MANAGEMENT	No changes.
7.1	Organization, Site Access & Security	No changes.
7.2	Supervision and Documentation of Work	No changes.
7.3	Mine Records	No changes.
7.4	Compliance Monitoring and Reporting	Changes to text and Table 7-2 to coincide with updated Temporary Closure Section and Tailings Management Plan.
7.5	Long Term Maintenance	No changes.
7.6	Temporary Closure	Section re-named and amended to include further information requested by YG relating to Temporary Closure scenarios.
8.0	CLOSURE COSTS	Cost Estimate Tables amended.
8.1	Year 0 Closure Costs	Year 0 cost table added after negotiations with EMR.
8.2	Year 2 Closure Costs	Year 2 cost table added after negotiations with EMR.
8.3	Final Closure Costs	End of Mine Life Closure Costs updated based on methodology agreed upon through Year 0 and 2 cost estimate review and negotiations.
8.4	Progressive Reclamation Costs	New table added to outline progressive reclamation schedule and estimated costs.
8.4	Updated Financial Security	Updated to reflect current security scenario for Start-up.
9.0	Closure	New section with signatures of principal authors.
10.0	REFERENCES	No changes.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	CLOSURE PHILOSOPHY	3
1.2	SCOPE OF PLAN.....	6
1.3	STATUTORY AND REGULATORY RESPONSIBILITIES.....	13
1.3.1.	<i>Government Environmental Assessment and Permitting Regime</i>	<i>13</i>
1.3.2.	<i>Initial Project Assessment and Licensing</i>	<i>13</i>
1.3.3.	<i>Existing Permits and Licences</i>	<i>15</i>
1.3.4.	<i>Remaining Permitting Schedule</i>	<i>16</i>
1.4	DOCUMENT ORGANIZATION	16
1.5	ACKNOWLEDGEMENTS	18
2.0	PROJECT DESCRIPTION	19
2.1	PROJECT BACKGROUND AND LOCATION.....	19
2.2	CURRENT STATUS.....	27
2.3	PLANNED MINING OPERATIONS	29
3.0	ENVIRONMENTAL SETTING	30
4.0	RECLAMATION PLANNING	31
4.1	RECLAMATION OBJECTIVES	31
4.2	RECLAMATION TO DATE	32
4.3	NATURAL REVEGETATION	32
4.4	RECLAMATION RESEARCH.....	33
4.4.1.	<i>Growth Media.....</i>	<i>34</i>
4.4.2.	<i>Revegetation Trials</i>	<i>34</i>
5.0	CLOSURE MEASURES FOR RECLAMATION COMPONENTS	41
5.1	WASTE ROCK AND OVERBURDEN DUMPS	45
5.1.1.	<i>Main Waste Rock Dump</i>	<i>45</i>
5.1.1.1.	<i>Closure Issues.....</i>	<i>45</i>
5.1.1.2.	<i>Closure Measures</i>	<i>48</i>
5.1.2.	<i>Ice-Rich Overburden Dump.....</i>	<i>49</i>
5.1.2.1.	<i>Closure Issues.....</i>	<i>49</i>
5.1.2.2.	<i>Closure Measures</i>	<i>50</i>
5.1.3.	<i>Ore Stockpiles and Pads</i>	<i>50</i>
	<i>Closure Issues</i>	<i>51</i>
	<i>Closure Measures</i>	<i>51</i>

5.1.4. Contractor's Shop and Work Area	52
5.1.4.1. Closure Issues.....	53
5.1.4.2. Closure Measures	53
5.2 OPEN PIT AND HAUL ROADS	55
5.2.1. Open Pit.....	55
5.2.1.1. Closure Issues.....	55
5.2.1.2. Closure Measures	57
5.2.2. Haul Roads.....	59
5.2.2.1. Closure Issues.....	59
5.2.2.2. Closure Measures	59
5.3 TAILINGS AREA AND DIVERSION STRUCTURES	62
5.3.1. Closure Issues.....	62
5.3.2. Closure Measures	65
5.4 MAIN WATER DAM	68
5.4.1. Closure Issues.....	68
5.4.2. Closure Measures	68
5.5 MILL AND ANCILLARY FACILITIES.....	72
5.5.1. Closure Issues.....	72
5.5.2. Closure Measures	74
5.5.3. Mill Building	75
5.5.4. Generator Buildings.....	76
5.5.5. Concentrate Shed.....	76
5.5.6. Tailings Filter Building	76
5.5.7. Mill Water Pond	76
5.5.8. Fuel Storage Area.....	79
5.5.9. Mill Reagents and Chemicals.....	79
5.6 MAIN ACCESS ROAD	81
5.6.1. Closure Issues.....	81
5.6.2. Closure Measures	81
5.7 MISCELLANEOUS SITES AND FACILITIES	84
5.7.1. Closure Issues.....	84
5.7.2. Closure Measures	84
5.7.3. Mine Camp and Related Infrastructure	86
5.7.4. Airstrip.....	87
5.7.5. Exploration Sites and Trails.....	87
5.7.6. Land Treatment Facility.....	87
5.7.7. Solid Waste Facility	88

5.7.8.	<i>Explosives Plant Site</i>	89
5.7.9.	<i>Mine Roads</i>	90
5.8	SUMMARY OF CLOSURE METHODOLOGY	90
5.9	ADAPTIVE MANAGEMENT PLANNING	92
6.0	IMPLEMENTATION SCHEDULE	95
7.0	POST CLOSURE SITE MANAGEMENT	98
7.1	ORGANIZATION, SITE ACCESS & SECURITY	98
7.2	SUPERVISION AND DOCUMENTATION OF WORK	100
7.3	MINE RECORDS	101
7.4	COMPLIANCE MONITORING AND REPORTING	102
7.5	LONG TERM MAINTENANCE	107
7.6	TEMPORARY CLOSURE	108
8.0	CLOSURE COSTS	119
8.1	ESTIMATED CLOSURE COSTS AT START-UP (YEAR 0)	122
8.2	ESTIMATED CLOSURE COSTS AT YEAR 2	135
8.3	ESTIMATED FINAL CLOSURE COSTS	148
8.4	PROGRESSIVE RECLAMATION COSTS	160
8.5	UPDATED FINANCIAL SECURITY	163
9.0	CLOSURE	165
10.0	REFERENCES	166

List of Figures

Figure 2-1	General Location Map	21
Figure 2-2	Project Area Overview	22
Figure 2-3	Project Area Current Conditions	28
Figure 5-1	Ultimate Overall Site Plan	42
Figure 5-2	Reclamation Measures for Waste Rock and Overburden Dumps	46
Figure 5-3	Typical Progressive Reclamation Measures	47
Figure 5-4	Reclamation Measures for Open Pit and Haul Roads	56
Figure 5-5	Haul Road and Site Road Typical Reclamation Cross-Section	60
Figure 5-6	Reclamation Measures for Tailings Area and Diversion Structures	64
Figure 5-7	Reclamation Measures for Main Water Dam	69

Figure 5-8 Reclamation Measures for Mill and Ancillary Facilities.....	73
Figure 5-9 Reclamation Measures for Mill Water Pond	78
Figure 5-10 Summary of Reclamation Measures	91
Figure 7-1 Monitoring Program Station Locations	106

List of Tables

Table 1-1 Global Information List.....	8
Table 2-1 Project Area Overview and Environmental Setting	26
Table 4-1 Selected Seed Mixture for Initial Revegetation Trials	38
Table 4-2 Revegetation test plot establishment locations and monitoring schedule	39
Table 4-3 Estimated Area of Disturbance – End of Mine Life (7 years).....	44
Table 7-1 Site Decommissioning and Reclamation Seasonal Personnel Requirements.....	100
Table 7-2 Closure Period and Post-Closure Monitoring Schedule	105
Table 7-3 Summary of Care and Maintenance Activities and Surveillance Program during Temporary Cessation of Mining Operations	109
Table 7-4 Surveillance Monitoring Sites for Temporary Closure	114
Table 7-5 Monitoring Program Schedule for Temporary Closure	115
Table 7-6 Property Site Inspection Form for Temporary Closure	116
Table 7-7 Temporary Closure Inspection Checklist (Structural)	117
Table 7-8 Temporary Closure Inspection Checklist (Visual).....	118
Table 8.1-1 Summary Table of Estimated Closure Costs for Year 0	122
Table 8.1-2 Minto Mine Closure Unit Rates for Year 0	123
Table 8.1-3 Waste Rock and Overburden Dumps, Estimated Closure Costs for Year 0.....	124
Table 8.1-4 Open Pit and Haul Roads, Estimated Closure Costs for Year 0.....	125
Table 8.1-5 Tailings Area and Diversion Structures, Estimated Closure Costs for Year 0	126
Table 8.1-6 Main Water Dam, Estimated Closure Costs for Year 0.....	127
Table 8.1-7 Mill and Ancillary Facilities, Estimated Closure Costs for Year 0.....	128
Table 8.1-8 Mill Water Pond, Estimated Closure Costs for Year 0	129
Table 8.1-9 Main Access Road, Estimated Closure Costs for Year 0.....	130
Table 8.1-10 Miscellaneous Sites and Facilities, Estimated Closure Costs for Year 0.....	131
Table 8.1-11 Reclamation Research and Revegetation, Estimated Closure Costs for Year 0.	132
Table 8.1-12 Site Management and Monitoring, Estimated Closure Costs for Year 0.....	133
Table 8.1-13 Supporting Studies for Year 0.....	134

Table 8.2-1 Summary Table of Estimated Closure Costs for Year 2	135
Table 8.2-2 Minto Mine Closure Unit Rates for Year 2	136
Table 8.2-3 Waste Rock and Overburden Dumps, Estimated Closure Costs for Year 2.....	137
Table 8.2-4 Open Pit and Haul Roads, Estimated Closure Costs for Year 2.....	138
Table 8.2-5 Tailings Area and Diversion Structures, Estimated Closure Costs for Year 2	139
Table 8.2-6 Main Water Dam, Estimated Closure Costs for Year 2.....	140
Table 8.2-7 Mill and Ancillary Facilities, Estimated Closure Costs for Year 2.....	141
Table 8.2-8 Mill Water Pond, Estimated Closure Costs for Year 2	142
Table 8.2-9 Main Access Road, Estimated Closure Costs for Year 2.....	143
Table 8.2-10 Miscellaneous Sites and Facilities, Estimated Closure Costs for Year 2.....	144
Table 8.2-11 Reclamation Research and Revegetation, Estimated Closure Costs for Year 2.	145
Table 8.2-12 Site Management and Monitoring, Estimated Closure Costs for Year 2.....	146
Table 8.2-13 Supporting Studies for Year 2.....	147
Table 8.3-1 Summary Table of Estimated Final Closure Costs	148
Table 8.3-2 Minto Mine Closure Unit Rates for Final Closure.....	149
Table 8.3-3 Waste Rock and Overburden Dumps, Estimated Final Closure Costs.....	150
Table 8.3-4 Open Pit and Haul Roads, Estimated Final Closure Costs.....	151
Table 8.3-5 Tailings Area and Diversion Structures, Estimated Final Closure Costs	152
Table 8.3-6 Main Water Dam, Estimated Final Closure Costs.....	153
Table 8.3-7 Mill and Ancillary Facilities, Estimated Final Closure Costs.....	154
Table 8.3-8 Mill Water Pond, Estimated Final Closure Costs	155
Table 8.3-9 Main Access Road, Estimated Final Closure Costs	156
Table 8.3-10 Miscellaneous Sites and Facilities, Estimated Final Closure Costs.....	157
Table 8.3-11 Reclamation Research and Revegetation, Estimated Final Closure Costs	158
Table 8.3-12 Site Management and Monitoring, Estimated Final Closure Costs.....	159
Table 8.4-1 Estimated Progressive Reclamation Costs.....	160

List of Appendices

Appendix A Environmental Setting (Excerpted from <i>Minto Project, Yukon – Site Inspection & Compilation of Environmental Information</i> . Prepared by Access Mining Consultants Ltd. for DIAND, Renewable Resources Waste Management Program, March 2000).	
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1.0 INTRODUCTION

Minto Exploration Ltd. (MintoEx), a wholly owned subsidiary of Sherwood Copper Corporation (Sherwood), is moving forward with the development of the Minto Project located 240 km (150 miles) northwest of Whitehorse, Yukon. For the purposes of this Report, the “Minto Project” means the development of the Minto deposit into an open-pit mine and a concentrator and the development of ancillary facilities. This project was subject to multiple developments over the years in which the principal milestones were:

- first drilling program initiated in 1971 by Silver Standard Mines Ltd. and Asarco Inc.;
- a detailed feasibility study completed in 1995 with reserves of 6,509,700 short tons at an average of 2.13% Cu, 0.018 oz/t Au and 0.27 oz/t Ag;
- completion of environmental assessment process and screening key licences (Type A Water Use Licence in 1998 and Quartz Mining Licence in 1999);
- detailed engineering and start of construction in 1997-1998. Some infrastructure was built (camp, mill concrete foundations, domestic water supply, access road);
- temporary suspension of the project in 1999 due to low copper prices and poor industry-wide macroeconomic conditions; and
- acquisition of MintoEx by Sherwood in June 2005.

A Decommissioning and Reclamation Plan was developed by the previous owners and filed with the Yukon Water Board in April 2001 as per Water Use License requirements. This plan included cost estimates for closure activities. The Company was issued a Type A Water Use Licence (QZ96-006) in 1998 pursuant to the Yukon Waters Act (YWA) and Regulations for the mine and milling operations. A Quartz Mining Production Licence (QML-9902) was issued in October 1999. These licences were screened under the Environmental Assessment and Review Process Guidelines Order (EARPGO) in April, 1997. Water Use Licence QZ96-006 was amended (Amendment #1) to revise the decommissioning requirements for the project, and to request the submission of an interim plan as the project was not yet constructed. The project is still subject to Water Use Licence QZ96-006, and QML-0001 (amendment to QML-9902), and the Company continues to ensure that all licence obligations are fulfilled as the project construction phase progresses and the mine approaches the operational phase.

A review of the 2001 plan by Yukon Government Water Resources identified areas of deficiency in the document, primarily associated with the level of detail provided and planning assumptions made. This review guided the preparation, as required in *Part G – Decommissioning and Reclamation* of the Company's Water Use Licence, of an Interim Care and Maintenance & Interim Closure Plan ("Interim Plan") which was filed with the Yukon Water Board in November 2003 (Access Mining Consultants Ltd, 2003.). The Interim Plan addressed two scenarios:

1. continued care and maintenance of the present project infrastructure; and
2. closure issues related to the decommissioning of existing site developments at the Minto mine and reclamation of the site, including reclamation and security costs associated with the then dormant property.

The 2003 plan presented closure scenarios based on existing conditions at the time, stating:

"The mine and related infrastructure to support mining and milling activities has not yet been fully constructed. Once the Company has made a production decision, the remaining components of the project will be constructed, including the mill, tailings facilities, open pit and waste rock storage areas. Development of those mine components and their operations will expand existing areas of disturbance and a new decommissioning and reclamation plan will be developed and submitted to the Yukon Water Board (YWB)."

Both the 2001 and 2003 plans have been drawn upon in the preparation of this Detailed Decommissioning and Reclamation Plan (the "Plan"), the submission of which is required under the Quartz Mining Production Licence QML-0001, Section 14.1, which states:

"At least six (6) months prior to the Start-up Date, the Licencee must submit to the Chief a closure plan for the Undertaking for the Chief's review and approval."

This Plan addresses the long-term physical and chemical stability of the site, including reclamation of surface disturbances. A program is presented for site management and monitoring both during implementation of closure and after decommissioning and reclamation

measures are completed. Decommissioning and reclamation cost estimates are provided and financial security requirements reviewed.

The Plan is based on the best information available at the present time. As required in section 14.3 of QML-0001, this plan will be updated every two years, and submitted to the Chief for review and approval no later than every second anniversary of the startup date.

1.1 CLOSURE PHILOSOPHY

In keeping with its high standards for environmental and social responsibility, the Company intends to implement an environmentally sound and technically feasible decommissioning and reclamation plan for the Minto mine. Closure planning and the implementation of this phase at a mine site must be undertaken with appropriate environmental care while respecting local laws, first nations agreements, and the public interest and ensuring that the Company's high environmental standards are achieved. Necessary environmental protection measures have been adopted in the development of this Plan to ensure that a healthy environment exists after mine closure. This approach is consistent with the Company's Corporate Environmental Safety and Health Policy, which states:

"Minto Explorations Ltd. recognizes and believes that its operations should be designed and managed to protect the natural surroundings, provide a safe and healthy work environment, and permit the responsible and cost-effective extraction of natural resources. Minto Explorations Ltd. intends to comply with all applicable legislation and regulations and to match industry best practices in its operations."

A principle tenet of the philosophy followed during the development of this Plan was to work towards an eventual passive closure, with eventual walk-away closure after long term chemical and physical stability has been demonstrated. This involved an assessment of the key mine components that could potentially place the public or the environment at risk following closure, if not properly mitigated. Mitigation measures have been incorporated into elements of the Plan to address public safety issues and environmental concerns with post closure monitoring and inspections planned to ensure that this objective is met. Once the effectiveness of each mitigation measure is assured, then management of the site can be safely reduced to a level

that is consistent with closure. It is anticipated that final determination of the effectiveness of closure measures for passive and eventual walk-away status will be the subject of review and concurrence with regulatory agencies, First Nations and the public. Under the Quartz Mining Act (QMA), the company would then apply for a certificate of closure from Yukon Government (YG).

The Company has entered into a comprehensive Benefits and Cooperation Agreement (Agreement) with the Selkirk First Nation (SFN). All activities at the site including closure measures are guided by this Agreement. Therefore, a strong working relationship with the SFN forms a foundation for this document. To that end, preliminary meetings with SFN were held, and a draft of this document was provided for their review.

The principle of progressive reclamation is key to the Company's closure philosophy. Progressive reclamation, or those reclamation activities that are conducted during mining operations, reduces the ongoing risk carried by the company by:

- stabilizing potential sources of erosion and sediment release;
- initiating slope stability measures to enable reclamation;
- replanting and reseeding disturbed areas not scheduled for rework;
- providing sites for reclamation research trials and serving as an early indicator of reclamation success; and
- reducing the total area requiring reclamation at the end of active mining activities.

Resources required for specific progressive reclamation activities will be incorporated into operational planning, and their completion will be scheduled into yearly operational targets. The schedule for progressive reclamation is dependant upon the progress of mining activities, and is therefore not presented in this Plan.

To ensure that the overall closure philosophy can be achieved, the following objectives were emphasized during the development of this plan:

- protection of public health and safety;
- implementation of environmental protection measures that prevent adverse environmental impact;

- ensuring land use commensurate with surrounding lands;
- ensuring full consultation with the SFN, so that closure measures are appropriate and supported by the local peoples who are most affected;
- recognize mine start-up and construction in the short term and incorporate long term closure measures;
- progressive reclamation measures implemented during mine opening and operations;
- post closure monitoring of the site to assess effectiveness of closure measures for the long term; and
- passive post closure monitoring and management of the site until the former mine presents evidence of an environmentally benign site, in which case a walk-away closure scenario may be realized.

1.2 SCOPE OF PLAN

With the closure philosophy outlined previously guiding the development of the Plan; it has been specifically scoped to fulfill the requirements in section 14.0 *Preparation, Approval and Implementation of Closure Plan* of the Company's Quartz Mining Licence QML-0001. Clause 14.2 outlines the criteria components that must be addressed:

- (a) a detailed analysis of the measures required to be implemented to ensure the ongoing physical and chemical stability of the Undertaking;*
- (b) a description of how the Licencee intends to meet the performance standards identified in Schedule B of this Licence, unless other standards are agreed to in advance of submission of the plan by the Chief;*
- (c) detailed designs, prepared and sealed by a professional engineer licenced to practice in the Yukon, for the closure of all facilities associated with the Undertaking, including dams, spillways, diversion ditches, waste rock and overburden dumps, roads, or stockpiles and mill and camp infrastructure and consideration of probable maximum flood and maximum credible earthquake;*
- (d) plans for ensuring the long term stabilization and rehabilitation of the tailings storage facilities;*
- (e) detailed designs, prepared and sealed by a professional engineer licenced to practice in the Yukon, for upgrading any impoundment structures and Minto Creek diversion ditch;*
- (f) plans for a reclamation research program and related implementation schedule focusing on characterization of soils in the area, establishing test plots and documenting re-vegetation;*
- (g) program and related implementation schedule for progressive reclamation to be carried out while production and development activities are conducted at the Undertaking;*
- (h) monitoring program and related implementation schedule adequate to verify that performance objectives applicable at closure for all facilities are met;*
- (i) a cost estimate, prepared by a professional engineer licenced to practice in the Yukon, for decommissioning the Undertaking, including costs related to any required post-closure monitoring; and*
- (j) details respecting how site security will be maintained, monitoring of geochemical and physical stability of all facilities at the Undertaking and other matters as appropriate, during any closures, including a Temporary Closure.*

To achieve these criteria, a review of pertinent historical information relating to the Minto operation was undertaken. Table 1-1 Global Information List, presents a listing of reports and other information sources that are related to and/or have been prepared specifically for the Minto Project. Many of these documents were reviewed in preparation of this Plan.

Various closure options were assessed to ensure that closure objectives were met for each mine component. A meeting was held between the company's consultants and First Nations to review the closure philosophy and approach and methods to optimize the Plan.

The approach taken in the presentation of this Plan is to provide a brief description of each mine component and the closure issues and measures related to that component. Previous work or reports on the project have been referenced without repeating details so that this document is focused on decommissioning and reclamation.

Table 1.2-1 Global Information List

(List of Reports Related to and/or Prepared for the Minto Project)

Report Title / Topic	Author	Date
Initial Environmental Study of the Minto Project. Prepared for Wright Engineers Ltd.	Division of Applied Biology, B.C. Research	1976
Report to Wright Engineers Ltd. on 1976 Geotechnical Investigations, Minto Project Feasibility Study.	Golder and Associates	1976
An Assessment of the Pre-Development Water Quality and Biological Conditions in the Water Shed Around the Minto Ore Body.	Fisheries and Environment Canada, Environmental Protection Service	1977
The Minto Copper Deposit, Yukon Territory: A Metamorphosed Ore Body In The Yukon Crystalline Terrane", An M.Sc. Thesis, Queen's University, Kingston, Ontario, Canada	Pearson, W.N.,	1977
The Minto Copper Deposit, Yukon Territory, A Metamorphosed Orebody in the Yukon Crystalline Terrane. In Economic Geology, Vol. 74, p. 1577-1599.	Pearson, W.N., Clark, A.H.	1979
The Minto Project, Yukon, Mineral Inventory Review Minto Explorations Ltd, Vancouver, B.C.,	H.L. Klingmann and J.S. Proc	1994
Minto Project, Initial Environmental Evaluation, Supporting Volume I, Development Plan. Prepared for Minto Explorations Ltd.	Hallam Knight Piesold Ltd.	1994
Minto Project, Initial Environmental Evaluation, Supporting Volume II, Environmental Setting. Prepared for Minto Explorations Ltd.	Hallam Knight Piesold Ltd.	1994
Minto Project, Initial Environmental Evaluation, Supporting Volume III, Socioeconomic Description and Impact Assessment. Prepared for Minto Explorations Ltd.	Hallam Knight Piesold Ltd.	1994
Survey of Firekilled Fuelwood Harvest Potential, Minto Creek, Yukon, Prepared for Minto Explorations Ltd. Vancouver, B.C.	John Gibson	1994
"Development of the Minto Project Process Design", Project No. 8553-15	Kilborn Engineering Pacific Ltd.	1994
An Impact Assessment of the Minto Project. Memo from the Selkirk First Nations to the Northern Affairs Program.	Magrum	1994
Minto Project Prospectus prepared for Minto Explorations Ltd.	Pearson, Hofman and Assoc. Ltd.	1994

Report Title / Topic	Author	Date
Minto Area Archaeology And History - Final Report of the Minto Archaeological Impact Assessment Project	Sheila Greer, Edmonton	1994
Development of the Minto Project Process Design	Kilborn Engineering Pacific Ltd.	1994
Geotechnical Evaluation – Minto Core. Internal report submitted to Minto Explorations Ltd.	Steffen, Robertson and Kirsten Ltd.	1994
Technical Feasibility Study - Thickened Tailings Disposal System - Minto Project - Phase 1. Laboratory Tailings Characterization Tests, Project 94-608	E.I Robinsky Associates Limited, Consulting Engineers	1995
Geotechnical Design Tailings/Water Dam, Minto Project, Yukon	EBA Engineering Consultants Ltd., Edmonton, Alberta, 0201-95-11509	1995
Metallurgical Test Work And Mill Design Criteria”, Minto Project, Yukon	H.L. Klingmann	1995
The Minto Project, Yukon, Feasibility Study – May 1995	H.L. Klingmann & J.S. Proc, Vancouver, BC	1995
Minto Project, Initial Environmental Evaluation, Supporting Volume IV, Environmental Mitigation and Impact Assessment. Prepared for Minto Explorations Ltd.	Hallam Knight Piesold Ltd.	1995
Minto Project, Application for Land Use Permit YA5F045. Submitted as reference to the YWB.	Minto Explorations Ltd.	1995
Minto Explorations Ltd., Minto Project, Proposed Designs for Big Creek Crossing, Minto Creek Crossing, Yukon River Barge Landings	N.A. Jacobsen, P. Eng., Civil Engineering Consultant, Whitehorse, Yukon.	1995
Minto Explorations Ltd., Access Road Design Report	Yukon Engineering Services, Whitehorse, Yukon	1995
Evaluation of Grinding Testwork for the Minto Deposit and Recommendations for Grinding Equipment Sizing at 1,500 stpd,	Fluor Daniel Wright Ltd.	1995
Environmental Assessment Screening Report and Project Summary: Land Use Permit Application <u>YA5F045</u> and Water Licence Application <u>MS95-013</u> .	Department of Indian Affairs & Northern Development (DIAND) and YWB	1996
Minto Waste Rock Stability Evaluation. EBA File 0201-96-11509	EBA Engineering Consultants Ltd.	1996

Report Title / Topic	Author	Date
Environmental Assessment Screening Report and Project Summary: Land Use Permit Application YA5F045 and Water Licence Application MS95-013.	DIAND and Yukon Territory Water Board,	1997
Environmental Assessment Screening Report: Minto Explorations Ltd. Minto Property. Whitehorse, Yukon Territory.	DIAND and Regional Environment Review Committee	1997
Revised Preliminary Dam Design, Minto Project, YT	EBA Engineering Consultants Ltd., Edmonton, Alberta.	1997
Construction Quality Assurance Manual for Waste Dumps, Tailings/Water Dam, Mill Water Pond and Diversion Ditch, Minto Project, Yukon”, Project No. 0201-95-11509	EBA Engineering Consultants Ltd., Whitehorse, Yukon	1997
Design Brief Tailings/Water Dam, Minto Project, Yukon Project No. 0201-95-11509	EBA Engineering Consultants Ltd., Whitehorse, Yukon	1997
Brief to the YWB, re. Water Licence Application <u>QZ96-006</u> Minto Explorations Ltd..	Environment Canada and Fisheries and Oceans Canada	1997
Minto Project, Application for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	1997
Review of Hydrology for Minto Project	Remi J.P. Allard Rescan Environmental Services Ltd.	1997
Geotechnical Evaluation - Proposed Main Waste Dump - Minto Project - Yukon Territory - 0201-95-11509	EBA Engineering Consultants Ltd., Edmonton, Alberta	1998
Minto Project, Geology, Ore Reserves & Mine Design	H.L. Klingmann and J.S. Proc	1998
Mill Water Pond, Minto Project	H.L. Klingmann and J.S. Proc	1998
Grout Curtain For The Tailings/Water Dam	H.L. Klingmann and J.S. Proc	1998
Minto Explorations Ltd., Minto Project, 6102-01, Design Progress At June 1998. Vancouver, B.C.	Rescan Engineering Ltd.	1998
Minto Project, Yukon Airborne Geophysics Interpretation, Geological Synthesis and Target Generation	Steffen, Robertson and Kirsten (Canada) Ltd., Bartsch, R.	1999
Cumulative Effects Assessment, Minto Project. Prepared for Minto Explorations Ltd.	Access Consulting Group	1999

Report Title / Topic	Author	Date
Construction Monitoring Report Grout Curtain for Tailings/Water Dam, Minto Project, Yukon. Prepared for Minto Explorations Ltd.	EBA Engineering Consultants Ltd.	1999
Revised Construction Specification Tailings/Water Dam Minto Project, Yukon. Prepared for Minto Explorations Ltd.	EBA Engineering Consultants Ltd.	1999
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	1999
Minto Project, Yukon Airborne Geophysics Interpretation, Geological Synthesis and Target Generation	Steffen, Robertson and Kirsten (Canada) Ltd., Bartsch	1999
Minto Optimisation Study: SAG Milling Throughput Studies for a Two-Stage Grinding Circuit,	Fluor Daniel Wright Ltd.	1999
Minto Project, Yukon – Site Inspection & Compilation of Environmental Information. Prepared for DIAND, Renewable Resources Waste Management Program.	Access Consulting Group	2000
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2000
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2001
Minto Project, Decommissioning and Reclamation Plan.	Minto Explorations Ltd.	2001
Metallurgical Test Work & Mill Design	Minto Explorations Ltd.	2001
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2002
Minto Project Summary	Minto Explorations Ltd.	2003
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2003
Minto Project, Yukon. Care and Maintenance & Interim Closure Plan. Prepared for Minto Explorations Ltd.	Access Consulting Group	2003
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2004

Report Title / Topic	Author	Date
Early Jurassic porphyry (?) copper (-gold) deposits at Minto and Williams Creek, Carmacks Copper Belt, western Yukon. In Yukon Exploration and Geology 2003	Tafti, R. and Mortensen, J.K.	2004
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2005
Technical Report on the Minto Project, for Sherwood Mining Corporation, July 15, 2005.	Orequest Consultants, Cavey, G., Gunning, D. LeBel, J.L., and Giroux Consultants Ltd., Giroux, G.	2005
Technical Report on the Carmacks Copper Project, Whitehorse Mining District, Yukon Territory for Western Copper Corp.	Cavey G., Gunning D., Clegg J.	2006
Report on the Geological Exploration Programs, Results and Perspectives, STU Claims, Hoochekoo Creek Area, Whitehorse Mining District. Internal Minto Explorations report.	Rus, John	2006
An Assessment of Metallurgical Response - Global & Variability Composites"	G&T Metallurgical	2006
Minto Project: Updated Projections of Mill Throughput with One Additional Ball Mill (ex. Asarco Silverbell),	DJB Consultants, Inc., (June 2005) with Addendum (June, 2006)	2006
Geotechnical Design Ice-Rich Overburden Dump Minto Mine, Minto, YT	EBA Engineering Consultants Ltd.	2006
Minto Project, Annual Report for Water Licence QZ96-006. Submitted to the YWB.	Minto Explorations Ltd.	2006
Minto Geotechnical (Open Pit) Feasibility Study. EBA File: 1200173.	EBA Engineering Consultants Ltd.	2006
Detailed Feasibility Study for the Minto Project	Minto Explorations Ltd.	2006
Phase I Water Treatment Contingency Plan	Access Consulting Group	2006
Minto Mine Flow Monitoring Plan	Access Consulting Group	2006

1.3 STATUTORY AND REGULATORY RESPONSIBILITIES

1.3.1. *Government Environmental Assessment and Permitting Regime*

Several agencies are involved in reviewing, assessing, authorizing and monitoring mining projects in the Yukon. Through the licences previously mentioned, these agencies have permitted this undertaking after review of various environmental assessments and screenings completed for the project. Included in the information assessed was a conceptual closure plan, but both the Water Use Licence and the Quartz Mining Licence require submission of closure plans. This Plan was developed to meet these regulatory requirements.

The Company has taken a proactive approach towards its regulatory responsibilities by meeting with various government regulatory agencies, boards, and local First Nations. Periodic meetings are held to provide project updates. A similar approach is planned for implementation of the Plan.

Prior to implementing the closure measures described in this Plan, meetings will be held with the SFN and the local community to ensure that First Nations and community interests and concerns are addressed and included in the closure planning of the Minto mine. Also prior to plan implementation, the YG, Water Resources Division and Mining Land Use Divisions will be informed of the Company's intentions to implement the Plan. Meetings will also be held with Environment Canada, Environmental Protection, Department of Fisheries and Oceans, Environmental Health, and Government of Yukon departments of Environment and Occupational Health and Safety to apprise regulators of planned site activities. These meetings will ensure that regulatory agencies' concerns with closure implementation are met.

1.3.2. *Initial Project Assessment and Licensing*

Minto has completed extensive environmental and permitting work for the Minto Project. In December 1994, a four volume Initial Environmental Evaluation (IEE) was submitted under EARPGO to DIAND for review. The IEE prepared by Hallam Knight Piesold, encompassed:

- Volume I – Development Plan providing a general overview of the Minto Project;
- Volume II – Environmental Setting which described the local environmental conditions and studies undertaken at the site since the 1970's;

- Volume III – Socio-Economic Description and Impact Assessment describing socio-economic conditions and archaeological evaluation and impact assessment for the Minto Project; and
- Volume IV of the IEE – Environmental Mitigation and Impact Assessment was submitted in May 1995 and summarized the results of overburden and waste characterization studies.

The assessment indicated no acid generation potential as tailings solids and effluent test work indicated very low levels of metals present and showed solids that were strongly acid consuming. Subsequent correspondence and information was exchanged with DIAND regulators to address issues raised during the review. Public consultation was carried out with interested members of the public, stakeholder groups and First Nations. DIAND issued an EARPGO screening report decision on April 7, 1997, indicating that potentially adverse environmental effects that may be caused by the project are mitigable using known technology and that the project could proceed.

Type A Water Use License

In February 1997, MintoEx submitted a Type A Water Use Licence application (QZ96-006). The YWB convened a public hearing into the application in May 1997 and after deliberations by the YWB, the Type A Water Use Licence was subsequently issued in April 1998. The Type A Licence was supported by the SFN and contained typical licence terms and conditions to ensure that mitigation measures identified during the environmental assessment are implemented. The licence expiry date for the Type A Water Use Licence was June 30, 2006.

Type B Water Use Licence

A Type B Water Use Licence application was filed with the YWB in August 1995 for construction of the Yukon River barge landing sites, the Big Creek Bridge and Minto Creek road culvert installations. In October, 1995 a land use and quarry permit application for the access road construction were filed with DIAND Land Resources. An integrated CEAA screening of the Type B and land use applications was completed and a positive determination was made in August 1996. Type B Water Use Licence MS95-013 and Land and Quarry Permit YA5F045

were issued in August 1996 and the initial 16 km of the Minto project access road, barge landings and Big Creek Bridge were installed in September and October 1996.

Yukon Quartz Mining Production Licence

In 1999, the YQMA was amended and section 139 of the YQMA required that all development and production activities related to quartz mining in the Yukon be carried out in accordance with a licence issued by the Minister. In June 1999, Minto filed an application with DIAND Minerals for a Yukon Quartz Mining Production Licence, which included a cumulative effects assessment for the project to ensure that the provisions of CEAA were met. DIAND issued Yukon Quartz Mining Production Licence QLM-9902 in October 1999 with a licence expiry date of June 30, 2006.

1.3.3. Existing Permits and Licences

As the Type A Water Use Licence (QZ96-006), Type B Water Use Licence (MS95-013) and Yukon Quartz Mining Licence (QLM-9902) were set to expiry in June 2006 and in recognition of the changing nature of the environmental assessment regime in Yukon, licence amendment applications were filed with the YWB and YG Department of EMR in October 2004.

The YWB completed a YEAA screening of the Type B application and subsequently issued the amended Type B Water Use Licence (MS04-227) in February 2005. YG Development Assessment Branch completed a YEAA screening of the Type A Water Use Licence and Yukon Quartz Mining Licence using the previous EARPGO screening and issued their screening report in March 2005. The YWB issued the amended Type A Water Use Licence (QZ04-064) in September 2005 and YG Energy Mines and Resources (“EMR”) issued amendments to the Yukon Quartz Mining Licence QLM-0001, Amendment No. 05-001 in December 2005 and Amendment No. 05-002 to change the mill rate to 2,500 t/day in October 2006.

Generally, the amended licences contain similar terms and conditions as the original licences and are typical of other Yukon mining licences. All of the above noted licences have an expiry date of June 30, 2016.

In addition, the Federal MMER (Metal Mining Effluent Regulations) under the Fisheries Act currently applies to the Minto mine. This regulation is a law of general application and the requirements of this legislation will be the responsibility of the company. Generally, the Type A Water Use Licence is considered more restrictive than the MMER, however separate reporting for effluent discharge and receiving water monitoring is required by the Federal Department of Environment Canada.

1.3.4. *Remaining Permitting Schedule*

The existing licences have terms and conditions that require the company to submit plans, undertake monitoring and report on site activities. MintoEx has submitted necessary plans and annual reports and has undertaken monitoring in accordance with various licence conditions. These include submission of existing engineering plans for the main water dam and a Construction Quality Assurance Manual and a Spill Contingency Plan. Recently submitted plans include the Waste Rock Dump and Overburden Dump Design Plans, Flow Monitoring Plan and Water Treatment Contingency Plan (see Table 1-1.) Monthly and annual reporting is ongoing in accordance with licence conditions.

Upon final decommissioning and reclamation, the Company will apply for a closure certificate under the YQMA legislation at the conclusion of the implementation of the final closure measures to seek government approval of conditions at the site.

Various other agencies grant the permits necessary to develop, operate and close a project of this nature. As part of implementing the Plan, the Company would ensure that the various other licences and/or permits that are required for undertaking various closure measures are secured and followed.

1.4 DOCUMENT ORGANIZATION

Section 1 of this document introduces the philosophy and scope for the decommissioning and reclamation plan for the site and the Company's corporate background. Information is provided on the property and its history and a discussion of regulatory responsibilities regarding closure.

Section 2 provides a project description, including a brief overview of the current status of the Minto mine and the Company's plans for eventual mine opening.

Section 3 provides a brief summary of the environmental setting for the mine.

Section 4 presents the reclamation strategy for the project, including reclamation objectives and reclamation research planning. The research will focus primarily on revegetation efforts and success.

Section 5 outlines the details of the Company's decommissioning and closure plan, and the activities to be followed at closure. The information is presented in a format that briefly describes the mine "reclamation component" and then presents closure issues in the context of physical and chemical stability. Closure measures are then presented in detail and in summary form as the basis for the closure cost estimates.

Section 6 presents the implementation schedule for the plan.

Section 7 deals with post closure site management plans and activities. This section presents the environmental management measures proposed for the decommissioning and post closure period, and proposes temporary closure issues and measures.

Section 8 provides an updated cost estimate for implementing the closure plan at different times during the life of mine.

Section 9 provides the document closure and signatures.

Section 10 provides report references.

1.5 ACKNOWLEDGEMENTS

This report benefited from input by the following companies:

Minto Explorations Ltd. – Bill Dunn provided overall direction for the Project as well as the corporate policy framework and senior technical review of the proposed closure measures.

Access Mining Consultants Ltd. – Responsible for overall project management, document preparation and coordination.

Selkirk First Nation – Provided input into the development of closure scenarios based on current and potential future use of the project area.

EBA Engineering Consultants Ltd. - Provided base data for conceptual design drawings and contributed to the technical review of closure design elements and cost estimates.

JDS Mining and Energy, Ltd. – Provided technical review of closure measure planning and associated cost estimates.

2.0 PROJECT DESCRIPTION

2.1 PROJECT BACKGROUND AND LOCATION

The Minto Project is a copper-gold-silver project located on the west side of the Yukon River approximately 75 km (47 miles) north-northwest of Carmacks, Yukon Territory. The mine site and access road lie within the traditional territory of the SFN and comprises part of land claim settlement parcels R-6A, R-44A (Type A settlement lands) and R-40B. The Company concluded a comprehensive cooperation agreement with the SFN on September 16, 1997. This agreement is still in effect.

The Minto Property is centered at approximately 62°37'N latitude and 137°15'W longitude (NAD 83, UTM Zone 8 coordinates 6945000N, 384000E). The Minto Project consists of 284 claims. There are 120 pending quartz claims, 99 quartz claims and 65 quartz claims under lease. The 100% registered owner of the claims and leases is MintoEx. The quartz claims are in good standing until 2007/03/01 while the DEF leases are valid until 2007/10/07 and the Minto leases are valid until 2018/05/13.

Copper deposits were first discovered in 1970 and claims were staked in 1971. Extensive exploration yielded the first significant drill intersection in July of 1973. The Minto and DEF claims and leases cover an area of approximately 10 square miles. Mineable reserves for the deposit, above a cut-off grade of 0.50% copper, consist of 8,510,000 tonnes at grades of 1.81% copper, 0.57 g/t gold and 7.57 g/t silver. Current project design parameters are based upon 8,850,800 t at grades of 1.68% copper, 0.60 g/t gold and 6.9 g/t silver.

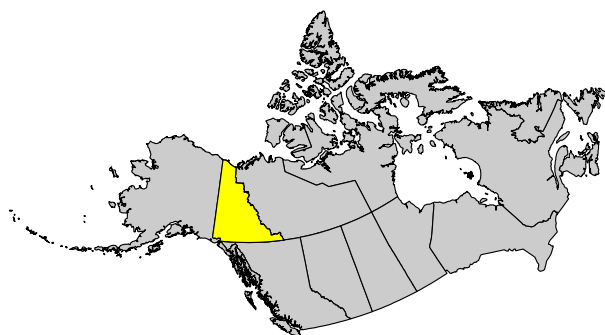
The ore deposits are to be mined using conventional open pit truck and loader operations and processed in a mill plant on site. The plant will initially process 1,563 tpd (metric tons per day) of ore in year 1 defined as Phase 1. In year 2, the plant throughput increases to 2,400 tpd of ore for the rest of the mine life, defined as Phase 2. Tailings will be thickened and vacuum filtered into a 'cake' and deposited on a bench to the south (upslope) of Minto Creek, and precipitation and surface water will collect in the main water storage pond.

A total complement of 110 employees will be required once the mine is in full production. A camp to accommodate 54 persons was constructed in 1998, and was expanded to its present

capacity of 140 persons in the summer of 2006. The camp is presently at full capacity with the mine construction management, contractors and support staff.

The property is accessible by crossing the Yukon River at Minto Landing. Barge landings have been constructed for ice-free crossing and an ice bridge is used upon freeze-up of the Yukon River.

Figure 2-1 and Figure 2-2 present visual depictions of the general project location with in the Yukon and the project area overview.



**SHERWOOD
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Minto Explorations Ltd.



Minto Mine Project

Detailed Decommissioning Reclamation Plan

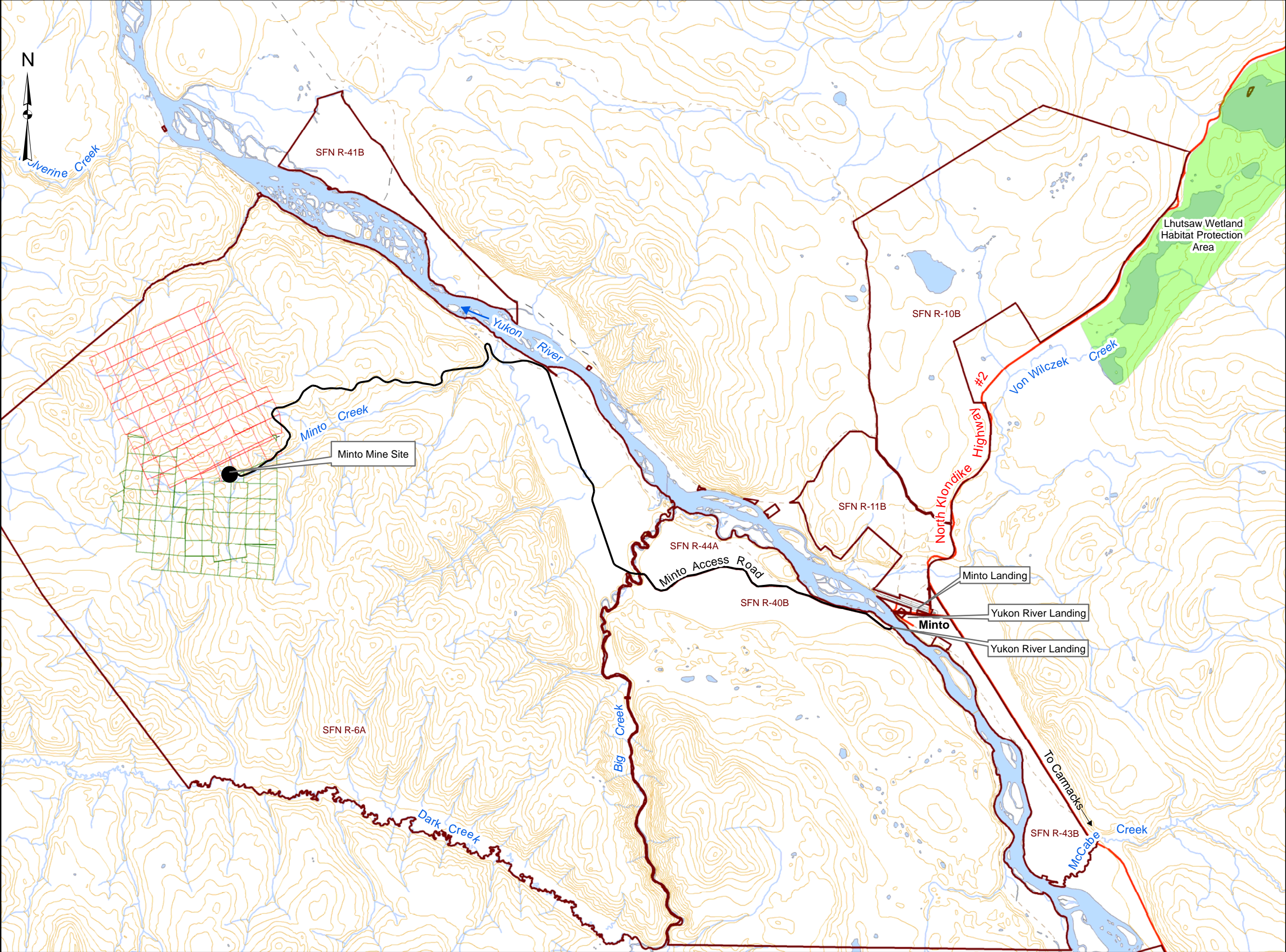
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Figure 2-1

Checked By: RM

Date: Sept. 2006

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**Minto Mine
Project**

**Detailed
Decommissioning
Reclamation Plan**



Legend

- Minto Mine Site
- Contour (100' interval)
- - - Limited used road
- Road
- Access Road
- - - Proposed Access Road Extension
- - - Trail
- Watercourse
- Minto Claim - DEF
- Minto Claim - MINTO
- Waterbody
- Habitat Protection Area
- First Nation Settlement Land

Projection: UTM Zone 8 NAD83
Units: Meters
NTS Sheet 115 I/10 and 115 I/11

Figure 2-2

Project Area Overview

Scale:
1:100,000
0 0.5 1 2 3 4 km



Drawn by: HD | Checked by: SK
Date: September 2006

Preliminary site development was initiated at the property in 1996. Construction activities at the site can be summarized as follows:

1996 Construction - The initial 16 km of access road and a barge landing on the west side of the Yukon River and the bridge across Big Creek were constructed.

1997 Construction - The remaining 12.8 km of access road were constructed with only final grading and minor clean-up to be done after the 1998 spring break-up.

The site for the permanent camp was excavated. A water well to supply domestic water for the camp was drilled to a depth of 72 m, tested and equipped. A set of septic tanks was installed and a leach field was constructed. A camp services unit built in Whitehorse during the winter months was moved to site. This unit includes a water purification system, water storage for both fire protection and for domestic purposes and has provision for housing a generator for emergency power generation.

The mill site was excavated and various roads on site and the pit perimeter road for the first phase of mining were constructed.

Two used grinding mills were purchased in the United States, dismantled and shipped to the Yukon and across the Yukon River.

1998 Construction - The mill footings were constructed. A total of 1,688 m³ of concrete was placed over a period of eight weeks.

The Company purchased a used, eight-unit, 42-man bunkhouse and a new, seven-unit kitchen/diner/change house complex. These units were erected on site and all services such as sewage disposal, potable water supply and power distribution were installed.

Final grading, minor cleanup and reclamation were done along the 28.8 km long access road. The road was in excellent condition and approximately sixty loads of freight were hauled to site during the three months of construction.

A grout curtain, designed to control seepage through the foundation of the tailings/water dam, was completed.

1999 Construction - A short construction program was completed in September 1999. The two grinding mills were moved to site, mill components were cleaned, sandblasted and painted and the two mills were assembled. Svedala Canada Inc. completed a detailed inspection of the mills and submitted a proposal for the final installation of the mills.

2000 Construction - The Company completed work on the camp in September 2000 and additional engineering work is ongoing.

2001 Construction - Road maintenance and repair work was done along the access road in the vicinity of Big Creek as per a recommendation by BK Hydrology Service, which was submitted to the YWB on January 8, 2001.

2002 Construction - Further repair and preventative maintenance completed on access road near Big Creek. Tension cracks in the mill pad were repaired and the mill floor sumps were pumped. Eroded fill near the camp septic system was replaced and camp was winterized and maintained. Road signs were repaired and replaced.

2003 Construction - Regular inspection and maintenance conducted.

2004 Construction - Regular inspection and maintenance conducted.

2005 Construction - In July 2005, fill was added to the east bank of the Yukon River barge landing. In July and August 2005 the Minto camp was retrofitted and re-opened so that workers could be accommodated at the site, in support of MintoEx exploration programs.

Two diesel fuel tanks (capacities 9,150 L and 50,000 L) were installed at the Minto Property in the summer of 2005. All tanks are double walled enviro tanks.

2005 Exploration - In September 2005, approximately 5 km of access roads were rehabilitated and approximately 2.5 km of trails were constructed to support the drill programs. Diesel and propane were hauled to the site to support the drill programs.

2006 Construction - In February and March 2006 equipment was mobilized to the Minto property and assembled in anticipation of the upcoming construction season. Another 400,000

L of double walled envirotank diesel storage capacity was added to the site. Snow clearing and site grubbing activities occurred during the month of March. Work was done on the construction camp and access road, and on sediment control structures in Minto creek in April and May in anticipation of construction activities during spring freshet.

The summer of 2006 saw pre-stripping and civil construction activities. This included the construction and upgrading of site haul and access roads, the expansion of the mill pad and construction of the mill water pond, the excavation and construction of a fuel storage pad, the expansion of the camp and the installation of a new septic field, and the excavation of the starter pit and the construction of the toe berms for the main waste rock dump and the ice-rich overburden dump. The sulphide ore storage pad and the explosives plant sites were also cleared/constructed.

The construction of the main water dam on Minto Creek began in July, and is presently nearing completion. Construction activities related to the mill and concentrate storage shed, as well as the tailings handling facility and infrastructure, have begun and are scheduled for completion in the spring of 2007 for the commencement of milling activities.

Table 2-1 provides an overview of the project area and environmental setting information for the study area. This table provides physical Project location information, geographic reference, access route, watershed drainage, special designations, and key environmental features within the study area. The information has been extracted from a number of documents, including previous CEAA and YEAA screenings, which are all summarized in Table 1-1.

Table 2-1 Project Area Overview and Environmental Setting

Project Area Attribute	Description
Region:	Yukon
Topographic Map Sheet:	NTS 115 I/10, 115 I/11
Geographic Location Name Code:	Minto Project
Latitude:	62° 36' N
Longitude:	137° 15' W
Drainage Region:	Yukon River
Watersheds:	Yukon River, Big Creek, Wolverine Creek, Dark Creek, and Minto Creek.
Nearest Community:	Pelly Crossing, Yukon, approx. 33 km north on Klondike Highway.
Access:	Klondike Highway, Barge crossing on Yukon River at Minto Landing, Minto mine access road. Airstrip on site.
Traditional Territory:	Northern Tutchone, Selkirk First Nation peoples. Traditional use for hunting, trapping and fishing.
Surrounding Land Status:	Selkirk First Nation Settlement Lands and Federal Crown Land.
Special Designations:	Lhutsaw Wetland Habitat Protection Area located approx. 17 km NE of Minto Landing (outside the project area).
Ecoregion:	Yukon Plateau (Central) - Pelly River Ecoregion.
Study Area Elevation:	Rolling hills above mine site at 1131 metres to 600 metres at the Yukon River Valley bottom.
Site Climate:	Temp. ranges from -30.9°C (Jan. 1994) to 12.1°C (July.1994). Mean annual temp. of -7.3°C. Mean annual precipitation is 378mm.
Vegetation Communities:	Riparian, black spruce, white spruce, paper birch, lodgepole pine, buck brush/willow and ericaceous shrubs, feathermoss, sedge, sagewort grassland, mixed, aspen, balsam, and sub-alpine. Discontinuous permafrost is present on site. Site has been subject to recent forest fires.
Wildlife Species:	Moose, caribou, Dall sheep, mule deer, grizzly and black bear, varying hare, beaver, lynx, marten, ermine, deer mouse, fox, mink, wolverine, least weasel, wolf, squirrel, porcupine coyote, muskrat, otter and wood frog. Bird species include: spruce, blue, ruffed, and sharptail grouse, waterfowl, raptors, and a variety of smaller birds.
Fish Species:	In the Yukon River, chinook, coho, and chum salmon, rainbow trout, lake trout, least cisco, bering cisco, round whitefish, lake whitefish, inconnu, arctic grayling, northern pike, burbot, longnose sucker and slimy sculpin; In Big Creek, Chinook and chum salmon, arctic grayling and whitefish species; In Wolverine Creek, chinook salmon, arctic grayling, and slimy sculpins; In Minto Creek and project area watershed (lower reaches only), slimy sculpin, round whitefish, arctic grayling.
Known Heritage Resources:	East side of Yukon River in the vicinity of Minto Landing four historic sites designated KdVc-2 (Minto landing), KdVc-3 (Minto Resort), KdVc-4 (Old Tom's Cabin), and KdVD-1 (Minto Creek).

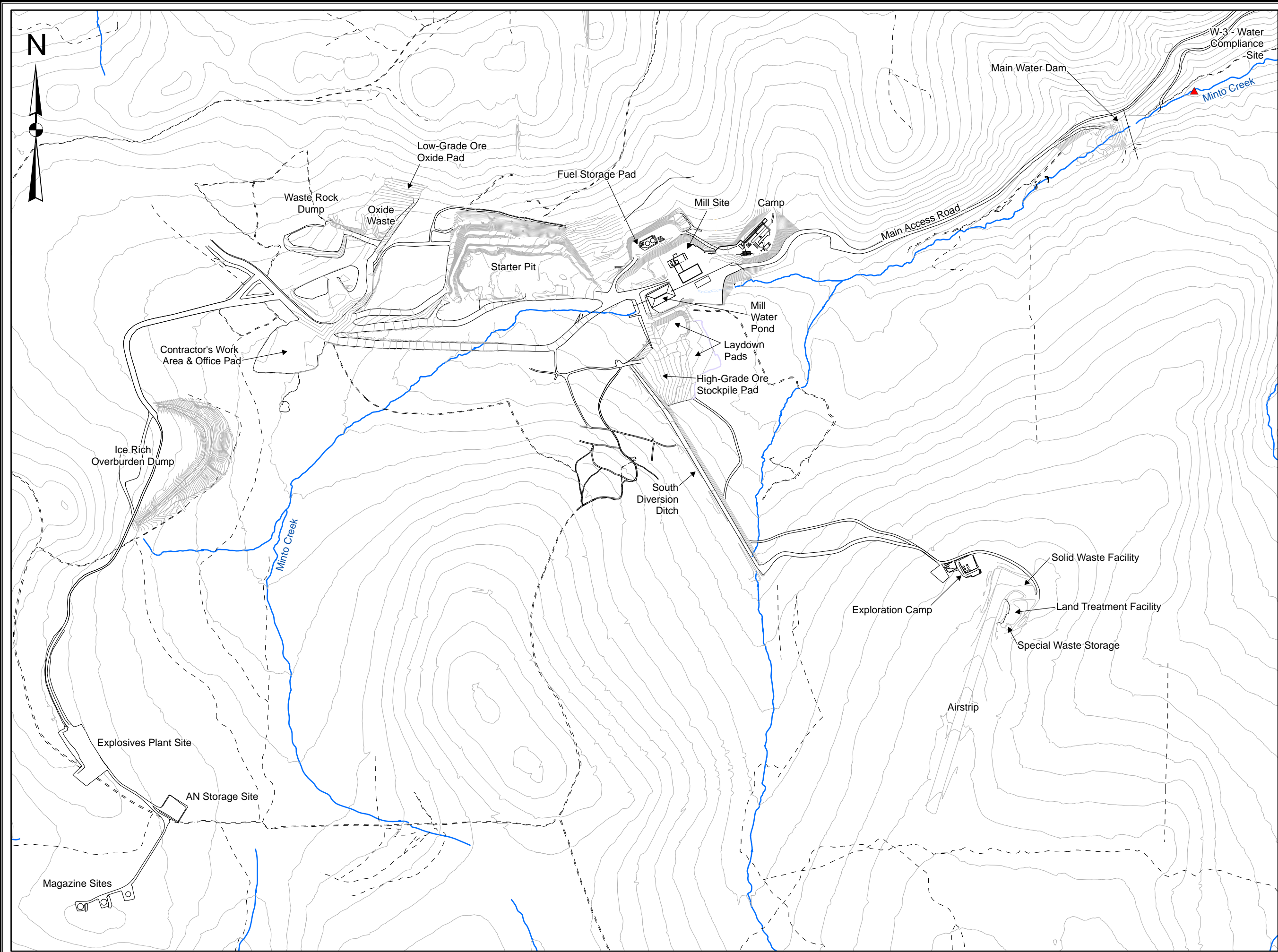
Note: Information summary drawn from various sources, including several Minto project reports and the CEAA screening report.

2.2 CURRENT STATUS

The Minto mine is currently under full construction, with the Startup Date for milling activities scheduled for the second quarter of 2007. Prior to 2005, the site had seen only minor development, and was in a state of interim closure and was under the care of the Company and a part-time caretaker. The caretaker provided security for the site, conducted periodic checks of the mill and the general area, mine camp, as well as documenting site maintenance requirements. Annual maintenance is conducted on the access road and camp to facilitate planned start-up. Details of the current state of all facilities are provided in later sections of this report.

Water quality monitoring, as required by Water Licence QZ96-006, was conducted on an annual basis until 2004, and on the company's initiative was conducted on a monthly basis during the open season of 2005, and on a daily basis by Access Consulting Group during spring freshet of 2006 (April-June). Combined, this sampling has ensured that adequate baseline data has been compiled prior to formal operational start-up.

Figure 2-3 presents an overview of current site conditions.



Minto Mine Project

Detailed
Decommissioning
Reclamation Plan



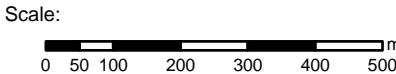
Legend

- Access Road
- Exploration Road
- Contour
- Water Course

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 1051/11
Basedata obtained from Yukon Engineering Services
Nov3_06_status_plan.dwg

Figure 2-3

Current Site Conditions



Drawn by: HD Checked by: RM

Date: September 2006

2.3 PLANNED MINING OPERATIONS

Along with standard blast and haul open pit mining practices, a conventional crushing, grinding and flotation process plant has been proposed for the projected 7 year mine life of the Minto project, utilizing standard unit processes and equipment. The plant will initially process 1,563 tpd (metric tons per day) of ore in year 1 defined as Phase 1. In year 2, the plant throughput increases to 2,400 tpd of ore for the rest of the mine life, defined as Phase 2.

The Minto plant was designed to process 1,563 tpd of ore containing copper, gold and silver to produce a copper concentrate. In Phase 2, provisions will be made to the plant layout and design to accommodate the increased throughput. The main changes will include a new building extension to contain the second ball mill circuit, 3 additional rougher flotation cells and also the utilization of the new re-cleaner cells in the main mill building. Equipment will be sized to handle both Phase 1 and 2 tonnages. The plant will consist of the following main unit operations:

- primary crushing;
- coarse ore conveying;
- two stage grinding circuits for Phase 1;
- additional Ball Mill circuit for Phase 2;
- copper flotation;
- concentrate thickening and pumping;
- concentrate filtration;
- concentrate storage (on-site);
- tailings handling; and
- water reclaim.

The primary crushing circuit will operate 6 hours per day, 365 days per year at an availability of 75%. The mill circuit will operate 24 hours per day, 365 days per year at an availability of 90%. Availability is the scheduled and unscheduled downtime for equipment maintenance.

3.0 ENVIRONMENTAL SETTING

Table 2-1 provides a summary of the key environmental features near the project area. Note that forest fires have repeatedly swept large parts of the Minto Creek basin and surrounding areas during the past twenty years. The original information on the project area submitted in the IEE is still relevant. In addition, a detailed description of the environmental setting of the project area has been excerpted from a report prepared previously for this project on behalf of DIAND. The relevant section of that document is included here as Appendix A.

Further characterization of the site water quality, specifically of Minto Creek, is submitted to the Yukon Water Board annually in the company's Type A Water Use License reports, and will be submitted monthly beginning in November 2006 when the project transitions out of Interim Closure. Hydrology on the site was characterized and submitted under Access Consulting Group's Minto Mine Flow Monitoring Plan (2006).

4.0 RECLAMATION PLANNING

A systematic approach to decommissioning and closing reclamation is required for the Minto project. This section of the Plan provides reclamation objectives and the overall reclamation strategy for the Minto site. Also provided is information regarding planned reclamation and revegetation research programs, and details and observations on reclamation and revegetation to date. Section 5.0 then addresses specific closure measures proposed for the discrete mine components.

The Company will implement progressive reclamation measures where possible during mine construction and operations. This approach will not only provide valuable reclamation success feedback for use in advanced/final closure, but progressive reclamation will reduce final reclamation liability and costs and shorten the overall reclamation implementation schedule. These progressive efforts will also help reduce slope erosion through physical slope stabilization of revegetation efforts, enhancing ultimate reclamation success.

4.1 RECLAMATION OBJECTIVES

The primary objectives of land reclamation and revegetation at the Minto mine site include:

- undertaking mining planning to incorporate progressive reclamation;
- providing short and long term slope stabilization and erosion control on linear and non-linear disturbances;
- ensuring the long-term chemical stability of residual mining components and their effects on water quality draining the property;
- ensuring the long-term physical stability of key structures such as the waste dumps and the diversion and drainage ditches; and
- working towards a walk-away closure scenario for most or all mine components.

The overall goal of closure at the Minto site is to leave the area as a self-supporting ecosystem, ensuring that land use after closure is compatible with the surrounding lands, and that the site vegetation returns to a state as near as possible to that in existence prior to mining activities.

These closure objectives are reflective of the closure objectives laid out for the licensee to achieve in Schedule B of the Quartz Mining License QML-0001 “*Terrestrial Reclamation*

Standards for the Minto Mine". These standards were derived from the YG's's Reclamation and Closure Policy, the development of which saw contribution from all Yukon First Nations.

MEL is committed to refining the closure objectives for the site and surrounding land with SFN. Prior to the first review of this document, scheduled for two (2) years after startup, MEL will work with the appropriate SFN representatives to review these objectives in the context of SFN's traditional and expected future land use, and to refine them to ensure that the closure activities will achieve the expected results in the long term. These discussions will include further community presentations of the closure objectives and measures aimed at soliciting SFN citizen input into the priorities for the land reclamation, and will be refined with SFN leadership to ensure consensus regarding the closure objectives.

4.2 RECLAMATION TO DATE

Reclamation of disturbed areas along the access road and at Big Creek in the vicinity of the Big Creek Bridge was completed between May 6 and May 10, 2000. This reclamation has been successful when compared against the reclamation objectives, as noted in previous annual reports for the Type B Water Use License, submitted by the company. Revegetation and fertilizer mixtures for this effort are known and the seeded areas are monitored for revegetation success. This information will be used to assist with planned progressive reclamation measures, reclamation research and measures for final closure.

Overall reclamation is therefore expected to be successful with seeding and natural re-vegetation complimenting each other.

4.3 NATURAL REVEGETATION

The project area was first disturbed by the construction of trails and trenching which was done as part of exploration programs on the property from 1971 to 1976. Natural re-vegetation has been effective in largely covering these disturbed areas in the 35 years since the area was first disturbed. For example, prior to construction activities in 2006, the airstrip was almost completely revegetated and required extensive clearing in preparation of re-commissioning. Other areas that have seen significant natural revegetation on the site (some of which are now re-disturbed by current construction activities) include areas adjacent to the water dam centerline, old borrow sources and the cleared right-of-way of the main access road.

The primary colonizing plant species now found around the mine site are willows and graminoids. The extent of recolonization at each location is dependent on local conditions, including soil conditions (type and moisture content) and aspect. Generally, revegetation is occurring more extensively next to undisturbed areas and on linear disturbances.

4.4 RECLAMATION RESEARCH

An important component of the reclamation planning process will be ongoing reclamation research with the objective of developing the methods required to implement a successful reclamation program. Reclamation research will focus primarily on the revegetation aspect of reclamation, as the success of this element of a reclamation plan is closely linked to site specific conditions such as soil characteristics, climatic variables and existing vegetation populations. Other aspects of minesite reclamation including recontouring and erosion stabilization techniques are well established and are less reliant upon site-specific research for success.

The reclamation research will build on the information obtained during the baseline studies program. Indigenous species of plants were catalogued and soils were characterized. These conditions are documented in the IEE, and are summarized in the attached excerpt in Appendix A.

It will also be important to further document natural re-vegetation successes as described in section 4.3. Information developed on site can be supplemented with information obtained from other mine reclamation programs in the Yukon and other northern jurisdictions. Considerable research has been carried out into the reclamation and revegetation of disturbed lands in the Yukon, including operating and abandoned mines, and mineral exploration sites. Much of this information is in the public domain and is well presented in the guidance document *Mine Reclamation in Northwest Territories and Yukon* (INAC, 1992.)

The true benefits of reclamation research will be realized if the information obtained and knowledge gained is incorporated into larger scale reclamation projects as quickly as possible.

4.4.1. *Growth Media*

The natural vegetation found on undisturbed sites around the mine generally indicate the underlying soil properties, including texture, drainage, and pH, and the level of available nutrients.

A program of sampling and analysis of soils in the project area was done in 1994 as described in the environmental assessment, which provides the basic information required for reclamation planning. Additional soil sampling on disturbed sites will be completed in order to determine areas of localized nutrient deficiencies. Soils in the upper Minto Creek basin support growth but soil cover is relatively thin and not enough surface soils can be stockpiled to cover all disturbed areas for closing reclamation.

Plants require, as a minimum, a medium that will allow roots to penetrate, that will retain adequate moisture and that contains levels of nutrients for successful growth. It will therefore be important to determine the characteristics of the overburden from the southern portion of the open pit as this overburden will be the only material readily available to cover the waste rock dumps, the thickened tailings and possibly other areas and thus provide a growth medium.

Diamond drilling done in the 1970's indicated that the ore body is covered by up to 60 m of overburden to the south in an area where permafrost is expected to depths of 18 m. This overburden consists of silt and fine sand with varying amounts of organic material and occasional layers of peat and gravel. The thickness of overburden required to retain moisture is expected to be 25 cm (0.25 m). This will be confirmed by trial, as the depth of growth media placed will be varied and soil moisture measurements compared with revegetation success on the various plots will suggest an optimum depth of overburden placement for revegetation measures.

4.4.2. *Revegetation Trials*

Key to long term reclamation success is site-specific revegetation research. In order to establish a successful revegetation program, the Company will initiate a methodical program to assess and provide:

- a) a further inventory of available soils around the site (particularly the overburden material) and their physical characteristics;
- b) the nutrients in the available soils - while fertilizers will likely be necessary to encourage quick initial establishment of healthy growth, the plant mixtures used must be capable of sustaining long term growth without the aid of artificial fertilizers;
- c) practical seed mixes - while it is known what seed types have been used at the site previously and what types of plants have been naturally revegetating the site, further reviews and investigations are necessary to confirm the appropriate seed mixes that should be used. The ultimate seed mixtures will be developed using:
 - knowledge of the naturally occurring vegetation and soil conditions;
 - an inventory of naturally occurring seed sources on site;
 - results from revegetation activities to date;
 - existing literature on regional revegetation science; and
 - information gained from revegetation test plot trials on site.
- d) the effect of slope and aspect on revegetation success, and if necessary the subsequent effect of erosion control measures; and
- e) the potential for metals uptake by the plants on the growth media over the tailings - different plant varieties and species, tailings characteristics, cover designs and other environmental conditions are all factors influencing uptake of metals by plant tissues. Sampling of plant tissues from the tailings test plots will be conducted to assist in designing the revegetation program, and existing literature and research regarding plant metal uptake and foraging patterns will be incorporated into the seed mix design.

Different seed mixes will be grown on test plots to develop optimum seed compositions. Initial recommended seed mixes have been developed (see Table 4.4-1 for the seed mixes proposed for specific disturbances.) Results from the test plot trials will also confirm:

- optimum seeding times;
- optimum growth media (overburden) covering depth;

- utility of techniques such as snow seeding;
- fertilizer requirements to amend nutrient content of the overburden; and
- utility of soil amendments such as lime, wood fibre or mulches.

Test plots are typically small and optimum conditions may apply. The information obtained from test plots will therefore be applied in further reclamation trials to areas 1 ha or larger in size. Overburden will be hauled by truck to the selected sites and will be spread with a dozer or grader. Successes and failures will provide valuable information on alternative approaches to closing reclamation.

The establishment of an initial ground cover of graminoids has historically been viewed as a desirable objective on most disturbed areas to stabilize slopes and control soil erosion. Graminoids are all grasses and grass-like plants, including sedges and rushes. Reclamation and revegetation efforts on site will ensure that this objective is achieved; however, the establishment of existing or natural vegetative communities and species is also another desirable objective. Based on recent reclamation research, it is noted that there is typically an abundance of natural seed or reproductive seed material available from local surroundings, and that these naturally occurring seed sources should be considered as part of any reclamation programs (Craig, et al., 1998).

Evidence indicates that revegetation by the seeding of sod-forming grass species will inhibit the invasion of the area's natural colonizing species by competing for space, light, nutrients, sunlight and moisture (Craig, et al., 1998). Seeding predominantly with native species should aid in ensuring that the later successional stages of vegetative cover appear. The creation of shrub willow islands can also enhance natural succession.

The nutrient uptake by northern native seed varieties on nutrient deficient soil is usually more effective than nutrient uptake by southern agronomic species. Seeding with agronomic species at the Minto mine site may be required because of the high cost and limited availability of northern native revegetation species.

In the larger, more open disturbed areas at the minesite (borrow areas, mill and camp site area), where natural seed sources are less available, the seeding/planting of indigenous shrub species (primarily willows, birch and alders) may be required to encourage the later seral stages of plant

succession on these sites. Shrub species would be planted concurrently with the revegetation plot trial plantings.

The initiation of progressive reclamation measures that see the covering of areas with overburden (toe berm of ice-rich overburden dump, toe of first lift of wasterock dump and toe of starter bench for tailings deposit) will provide areas of different aspect/exposure for the establishment of initial revegetation trial plots. Table 4-2 outlines the proposed trial plot locations, design and implementation and monitoring schedule for the revegetation trial program.

The successes from the trial plot program will be transferred to the progressive reclamation efforts that will provide a large-scale opportunity for refinement of reclamation and revegetation techniques and measures.

Table 4.4-1 Selected Seed Mixture for Initial Revegetation Trials

Native Species	Mix #1 Willow / Sedge kg/ha	Mix #2 Black Spruce kg/ha	Mix #3 Mixed Deciduous / Coniferous kg/ha	Mix #4 Sand / Gravel Cutslopes kg/ha
Yukon wheatgrass			2	4
Violet wheatgrass			6	6
Northern fescue			2	
Arctic lupine			2	
Yellow locoweed				1
Glaucous bluegrass			2	3
Meadow foxtail	3	5		
Tufted hairgrass	4	4		
Polargrass		1		
Bluejoint reedgrass	1	1		
Altai fescue		6		
Fowl bluegrass	8			
Sheep fescue			2	5
Showy locoweed				
Sweetgrass			1	
Total (kg/ha)	16	17	17	19

Native species may be substituted with agronomic species, however, native species are recommended and require approximately one half the weight in seed as the agronomic species (adapted from Kennedy 1993.)

Table 4-2 Revegetation test plot establishment locations and monitoring schedule

Location	Description	Proposed Plot Details	Establishment Timeline	Monitoring Timeline
Toe Berm of Ice Rich Overburden Dump	east facing aspect, ~50% slope	Control Plot (no treatment) Plots with variable seed/fertilizer rates Spring and fall plantings	Spring 2007	Anually in August Observations, soil samples
Toe of Waste Rock Dump	south facing aspect, rolled bench/slope	Control Plot (no treatment) Plots with variable seed/fertilizer rates Spring and fall plantings	Spring 2007	Anually in August Observations, soil samples
Starter Bench below Tailings Deposit	north facing aspect, ~40% slope	Control Plot (no treatment) Plots with variable seed/fertilizer rates Spring and fall plantings	Fall 2007	Anually in August Observations, soil samples
Tailings Deposit Surface	low slope (~2%)	Control Plot (no treatment) Plots with variable seed/fertilizer rates Spring and fall plantings	Spring 2008	Anually in August Observations, vegetation samples, soil samples
Typical Fill Slope	variable slopes and aspects	Control Plot (no treatment) Various slopes to determine erosion/slumping impacts Plots with variable seed/fertilizer rates Spring and fall plantings	Spring 2007	Anually in August Observations, soil samples
Borrow Area on Access Road	flat, compacted gravels	Control Plot (no treatment) Plots with variable seed/fertilizer rates Spring and fall plantings Indigenous shrub plantings	Spring 2007	Anually in August Observations, soil samples

Further planning of the test program will be conducted in the winter of 2006/07 and the program will be initiated in the spring of 2007, with the establishment and planting of test plots at the ice-rich overburden dump, waste rock dump and borrow area locations. Planting of the test plot on the tailings facility starter bench will be conducted in the fall of 2007 and the tailings surface plot will be established in the spring of 2008, after the placement of the initial lift of tailings.

Monitoring of the plots will take place annually in August by a vegetation specialist. The following parameters will be monitored at each plot during the annual inspections:

- established photo hubs will be documented photographically and growth success and species present will be documented;
- vegetation samples will be collected from the plots for ICP metals scan to assess metals uptake; and
- soil samples will be collected from plots and analyzed for ICP metals, available nutrients and general parameters such as soil pH and alkalinity.

In addition, natural revegetation success at other locations on the site will be tracked and incorporated into the final reclamation revegetation plan.

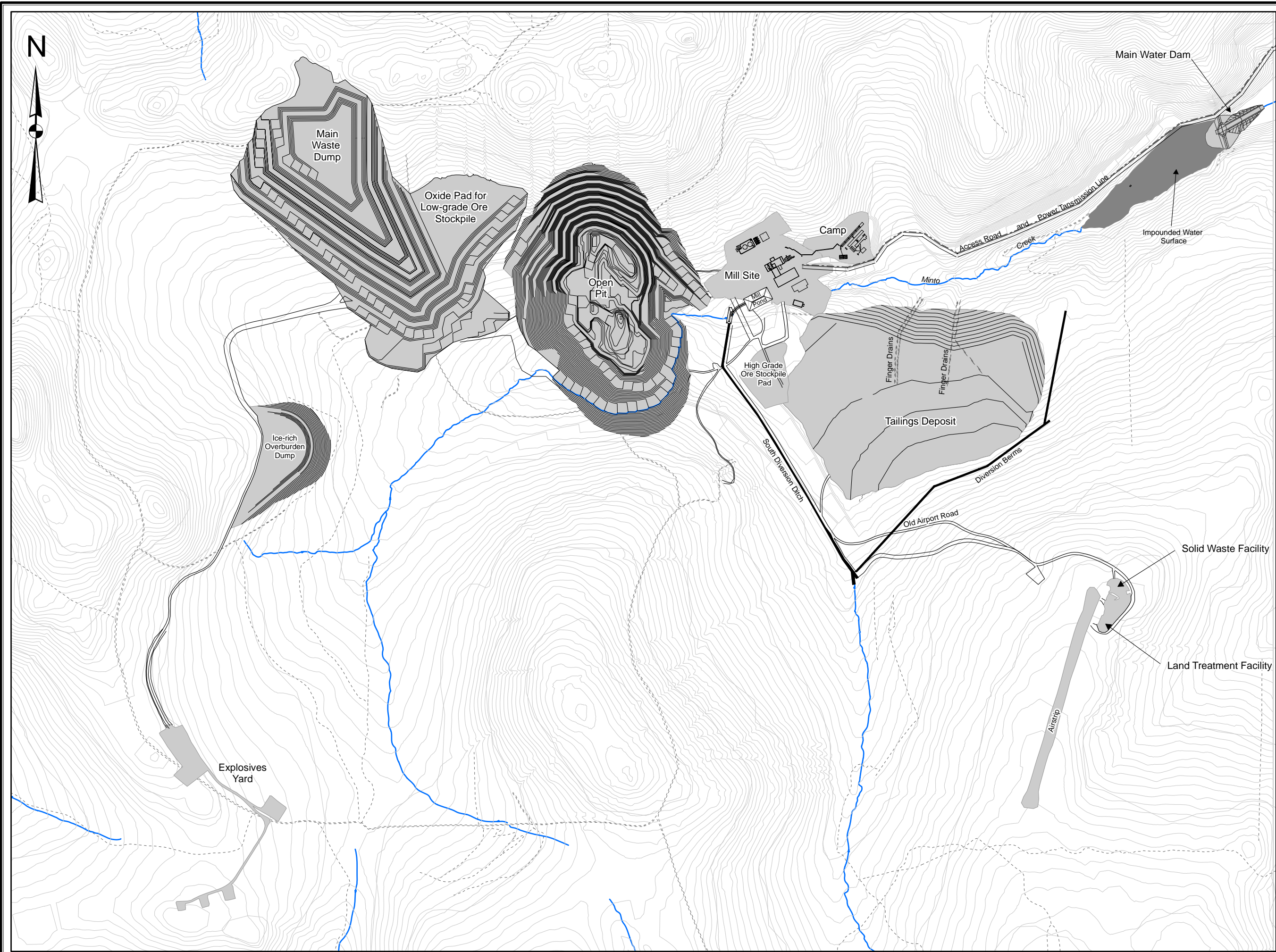
5.0 CLOSURE MEASURES FOR RECLAMATION COMPONENTS

This section presents a discussion of the closure issues and measures associated with the various components slated for reclamation (reclamation components) on the Minto property. The approach to each subsection is to present a description of each area so that readers are familiar with the existing facility and do not have to refer back to previous reports or information. Planned closure measures are then presented. Each section is supported with detailed figures and tables as required. Where needed, references are made to previous reports or supporting documentation.

Figure 2-3 provides a general arrangement plan for current conditions at the site as of September 2006, and Figure 5-1 presents the ultimate overall site plan as proposed at the end of mine life. Figure 5-2 to Figure 5-9 provide summaries of the various closure measures for features or groups of features on the general arrangement plan.

The disturbed area has been divided into reclamation components as follows:

- Waste Rock And Overburden Dumps;
- Open Pit and Haul Roads;
- Tailings Area and Diversion Structures;
- Main Water Dam;
- Mill and Ancillary Facilities;
- Mill Pond;
- Access Road; and
- Miscellaneous Components.



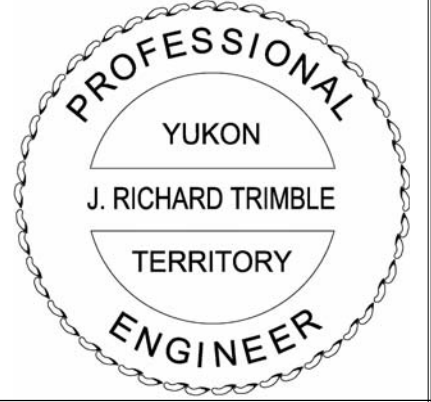
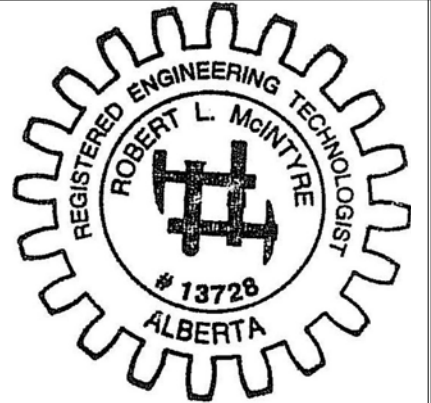
Minto Mine Project

Detailed Decommissioning and Reclamation Plan



Legend

- Access Road
- Road
- Exploration Road / Trail
- Transmission Line
- Contour
- Site Feature Profile Contour
- Water Course
- Areas of Construction



Original Drawing by HATCH
ACAD-Overall for Reclamation.dwg, Drawn by D.L.N Feb. 06
Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115/11

Figure 5-1

Ultimate Overall Site Plan

Scale: 0 100 200 400 m



Drawn by: HD/RG Checked by: RM Date: October 2006
Our File: D:\Project\AllProjects\Minto\gis\mxd\ClosurePlan\Sept06\Fig5_1_UltimateMinePlan.mxd

Table 4.4-3 provides a summary of the project area disturbance at the end of mine life. This table lists the reclamation components and sub-components, the area disturbed by each component during construction and operations, the area slated for progressive reclamation and the area requiring reclamation at final closure. Of note is that the area disturbed is the “footprint” of the disturbance, where the reclamation areas refer, where applicable, to the entire (slope compensated) surface area of the reclamation component. An example of this would be the increased surface area of the final waste rock dump compared with the actual footprint of the area disturbed.

In addition, three different closure scenarios regarding the access road are considered, and each affects the component and total reclamation areas differently, depending upon the final closure option selected. Section 5.6 discusses these scenarios and associated reclamation measures further.

In total, it is estimated that 195.1 hectares will be disturbed as a result of the mine development with 58.9 to 85.1 hectares (depending on access road closure extent) requiring reclamation at the end of mine life. Figure 5-10 provides a summary of planned closure activities for various mine components.

Table 4.4-3 Estimated Area of Disturbance – End of Mine Life (7 years)

Reclamation Component	Area Disturbed (ha)	Total Surface Area Requiring Reclamation (ha)	Area Reclaimed Progressively (ha)	Area Requiring Reclamation at Final Closure (ha)	
Overburden and Waste Rock Dumps	46.7	54.3	33.5	27.5	
Main Waste Dump	31.5	37.8	32.3	5.5	
Ice-Rich Overburden Dump	6.6	7.9	1.2	6.7	
Ore Stockpile Areas	8.6	8.6	0	8.6	
Open Pit	37.1	5	5	0	
Haul Roads	5.0	5.0	0	5.0	
Tailings Area	37.3	38.5	30.9	7.6	
Main Water Dam (including 4.7 ha impacted by impounded water)	6.0	6.0	0	6.0	
Mill and Ancillary Facilities	7.6	7.6	0	7.6	
Access Road (extent of access road reclamation to be determined with SFN)	26.2	26.2	0	Scenario 1 (No Deactivation)	0
				Scenario 2 (Deactivation From Mine Site to Minto Creek Crossing)	8.8
				Scenario 3 (Complete Access Road Deactivation)	26.2
Miscellaneous Components	29.2	5.8	0.6	5.2	
Mine Camp	2.2	2.2	0.6	1.6	
Air Strip	2.4	n/a	n/a	n/a	
Exploration Sites and Trails	21.0	n/a	n/a	n/a	
Land Treatment & Solid Waste Facilities	1.0	1.0	0	1.0	
Explosives Plant Site	2.6	2.6	0	2.6	
Total	195.1	161	82.6	Scenario 1	58.9
				Scenario 2	67.7
				Scenario 3	85.1

5.1 WASTE ROCK AND OVERBURDEN DUMPS

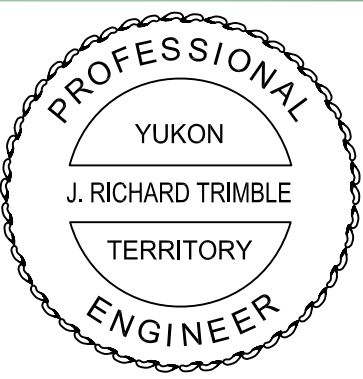
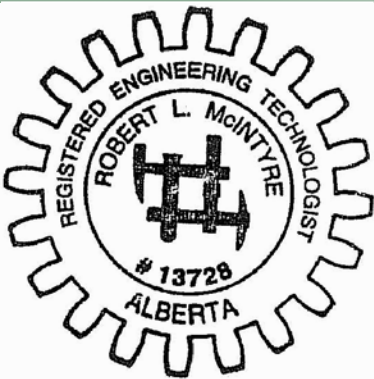
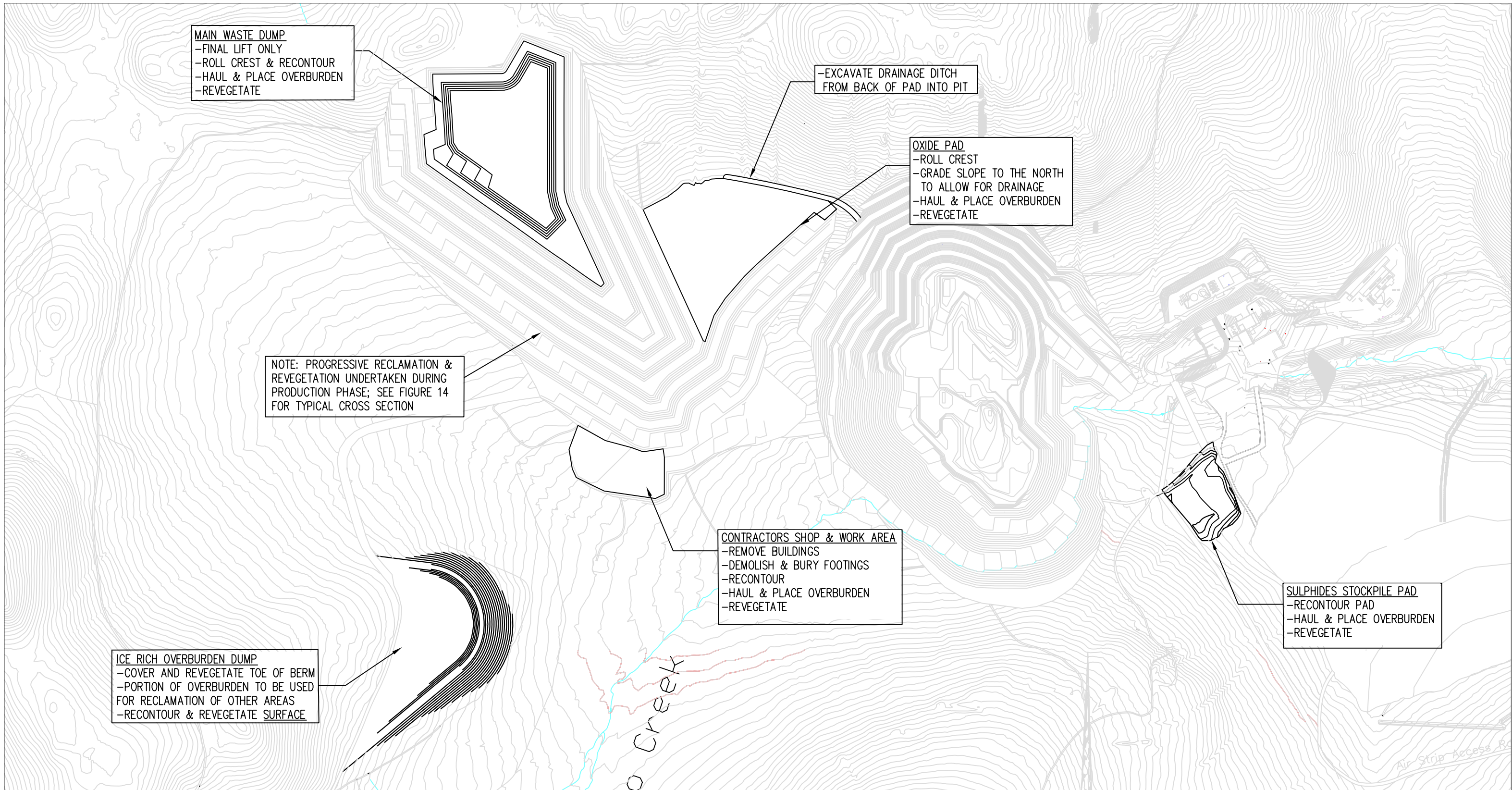
Figure 5-1 shows the locations and layouts of the main waste rock dump, ice-rich overburden dump, ore stockpile pads and contractor's shop and work area at the end of mine life. Figure 5-2 summarizes the reclamation measures for each component.

5.1.1. Main Waste Rock Dump

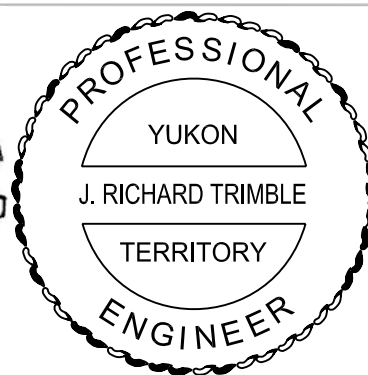
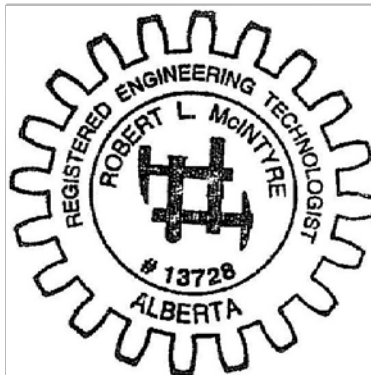
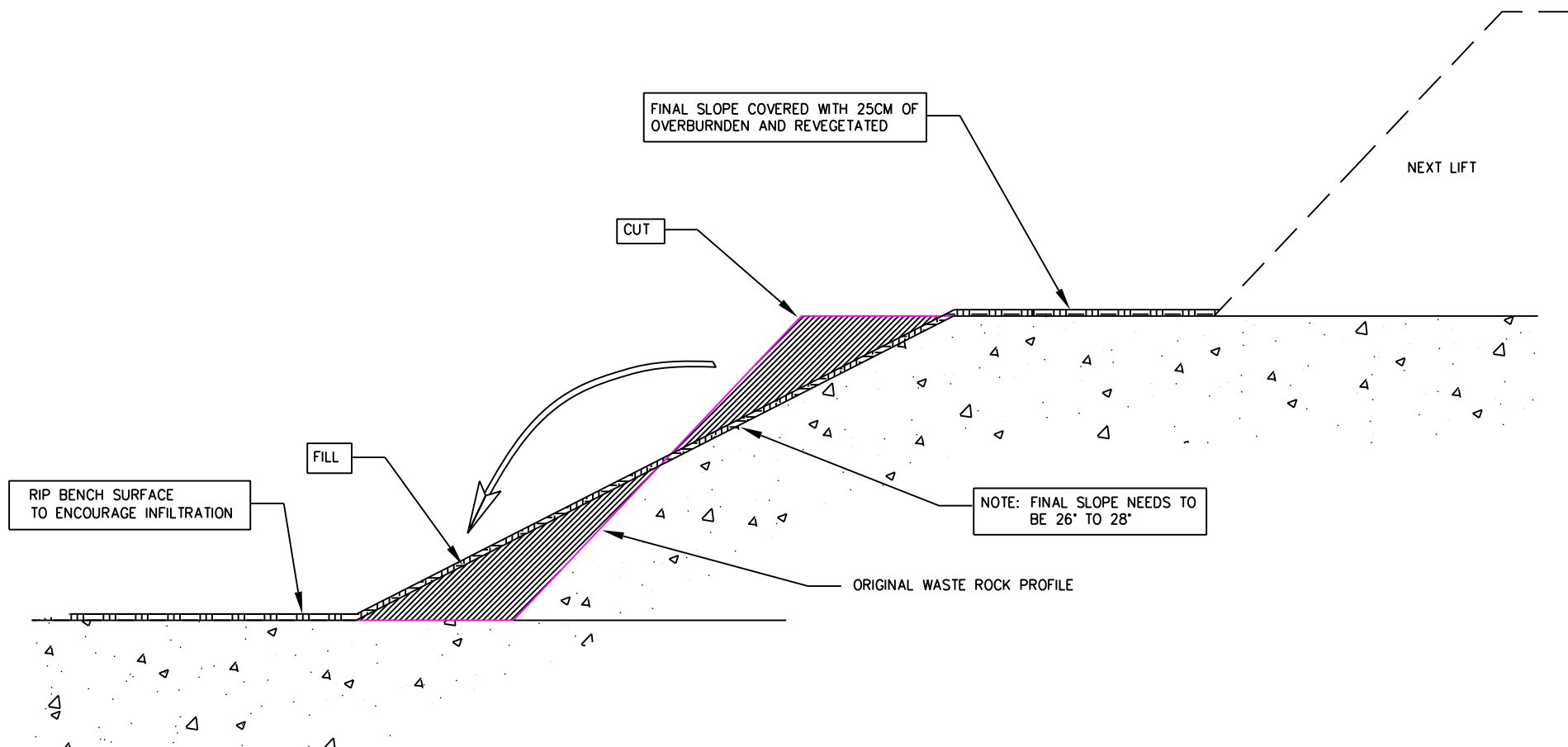
5.1.1.1. Closure Issues

The main waste rock dump, located immediately northwest of the open pit, will be established in sequential lifts as extracted from the pit. Prior to the placement of subsequent lifts, the toe slope and bench below the slope of the finished lift will be reclaimed as per Figure 5-3, which shows typical progressive reclamation measures of a dump slope. Slope crests will be rolled over and the slope and bench surfaces will be covered with a layer of overburden 25 cm thick. Initial reclamation of the waste rock toe slopes (recontouring and covering with growth media) will also include the establishment of revegetation trial plots, and the ultimate revegetation seed mixtures and fertilization requirements for the main waste rock dump will depend on trial and natural revegetation success.

Physical stability of the waste rock dump is of primary concern in a closure scenario. The waste rock dump will be constructed according to EBA's Waste Rock Stability Evaluation, Minto Project, Yukon (1996) which addresses physical stability design considerations such as maximum credible earthquake criteria, therefore the likelihood of failure will be low. In the unlikely event of a dump failure, the consequences would be minor as there are no public facilities downslope of the dump and the open pit would effectively act as a settlement basin for any sediment load within runoff water before it is introduced to Minto Creek.



					
TITLE FIGURE 5-2: RECLAMATION MEASURES FOR WASTE ROCK AND OVERBURDEN DUMPS					
PROJECT					



TITLE **FIGURE 5-3: TYPICAL PROGRESSIVE RECLAMATION MEASURES**

PROJECT **MINTO MINE**

DATE: **October 2006**

ACCESS JOB NO. **MIN-05-01**

DWN. **CSF**

CHKD.

REVISION NO.: **1**

Geochemically, runoff from the main waste rock dump would contribute a minor metal (primarily copper) load to the already high background metal concentrations of Minto Creek (IEE). Previous acid-base accounting testwork and assessment on waste rock materials overlying the orebody indicates that there is a very low potential for acid generation and metal leaching (Mills, 1997.)

5.1.1.2. *Closure Measures*

As progressive reclamation advances with the dump establishment, final reclamation measures will only be required for the 5.5 hectare area of the final waste rock lift. This will see the final lift covered with growth media and seeded as per successful techniques and mixtures established during progressive reclamation activities. Overburden will be loaded with an excavator and hauled by trucks initially from the pit area after removal, and later from the overburden dump. Overburden can be spread with the trucks and further spread with a dozer equipped with wide tracks. Compaction of the overburden during spreading will be minimized.

The following section lists the closure measures related to both physical stability and geochemical stability that are planned for this portion of the main waste rock dump. It is presented as an itemized list for ease of reference, as this will form the basis for the costing and scheduling.

Physical Stability

- i. Roll crests of final waste rock lift and recontour.
 - *Dozer x 175 hrs for area of 5.5 ha*
- ii. Haul and place overburden on surface and prepare for seeding.
 - *Custom Unit Rate A = \$6.00 x 13,750 m³ (5.5 ha x .25 m cap = 13, 750 m³)*
 - *Custom unit rate based on site specific factors: haul distance, grade, machinery required, time required, etc.*
- iii. Revegetate based on success of test plots.
 - *5.5 ha for seeding/fertilizing, re-seeding 3 ha, plant seedlings on 5.5 ha*

Chemical Stability

- i. Continued acid-base accounting test work as per Water Use and Quartz Mining Licence requirements during operations.
 - *Ongoing operational cost, not included in closure costing.*
- ii. Monitor dump seeps below dump to check on loading from dump.
 - *Dump seep survey, monitoring based on findings*

5.1.2. Ice-Rich Overburden Dump

The overburden dump is the furthest west reclamation unit on the site. A toe berm constructed from waste rock will retain the ice-rich overburden and prevent migration of the material downslope.

Overburden material from this dump will be used as a growth media cover for both progressive and final reclamation of various units including the tailings disposal area, waste rock dumps, mill and plant area, water dam and access roads. Overburden that remains on the dump after closing reclamation has been completed will be resloped and revegetated.

5.1.2.1. Closure Issues

Physical stability of the ice-rich overburden dump is the primary concern for closure. The waste rock dump will be constructed according to EBA's Geotechnical Design, Ice-Rich Overburden Dump, Minto Mine, Minto YT (2006) which addresses physical stability design considerations such as maximum credible earthquake criteria, and much of the overburden material will be removed from the dump for closure measures on other sites. Therefore the likelihood of failure will be low. As with the waste rock dump, the consequence of failure of the dump would be minor as there are no public facilities downslope of the dump and the open pit would effectively act as a settlement basin for any sediment load within runoff water before it is introduced to Minto Creek.

Chemical stability of the dump is not a concern for closure. Seepage from the dump is expected (by design) to flow through the toe of the waste rock berm, but the organic/clay nature of the overburden material is not expected to contribute a significant chemical load to this seepage.

5.1.2.2. Closure Measures

Initial reclamation of this unit will involve the placement of a 25 cm layer of overburden on the toe berm. This material will cover the uppermost 75% of the slope, leaving the furthest downslope area of the toe berm (where it contacts the original ground surface) uncovered to allow moisture seepage as per the construction design. This will avoid raising the phreatic surface inside the dump.

Revegetation test plots will be established on the toe berm in 2007, and ultimate revegetation seed mixtures and fertilization requirements for the overburden dump will depend on trial and natural revegetation success.

Materials from the dump will be utilized as a growth medium on other sites at closure, with the remaining materials in the dump will be subject to in situ closure methods. The following section lists the closure measures related to both physical stability and geochemical stability that are planned for this portion of the ice-rich overburden dump. It is presented as an itemized list for ease of reference, as this will form the basis for the costing and scheduling.

Physical Stability

- i. Recontour overburden surface after reclamation activities completed on other sites
 - Dozer x 16 hrs
- ii. Revegetate based on success of test plots.
 - 6.7 ha for seeding/fertilizing, re-seeding 3 ha, plant seedlings on 6.7 ha

Chemical Stability

No specific closure measures required.

5.1.3. Ore Stockpiles and Pads

Ore to be milled will be stockpiled on constructed pads in various locations on the site during active mining activities. Specific stockpiles and pads (see Figure 5-1) will include:

- high grade sulphide ore stockpile and pad (located south of the mill); and
- low grade sulphide ore stockpile and pad (located between the pit and the main waste rock dump).

The stockpiles will be milled prior to final closure, beginning with the high grade ore. Mill re-orientation and re-tooling will be required for the milling of the low grade ore. Should economic conditions warrant consideration of not milling the low grade ore, the ML/ARD potential of the low grade ore (as determined by the results of the Water License ABA Test Program during operations) will be factored into the decision-making process. Should the decision be taken not to mill this material, the closure measures and area will be the same as those identified below for the reclamation of the low grade ore pad. Monitoring of the seepage/runoff from the reclaimed stockpile, already proposed in Section 7, will serve to identify any emerging geochemical concerns during the post closure period. Section 5.9 further presents adaptive management planning measures to deal with emerging conditions including ML/ARD concerns.

Both pads will require reclamation (recontouring, cover and revegetation) at final closure.

5.1.3.1. Closure Issues

Physical stability of the ore stockpile pads is the primary concern for closure. The low grade sulphide stockpile pad will be constructed from waste rock according to design criteria set out in EBA's Waste Rock Stability Evaluation, Minto Project, Yukon (1996) which addresses physical stability design considerations such as maximum credible earthquake criteria, therefore the likelihood of failure will be low.

Geochemically, runoff from the low grade sulphide pad (constructed from oxidized materials) would have the potential to carry a minor metal (primarily copper) load. Acid-base accounting testwork to date on oxidized waste rock materials overlying the orebody indicates that there is a very low potential for acid generation and metal leaching (Mills, 1997.)

5.1.3.2. Closure Measures

Progressive reclamation measures will not apply to these stockpile pads, as they will typically see material handling activities throughout the entire mine life. All stockpile pads will be recontoured, covered with overburden and seeded upon final reclamation. To discourage runoff from compromising the physical stability of downslope reclamation efforts (overburden placement and revegetation), the 5.2 hectare area of the low grade ore pad adjacent to the main dump will be graded slightly to the north (towards the hillside) prior to covering and a rip rap lined collection ditch will be constructed to convey this runoff over the high wall and into the pit.

The following section lists the closure measures related to both physical stability and geochemical stability that are planned for the ore stockpile pads. It is presented as an itemized list for ease of reference, as this will form the basis for the costing and scheduling.

Physical Stability

iv. Roll crests of pads and recontour.

- *Dozer x 70 hrs for area of 8.6 ha*

v. Construct runoff collection ditch for low-grade ore pad.

- *Dozer x 10 hrs, Hoe x 16 hrs*
- *Haul and place rip rap, 275 m x 3 m x 0.5m = 415 m³ x \$13/m³*

vi. Haul and place overburden on surface and prepare for seeding.

- *Custom Unit Rate (A)+(B) = (\$6.00 x 13,000 m³)+(\$4.50 x 8500 m³) – (8.6 ha x 0.25 m cap = 21,500 m³)*

vii. Revegetate based on success of test plots.

- *8.6 ha x \$2260/ha for seeding/fertilizing, re-seeding 4 ha, plant seedlings on 8.6 ha*

Chemical Stability

iii. Continued acid-base accounting test work as per Water Use and Quartz Mining Licence requirements during operations.

- *Ongoing operational cost, not included in closure costing.*

iv. Monitor pad seeps below to check on loading from pad seepage.

- *Pad seep survey, monitoring based on findings*

v. Continued Groundwater Monitoring Program as per Water License requirements during operations.

- *Cost included in monitoring activities*

5.1.4. Contractor's Shop and Work Area

The mining contractor's area, constructed on site adjacent to the toe of the waste rock dump, will serve as the base of operations for the mining contractor during active mining activities. At closure, the buildings in this area will be dismantled and removed, and any scrap will be hauled to the on site permitted Solid Waste Facility.

5.1.4.1. Closure Issues

Physical stability will not be a concern at closure for this area. This is a low elevation pad that will only require proper erosion control. The chemical stability of the remaining soils will be ensured through an investigation for contaminated soils during the environmental site assessment at closure, and any contaminated materials will be hauled to the on site Land Treatment Facility.

5.1.4.2. Closure Measures

The following section lists the closure measures related to both physical aspects and geochemical stability that are planned for the contractor's shop and work area. It is presented as an itemized list for ease of reference, as this will form the basis for the costing and scheduling.

Physical Stability

- i. Remove salvageable equipment and dismantle buildings; haul off site
 - General labourer x 60 hrs for area of 2 ha
 - Trades labourer x 48 hrs
 - Tractor Trailer and lowbed x 20 hrs
- ii. Dismantle Buildings
 - General labourer x 60 hrs
 - Hoe X 20 hrs
- iii. Haul building pieces off site – equipment
 - Tractor Trailer and lowbed x 20 hrs
- iv. Haul scrap to site waste management facility
 - Haul truck x 20 hrs
- v. Footings pushed in and buried with fill
 - 0.25 ha x 1 m deep = 2,500 m³
- vi. Recontour and cover in 0.25 m overburden for seeding
 - Dozer x 15 hrs, Custom Unit Rate C = \$3.00 x 5,000 m³ (8 ha x 0.25 m cap = 5,000 m³)
- vii. Revegetate based on trial success
 - 8.6 ha x \$2,260/ha for seeding/fertilizing, re-seeding 4 ha, plant seedlings on 8.6 ha

Chemical Stability

- i. Site will be assessed for contaminated soils

- *Part of environmental site assessment at closure*
- ii. Contaminated soils moved to land treatment facility on site
 - *Cost based on volumes at closure, estimate 25 m³*

5.2 OPEN PIT AND HAUL ROADS

Figure 5-1 shows the location and layout of the open pit and haul roads at the end of mine life. Figure 5-4 summarizes the reclamation measures for each of these components, and the specific measures are discussed in greater detail below.

5.2.1. Open Pit

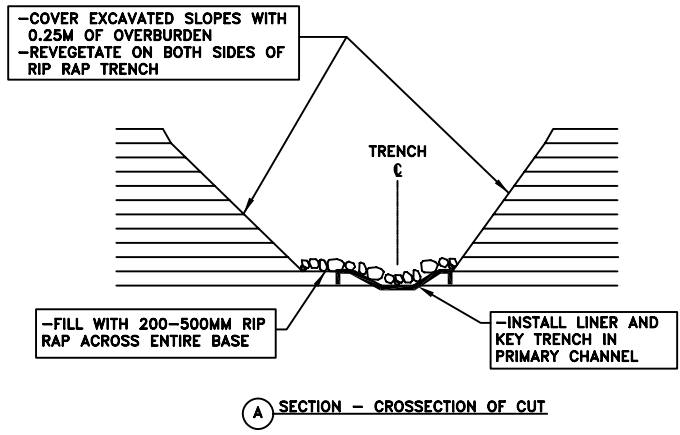
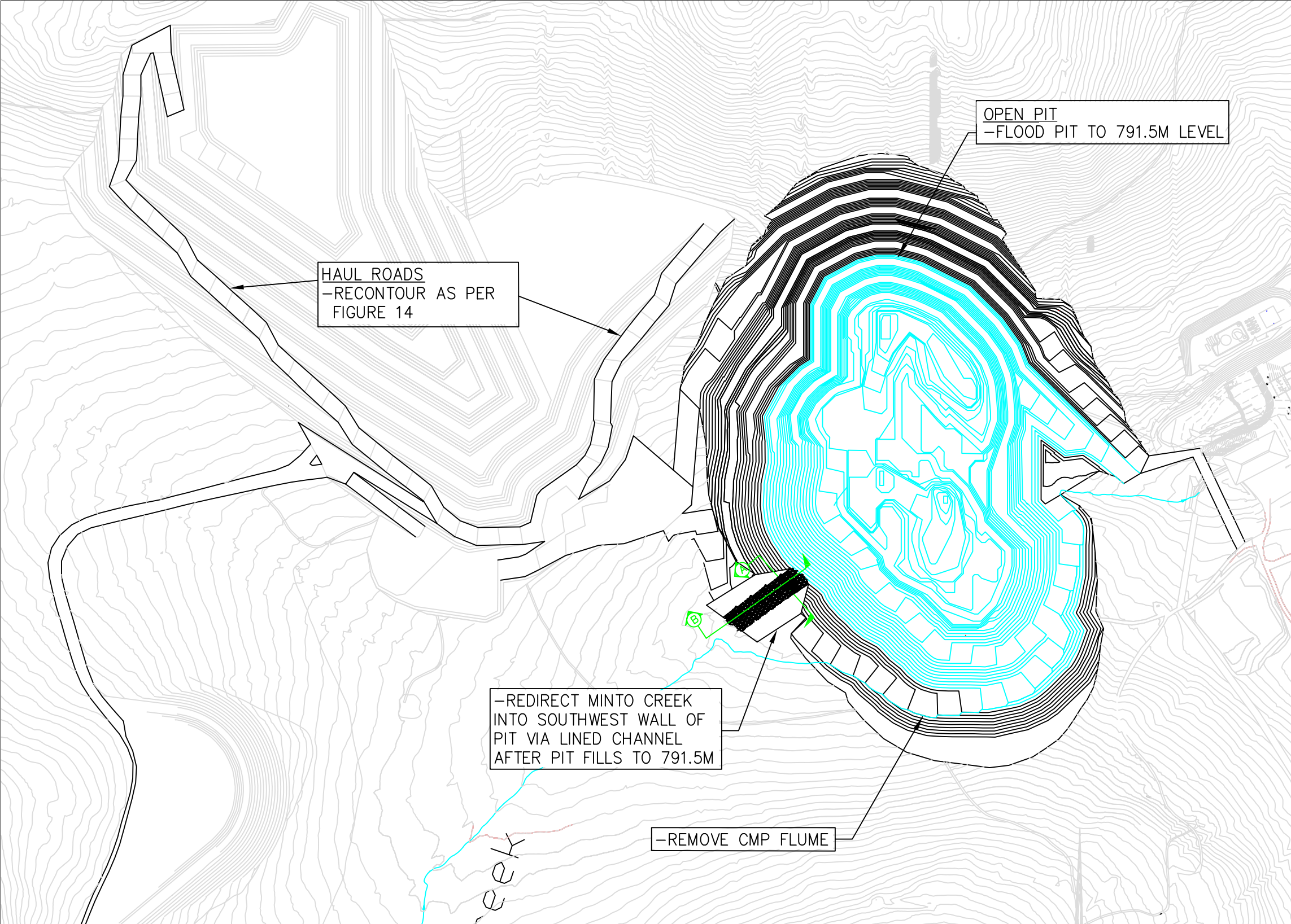
The open pit will encompass the drainage channel for Minto Creek and therefore will be diverted along the south side of the pit during operations. It is anticipated that this diversion will run adjacent to the access ramp and the flow will re-enter the original Minto Creek channel on the east side of the pit.

5.2.1.1. Closure Issues

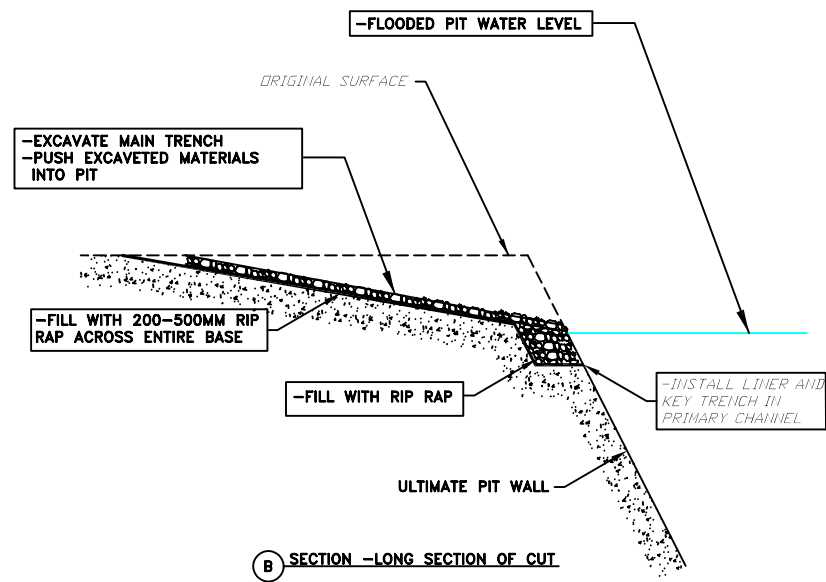
The pit will be excavated according to MintoEx's Open Pit Design Plans (2006). With respect to physical stability of the pit, at closure the north wall of the pit will be benched in competent bedrock, and the south wall will be a continuous slope composed of ice-rich permafrost. The exposed south wall of the pit will have been covered with a thermal insulating medium during operations to prevent thawing and destabilization and this covering will remain at closure.

Acid-base accounting indicates that the open pit wall rocks are slightly acid consuming or neutral and this will be confirmed by work done during the life of the mine through the Water License ABA Test Program. The open pit will act as a very large settling pond for all runoff from the overburden and waste rock dumps. Water quality will be monitored at the mill water pond channel as required, see section 7.4 for the monitoring locations and schedule.

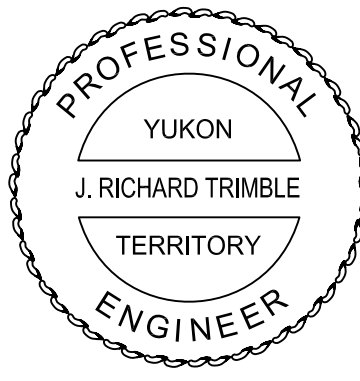
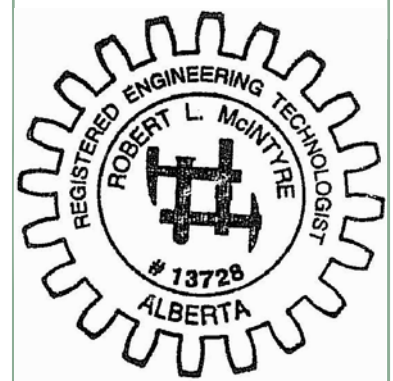
W:\ACG_ACTIVE\Minto\Closure and Decommissioning\Closure Plan - 2006\PDF Document and CD\Original Files\Figures\Fig5_4_Open Pit & Haul Roads.dwg [Layout1] June 13, 2007 - 8:49pm heather



MINTO CREEK ENTRANCE CHANNEL



MINTO CREEK ENTRANCE CHANNEL



TITLE				FIGURE 5-4: RECLAMATION MEASURES FOR OPEN PIT AND HAUL ROADS			
PROJECT				MINTO MINE			
DATE:		October 2006		ACCESS JOB NO.		MIN-05-01	
DWN.		CSF		CHKD.		REVISION NO.: 1	

5.2.1.2. Closure Measures

Prior to flooding, any accessible benches in the pit will be scarified to encourage natural revegetation, but no reclamation work will be done on the open pit high walls beyond the operational measure of thermal stabilization previously mentioned. Boulders, up to 1 m in size, will be placed on all potential access routes to prevent uncontrolled access to the pit.

At closure, the diversion of Minto Creek around the pit will be maintained but will terminate in the pit instead of flowing back into the creek channel, to begin the pit flooding process. This diversion will persist while an armoured entry channel is constructed that will ultimately lead the Minto Creek flow into the open pit. The temporary southern pit diversion will be abandoned.

This channel will be excavated in an area of continuous permafrost. The channel will be excavated to a slope of approximately 5.5 to 1, and will terminate at the 791.5 m elevation. The main channel will be armoured with 1 metre of rip rap, and the excavation slopes will be covered in 25 cm of overburden and vegetated with willows to stabilize the future riparian zone. Entrainment of Minto Creek into the pit via the constructed channel will not occur until these slopes are sufficiently stabilized and revegetated and the pit is completely flooded.

The open pit will be flooded to the 791.5 m elevation at the end of the life of the mine. Flood water will flow from the open pit at the low spot on the final access ramp to the mill pond and then Minto Creek. The time required to flood the open pit is estimated to be 5.5 years based on mean flows. Approximately 55 % (10.6 ha) of the open pit walls will remain exposed above water.

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for the open pit. This will form the basis for the costing and scheduling.

Physical Stability

- i. Remove pumping/piping systems, general cleanup
 - Labour x 90 hrs, support equipment \$1,500
- ii. Secure pit access – boulder placement
 - Hoe x 25 hrs

- *Haul truck x 25 hrs*
- iii. Construct creek entrance channel into pit
 - *Hoe x 20 hrs*
 - *Haul and place rip rap , 50 m3*

Chemical Stability

- i. Continued acid-base accounting test work as per Water Use and Quartz Mining Licence requirements during operations.
 - *Ongoing operational cost, not included in closure costing.*
- ii. Monitor pit discharge water quality as part of post closure monitoring program
 - *Monthly during active closure, semi-annually to annually in post-closure.*

5.2.2. Haul Roads

The haul roads on the site will radiate out from the open pit to the mill, the ore stockpiles, the waste rock dump and the ice-rich overburden dump. Figure 5-5 shows typical road reclamation measures that will be employed at final closure. These measures will apply to haul roads, site roads and the main access road alike.

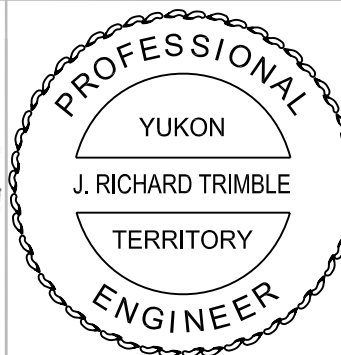
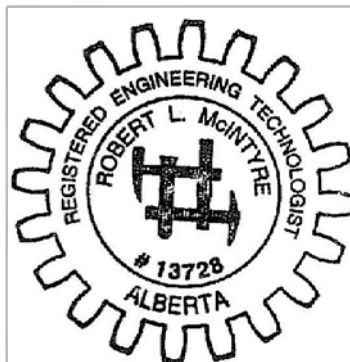
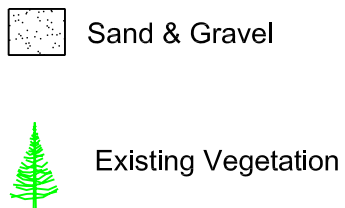
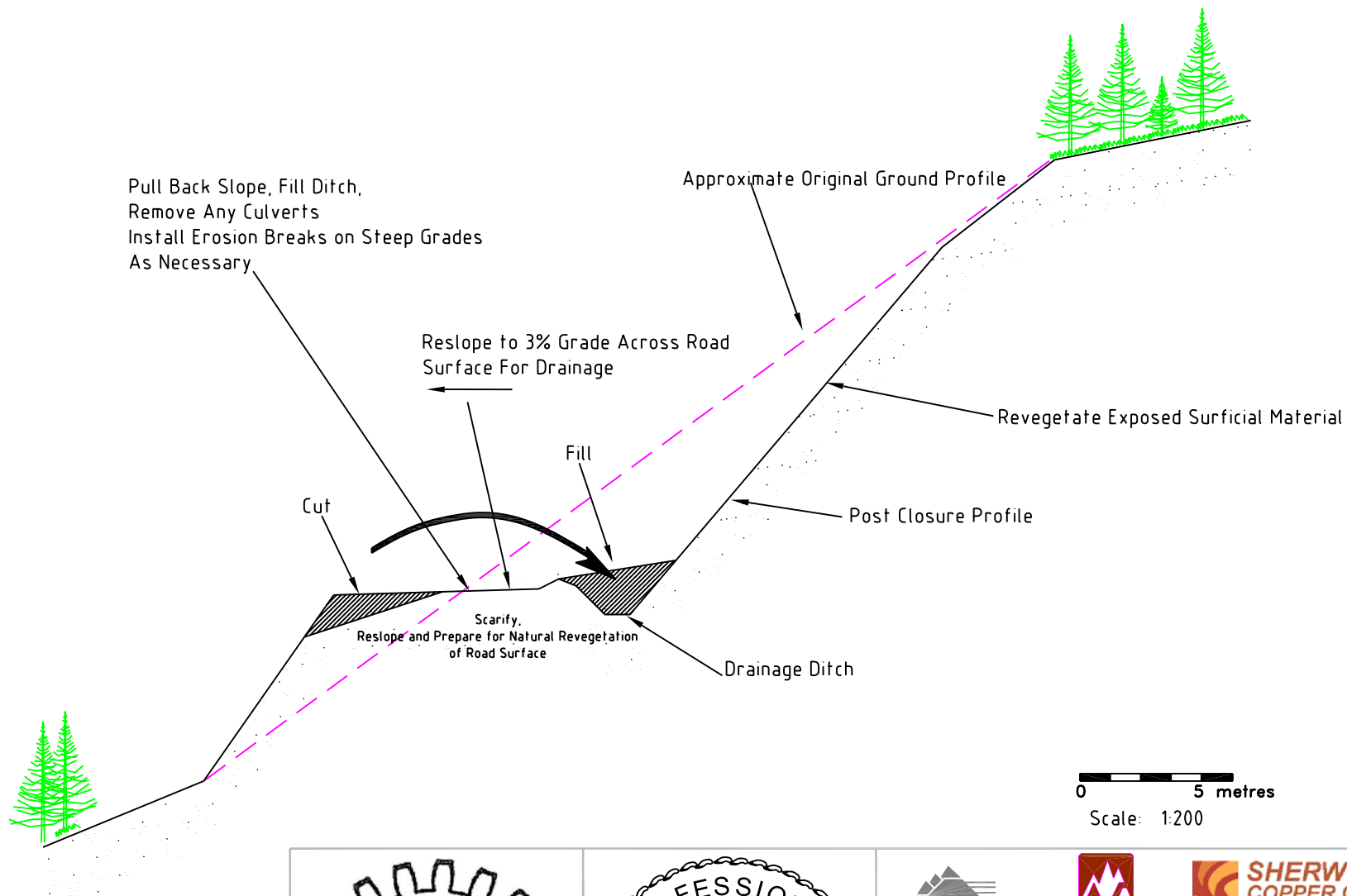
5.2.2.1. Closure Issues

The primary consideration for the physical stability of the haul roads at closure will be slope stability where culverts have been removed and drainages channels have been established through the road alignments.

Geochemically, the road materials have not been observed to contribute to chemical loading of runoff, but the understanding of this potential will be refined through adaptive management during operational water quality monitoring. Physical stabilization measures such as erosion control and revegetation of the haul roads will contribute to the mitigation of any potential geochemical concerns at closure.

5.2.2.2. Closure Measures

These roads will be subject to standard road decommissioning and reclamation measures at closure, including culvert excavation, drainage recontouring, slope stabilization and surface scarification. Regrading/contouring the roads will ensure that runoff sheds off the road surface. The road surfaces are not expected to require seeding, only surface scarification to encourage natural revegetation. Should runoff from haul road bed materials present a geochemical concern, seeding and fertilization may be required.



TITLE Figure 5-5: Haul Road and Site Road Typical Reclamation Cross-Section

PROJECT MINTO MINE

DATE: October 2006

ACCESS JOB NO. MIN-05-01

DWN. RG/HD

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REVISION NO.: 1

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for the haul roads. This will form the basis for the costing and scheduling.

Physical Stability

i. Remove culverts and haul away

- *Labour x 40 hrs, hoe x 20 hrs, haul truck x 20 hrs*

ii. Recontour slopes and surfaces

- *Dozer at 150 hrs*

iii. Scarify road surfaces

- *Dozer x 150 hrs*

iv. Stabilize slopes

- *Erosion barriers: $5 \times 400 \text{ m}^2 = 2000 \text{ m}^2$*

Chemical Stability

i. Continued testing and monitoring of runoff quality

- *Ongoing operational cost, not included in closure costing.*

5.3 TAILINGS AREA AND DIVERSION STRUCTURES

The tailings from the Minto milling process will undergo a dewatering process before being conveyed to the tailings deposit area for spreading and compaction. The company's Tailings Management Plan provides further detail on the tailings handling procedures, and will be submitted to EMR in conjunction with this Plan. The general location of the tailings area and diversion structures is shown in Figure 5-1 and proposed reclamation measures for the tailings area and diversion structures are presented in Figure 5-6.

It should be noted that the design for the tailings facility used in this planning document is preliminary, and is subject to minor revisions under the Tailings Management Plan. Ultimately, the locations of elements of the tailings area such as the starter bench and finger drains and diversion berms will be presented in IFC and as-built drawings. These data will be incorporated into the DDRP under the future revisions required in the QML conditions.

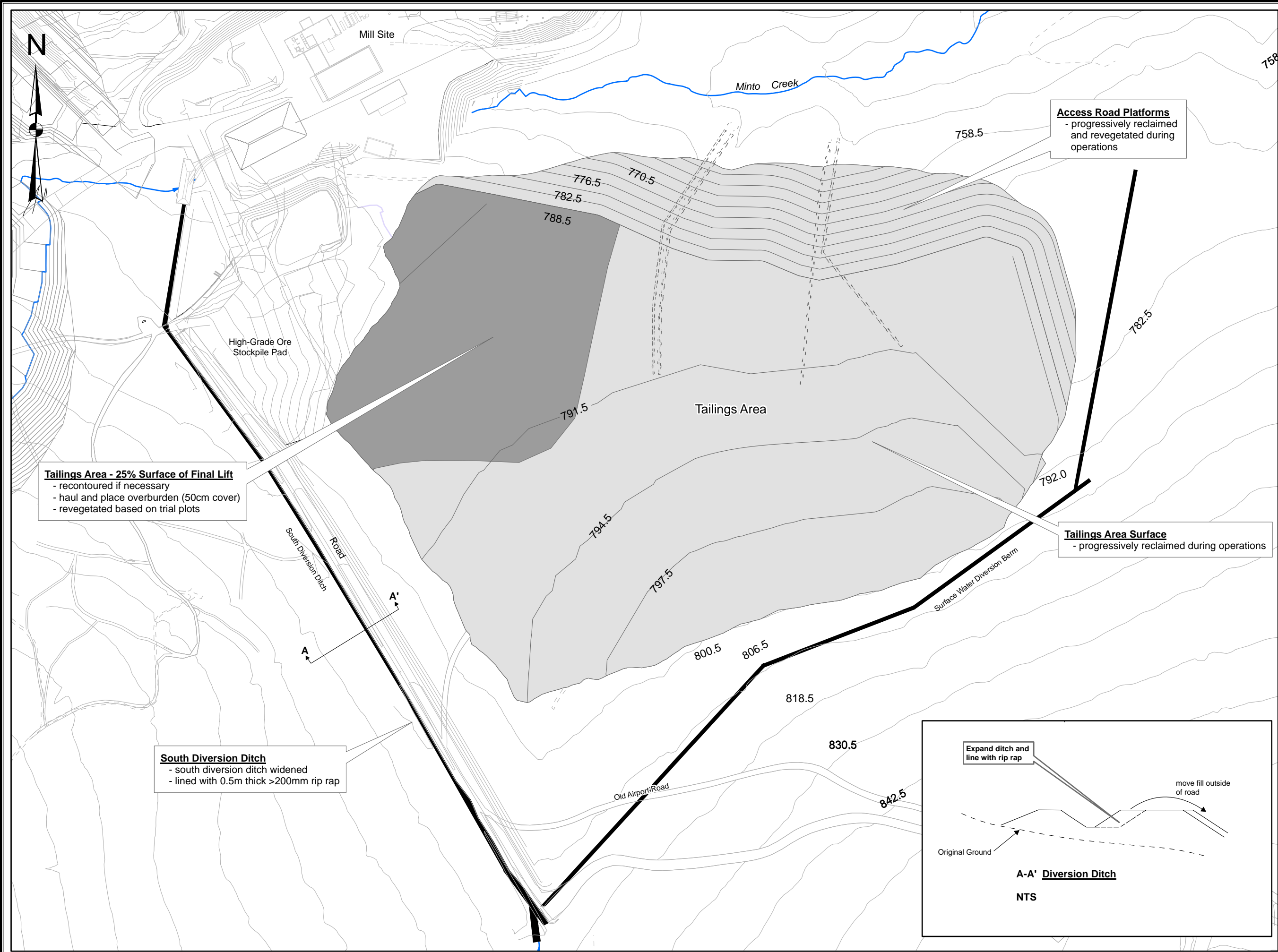
5.3.1. Closure Issues


The Minto tailings deposit will be located on a bench opposite (to the south) of the mill and upslope from the Minto Creek channel, and will be constructed to the specifications provided in the Tailings Management Plan. As such there should be no physical stability concerns with the tailings deposit. Monitoring of the stability of the stack will be conducted as presented in the Tailings Management Plan through the installed instrumentation (piezometers, ground temperature cables and settlement monuments) will be conducted monthly during active closure and for the first 5 years after closure, and reduced to semi-annual and annual monitoring thereafter if approved by the project engineer.


At closure, tailings deposits often require an engineered cap consisting of clay or synthetic liners to prevent precipitation infiltration into the tailings and subsequent leaching of chemical tailings constituents into the receiving environment. After the Minto Project tailings have been filtered, mechanically spread and compacted, the compacted tailings will have a low permeability factor. Infiltration of precipitation is not expected, as the deposit will effectively 'shed' direct precipitation. Progressively reclaimed (covered and revegetated) areas of the tailings deposit will further infiltration of meteoric water on the deposit. Design components (diversion berms and ditches and finger seepage drains) will intercept and divert surface runoff from upslope and


seepage from below the deposit respectively. These flows (which will report to the dam reservoir during operations) will be regularly monitored in addition to the monitoring at the established final compliance point as part of the post-closure monitoring program (see Figure 7-1 and Table 7-2). Although not identified in the Tailings Management Plan, this seepage monitoring will be conducted during operations as part of water quality monitoring due diligence, so will therefore be continued in any temporary or final closure scenario.


Previous testwork has indicated no acid-rock drainage/metal leaching (ML/ARD) potential within the tailings (Mills, 1997) and there are no expected geochemical concerns with the tailings area. Ongoing ABA testwork under the Water License ABA Test Program will characterize the geochemical nature of the tailings solids and will alert MEL to any potential concerns with acid generation well in advance of closure. See Section 5.9 Adaptive Management Planning for further discussion regarding ML/ARD mitigation.





- Legend
- 


 Access Road
- 


 Road
- 

 Exploration Road / Trail
- 

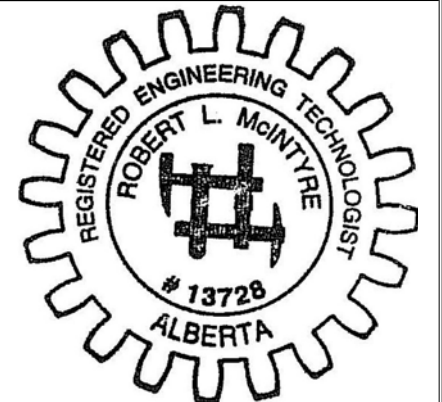
 Transmission Line
- 

 Contour
- 

 Site Feature Profile Contour
- 

 Water Course
- 

 Areas of Construction



Base data obtained from Yukon Engineering Services
Nov3_06_status_plan.dwg

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115/11

Figure 5-6

Reclamation Measures for
Tailings Area and Diversion Structures



5.3.2. Closure Measures

Reclamation measures at the tailings facility will focus on erosion control of the tailings surface and on the toe of the fill platforms used for access around the toe of the tailings area. As the tailings will be constructed from the lowest section of the tailings basin upwards, mine operators will progressively reclaim and revegetate the tailings facility concurrent with the placement of tailings materials during the life of the mine. This will include covering the tailings with fill or overburden material to prevent aeolian erosion and ex-situ deposition.

The access road and rock fill platforms will be progressively recontoured as the tailings basin increases in size. The repose will be 4:1 for the length of the tailings face (top to bottom), with small sections of step-like platforms that form a 1:1 repose on the downside edge of each platform. Prior to the placement of each new platform, the existing slope will be recontoured (crest rolled back) and covered with a layer of overburden approximately 25 cm in thickness. Figure 5-3 details these progressive reclamation measures. The initial growth media placement on the tailings facility will be followed by the establishment of revegetation trial plots.

Section 9.3 – Site Zonation of the IEE highlighted the specific vegetative characteristics of the tailings disposal area:

“Willow/sedge communities occurred in the Minto Creek valley, adjacent to the creek. This region was usually poorly drained and prone to flooding. A moderate to dense overstory of willow occurred. Groundcover was dominated by sedge species and moss; grasses and horsetail were common and sphagnum moss was often present. Riparian vegetation occurred along the creek drainage. Associated species included scrub birch, shrubby cinquefoil, nagoonberry, sedge, grass, horsetail, coltsfoot, tall lungwort and sphagnum moss.

Black spruce communities occurred on north aspect slopes in the Minto Creek valley. These communities have a sparse tree layer dominated by black spruce and a shrub understory of scrub birch, willow, Labrador tea and shrubby cinquefoil. The herb layer for these communities consisted of bog blueberry, crowberry, red bearberry, cloudberry and lousewort. The moss groundcover layer in these areas was extensive and was usually dominated by sphagnum moss and feathermoss.”

In recognition of this assessment, seed mixtures compatible with the willow/sedge (mix #1) and black spruce (mix #2) communities as shown in Table 4.4-1 will be used for initial seeding of the test plots in the tailings area, however the ultimate revegetation seed mixtures and fertilization requirements for the tailings facility will depend on revegetation trial and natural revegetation success.

At final closure, approximately 25% of the total deposit surface area will require reclamation, with the balance having been previously reclaimed during operations. Little recontouring of the thickened tailings material will be required as the repose will be approximately 1:40. The remaining surface of the tailings deposit will be covered with overburden growth media 50 cm thick and seeded.

Reclamation of the filter building is covered in Section 5.5 under Mill and Ancillary Facilities reclamation measures.

The main diversion structure – the south diversion ditch – conveys the flow from the main tributary channel previously running through the area of the future tailings deposit into the mill water pond. This ditch is presently constructed to convey a 1 in 200 year flood event, so will require widening at closure to accommodate Probable Maximum Flood (PMF) calculated flows.

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for the tailings facility and diversion structures. This will form the basis for the costing and scheduling.

Physical Stability

i. Haul and place overburden cover, 0.5 m thickness

- $8.0 \text{ ha} \times 10,000 \text{ m}^2/\text{ha} \times 0.5 \text{ m thick} = 40,000 \text{ m}^3$

ii. Revegetate based on trial success

- 8.0 ha for seeding/fertilizing, re-seeding 4 ha , plant seedlings on 8.0 ha

iii. Widen south diversion ditch and re-line and armour

- $\text{Hoe} \times 50 \text{ hrs}$
- $\text{Supply install HDPE liner, } 800 \text{ m} \times 6 \text{ m} = 4800 \text{ m}^2$
- $\text{Haul and place rip rap, } 800 \text{ m} \times 6 \text{ m} \times 0.5 \text{ m deep} = 2400 \text{ m}^3$

Chemical Stability

- i. Monitor diverted seepage and runoff water quality as part of post closure monitoring program
 - *Monthly during active closure, semi-annually to annually in post-closure.*

5.4 MAIN WATER DAM

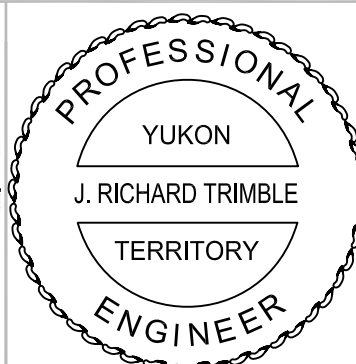
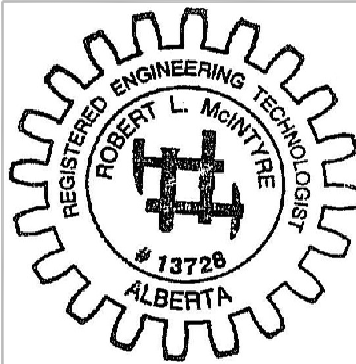
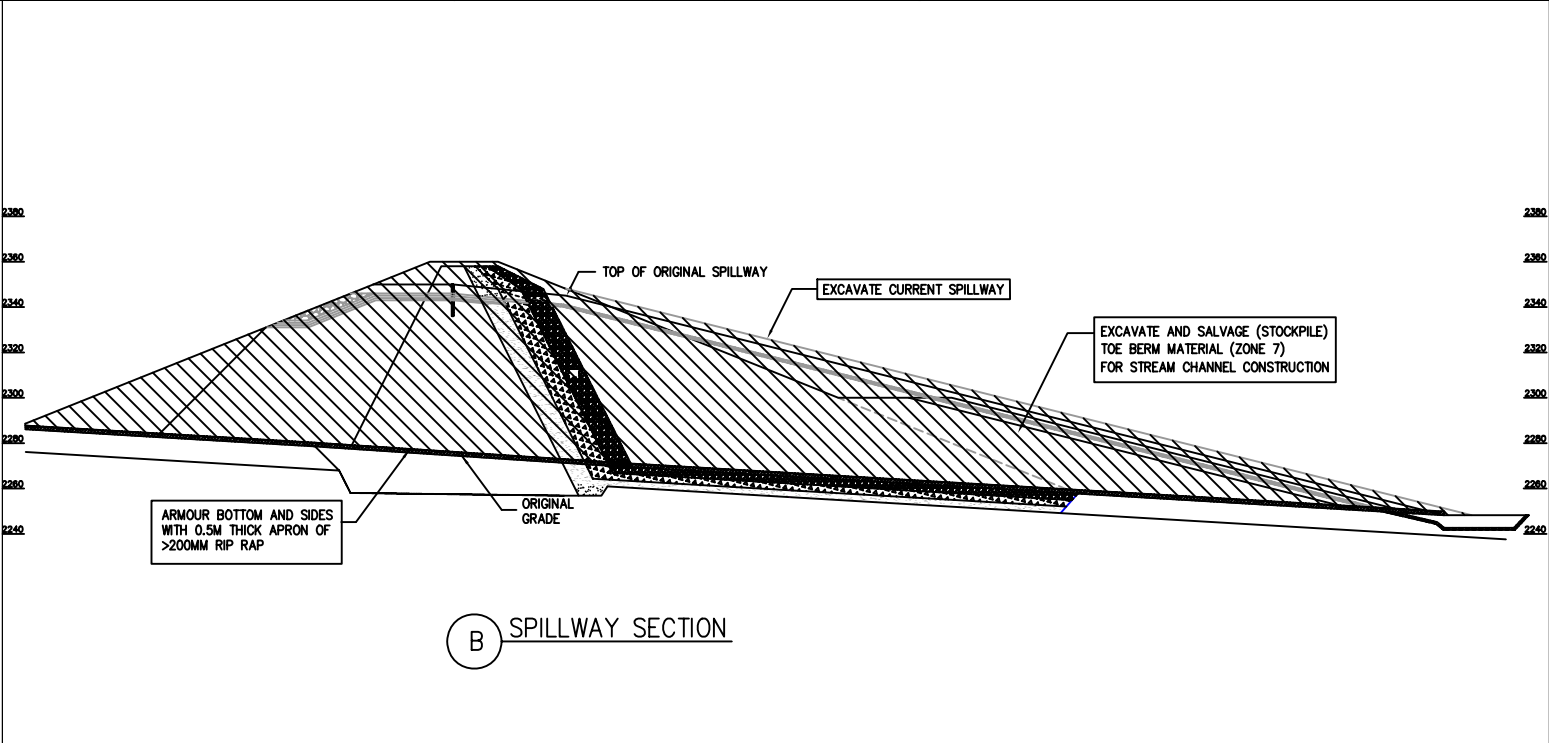
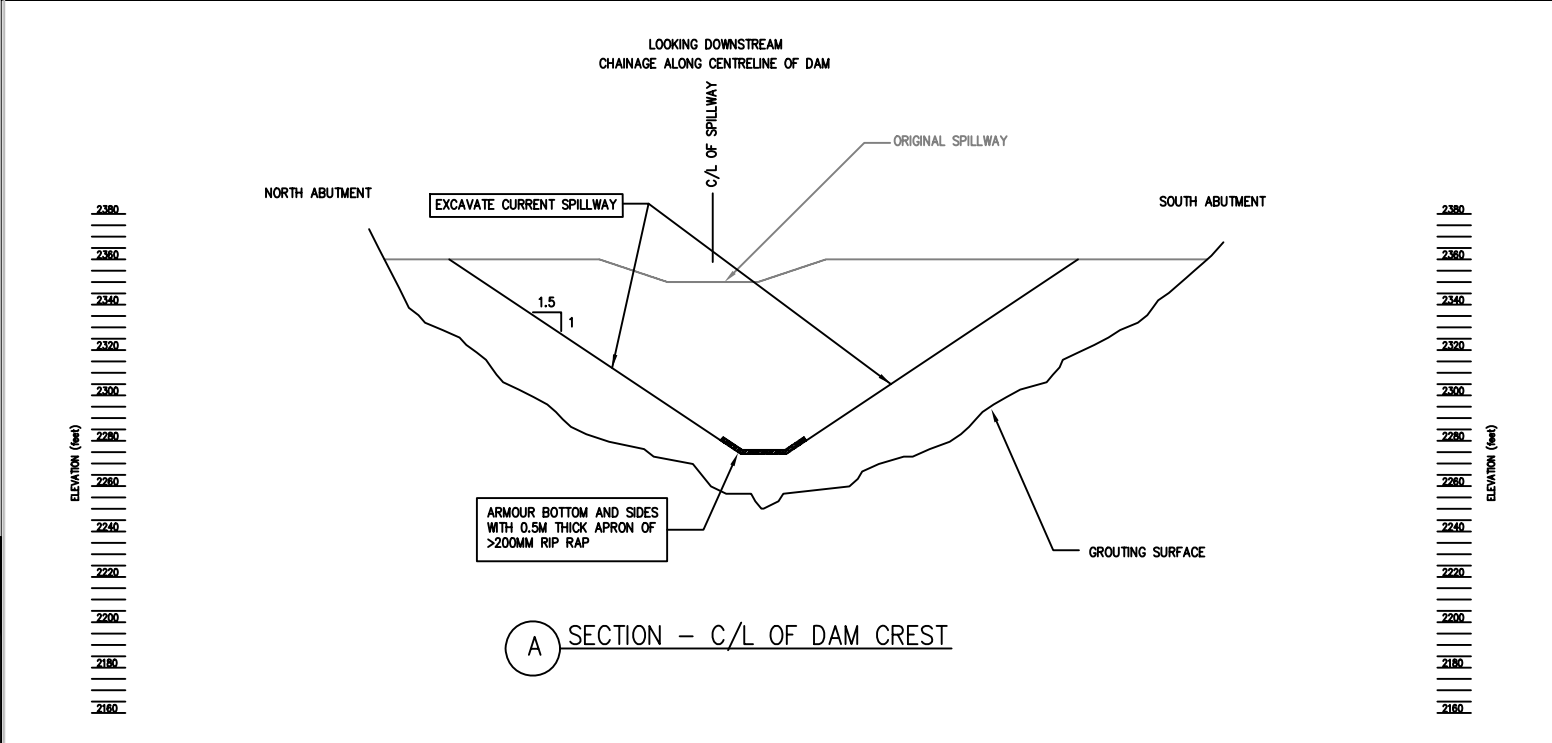
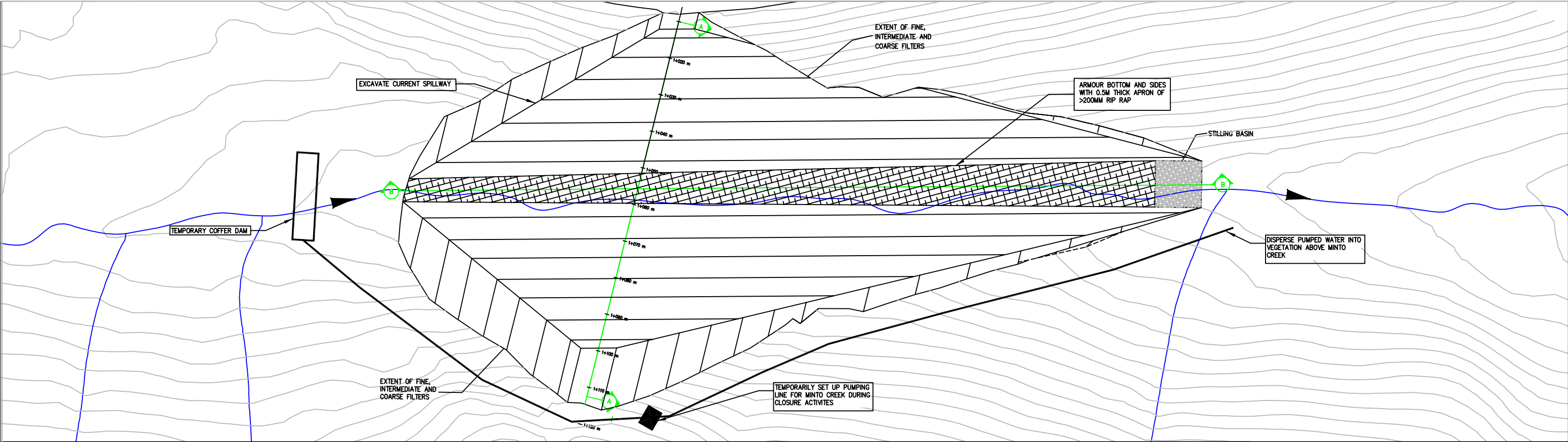
The location of the main water dam relative to the other site development is shown in Figure 5-1. The water dam on Minto Creek will provide 7 years of water retention for mill processes and various site uses during operations. Upon completion of the dam construction, areas in the immediate vicinity that have been disturbed will be re-contoured and seeded. Figure 5-7 shows the planned measures for main water dam reclamation.

5.4.1. Closure Issues

Physical stability of the structure will be ensured during operations by regular geotechnical inspections. With the goal of a walk-away closure scenario for the project in place, physical stability concerns post closure will be minimized upon the cessation of mining activities by decommissioning the dam so that no water remains impounded. The reclamation goal for the main water dam will be to return the Minto Creek channel as close to the original alignment/elevation as possible, while maintaining engineering design for probable maximum flood capacity.

5.4.2. Closure Measures

Decommissioning of the main dam will begin with the drawdown of the reservoir by pumping into the Minto Creek channel. Once drained, a temporary coffer dam will be constructed upstream of the dam area to facilitate a 'pump around' system. This system will be in place for the duration of the dam decommissioning activities, and will mirror the dam/pump setup used for the dam construction.



TITLE				FIGURE 5-7: RECLAMATION MEASURES FOR MAIN WATER DAM			
PROJECT				MINTO MINE			
DATE: October 2006		ACCESS JOB NO. MIN-05-01					
DWN. CSF		CHKD.		REVISION NO.: 1			

The filling and operation of the dam will lead to the deposition of a layer of fine-grained sediment in the basin above the dam. At closure, this sediment will be tested and covered with fill material from the dam breaching by dozer pushing. Prior revegetation studies of exposed lakebeds created by dams suggest that natural revegetation, albeit slow because of albedo-related high soil temperatures and lower moisture content, would eventually establish on these fine grained soils (Grapel and Hebert, 2006). Bioengineering efforts, such as live willow plantings, may expedite the stabilization of these soils and assist with the establishment of pioneer species that would lower the albedo and retain more moisture. However, it is expected that covering with fill material and using revegetation and bioengineering efforts will return quicker stabilization of these materials.

The breaching of the dam will be commenced after the downstream shell rip rap materials have been removed and stockpiled. The stream channel will essentially be re-established by pushing the materials and spreading in the valley bottom upstream of the dam. A channel will be established (approximately 15 feet wide) and the channel bottom and sides (approximately 10 feet up slope on each side) will be armoured using the stockpiled shell rip rap. These dimensions and materials will fulfill the requirements for PMF design as prescribed in the letter entitled Revised Hydraulic Design for Overflow Spillway at Minto Tailings/Water Dam (Hayco, 2006).

The disturbed slopes above the channel will be covered in overburden, seeded and stabilized with erosion control matting. Live willow plantings will be employed along the channel to enhance succession and stability of growth medium.

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for the main water dam. This will form the basis for the costing and scheduling.

Physical Stability

i. Dismantle and remove reclaim system, including pumps, buildings and pipeline.

- *Labourer x 268 hrs, Trades labourer x 98*
- *Hoe x 120 hrs, haul trucks x 100 hrs*

ii. Recontour pipeline alignment

- *Dozer x 16 hrs*

iii. Pump down reservoir

- *Labour x 96 hrs*

iv. Remove and stockpile the rip rap material from the downstream shell of the dam

- *10,000 m3 based on unit cost*

v. Breach dam, relocate and recontour materials, re-establish the stream channel close to the elevation of the original creek channel;

- *31,000 m3 based on unit cost*
- *25,000 m3 based on Custom Unit Rate E*

vi. Characterize sediments

- *Consultants/technicians x 60 hrs, analytical costs*

vii. Construct stream channel at original grade

- *2,250 m3 based on unit costs*

viii. Haul and place overburden on slopes of new area u/s of main water dam

- *3,000 m3 based on Custom Unit Rate E*

ix. Revegetate based on trial success

- *Channel slopes: 0.3 ha for seeding/fertilizing, re-seeding 0.2 ha, plant seedlings/shrubs on 0.3 ha*
- *Recontoured sediments/dam materials: estimate 3 ha for seeding/fertilizing, re-seeding 1.5 ha, plant seedlings/shrubs on 3.0 ha*

Chemical Stability

- Water quality will continue to be monitored at the discharge from the site W3 weir as required for post closure monitoring (Section 7.4.)

5.5 MILL AND ANCILLARY FACILITIES

This section addresses the decommissioning measures for the mill and the facilities in the immediate vicinity that support the milling activities. These include:

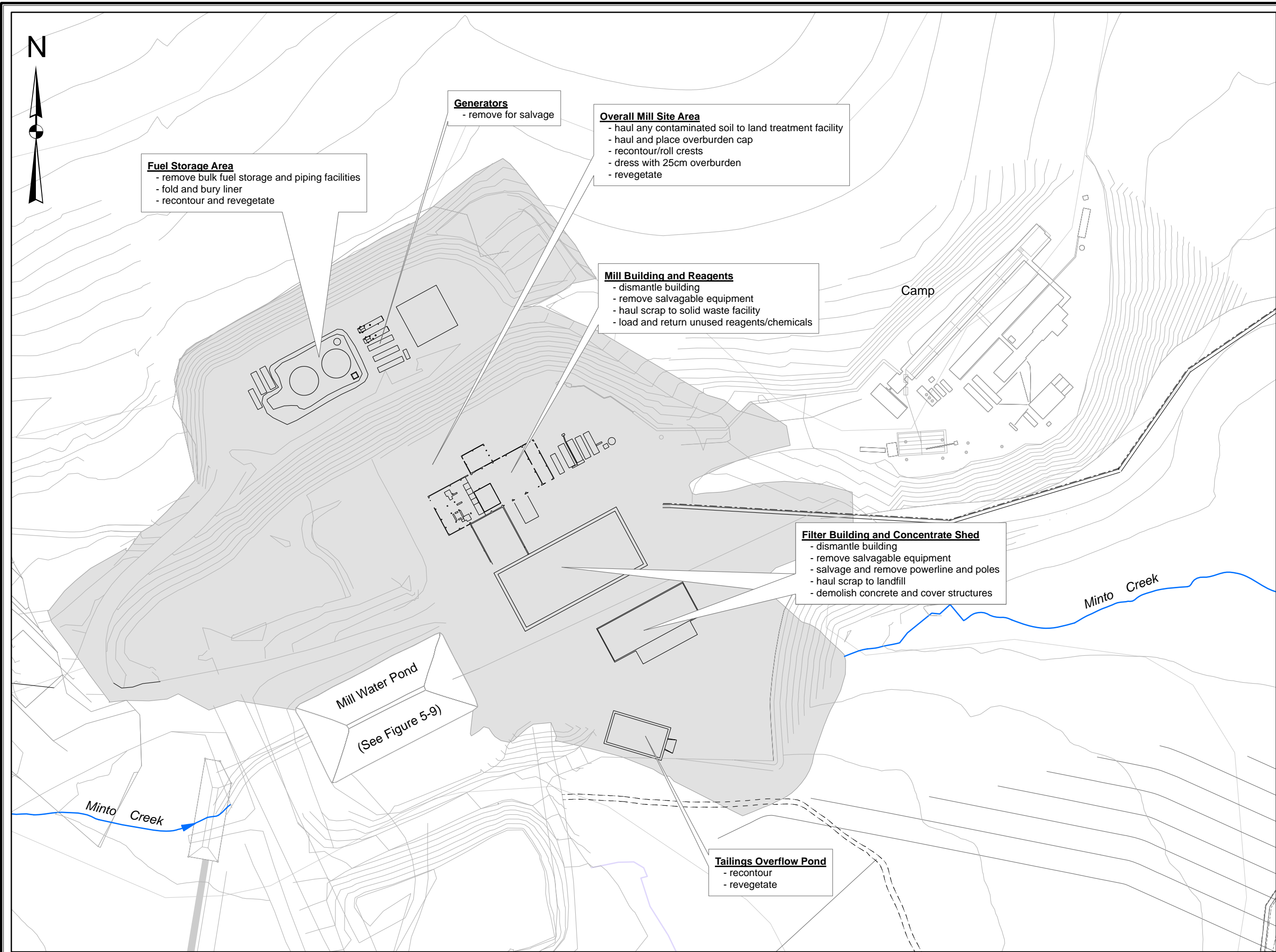
- mill and mill reagents;
- concentrate shed;
- filter building;
- fuel storage area and generator buildings; and
- mill water pond

The general location of the milling area is shown in Figure 5-1, and general closure issues and measures are presented for these facilities and are shown in Figure 5-8. Specific decommissioning activities are also outlined in sections 5.5.3 to 5.5.9 for the mill and the ancillary structures.

5.5.1. Closure Issues


Concern regarding physical stability of these structures at closure will be mitigated for the most part by their disassembly and removal from the site. Of these facilities, only the mill water pond closure measures require significant engineering design and earthworks to mitigate physical stability issues.

Chemical stability issues for this area and facilities would arise primarily from contamination of surrounding soils by fuel, chemicals or concentrates. Such instances will be documented through an environmental audit, conducted upon the completion of milling activities.



Minto Mine Project

Detailed Decommissioning and Reclamation Plan


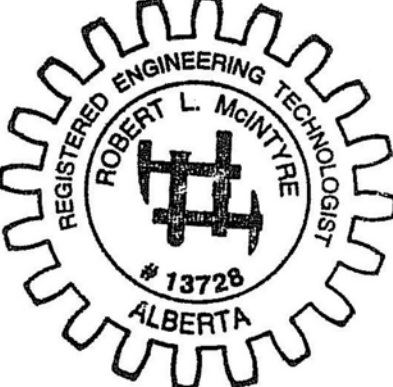


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Legend

- Access Road
- Road
- Exploration Road / Trail
- Transmission Line
- Contour
- Site Feature Profile Contour
- Water Course
- Areas of Construction

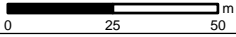




Base data obtained from Yukon Engineering Services
Nov3_06_status_plan.dwg

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115/11

Figure 5-8

Reclamation Measures for Mill and Ancillary Facilities

Scale: 



Drawn by: HD

Checked by: RM

Date: October 2006

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5.5.2. Closure Measures

A salvage program will be employed before the end of mine life to minimize in-situ final disposal of mill and ancillary facility scrap. It is expected that removal of the mill and ancillary facilities will be done by auction or contractor for salvage value.

Contaminated soil will be remediated on site at the site's approved Land Treatment Facility, and mill reagents and chemicals will be removed from site. Propane storage tanks and hardware items will be returned to the supplier.

The reclaim line and all above ground power cables and overhead power line gear will be salvaged. Buried services such as piping and wiring will remain buried. Concrete footings will be semi-demolished by drilling and blasting as required and will be covered with fill and recontoured to establish final drainage runoff patterns. Culverts will be removed and the entire area will be covered in 1 metre of overburden and revegetated. Non-salvageable materials will be buried in waste rock in the waste rock dump.

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for the mill and ancillary facilities. This will form the basis for the closure costing and scheduling.

Physical Stability

- i. Remove salvageable equipment from mill, filter building, generators, concentrate shed, and fuel storage area
 - *Labour x 790 hrs, trades labourer x 840 hrs*
 - *Crane support x 64 hrs*
- ii. Decontaminate Building – hosing and clean-up
 - *Labourer x 160 hrs*
- iii. Dismantle buildings
 - *Labour x 1160 hrs, trades labourer x 680*
 - *Hoe x 160 hrs, crane support x 90 hrs*
- iv. Concrete demolition
 - *Blaster x 80 hrs, hoe x 40 hrs, dozer x 40 hrs*

- v. Scrap haul to solid waste facility
 - *Hoe x 60 hrs, haul trucks x 120 hrs*
- vi. Test soils for contamination and haul to land treatment facility
 - *Environmental scientist x 35 hrs*
 - *Hoe x 15 hrs, haul truck x 15 hrs*
- vii. Fold and bury liner for fuel storage area
 - *Hoe x 20 hrs, dozer x 100 hrs*
- viii. Re-contour area and slopes to bury footings and establish drainage
 - *Dozer x 100 hrs*
- ix. Haul and place 1 m deep overburden cap and contour for seeding
 - *5.0 ha x 1 m depth = 50,000 m³*
- x. Revegetate based on trial success
 - *5.0 ha for seeding/fertilizing, re-seeding 2.5 ha, plant seedlings/shrubs on 4.0 ha*

Chemical Stability

- i. Environmental audit/site assessment prior to closure activities to identify contamination sources
 - *Conducted by consultant, sampling and reporting included*
- ii. Mill reagents returned to suppliers or removed as waste as appropriate, based on storage condition
 - *Costs dependant upon stock/condition at closure*
- iii. Contaminated soils excavated/removed to land treatment facility based on findings of environmental investigation
 - *Costs dependant upon findings*
- iv. Water quality will continue to be monitored at the mill water pond channel outlet as required for post closure monitoring (see section 7.4 Compliance Monitoring and Reporting)

5.5.3. Mill Building

Closure measures for this site include removal of the salvageable mill components, such as the ball and SAG mill and milling-related equipment stored here. Any recyclable materials will be shipped to an appropriate recycling facility and all wastes will be disposed of in an appropriate disposal area, either the site solid waste management facility or an approved off site disposal

facility. The concrete mill foundations will then be partially demolished and pushed in, covered with fill and overburden and revegetated.

The toe slopes of the fill at both the mill and the campsite pads will be recontoured to assume a more rounded slope, limiting erosion as much as possible. The angle and subsequent stabilization/revegetation measures will be contingent upon reclamation research findings from variable slope trial plots.

5.5.4. Generator Buildings

The generator buildings will be removed from the site after the power hookups are disassembled. Site reclamation after the building removal is covered in section 5.5.8.

5.5.5. Concentrate Shed

The concentrate shed will be dismantled and removed for sale or salvage at the end of mine life. The remaining concrete footings will be partially demolished by blasting. The very southwest corner of the foundation may require complete demolition to facilitate the excavation of the reclaimed drainage channel for Minto Creek in the vicinity of the mill water pond (see section 5.5.7 Mill Water Pond). This section of the foundation would be pushed into the interior of the remaining footings area, and all footings will be collapsed inward and buried with fill prior to surface reclamation.

5.5.6. Tailings Filter Building

The tailings filter building and associated tailings handling infrastructure (conveyors, etc.) will be dismantled and removed for sale or salvage at the end of mine life. Any recyclable materials will be shipped to an appropriate recycling facility and all wastes will be disposed of in an appropriate disposal area, either the site solid waste management facility or an approved off site disposal facility.

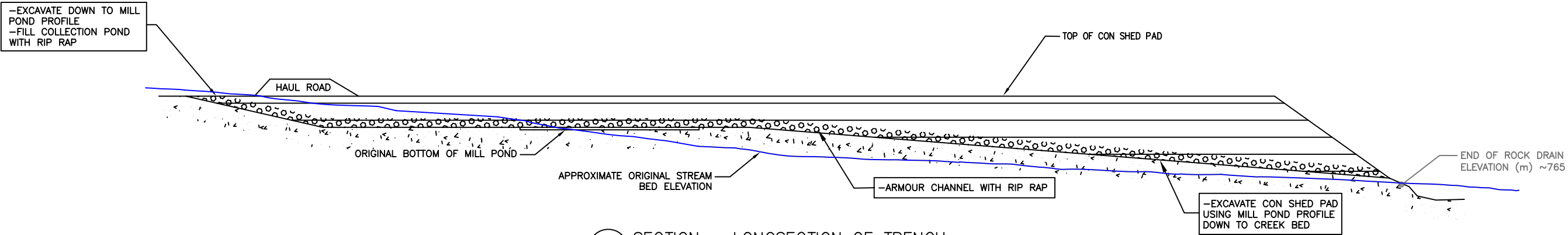
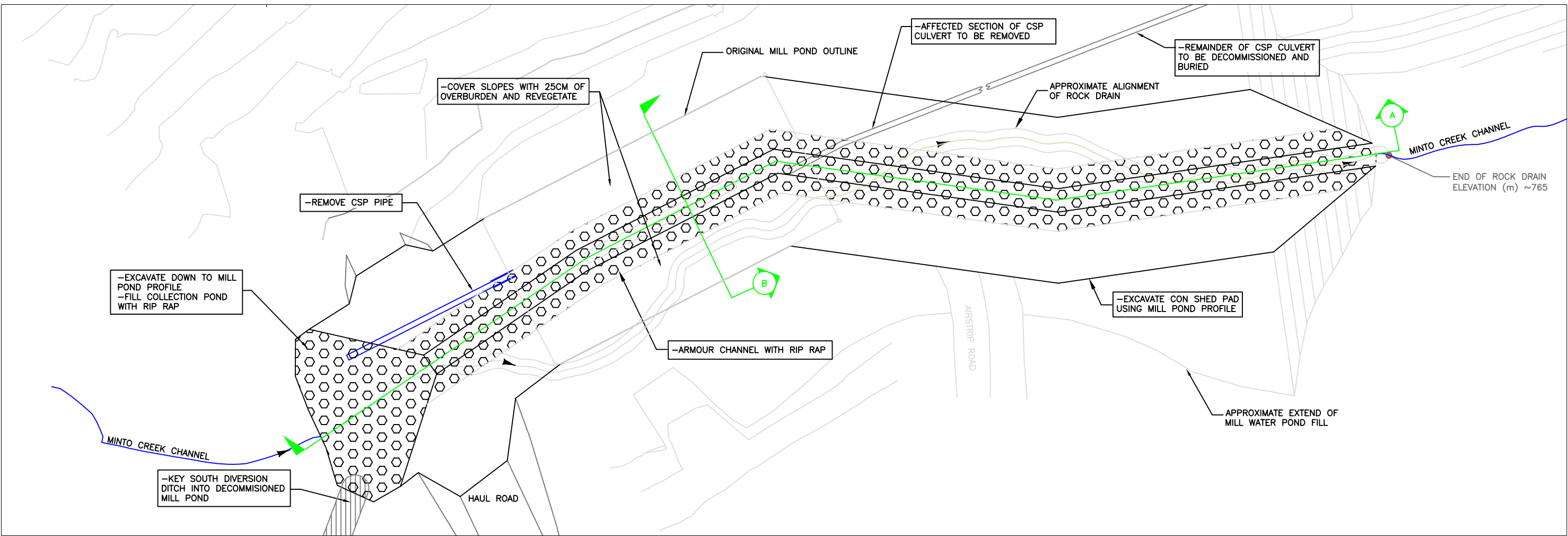
5.5.7. Mill Water Pond

The mill water pond is a lined pond, constructed according to EBA's Final Preliminary Design – Mill Water Pond, Minto Property, Yukon Territory (1997). Together, the mill water pond and the

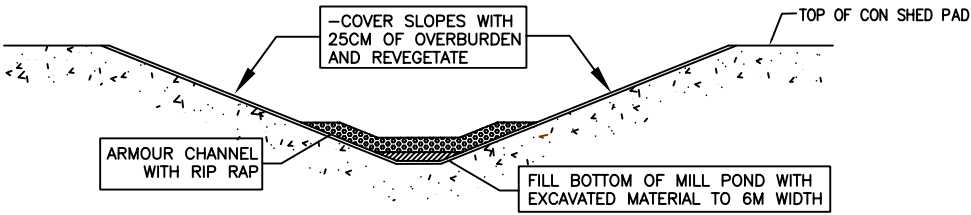
main dam impoundment will retain the water needed for the reclaim water system. This system provides make up process water for milling activities, supplementing water from the pit dewatering wells and mill groundwater well.

Figure 5-9 shows the planned reclamation activities for the section of Minto Creek presently entering and exiting the mill water pond. The existing culvert upstream of the mill water pond will be excavated and removed. In order to withstand the probable maximum flood flow, a conveyance channel will be constructed through the present alignment of the mill water pond, with the same dimensions as those utilized for the main dam spillway construction.

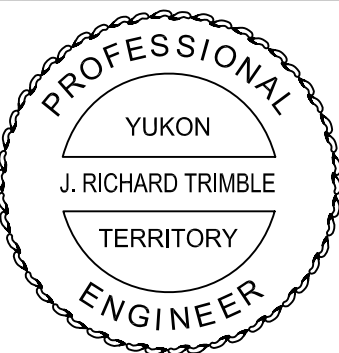
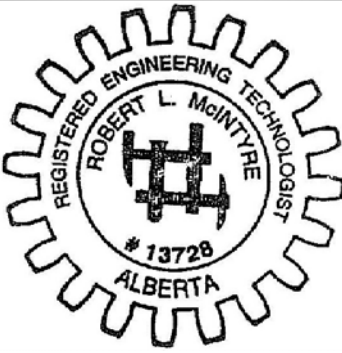
Water quality will be monitored at the mill water pond discharge as required. See Section 7.4 for the post closure monitoring schedule.






A SECTION – LONGSECTION OF TRENCH



MILL POND SECTION B



				 Minto Explorations Ltd.	
TITLE		FIGURE 5-9: RECLAMATION MEASURES FOR MILL WATER POND			
PROJECT		MINTO MINE			
DATE: October 2006		ACCESS JOB NO.		MIN-05-01	
DWN. CSF		CHKD.		REVISION NO.: 1	

5.5.8. *Fuel Storage Area*

The following bulk fuel storage tanks will be removed from the site after the piping/delivery systems have been removed by qualified contractors:

- 2 x 1.5 million L
- 1 x 55,000 L
- 2 x 90,000 L

The area will be subject to environmental investigation and characterization at closure that will prescribe the extent of the closure measures for the removal of any fuel-contaminated soils. Any such materials will be hauled to the site land treatment facility for treatment.

The fuel storage area HDPE liner will be folded into the recessed area and buried with local fill. Final grading will establish ultimate drainage patterns and the pad will be covered in 1 m of overburden and revegetated.

5.5.9. *Mill Reagents and Chemicals*

Unused mill reagent supplies will be returned for credit once the mill has been shut down. It is anticipated that all reagent product will be properly contained/stored so as that there no product will be considered special waste. A closure inventory/investigation of reagents and hazardous materials on site will be conducted upon the cessation of mining activities and the implementation of the closure plan. Should some product's containment be deemed suspect upon the closure inspection, that volume of materials will be added to an inventory of special wastes, stored under the Company's Special Waste Permit # 43-040, and removed from the site for disposal in a permitted facility by a licenced contractor with other special wastes on site.

It is expected that the inventory of hydrocarbon products at the Minto site will be consumed as part of the interim closure. Fuels and lubricants will be required during the two-year period for implementation of the interim closure measures after mine shutdown. The inventory remaining on site once all activity has ceased will be removed from the site by one of three methods:

- returned to the original supplier for credit wherever possible;
- sold to a third party user; or

- trucked to an authorized disposal agency to be recycled or destroyed.

It should be noted that the operation of diesel powered vehicles and any electrical generators used on site will provide the Company with a method of reducing remaining inventory of diesel fuel as the mining operations cease. Gasoline will be similarly removed, and any remaining inventories of diesel and gasoline will be returned to suppliers or sold based on its' wide spread local use.

The propane supplier will remove propane tanks. Associated fuel delivery lines at the camp will be removed and disposed of in a manner similar to that of the gasoline and diesel fuels.

Other hydrocarbon products that may be present at the mine site are primarily hydraulic fluids, lubricating oils, greases, antifreeze and solvents packaged in either 1000 litre bulk cubes, 200 litre drums or smaller packaging. In most cases the remaining inventory of these materials will be returned to the original suppliers for reuse or sold to other third party users in the local area. In certain circumstances, specialized products may have to be disposed of through a licenced waste disposal firm. It is anticipated that such material will be small in volume.

During the final site assessment, petrochemical contaminated soils will be identified and processed for remediation. Any fuel storage areas and refueling stations, once decommissioned, will then be assessed for soil contamination. The affected soils will be treated at the company's permitted Land Treatment Facility.

5.6 MAIN ACCESS ROAD

The main access road to the property was constructed in 1996 and 1997. This road was constructed to facilitate traffic from 26-ton ore concentrate trucks. The road was constructed by cut and fill methods with a road width of 8 meters and associated ditch drainage and culvert installations. Figure 2-2 Project Area Overview shows the alignment of the main access road.

5.6.1. Closure Issues

The Company expects that the determination of the closure fate of the main access road will be made in consultation primarily with the Selkirk First Nation and secondarily with local trappers, the community, and government regulators. The closure plan presents three options for road reclamation.

1. No road deactivation;
2. Road deactivation from Minto Creek to the mine site; or
3. Deactivation of the entire road.

In making a final decision about closing the main access road, consideration will also be given to the potential requirement for equipment access. Despite the identified closure timing and schedule, final access road removal (if selected) would only be undertaken once it is concluded that the site is stable.

The primary consideration for the physical stability of the main access road at closure will be slope stability where culverts have been removed and drainages channels have been established through the road alignments. Siltation of streams could occur during culvert removal and bank stabilization work. There are no chemical stability concerns associated with the main access road.

5.6.2. Closure Measures

Should a deactivation option be selected for the road, it will be subject to standard road decommissioning and reclamation measures at closure, including culvert excavation, drainage recontouring, slope stabilization and surface scarification. This will include conducting culvert

removal work in the later summer/early fall when flows are low or non-existent. Culvert removals and bank recontouring works at locations where there is still flow will include pump around or flow diversions to ensure that work is done in the dry and the silt loads are not added to stream systems. Regrading/contouring the roads will ensure that runoff sheds off the road surface. The road surfaces are not expected to require seeding, only surface scarification to encourage natural revegetation.

Closure objectives for the site access roads include slope and drainage stabilization, erosion prevention and revegetation. Actual decommissioning measures will include recontouring, scarification, and removal of stream culverts. On steeper slopes, erosion barriers will be placed at frequent intervals to ensure stability.

A number of culverts will be removed upon final closure of the road. Of key importance is the removal of culverts at stream crossings which are fish bearing. At these stream crossings, the roadbed would be cut down to the culvert and original streambed elevation with side slopes brought back to 2:1. Material removed during culvert removal will be spread loosely on adjacent road surface to promote revegetation. The stream channel would be stabilized and slopes revegetated.

The Big Creek Bridge and all culverts will be removed once all heavy equipment has been removed from the mine and closing reclamation has essentially been completed in the upper Minto Creek basin.

Experience shows that vegetation will have re-established itself in the 30 m wide cleared right-of-way in the 7 years of life of mine and only remedial revegetation work will likely be required. The preferred methodology is to encourage natural revegetation to occur, after first preparing the road surface by recontouring and scarifying.

Figure 5-5 depicts the typical treatment of the access road for final closure. The following section summarizes the closure measures related to physical stability that are planned for the main access road, assuming entire deactivation. This will form the basis for the costing and scheduling.

Physical Stability

- i. Excavate and remove culverts
 - *Labour x 415 hrs, tradesmen x 40 hrs*
 - *Hoe x 140 hrs, haul truck x 100 hrs*
- ii. Recontour and stabilize slopes and re-establish drainages
 - *Dozer x 70 hrs, 1000 m² erosion control blanketing*
- iii. Revegetate slopes in drainage areas
 - *2 ha for seeding/fertilizing, re-seeding 1.0 ha, plant seedlings/shrubs on 1.0 ha*
- iv. Scarify road surface
 - *Grader x 150 hrs*
- v. Remove Big Creek bridge
 - *Remove decking and span: labour x 50 hrs, crane x 40 hrs, hoe x 40 hrs, lowbed truck x 20 hrs*
 - *Cut off piles: labour x 50 hrs*
 - *Recontour banks if necessary: hoe x 30 hrs, dozer x 30 hrs*
- vi. Reclaim barge ramps
 - *Remove gravels and recontour and scarify areas: hoe x 20 hrs, dozer x 30 hrs*

Chemical Stability

Chemical stability is not a concern for the reclamation of this component.

5.7 MISCELLANEOUS SITES AND FACILITIES

This section addresses the decommissioning measures for miscellaneous facilities and sites around the property. These include:

- mine camp and related infrastructure;
- airstrip,
- exploration sites and trails;
- land treatment facility;
- solid waste facility
- explosives plant site; and
- site roads.

General closure issues and measures are presented for these areas and closure measures are shown in Figure 5-10 Summary of Reclamation Measures on page 91. Specific decommissioning activities are also outlined in sections 5.7.3 to 5.7.8.

5.7.1. Closure Issues

Any concern that may exist regarding the physical stability of these structures/areas at closure will be mitigated for the most part by either:

- a) disassembly and removal from the site; and/or
- b) recontouring and revegetation of the area.

Chemical stability issues for this area and facilities would arise primarily from contamination of surrounding soils by fuel, chemicals or other wastes. Such instances will be documented through an environmental audit, conducted upon the completion of milling activities.

5.7.2. Closure Measures

The salvage program before the end of mine life will minimize in-situ final disposal of any scrap generated in the decommissioning of these facilities. It is expected that removal of these facilities, namely the camp and explosives plant site, will be done by auction or contractor for salvage value.

Any contaminated soils identified will be remediated on site at the site's approved land treatment facility, and any recyclables and/or special wastes will be removed from the solid waste facility. Closure plans will be submitted to YG Environment prior to the final decommissioning of the land treatment facility and the solid waste facility.

Buried services such as piping and wiring will remain buried. Concrete footings will be semi-demolished by drilling and blasting as required and will be covered with fill and recontoured to establish final drainage runoff patterns. Culverts will be removed and pertinent areas will be covered in 0.25 metres of overburden and revegetated.

The following section summarizes the closure measures related to both physical stability and geochemical stability that are planned for these miscellaneous sites and facilities. This will form the basis for the closure costing and scheduling.

Physical Stability

- i. Remove salvageable equipment from camp and explosives plant area
 - *Labour x 804 hrs, tradesmen x 50 hrs*
 - *support equipment*
- ii. Dismantle buildings
 - *Labour x 1400 hrs, hoe x 150 hrs*
- iii. Site clean-up
 - *Labourer x 500 hrs*
- iv. Scrap haul to solid waste facility
 - *Hoe x 20 hrs, haul trucks x 50 hrs*
- v. Reclaim septic system
 - *Labour x 10 hrs, hoe x 2 hrs*
- vi. Scarify airstrip to promote natural revegetation
 - *Grader x 20 hrs*
- vii. Reclaim solid waste facility and land treatment facility
 - *Tractor trailer x 40 hrs, dozer x 16 hrs, hoe x 40 hrs, haul truck x 40 hrs*
- viii. Recontour areas and site roads, cover in overburden 0.25 m thick
 - *5.2 ha x 0.25 m = 13,000 m³*
- ix. Revegetate based on trial success
 - *5.2 ha for seeding/fertilizing, re-seeding 2.5 ha, plant seedlings/shrubs on 4.0 ha*

Chemical Stability

- i. Environmental audit/site assessment prior to closure activities to identify contamination sources
 - *Conducted by consultant, sampling and reporting included*
- ii. Contaminated soils excavated/removed to land treatment facility based on findings of environmental investigation
 - *Costs dependant upon findings*
- iii. Closure plans submitted for waste facilities
 - *2 plans prepared by consultant*
- iv. Special wastes and recyclables removed from site
 - *Costs based on materials stored at facilities at closure*

5.7.3. Mine Camp and Related Infrastructure

In 1999 the Company completed construction of a camp for mine staff that included living quarters for 42 persons - a seven-unit accommodation/kitchen/diner/changehouse complex. In 2006, the camp was expanded by the addition of trailers and other construction to provide capacity for 140 persons, including an office complex. The facility provides a potable water supply (drilled groundwater well, 1998), gas-fired heat, a local power supply, and sewage disposal to two adjacent septic fields. Several structures behind the facility house the fuel supply to the furnaces, relay power from a diesel electrical generator, and pump fresh water.

Closure measures for the campsite include disassembly of the camp trailers and related infrastructure. All salvageable material will then be removed from the site. The remaining campsite landing will be recontoured for erosion stabilization, covered in 0.25 m overburden, and revegetated.

Upon closure the septic tanks would be pumped out and the waste will be hauled to an approved disposal facility, as during operations. The remaining tanks will be crushed and covered with local soils. The remaining infrastructure (i.e. piping and related materials, including the septic field) for the two systems would remain buried.

5.7.4. *Airstrip*

During the period of inactivity (1997-2005) the airstrip saw substantial colonization by natural vegetation. Upon final closure, the airstrip will be scarified and allowed to revegetate naturally. Seeding will not be required, as there is minimal erosion potential with the airstrip. The airstrip makes up approximately 2.4 ha of the total 29.2 ha area of all the miscellaneous sites.

5.7.5. *Exploration Sites and Trails*

Current exploration activities being conducted on the site are operating under a Class III Mining Land Use Authorization, and are subject to specific closure measures by Minto Explorations Ltd. These measures will be implemented as required by the exploration crew, and are not subject to closure planning in this plan.

An old exploration trail system exists around the height of land surrounding the general mine area. These trails primarily follow the local ridges navigating the highest elevations of the Minto Creek catchment basin. These trails have provided access for mineral exploration activities and are characterized by intermittent trenching lines, drilling pads, and various forms of non-hazardous debris related to these exploration activities. The trail system is also used by a local trapper who has a small cabin along the ridge immediately to the north of the mill and campsite.

The exploration trails are outside of the immediate mine site and have seen only minimal use in recent years. The trails are narrower than the main access road and generally follow topographic contours (i.e. were not constructed using cut and fill techniques). They will be left to allow for natural vegetation to continue, which should continue to be successful due to the proximity of the seed source and the minimal compaction during original construction and subsequent use. Some limited recontouring and stabilization may be required in a few locations where potential erosion is a concern.

5.7.6. *Land Treatment Facility*

The land treatment facility (LTF) for the site is located near the airstrip in an area originally excavated from bedrock for an equipment laydown area. This facility is permitted by YG, Department of Environment, Environmental Programs Branch under Permit # 24-204 to treat a maximum volume of 700 m³ of hydrocarbon contaminated soil. Contaminated soils from fuel/oil

spills during operations will be treated at the site to appropriate levels of remediation before being used as industrial fill as per the permit requirements.

The closure of this facility is subject to the submission of a formal Closure Plan to YG, along with sampling results which demonstrate the final concentrations of contaminants in the soil being treated. It is expected that upon final closure of the entire site, dismantling and decommissioning activities may reveal or result in soil contamination requiring the relocation to the LTF and an undetermined number of months of treatment to achieve desired remediation levels. As such, the LTF Closure Plan and final sampling results will be prepared and submitted some time after final closure of the mine site has begun.

Generally, once the desired contaminant levels have been reached in the final volumes of treated soil, and the Closure Plan has been approved by YG, the soils will be spread over the site, recontoured in place and revegetated. If required, additional overburden may be hauled and used as cover material and growth media for revegetation.

5.7.7. Solid Waste Facility

Under Commercial Dump Permit # 81-005, issued to Minto Explorations Ltd. by YG, Department of Environment, Environmental Programs Branch, MintoEx has established a Solid Waste Facility adjacent to the Land Treatment Facility near the airport that includes:

- a burning pit for wood and paper waste;
- construction waste disposal area;
- metal and rubber tire disposal areas; and
- incinerator ash disposal in old exploration trenches.

This facility will receive construction and operational waste throughout the operation of the mine, as permitted by the authorization, and will be covered by fill and compacted in 'lifts' as per common landfill practice.

Scrap equipment will be stored in various lay down areas (known as "bone yards") located on site and along the access road, including primarily scrapped equipment stored to be utilized on the mine site as a source of spare parts or good recyclable scrap material. At mine closure,

salvageable material from these sites will be sold as scrap and removed from the site. Material that has no scrap value will be disposed of in the solid waste facility. Prior to disposal in the landfill, all of this material will be examined to ensure that all hazardous materials have been removed.

Hazardous materials so removed will be shipped off site to a licenced waste disposal site, along with other stored hazardous or special wastes, permitted under the company's Special Waste Permit # 43-040.

At final closure, the submission to YG of a formal Closure Plan for the solid waste facility will be required, documenting the conditions and materials at closure. Preceding the final facility reclamation, tires and salvageable scrap metal will be hauled off site for salvage/recycling and once the closure plan is approved by YG, the facility will be covered by two compacted layers of 200 mm thick compactable soil material obtained from local borrow sources. The cover material will be graded to prevent pooling of precipitation runoff and to encourage the shedding of water. The site will then be revegetated.

5.7.8. Explosives Plant Site

The ANFO explosives (ammonium nitrate – fuel oil) production area is comprised of the production plant and AN bag storage and powder magazine storage areas, located near the drainage boundary southwest of the main mine site (see Figure 5-1).

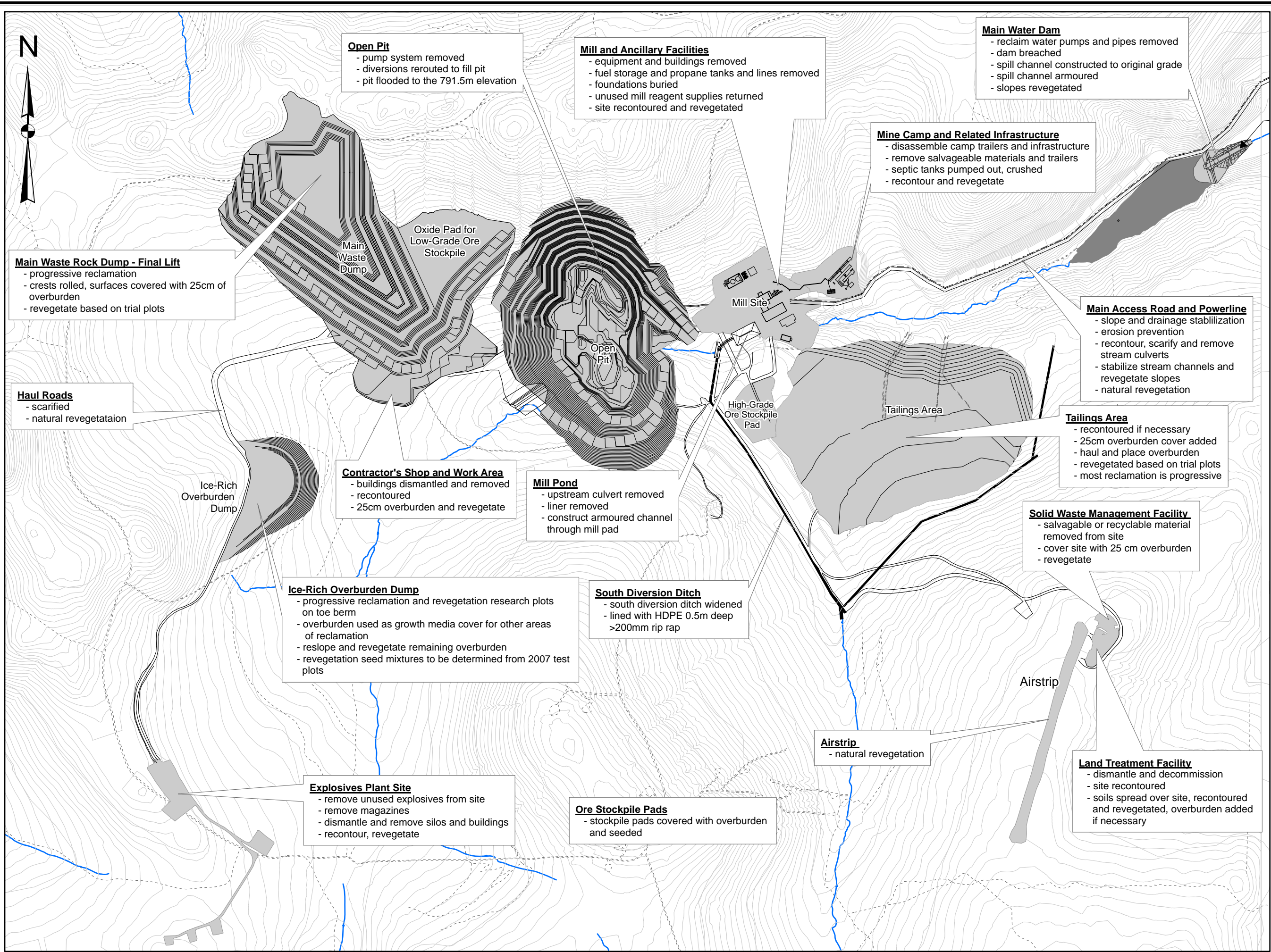
At closure, unused explosives that remain on site will be returned for credit and the explosives magazines and other equipment will be returned to the explosives supplier. The septic system at the site will be pumped and decommissioned (destroyed) by excavator. Any fuel-contaminated soils will be excavated and hauled to the land treatment facility for treatment. The disturbed areas will be recontoured if necessary and covered with overburden growth media and revegetated. Seed mixtures and fertilization specifications will be based on both revegetation trials and natural revegetation observations and success.

5.7.9. *Mine Roads*

All mine roads will be subject to typical road reclamation measures, as per haul roads and main access road. These measures are laid out in Figure 5-5.


5.8 SUMMARY OF CLOSURE METHODOLOGY

Figure 5-10 presents an overview of the closure and reclamation measures for the all mine development components over the entire site.











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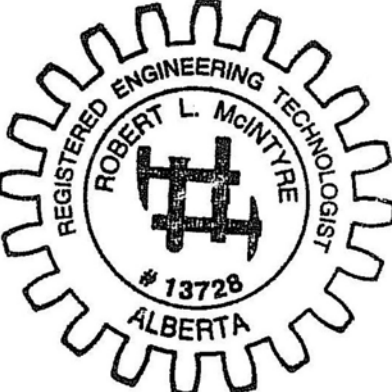
Detailed Decommissioning and Reclamation Plan



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Legend

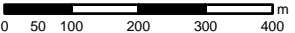
	Access Road
	Road
	Exploration Road / Trail
	Transmission Line
	Contour
	Site Feature Profile Contour
	Water Course
	Areas of Construction





Original Drawing by HATCH
ACAD-Overall for Reclamation.dwg, Drawn by D.L.N Feb. 06

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115/11

Figure 5-10 Summary of Reclamation Measures

Scale: 



Drawn by: HD/RG	Checked by: RM	Date: October 2006
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5.9 ADAPTIVE MANAGEMENT PLANNING

The Minto project is subject to a number of operational monitoring programs, including but not limited to:

- Water Quality Surveillance for site and receiving waters;
- Physical Stability Monitoring of various site structures;
- ABA Testing;
- Groundwater Monitoring;
- Tailings Stability Monitoring; and
- Geotechnical Inspections.

A significant amount of data has been collected under some of these programs and similar requirements during the interim closure period. During the operational mine life, the site database will be added to extensively through these monitoring efforts. Section 7.0 Post Closure Management, proposes the continuation (and progressive scaling back) of the majority of these monitoring initiatives during the active closure and post-closure period.

The closure measures in the previous sections have been developed and proposed based on the most up to date information collected at the site, and the best interpretations of these data with respect to the projected conditions on the site at final closure. Without doubt, these conditions will change as the dynamic site progresses through operations and closure. The periodic revisions to this DDRP document as per the QML schedule will address these changing conditions moving through operations, but as closure activities progress and monitoring on the site continues, planning mechanisms that can account for and react to changes to the expected conditions governing the closure measures need to be in place.

Adaptive management planning (AMP) is a recognized and effective way to ensure that changing conditions during closure are not subject to static reclamation initiatives, and that closure programs can be adapted to these conditions to achieve desired performance. MEL is committed to AMP in the context of closure of some of the higher risk features on the site. At this point in the planning process, as monitoring information and data collection is limited in some areas, MEL sees the application of AMP for the following mine component/conditions:

- **Tailings Storage Facility** – an operational adaptive management program has been proposed for the Tailings Storage Facility in the Tailings Management Plan, based on data collected through the monitoring initiatives proposed in the same document. These data will be essential not only to guide tailings placement, but also in assessing and revising the closure plans. The continuation of this monitoring regimen into the post closure period after tailings placement has ceased and closure measures have been applied to the facility will provide further information for the comparison of the closure measures against the expected performance. An Adaptive Management Plan for the long term closure of the Tailings Storage Facility will be prepared and implemented for closure. Drafts of this plan will be presented in future revisions of this DDRP as operational monitoring data further clarifies the picture of the stability of the feature.
- **Metals Leachate/Acid Rock Drainage Issues (ML/ARD)** – Acid Base Accounting (ABA) and representative ML testing is currently being conducted under the water license ABA Testing Program. This is a comprehensive testing program that will characterize both the waste rock and tailings materials during the entire mine life, and all results to date have indicated that there is no ML/ARD concern with materials extracted. This will continue to guide the placement of waste materials during operations, ensuring that any materials with acid generating potential is not used for construction and is confined to the assigned waste placement areas. Furthermore, the company will specify distinct areas for any such material within the waste storage areas, such that should alternate closure measures be required for this material, they will be readily accessible and accurately delineated. This operational information collected, coupled with the proposed closure monitoring of the waste storage areas, will be used in preparing and implementing an Adaptive Management Plan for ML/ARD issues site wide, to be prepared and ready for implementation at closure.
- **General Reclamation Measures**
 - **Reclamation Cover Material** – The tracking of the volumes of materials excavated and placed – specifically overburden materials – conducted in the course of prudent operational management and required under the Water License Physical Monitoring Program will provide a running indication of the quantity of overburden available for reclamation growth medium. Preliminary drilling core results indicate that there is sufficient material available for the planned closure initiatives. Should the

information gained prior to closure indicate that this is not the case, the company will have in place an adaptive management plan for ensuring that sufficient growth media is available for the required reclamation. This plan will also consider the results of the reclamation research program, which at the time of closure will have provided significant insight into the quality and quantity of growth medium required to achieve the objectives of the revegetation/reclamation planning.

- **Contaminated Soils** – the Land Treatment Facility on the site is permitted for the treatment of soils to remove hydrocarbon contamination. This process is not effective for the removal of metal contamination, and the nature of the site and the confirmed geochemical signature of area surficial soils make it likely that some of the materials treated will have metal contamination that would designate it as special waste. This has been confirmed by recent testing of materials in the LTF. This material, once successfully treated for hydrocarbons, could be placed in one of the waste storage areas (tailings, waste rock or IROD storage areas) and reclaimed in keeping with the implemented measures at that location, as metal concentrations in materials at these locations will likely be similar or higher. This approach has been approved by YG Environmental Programs in the past at closed sites. This adaptive management plan will refine these measures based on remediation success and departmental correspondence leading up to and after closure.

These adaptive management plans will be developed over the operational life of the mine with the goal of having them finalized for implementation at closure. They will be modelled on accepted AMP features, such as performance monitoring programs, threshold levels for data from the monitoring programs and associated triggers for action items, and response actions for expanding or refining the monitoring initiatives, implementing extended closure measures, and/or conducting further studies to develop mitigation measures for conditions that are divergent from those expected.

6.0 IMPLEMENTATION SCHEDULE

The mine life is expected to be approximately 7 years. Approximately one year will be required for site preparation, construction of the mill and ancillary facilities and for mine pre-production development. Production will start in year 1 and will continue to the middle of year 7. Reclamation of the disturbed areas will be done on the basis of distinct phases, initially to match the overall mining schedule and after closure to reflect the reclamation and monitoring effort required. This 'phased' approach to reclamation planning will assist the company in achieving the overall objectives of progressive and final reclamation at the site.

Year 1 – First Year of Production

Phase I will commence during the latter part of construction and continue through into the first year of production. Progressive reclamation priorities will be:

- cuts and fills along the access road to control erosion;
- disturbed areas near water courses along the access road; and
- other disturbed areas suitable for reclamation e.g. borrow sources for dam construction.

Year 2 to Year 7 - Operations

Phase II of the reclamation program will be initiated once the mine is in full production and continue until the end of the life of the mine. A moving three-year plan will be formulated each year outlining progressive reclamation objectives and refining reclamation studies. This will include:

- the area of disturbed land at the beginning of the period;
- the area of additional lands to be disturbed during the period;
- the area of disturbed land to be prepared, seeded and/or planted and fertilized;
- the area of remaining disturbed land at the end of the period;
- ongoing progressive reclamation of waste rock dumps, tailings area, overburden dump and fill slopes;
- ongoing evaluation of test plots and reclamation trials;
- the initiation of additional reclamation research as required;

- the undertaking of larger scale progressive reclamation of abandoned or phased out areas; and
- ongoing monitoring results and analysis.

Table 6-1. Schedule for Progressive Reclamation Activities during Mine Operations.

Mine Component	Total Area for Reclamation (Progressive and Final - Hectares)	Reclamation Category	Total Area for Progressive Reclamation (Hectares)	Operational Year						
				1	2	3	4	5	6	7
Main Waste Rock Dump	37.8	Earthworks	32.3	0.25	8	5.55	5.5	5.5	5.5	2
		Revegetation	32.05	-	8	5.55	5.5	5.5	5.5	2
Ice-Rich Overburden Dump (Toe Berm)	7.9	Earthworks	1.2	0.25	0.95	-	-	-	-	-
		Revegetation	0.95	-	0.95	-	-	-	-	-
Tailings Area	38.5	Earthworks	30.9	0.25	-	2	2	8.9	9.75	8
		Revegetation	30.65	-	-	2	2	8.9	9.75	8
Test Plots and Reclamation Trials	4	Earthworks	-	-	-	-	-	-	-	-
		Revegetation	4	3	1	-	-	-	-	-

This table provides the approximate schedule for progressive reclamation (earthworks and revegetation) for the 7 year mine life. The work is scheduled by mine component on a hectare basis. Costs associated with these activities are presented in section 8, Table 8-13.

Year 7 – Mine Closure and Commencement of Reclamation

Final preparation for closure will be done in the middle of year 7 and closing reclamation will commence in the second half of year 7, the final year of production. No ore will remain on the mill stockpile or on the low grade sulphide stockpile. All concentrate spills around the concentrate storage area will be recovered and blended into the mill feed with no further cleanup required after the mill has been shut down. Levels of fuel, reagents, explosives and other operating supplies stored on site will be reduced to minimum levels.

Year 8-10 – Active Decommissioning

It is anticipated that 3 years will be required to fully implement and complete all aspects of the decommissioning and reclamation works. The work would be conducted seasonally during the ice-free period (May-September). During the first year of closure, the majority of site decommissioning works would be initiated.

As one of the first steps in decommissioning the site, an environmental site assessment/audit will be done to identify any closure issues not addressed at the time of writing this plan.

Decommissioning and final closure of the main property access road will be the last closure measure to be fully completed.

Year 11-22 – Closure Monitoring

A program of post closure monitoring and inspection will be carried out during the implementation of closure measures and for a 12-year period following closure. The details of the post closure-monitoring program are discussed in Section 7.4. The program would continue until it is demonstrated that closure objectives have been met and performance in the long term is assured.

7.0 POST CLOSURE SITE MANAGEMENT

The closure phase of the Minto mine will commence with the cessation of economic mining of the open pit and the milling of ores and stockpiles from the ore zone. Once all mineable ore reserves have been processed, the mill and concentrator will be flushed and the tailings management facility will be decommissioned and water retaining structure removed. During the active decommissioning phase which is expected to last approximately 3 years, the number of personnel required will vary depending on site activities, however it is expected that as the major decommissioning and reclamation tasks are completed the number of site personnel required will decline.

It is expected that a Water Use Licence will be required for the decommissioning phase of the operation as water use will continue on a limited basis and wastewater will be released from the water dam in a controlled fashion. Decommissioning of the Big Creek Bridge along the main access road will be subject to community consultation and this activity may also require a Water Use Licence. The continued need for a Water Use Licence following the decommissioning phase will be dependent on site conditions, performance of closure measures in achieving stated objectives and legislated requirements. Post closure management and monitoring of the site will be guided to some extent by water licence, quartz mining licence or other permit requirements, the performance of physical structures remaining on site and the ability of achieving and demonstrating long-term compliance with existing waste discharge standards.

Once overall closure performance has been demonstrated for all aspects of decommissioning, the necessity of maintaining licences or permits would be re-examined. At that point a Certificate of Closure, under the Quartz Mining Act would be requested. The following section provides a general outline of the site management approach that will be taken at the Minto mine during the closure phase.

7.1 ORGANIZATION, SITE ACCESS & SECURITY

A number of personnel will be required on site to implement the various decommissioning and closure tasks. Generally these tasks entail closure of mine workings, regrading of waste rock and overburden piles, decommissioning of the tailings management facility, removal of the water retaining dam, salvage and removal of infrastructure, equipment and reagents,

decommissioning of access roads and reclamation and revegetation of disturbed lands. These activities would be undertaken on a seasonal basis and directed by an onsite manager responsible for decommissioning and reclamation of the Minto mine.

During site decommissioning, it is anticipated that at least a portion of the existing camp accommodations would remain on site to support site personnel. It is anticipated that during the initial post closure phase, site security requirements will continue with a caretaker remaining on site following seasonal closure of the site. A site inspection schedule will continue for the period of closure implementation (3 years) and then move into a post closure monitoring period (12 years) for a total of 15 years. Security personnel will no longer be required once decommissioning and reclamation activities are completed on the property. Table 7.1-1 provides a summary of the personnel requirements by year for decommissioning and reclamation works. Once the majority of physical reclamation works are performed on the site, the number of employees or contractors required will be reduced. The Company is committed to having Selkirk First Nation members employed during implementation of the Plan and will continue to work with Selkirk to optimize long term closure monitoring requirements.

Prior to undertaking closure activities, as part of a comprehensive environmental site assessment, areas of suspected oil, chemical, or other contaminant spills will be tested to confirm locations and quantities requiring clean-up. This site assessment will review previous operational reports and procedures and identify areas of potential concern or contamination. Follow-up testing would be undertaken and plans refined for remediation.

The main access road, barge landings and property security gate will be maintained during implementation of the post closure phase. Site access along the main road, barge support and Big Creek bridge will be required for personnel and truck haulage requirements to and from the site. The security gate and fencing would be maintained while the main access road is in use. Decommissioning and reclamation of various property haul and site access roads will be completed once closure measures have been completed at each facility and site access is no longer required.

Once decommissioning activities are completed on-site, and following a period of post closure monitoring, a determination will be made to permanently close the main site access road. This determination will be done in conjunction with Selkirk First Nation. Closure of the main access

road is expected to be consistent with the plan's closure philosophy; however, it is recognized that the performance of physical reclamation of the site must be assured before a final determination of the main access road closure is made.

The level of access road decommissioning will be discussed first with the Selkirk First Nation. As the access road lays within SFN Category "A" settlement lands, they should determine the appropriate course of action for potential road deactivation. Government regulators and the local trapper will also be consulted regarding decommissioning plans for the road.

Table 7-1 Site Decommissioning and Reclamation Seasonal Personnel Requirements

Personnel	Closure Period Year 1	Closure Period Year 2	Closure Period Year 3	Post Closure Year 4 to 15
Project Manager	1	1	1	
Construction Supervisor/Engineer	1	1	1	
Environmental Monitoring *	1	1	1	1
Equipment Operators	12	4	2	
Equipment Mechanics/Welders/ Fabricators/Electricians	5	5	1	
General Labourers	5	3	2	
Catering Staff	2	1		
Total Seasonal Personnel	27	16	8	1
Part Time Off Season Site Security/Caretaker *	1	1	1	1

Note: Some personnel may be contractors.

* Denotes Selkirk First Nation Band member

7.2 SUPERVISION AND DOCUMENTATION OF WORK

All decommissioning and reclamation works will be properly supervised to ensure that works are constructed according to their design, and that this work is properly carried out and documented. The project manager or the construction supervisor would supervise all closure works. Daily inspection procedures would be completed to document work progress, deficiencies and completion. Existing plans for spill response or other site internal procedures

for fuel handling, waste disposal, fire control and suppression, health and safety and environmental management systems would be used, developed and followed as necessary.

Environmental inspections and tests conducted prior to the implementation of closure measures would be used to confirm areas requiring clean up.

For the water retaining dam and tailings management facility, detailed plans for all earthen works would be prepared and submitted to the YWB and YG Energy Mines and Resources for review prior to construction. These plans would be submitted in a timely manner to facilitate agency review and Board approval prior to implementation. A competent engineer following standard quality control and assurance procedures would inspect and document this construction work. As-built plans and drawings would be completed and the results of the closure work completed on the removed water dam and tailings management facility documented in a final as-built report. This report would be submitted to the Yukon Water Board and regulatory agencies upon completion of closure activities.

For the Big Creek Bridge removal and Minto Creek culverts, plans for all restorative works would be prepared and submitted to the YWB prior to construction. A competent environmental practitioner following standard quality control and assurance procedures would also design, direct and document this restoration work. A summary report of the works would be prepared. This report would be submitted to the YWB and regulatory agencies upon completion of closure activities.

Upon completion of the decommissioning and reclamation works, a final site plan report (summary text and drawings) would be prepared which would outline the facilities or works remaining on the site following closure. This plan would identify the location of buried concrete structures or scrap and landfill disposal areas. It is expected that this plan would accompany an Application for a Certificate of Closure under the Yukon Quartz Mining Act.

7.3 MINE RECORDS

As noted in the previous section, all decommissioning and reclamation works would be documented. Mine records comprising the extent of open pit workings would be retained by Minto Ex. Other site records, files and plans would be archived. Where plans or drawings are

required for mine safety reasons, these plans would also be submitted to government mine safety offices. As-built reports for structures completed for closure and the final site closure report would be retained for record and submitted to government agencies and boards.

7.4 COMPLIANCE MONITORING AND REPORTING

Environmental compliance monitoring, internal monitoring of earthworks and independent geotechnical inspections are presently ongoing at the property. The environmental monitoring at the Minto mine employs several types of scheduled periodic inspections to ensure that the facility is meeting environmental performance objectives and complying with appropriate regulatory standards. These inspections entail:

- scheduled inspections of the waste rock and overburden storage areas, tailings management facility, water retaining dam and mine components to monitor environmental performance;
- scheduled water quality sampling and flow measurements of effluent streams and local receiving water streams;
- scheduled receiving water programs for benthic invertebrates, stream sediments and fish to monitor downstream environmental quality;
- scheduled piezometric monitoring of water levels in wells and the spillway structure at the water retaining dam;
- monitoring of other instrumentation installed in the Tailings Storage Facility as per the Tailings Management Plan;
- annual summer inspections by a qualified geotechnical engineer of tailings management facility, diversion channel, waste rock and overburden storage areas, and water retaining dam for structural stability; and,
- scheduled environmental tours and audits of the property by Minto Ex staff to look for environmental hazards and site stability. Minto Ex will endeavor to invite various Government agencies' representatives as part of the environmental inspections.

At present, the site personnel (mine engineer and environmental monitor) undertakes the scheduled environmental monitoring and inspection programs with the exception of the annual geotechnical inspection and the benthic invertebrates, stream sediment and fish monitoring programs, which are conducted by qualified professionals. All results from the licenced

compliance monitoring programs are reported to the YWB, and YG EMR as monthly or annual reports.

During the active closure phase environmental and physical compliance monitoring and inspections will continue according to the present water use licence or quartz mining licence monitoring programs utilizing site-based personnel. A summary of the current monitoring activities under the present environmental and physical compliance and inspection program is shown in Table 7-1 (as the first 5-year period after milling cessation), with monitoring station locations and descriptions. Figure 7-1 provides the station locations for the environmental and physical monitoring programs.

It is expected that the amount of environmental and physical monitoring and inspection (frequency and quantity) will decline once all closures measures have been implemented. The approach to closure monitoring has been to continue with the present licence monitoring and inspection programs until decommissioning and reclamation measures have been completed and then reduce the frequency of site monitoring and the number of monitoring stations over time as satisfactory closure performance is confirmed. Revisions to the current water licence requirements will be required upon closure to authorize them.

The schedule for monitoring programs planned for the 15-year period immediately following cessation of active mining and milling operations are presented in Table 7-1. For the first 5 years following the cessation of mining, routine environmental monitoring will be completed to demonstrate the effective of closure measures and their performance. Thereafter (year 6 to 10) monitoring frequencies would be reduced to periodic inspections, with a further reduction of frequency for years 11 to 15. The purpose of these periodic inspections would be to ensure that waste discharges remain compliant, downstream receiving waters meet current CCME Guidelines for the Protection of Freshwater Aquatic Life, and physical structures are performing as designed. Should these inspections identify issues of concern, then plans would be developed to address the concerns.

Based on the results of site monitoring for the 15-year period and in discussion with the SFN and appropriate regulators, the need for and the frequency of additional site monitoring will be determined at that time. If the results from monitoring indicate that the site is stable with acceptable geotechnical and environmental performance, then Minto Ex would propose to

decrease the frequency of monitoring further. If the results from monitoring indicate there are concerns with either geotechnical conditions at the site or with environmental issues, then the site would continue to require more frequent monitoring than otherwise proposed and possibly additional remedial work would be required.

As previously mentioned, the Company is interested in having the SFN participate actively in both the closure activities and in post-closure monitoring. Minto Ex will work directly with the First Nation in this regard.

Table 7-2

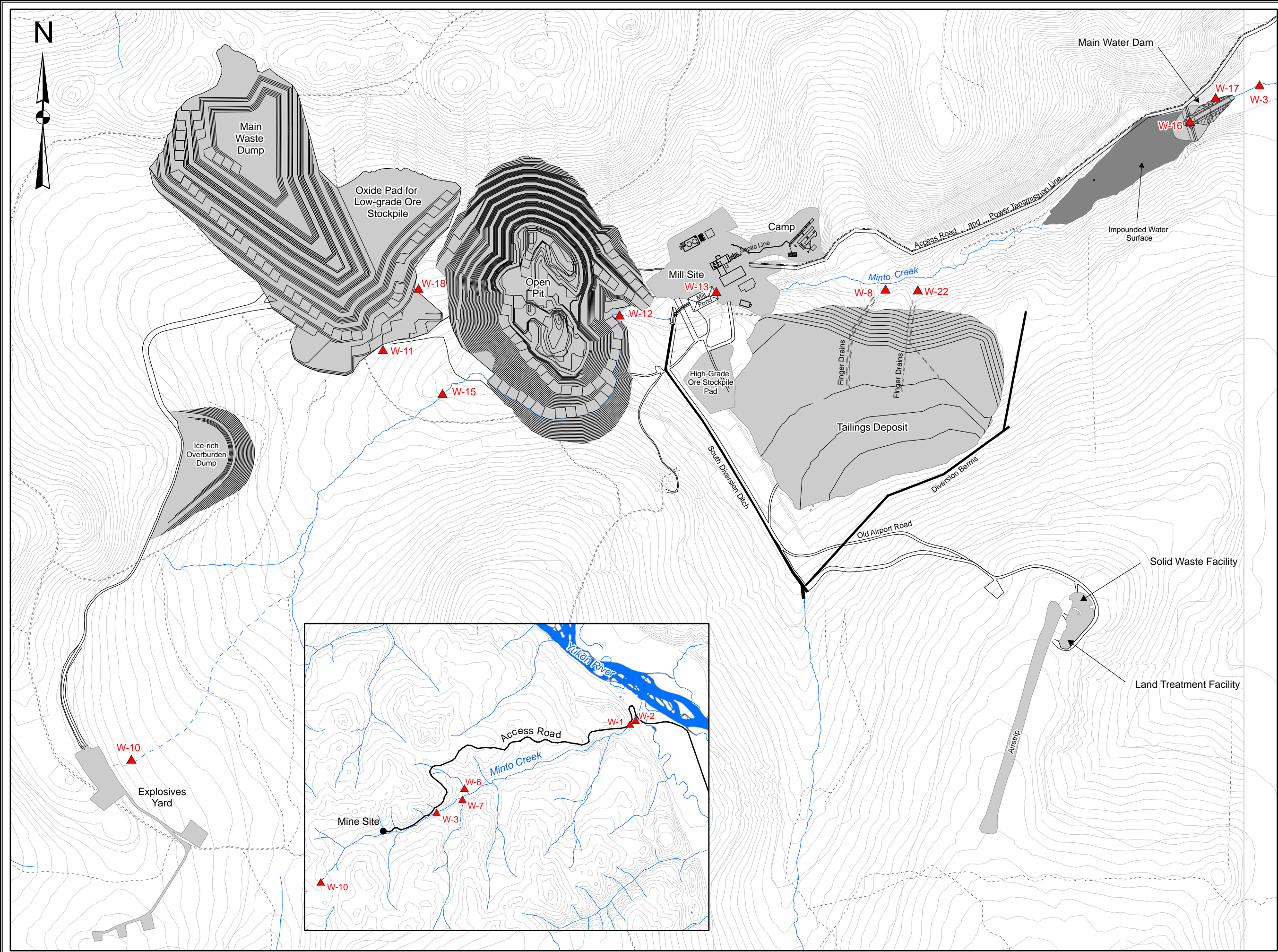
Minto Mine - Detailed Decommissioning and Reclamation Plan











		UTM LOCATION (m) ZONE 8		YEAR 1-5 FREQUENCY						YEAR 6-10 FREQUENCY					YEAR 11-15 FREQUENCY				
SITE	DESCRIPTION	Easting	Northing	Surface Water	Ground water	Sediment	Benthos	Flows	Other	Surface Water	Ground water	Sediment	Benthos	Other	Surface Water	Ground water	Sediment	Benthos	Other
Receiving Water Stations																			
W-2	Mainstem Minto Creek directly u/s Access Road Crossing	392616	6948477	W		A	BA	DCR, W		Q		BA	BA		A		A	BA	
W-3	Mainstem Minto Creek 50 m d/s toe of Dam (Final Point of Discharge)	386747	6945682	W		A	BA	DCR, W		M		BA	BA		Q		A	BA	
W-6	Tributary to Minto Creek	387544	6946420	Q		A	BA	Q		Q		BA	BA		A		A	BA	
W-7	Tributary to Minto Creek	387504	6946069	Q		A	BA	W		Q		BA	BA		A		A	BA	
W-10	Mainstem Minto Creek (south fork at headwaters)	383348	6943654	M				M		Q					A				
Mine Site Stations																			
W-11	Waste Rock Dump Seepage	384106	6944887	M						SA					A				
W-12	Discharge from Open Pit	384819	6944991	M						SA					A				
W-13	Mill Water Pond Discharge	385111	6945061	W2						SA					A				
W-15	Minto Creek, downstream of the overburden dump, just upstream of Open Pit	384286	6944754	M						SA					A				
W-16	Main Water Storage Pond Discharge (or Main Water Storage Pond if not discharging)	386538	6945573	W*							NLA					NLA			
W-17	Main Water Storage Pond Dam Seepage	386615	6945645	M*							NLA					NLA			
W-18	Low-Grade Ore Pad Seepage	384214	6945071	M						SA					A				
W-8	Alternate Tailings Area Seepage/Runoff	385620	6945067	M						SA					A				
W-22	Tailings Seepage/Runoff	385707	6945071	M						SA					A				
P1	Dam Piezometers	TBA	TBA		M						NLA					NLA			
P2	Dam Piezometers	TBA	TBA		M						NLA					NLA			
Physical Inspection Elements																			
	Water Dam	-	-						A*					NLA					NLA
	Tailings Area	-	-						A					A					A
	Diversion Ditches	-	-						A					A					A
	Waste Rock Dump	-	-						A					A					A
	Ice-Rich Overburden Dump	-	-						A					A					A
Environmental Inspection Elements																			
	Revegetation Inspection	-	-						A					A					A
	Wildlife Use Survey	-	-						A					A					A

* Unless structure has been decommissioned/reclaimed

Frequency Description

- W
- Weekly
- W2
- Every 2 Weeks
- M
- Monthly
- Q
- Quarterly
- SA
- Semi-annually
- A
- Annually
- BA
- Bi-annually
- NLA
- No longer active
- DCR
- Daily Continuous Record during open season



- Legend**
-  Water Quality Surveillance Program Sites
 -  Access Road
 -  Road
 -  Exploration Road / Trail
 -  Transmission Line
 -  Contour
 -  Site Feature Profile Contour
 -  Water Course
 -  Intermittent Water Course
 -  Areas of Construction

Original Drawing by HATCH
ACAD-Overall for Reclamation.dwg, Drawn by D.L.N Feb. 06

Projection: UTM Zone 8 NAD83
Units: Meters
NTS: 115/11

Figure 7-1

Monitoring Station Locations



Environmental monitoring and inspections conducted during the post closure period (years 4-15 after cessation of mining) will be undertaken by periodic visits to the site. Access to the property for post closure monitoring would be via ATV, snowmobile, and/or helicopter if the road is decommissioned.

During the post closure period, reporting on all environmental and inspection programs carried out on the property will continue. These reports will be filed with the YWB, and YG EMR in accordance with conditions contained in the Water Use Licence, and Quartz Mining Licence and other operating permits and approvals as may be.

Minto Ex personnel responsible for the management of the Minto mine would continue to meet with regulatory agencies, Selkirk First Nation, and the community on an as-needed basis to appraise interested parties of decommissioning activities and the results of post closure monitoring.

It is expected that a review of the environmental performance of the mine following closure would be made with YG EMR and or other interested parties. Once this review is completed, Minto Ex would apply to the Minister of YG EMR for a Certificate of Closure for the Minto mine under the Yukon Quartz Mining Act Mine Production Regulations. The Certificate of Closure will confirm that Minto Ex has fulfilled their closure obligations for the site.

7.5 LONG TERM MAINTENANCE

Provisions for maintenance of reclamation tasks such as erosion control and maintenance seeding have been included as part of the long-term closure requirements. Based on physical inspections and monitoring, maintenance works will be planned for and conducted as required to meet closure performance standards and objectives.

7.6 TEMPORARY CLOSURE

Temporary closure is defined in both the Quartz Mining License QML-0001 and the Water Use License QZ96-006 as the status of the project if no ore is processed through the mill for six (6) consecutive months after the start-up date.

Accordingly, although the project has not yet been completely constructed and start-up of the mill has not yet occurred, the following monitoring and “care and maintenance” planning items are focused on a temporary closure scenario occurring after mill start-up. In the unlikely event that a closure occurs during the Interim Period (as defined in QML-001 as the intervening time between the license effective date and start-up), these proposed temporary closure plans will still be applied where applicable to maintain the existing site infrastructure in order to enable a timely start-up, as opposed to a resumption of operations.

MEL’s priority during any temporary closure scenario is to ensure that the site remain geochemically and physically stable, secure and safe, monitored and in compliance with applicable licenses and legislation. Generally speaking, this will include both initial stabilization and then ongoing routine monitoring and maintenance of the site infrastructure and facilities. Water Use Licence QZ96-006 contains a temporary closure monitoring schedule (Part H – Interim Closure) that forms the foundation for the proposed temporary closure monitoring plan. It has been augmented to include planning for project elements that were not in place and therefore not subject to the interim closure period monitoring, such as the mill, water dam and mill water pond, waste dumps, tailings storage area, and the explosives facility.

Table 7-3 provides a summary of the various project components and the inspection and maintenance activities for use during any temporary cessation of mining activities.

Table 7-3 Summary of Care and Maintenance Activities and Surveillance Program during Temporary Cessation of Mining Operations

Project Component		Area of Interest	Care/Maintenance Activities	Monitoring Activities	Monitoring Responsibility	Monitoring Timing/Frequency
Open Pit		Water Management	Maintain creek diversion around pit	WUL Physical Monitoring Program	Caretaker	As per WUL
		Physical Stability	Restrict access to hazardous areas with physical barriers	Geotechnical Inspection of Creek diversion	Engineer	Annual
			Maintain perimeter ground interceptor wells if necessary			
Ore Stockpiles	High Grade	Physical Stability	Reduce High Grade Stockpile Inventory	n/a	n/a	n/a
		Geochemical Stability	Monitor for seepage	WUL Water Quality Surveillance Program	Caretaker	As per WUL
	Low Grade	Physical Stability	Monitor for stability	WUL Physical Monitoring Program and Annual Geotechnical Inspection	Caretaker	As per WUL
		Geochemical Stability	Monitor for seepage	WUL Water Quality Surveillance Program	Caretaker	As per WUL
Waste Rock and Overburden Dumps		Physical stability	Runoff/Erosion/Sediment control, as required.	WUL Physical Monitoring Program	Caretaker	As per WUL
			(Progressive reclamation will occur during operations)	Geotechnical Inspection	Engineer	Annual
		Geochemical Stability	Monitor for seepage	WUL Water Quality Surveillance Program	Caretaker	As per WUL
Tailings Storage Facility		Physical stability	Surface water diversion structure repair/maintenance, as required	Visual inspection elements of Monitoring Program from Tailings Management Plan (TMP)	Caretaker	As per TMP
			Runoff/Erosion/Sediment control, as required.	WUL Physical Monitoring Program		
			Dust Control, as required.	Geotechnical Inspection from WUL and TMP	Engineer	Annual
		(Progressive reclamation will occur during operations)				
		Geochemical Stability	Monitor for seepage and water quality	WUL Water Quality Surveillance Program and TMP Monitoring Elements	Caretaker	As per WUL
Mill and Camp Site		Buildings, Equipment, and Infrastructure	Concentrate removed from site	Visual inspection periodically for signs of instability	Caretaker	Monthly
		Physical Stability	Secure buildings and maintain necessary equipment onsite for resumption of milling	Structural Inspection	Engineer	Twice Annually
			Inspect for site stability			
		Mill Pond	Maintain pond liner, repair as required.	WUL Physical Monitoring Program	Caretaker	As per WUL
		Physical Stability	Maintain culverts.			
Water Dam		Water Management	Maintain spillway and structure as required based on geotechnical inspections.	WUL Physical Monitoring Program	Caretaker	As per WUL
		Physical stability	Monitor pond levels and water quality.	Geotechnical Inspection	Engineer	Annual
			Maintain spring/early summer pumping drawdown equipment.			
		Geochemical Stability	Monitor for seepage water quality	WUL Water Quality Surveillance Program	Caretaker	As per WUL
Explosives Facility		Physical stability	Remove bulk explosives from site. As required, repair and replace infrastructure	Visual inspection periodically for signs of instability.	Caretaker	Monthly
Barge Landing		Access to Yukon River	As required, granular upgrade to landing site.	Visual inspection periodically for signs of instability.	Caretaker	Weekly
Access Road and Surface Drainage		Entire Route	As required, surface grading and granular amendments, ditch and culvert maintenance.	Visual inspection periodically for signs of instability/erosion	Caretaker	Weekly and after heavy precipitation events
Entire Site		Physical stability	Runoff/Erosion/Sediment control, as required.	WUL Physical Monitoring Program	Caretaker	As per WUL
			Road/culvert maintenance as required.	Geotechnical Inspection	Engineer	Annual
			(Progressive reclamation will occur during operations)			
		Water Quality	Retain Contingency Water Treatment System	Undertake expanded temporary closure monitoring and submit to the YWB pursuant to Water Use Licence QZ96-006 (see Tables 7-4 and 7-5 for expanded monitoring program sites and schedule.) Continue required monitoring under Metal Mining Effluent Regulations (MMER)	Caretaker	As per WUL and MMER
		Security	Full time site caretaker will check, repair and replace as required: <ul style="list-style-type: none">precautionary signagesecurity gate – installed on Access Road at Main Dam	Site Inspection and Security Monitoring of all infrastructure and site elements	Caretaker	Daily: Inspection Sheets included in Annul Reporting
		Miscellaneous Infrastructure	Shut down and winterize camp, except for caretaker facilities Inspect power line	Site Inspection and Security Monitoring of all infrastructure and site elements – report any changes to stability/condition of miscellaneous infrastructure.	Caretaker	Daily: Inspection Sheets included in Annul Reporting
		Reporting	Prepare and submit annual report to the Yukon Water Board pursuant to Water Use Licence QZ96-006, including details of temporary closure activities and monitoring. Prepare and submit annual report to YG Mineral Resources Branch pursuant to the Quartz Mining License QML-0001, including details of temporary closure activities and monitoring. Prepare and submit quarterly monitoring reports to Environment Canada under MMER.		Minto Explorations Ltd.	Annually, before July 30 Quarterly, Online RISS Registry

7.6.1 Physical Stability and Geochemical Stability

Stabilization of site works during any temporary closure will be addressed initially well in advance of any closure scenario through the company's commitment to progressive reclamation and stabilization measures. Section 6.0 outlines the schedule planned for progressive reclamation work on the property. The main objective of progressive reclamation work is the physical and geochemical stabilization of site works through such measures as:

- resloping and crest rolling to reduce slope angles of repose;
- grading and contouring to direct surface water away from steeper slopes to reduce erosional impacts;
- covering potentially unstable areas in overburden and revegetating to establish a stable cover, again reducing erosional impacts; and
- augmenting revegetation efforts with bioengineering (planting of live cuttings/seedlings) efforts and short term stabilization products (fibre matting and mulching).

Conducted during operations on an ongoing basis, this progressive reclamation program is intended to reclaim areas as soon as operationally possible, to reduce both financial and operational liability.

Site infrastructure, including primarily buildings and process machinery, will be emptied/drained of hazardous reagents and process fluids where appropriate and stabilized for temporary closure based on recommendations from mechanical and chemical suppliers, contractors and engineers. This includes the removal of all hazardous wastes, including waste hydrocarbons, coolants, lubricants, mill reagents, and process chemicals. The bulk explosives inventory will be removed from site and explosives storage containers and facilities will inspected regularly.

This temporary decommissioning will only be conducted to a level whereby the infrastructure and systems are ensured to be stable in the short term (3 years) and whereby mining and milling operations can be resumed in a timely manner should the decision be made to emerge from temporary closure and transition back into operations. This will include:

- the retention of essential equipment/assets onsite to maintain infrastructure; and
- the storage of reagents and other hazardous materials (not waste) in competent primary and secondary containment, to ensure compliance with applicable legislation.

7.6.2 Security and Monitoring

Uncontrolled access to the mine site on the Minto property could pose a risk to the public and to the site assets. As such, a full-time caretaker/monitor (at least 2 individuals trained for cross-shift) will be housed onsite in a serviced portion of the existing camp. Site equipment and vehicles will be kept onsite for caretaker use in care and maintenance activities. Contingency equipment will also be kept onsite should more intensive earthworks be required during the temporary closure period.

Upon the move into temporary closure, a security gate will be installed on the main access road adjacent to the dam. This is a steep cut and fill location that will prohibit vehicle access around the gate. Snowmobile/ATV access can not always be controlled, but warning signs will be erected indicating the risk of entry to the site at the main gate and at key locations around the site. Site buildings will be locked and secured.

The main access road will be maintained for caretaker and emergency access with equipment retained on site (grader/loader). Previous periods of inactivity at the site have shown that the access road remains relatively stable and accessible with little maintenance requirements. In winter, contractors will establish the ice road across the Yukon River at Minto Landing, and the barge will be used only on an as needed basis during temporary closure, with a smaller boat being used when required for ferrying caretakers.

The caretaker(s) will be responsible for:

- regular inspections of the site to observe and document the condition of – and note any changes in – site security and public safety measures, infrastructure, mine works, etc., and to document any newly emerging environmental or public health and safety issues.
- conducting routine physical monitoring activities;
- regular water quality and flow monitoring;
- submitting inspection and monitoring reports to managers on a regular basis;
- responding to any security/safety issues as required; and
- conducting routine site maintenance and basic repairs to infrastructure and works as required (snow removal, culvert and road maintenance, building maintenance).

Site inspections and monitoring will be conducted by vehicle when seasonally possible. Some sites may only be accessible by snowmobile in winter, as snow removal will not be reasonable at all locations. Inspection results will be documented on a form as presented in Table 7-6. Submitted to management on a regular basis, any reports of changes in physical status of any part of the site may warrant a follow-up investigation by managers and/or professional personnel.

MEL's Water Use License contains a comprehensive Physical Monitoring Program with the licensee must conduct and report upon on a regular basis. This includes regular visual and seepage inspections of the following structures at different frequencies, varying from daily to annually:

- Main Dam;
- Mill Water Pond;
- Waste Rock and Overburden Dumps; and
- Diversion Ditch(es).

In addition, the company's Environmental Monitoring Plan further commits to structural monitoring of these elements. Tables 7-7 and 7-8 are the inspection sheets developed for documenting the results of these inspections. These programs will continue in the event of any temporary closure, with results to be included in annual reporting under the water license.

The monitoring program for the physical stability of the tailings deposit is presented in MEL's Tailings Management Plan (January 2007) which was approved in April 2007. Without ongoing tailings placement, the visual inspection elements of the stack stability monitoring will be conducted by the site caretaker, with any stability-related issues reported immediately.

Some elements of the monitoring program (geotechnical and structural inspections and non-routine water quality and biological monitoring) will be conducted by appropriate professional personnel, and results of these inspections will be included in the annual reports and other required submissions.

Monitoring stations for the water quality surveillance program during any temporary closure are shown in Figure 7-1.

7.6.3 Reporting

All monitoring and inspection data collected will be compiled and submitted according to the required annual reporting timeframes for both the Water Use and Quartz Mining Licences.

Table 7-4

Minto Mine - Detailed Decommissioning and Reclamation Plan

Surveillance Monitoring Sites for Temporary Closure

SITE	DESCRIPTION	UTM LOCATION (m) ZONE 8	
		Northing	Easting
W-1	Mainstem Minto Creek 300m u/s Main Access Road Crossing	6948279	392424
W-2	Mainstem Minto Creek directly u/s Main Access Road Crossing	6948404	392584
W-3	Mainstem Minto Creek d/s toe of Dam (Final Point of Discharge)	6945682	386747
W-6	Tributary to Minto Creek	6946420	387544
W-7	Tributary to Minto Creek	6946069	387504
W-8	Alternate Tailings Area Seepage/Runoff	6945067	385620
W-10	Mainstem Minto Creek (south fork at headwaters)	6943654	383348
W-11	Waste Rock Dump Seepage	6944887	384106
W-12	Discharge from Open Pit	6944991	384819
W-13	Mill Water Pond Discharge	6945061	385111
W-15	Minto Creek, downstream of the overburden dump, just upstream of Open Pit	6944754	384286
W-16	Main Water Storage Pond Discharge (or Main Water Storage Pond if not discharging)	6945573	386538
W-17	Main Water Storage Pond Dam Seepage	6945645	386615
W-18	Low-Grade Ore Pad Seepage	6945071	384214
W-22*	Tailings Area Seepage/Runoff	6945071	385707
P1	Dam Piezometer (to be installed summer 2007)	TBA	TBA
P2	Dam Piezometer (to be installed summer 2007)	TBA	TBA

* Unless structures are not developed

Table 7-5

Minto Mine - Detailed Decommissioning and Reclamation Plan

Monitoring Program Schedule for Temporary Closure

		FREQUENCY				
SITE	DESCRIPTION	Surface Water	Ground water	Sediment	Benthos	Flows
Receiving Water Stations						
W-2	Mainstem Minto Creek directly u/s Access Road Crossing	M		A	BA	DCR
W-3	Mainstem Minto Creek 50 m d/s toe of Dam (Final Point of Discharge)	W		A	BA	DCR
W-6	Tributary to Minto Creek	Q		A	BA	Q
W-7	Tributary to Minto Creek	Q		A	BA	Q
W-10	Mainstem Minto Creek (south fork at headwaters)	M				M
Mine Site Stations						
W-8	Alternate Tailings Area Seepage/Runoff	W				W
W-22	Tailings Area Seepage/Runoff	W				W
W-11	Waste Rock Dump Seepage	M				M
W-12	Discharge from Open Pit	M				M
W-13	Mill Water Pond Discharge	M				M
W-15	Minto Creek, downstream of the overburden dump, just upstream of Open Pit	M				M
W-16	Main Water Storage Pond Discharge (or Main Water Storage Pond if not discharging)	W/M				W/M
W-17	Main Water Storage Pond Dam Seepage	M				M
W-18	Low-Grade Ore Pad Seepage	M				M
P1	Dam Piezometer		M			
P2	Dam Piezometer		M			

Frequency Description

W	Weekly
M	Monthly
Q	Quarterly
A	Annually
BA	Bi-annually
DCR	Daily Continuous Record during open season
W/M	Weekly, except monthly if no discharge

Table 7-6

Minto Mine - Detailed Decommissioning and Reclamation Plan
Property Site Inspection Form for Temporary Closure

Inspection Conducted the Week of: _____

Inspector: _____

	Site Name and Number																																	
	Magazine Sites		AN Storage Site		Explosives Plant Site		Contractors Shop and Work Area		Fuel Storage Pad		Fuel Storage Generators		Mill Pond		Mill Building and Reagents		Mill Site Sea-Cans		Concentrate Shed		Filter Building		Mine Camp and Related Structures		Mine Camp Generators		Main Access Road and Powerline		Waste Management Facilities		Yukon River Gate		Dam Gate	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																	
A) Site Security & Public Safety																																		
1) Are access points secure? - doors, grates, windows, fencing, etc.	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
2) Are gates locked?																															Y	N	Y	N
3) Are chemicals stored properly?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
4) Are materials storage areas clean and leak free?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
5) Checked signage?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
6) Are there signs of unauthorized access to the mine property?																										Y	N			Y	N	Y	N	
B) Water																																		
1) Are there any water-related problems?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
2) Is there a noticeable change (since last inspection)?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
3) Is there any visible seepage in the area?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
C) Infrastructure																																		
1) Are there any damaged power poles/lines?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
2) Is there evidence of forced entry to any structure? - door, gates, windows, fencing, etc.	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
3) Is there any new damage to building(s)?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N				
D) Other																																		
1) Pictures taken?	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
2) Date and Time of Inspection (am/pm).																																		
3) Inspectors Initials.																																		

Note: Please Provide Comments/Concerns/Observed Changes, if Necessary:

Table 7-7

Minto Mine - Detailed Decommissioning and Reclamation Plan

Temporary Closure Physical Monitoring Program Inspection Checklist (Structural Elements)

Month: _____

		Date																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
DAILY MONITORING	Check <input checked="" type="checkbox"/> if correct or <input type="checkbox"/> if not (record details in spaces below)																															
	General																															
	Materials being disposed of in assigned areas?																															
	Main Waste Rock Dump (volume added last 24hrs?)																															
	Crest checked?																															
	Safe for use next 24 hrs?																															
	Toe checked?																															
	Dump limits adhered to?																															
	No creep?																															
	No possible failure?																															
	Oxide Waste Dump (volume added last 24hrs?)																															
	Crest checked?																															
	Safe for use next 24 hrs?																															
	Toe checked?																															
	Dump limits adhered to?																															
	No creep?																															
	No possible failure?																															
	Overburden Dump (volume added last 24hrs?)																															
	Crest checked?																															
	Safe for use next 24 hrs?																															
	Toe checked?																															
	Dump limits adhered to?																															
	No creep?																															
	No possible failure?																															
	Inspector's Initials																															

Comments (recommendations / corrective actions required)

Detailed description of maintenance activities

Table 7-8

Minto Mine - Detailed Decommissioning and Reclamation Plan

Temporary Closure Physical Monitoring Program Inspection Checklist (Visual Elements)

Month: _____

		Date																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Check <input checked="" type="checkbox"/> if correct or <input type="checkbox"/> if not (record details in spaces below)																																
DAILY	Main Waste Rock Dump																															
	Checked for seepage?																															
	Good runoff management?																															
	Rock drains performing?																															
	Photo(s) taken?																															
	Oxide Waste Dump																															
	Checked for seepage?																															
	Good runoff management?																															
	Rock drains performing?																															
	Photo(s) taken?																															
	Overburden Dump																															
	Checked for seepage?																															
	Good runoff management?																															
	Rock drains performing?																															
	Photo(s) taken?																															
	Water Dam																															
Checked visually																																
Checked for seepage?																																
No seepage?																																
Checked after storm event?																																
Diversion Ditch																																
Checked visually																																
Checked for seepage?																																
No seepage?																																
No failure?																																
No loose material?																																
WEEKLY	Mill Water Pond																															
	Checked visually																															
	Checked for seepage?																															
	No seepage?																															
	Checked after storm event?																															
	Inspector's Initials																															

Comments (recommendations / corrective actions required)

Detailed description of maintenance activities

8.0 CLOSURE COSTS

Costing of the proposed closure measures is the basis for the security provision schedule. As such, cost estimates have been prepared for three distinct instances in the life of the mine:

- Year 0 (Mill Startup, second quarter, 2007) in Section 8.1 (Tables 8.1-1 through 8.1-13);
- Year 2 in section 8.2 (Tables 8.2-1 through 8.2-13); and
- End of Mine Life (after Year 7) in section 8.3 (Tables 8.3-1 through 8.3-12).

A separate Section 8.4 presents the estimated costs associated with progressive reclamation.

These cost estimates for Year 0 and Year 2 have been reviewed by EMR through a third party and amended accordingly under previous negotiations. These estimates as presented have been approved by EMR and form the foundation for the estimates for implementing the closure measures at the end of mine life.

The estimated costs to implement the decommissioning and reclamation measures described in this report are presented in Tables 8.1-1 through 8.1-13 (Section 8.1) for Year 0, Tables 8.2-1 through 8.2-13 for Year 2 (Section 8.2) and Tables 8.3-1 through 8.3-12 for Final Closure (Section 8.3). Table 8.x-1 in each section presents the summary of cost estimates for various mine components including:

- Waste Rock And Overburden Dumps;
- Open Pit and Haul Roads;
- Tailings Area and Diversion Structures;
- Main Water Dam;
- Mill and Ancillary Facilities;
- Mill Pond;
- Access Road;
- Miscellaneous Components;
- Reclamation Research and Revegetation;
- Post Closure Management and Monitoring; and

- Supporting Studies (Years 0 and 2 only – these will be conducted during mine operational life.)

The salvage value of certain components of the mine is expected to offset some of the costs of implementing this closure plan, but only at Year 0 and Year 2. A salvage value of 50% has been agreed upon for the mill and ancillary facilities for the Year 0 and Year 2 cost estimates. Progressive reclamation will account for a large part of the reclamation effort and expenditure for the project, and these costs, although operational, are presented in Section 8.4 (Table 8.4-1.) Costs associated with progressive reclamation were used in the calculation of reclamation areas for the Year 0 and Year 2 cost estimates.

As shown in Table 8.3-1, a closure cost range of **\$4,172,444 to \$4,378,327** is estimated for final closure, based on three separate scenarios for road decommissioning. All costs are in constant 2006 dollars.

The costs have been developed using a combination of current unit rates for available Yukon contractors' equipment, and custom unit rates specific to the project. These custom rates were prepared with input from the mine construction heavy equipment contractor and based on their experience on site during the construction activities, considering such factors as:

- haul distance;
- road grade; and
- material handling considerations.

The unit costs have been applied to levels of effort in sufficient detail to allow thorough scrutiny by the reader. As such, equipment rates have been used where the level of effort is well understood, and in other cases, unit area or volume rates have been employed.

In each of the sections, the same table numbering scenario has been employed to present the following:

- Table 8-1 provides a summary of all cost estimates;
- Table 8-2 sets out unit rates used in the calculations;

- Tables 8-3 to 8-10 provide closure cost estimates for the specific site development reclamation components;
- Table 8-11 provides closure cost estimates reclamation research and revegetation activities;
- Table 8-12 outlines costs associated with the site management during closure implementation and presents post closure costs for compliance monitoring and maintenance for the entire projected 15 year active closure and post closure monitoring life:
- Table 8-13 presents costs for various supporting studies as outlined in the closure measures Section 5 (Section 8.1 and 8.2 only); and
- Table 8.4-1 presents the schedule and approximate costs associated with progressive reclamation activities during the operational period (Section 8.4 only.)

The closure measures presented in this plan have been prepared at a conceptual level of engineering. It is recognized that a certain level of detailed engineering will be required for major closure activities including, dam removal, and conveyance or diversion ditches. The approach is to ensure that closure measures are sound and have undergone review before detailed engineering is undertaken. Detailed engineering is planned for major works prior to implementation.

For the purposes of closure costing an estimate of 7% of the capital cost of each closure measure was used for typical project management and engineering costs. In addition, a 12% contingency allowance has been added to the overall closure cost estimate.

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.2-1

Summary Table of Estimated Closure Costs for Year 0

Table #	Description	Total Cost
3	Overburden & Waste Rock Dumps	\$329,763
4	Open Pit and Haul Roads	\$96,621
5	Tailings Area and Diversion Structures	\$4,494
6	Main Water Dam	\$501,728
7	Mill and Ancillary Facilities	\$567,223
8	Mill Pond	\$98,066
9	Main Access Road	
	Scenario 1 - No Access Road Deactivation	\$2,140
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$104,908
	Scenario 3 - Deactivate Entire Access Road	\$172,404
10	Miscellaneous Sites and Facilities	\$143,257
11	Reclamation Research and Revegetation	
	Scenario 1 - No Access Road Deactivation	\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$283,544
	Scenario 3 - Deactivate Entire Access Road	\$292,584
12	Post Closure Site Management	\$1,244,300
13	Supporting Studies	\$16,000

Total Closure Costs		
	Scenario 1 - No Access Road Deactivation	\$3,282,616
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$3,389,904
	Scenario 3 - Deactivate Entire Access Road	\$3,466,440

Total Closure Costs (Including Percentage Contingency Allowance on Above Elements)		12%
	Scenario 1 - No Access Road Deactivation	\$3,676,530
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$3,796,693
	Scenario 3 - Deactivate Entire Access Road	\$3,882,413

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-2
Minto Mine Closure Unit Rates for Year 0

Equipment Rates		
Equipment	Rates/hr	Rate/mo
D9H Dozer	\$210	
Haul Truck D250E	\$200	
Tandem Haul Truck	\$100	
Cat 235 Excavator	\$200	
Cat 16H grader	\$171	
988B Loader	\$170	
Tractor Trailer (lowbed)	\$100	
30 ton Crane	\$145	
Hiab Flatdeck truck	\$75	
Cat 950 loader	\$120	
Pickup Truck		\$2,500
Personnel Rates		
Personnel	Rates/hr	Rate/mo
Blaster	\$60	
General Labourer	\$45	
Trades Labourer	\$80	
Site Supervisor	\$95	
Design Engineer	\$130	
Environmental Scientist	\$95	
Project Manager		\$9,700
Camp Labourer		\$4,000
Site Caretaker		\$6,100
Environmental Monitor		\$5,000
Revegetation Rates		
Revegetation Seed Mix	\$13.00	per kg
Revegetation Seed Mix - 50kg/ha	\$510.00	per ha
Fertilizer	\$1.00	per kg
Fertilizer - 250kg/ha	\$250.00	per ha
Tree Seedlings (1,000 seedlings per ha)	\$1,750.00	per ha
Seed/Fertilizer Application	\$1,500.00	per ha
Erosion Barrier	\$3.00	per square m
Revegetation cost per ha. Including application cost	\$2,260.00	per ha
Contractor Unit Rates & Camp Costs		
Load, Haul and place soil cover	\$5.00	cu.m
Load, Haul & Place rock cover	\$7.00	cu.m
Custom Rate A (Load, haul and place from IROD - MWD / LGO)	\$6.00	cu.m
Custom Rate B (Load, haul and place IROD - HGO/MainWater Dam)	\$4.50	cu.m
Custom Rate C (Load, haul and place IROD - CSA)	\$3.00	cu.m
Custom Rate D (Push from TFOD - TF)	\$2.00	cu.m
Custom Rate E (Push from MWD - U/S MWD)	\$2.00	cu.m
Load and Haul Rip Rap	\$10.00	cu.m
Place Riprap	\$3.00	cu.m
Freight run to Whitehorse	\$1,000.00	per load
Camp Cost	\$60.00	per day per person
Power and Heat	\$5,500.00	per month
Employee Transport Costs	\$3,000.00	per month
Barge Operating Cost	\$10,000.00	per month

Note:

Custom Unit Rates have been developed specifically for Minto Mine, taking into account such factors as haul distance, grade, machinery required, time required, etc.

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-3
Waste Rock and Overburden Dumps, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WASTE ROCK AND OVERBURDEN DUMPS						
3.1	Main Waste Rock Dump (s 5.1.1.2)						
	Roll crest and recontour	Cat D9H Dozer	hrs	175	\$210	\$36,750	\$36,750
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13750	\$6.00	\$82,500	\$82,500
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$8,348	\$8,348
	Sub-Total						\$127,598
3.2	Low Grade Ore Stockpile and Pad (s 5.1.3.2)						
	Recontour Stockpile and Pad	Cat D9H Dozer	hrs	40	\$210	\$8,400	\$8,400
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13000	\$6	\$78,000	\$78,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,048	\$6,048
	Sub-Total						\$92,448
3.3	Ice-Rich Overburden Dump (s 5.1.2.2)						
	Roll crest of berm and recontour	Cat D9H Dozer	hrs	20	\$210.00	\$4,200	\$4,200
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$294	\$294
	Sub-Total						\$4,494
3.4	High Grade Ore Stockpile Pad (s 5.1.3.2)						
	Recontour stockpile and pad	Cat D9H Dozer	hrs	20	\$210.00	\$4,200	\$4,200
	Haul and place overburden for revegetation	Custom Rate B	cu.m.	8500	\$4.50	\$38,250	\$38,250
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,972	\$2,972
	Sub-Total						\$45,422
3.5	Contractor's Shop and Work Area (s 5.1.4.2)						
	Remove salvageable equipment	General Labour	hrs	60	\$45	\$2,700	
		Truck D250E	hrs	20	\$200	\$4,000	
		Trades Labour	hrs	48	\$80	\$3,840	\$10,540
	Dismantle buildings	General Labour	hrs	60	\$45	\$2,700	
		Cat 235 Excavator	hrs	30	\$200	\$6,000	\$8,700
	Haul building pieces off site - equipment	Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$2,000
	Scrap haul to site landfill	Truck D250E	hrs	20	\$200	\$4,000	\$4,000
	Bury footings - haul and place fill, locally sourced	Unit Basis	cu.m.	2500	\$5	\$12,500	\$12,500
	Recontour	Cat D9H Dozer	hrs	15	\$210	\$3,150	\$3,150
	Haul and place overburden for revegetation	Custom Rate C	cu.m.	5000	\$3	\$15,000	\$15,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$3,912	\$3,912
	Sub-Total						\$59,802
Total Estimated Cost in Reclaiming Overburden and Waste Rock Dumps							\$329,763

Note:
Costing incorporates progressive reclamation during production phase

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-4

Open Pit and Haul Roads, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	OPEN PIT AND HAUL ROADS						
4.1	Ultimate Pit (s 5.2.1.2)						
	Remove pit pumps and pipe column/general cleanup	General Labour	hrs	80	\$45	\$3,600	
		Support equipment	l.s.		\$1,000	\$1,000	\$4,600
	Secure pit access - boulder placement	Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$8,000
	Construct exit channel into Mill Pond system	Cat 235 Excavator	hrs	20	\$200	\$4,000	
	Riprap shoulder exiting pit	Unit Cost Basis	cu.m	50	\$15	\$750	\$4,750
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,215	\$1,215
	Sub-Total						\$18,565
4.2	Haul Roads (s 5.2.2.2)						
	Remove culverts and haul away	General Labour	hrs	40	\$45	\$1,800	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$9,800
	Recontour slopes	Cat D9H Dozer	hrs	150	\$210	\$31,500	\$31,500
	Scarify surfaces	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Stabilize slopes - erosion barriers - material	Unit Cost Basis	sq.m	2,000	\$3	\$6,000	\$6,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,107	\$5,107
	Sub-Total						\$78,057
Total Estimated Cost in Reclaiming Open Pit and Haul Roads							\$96,621

Note:

Linear disturbances to be scarified / decompacted and allowed to naturally revegetate

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-5

Tailings Area and Diversion Structures, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	TAILINGS AREA						
5.1	Tailings Deposit - Final Lift						
	Roll crest of starter bench and recontour	Cat D9H Dozer	hrs	20	\$210.00	\$4,200	\$4,200
5.2	South Diversion Ditch						
	not required for closure at Yr 0					\$0	\$0
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$294	\$294
	Sub-Total						\$4,494
Total Estimated Cost in Reclaiming Tailings Area							\$4,494

Note:

Costing assumes stockpiling overburden along downhill slope of south diversion ditch during production phase. Down slope tailings perimeter rip rap blanket will be advanced as tailings facility accumulates during production phase.

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-6
Main Water Dam, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WATER DAM						
6.1	Reclaim System						
	Remove salvageable equipment - pipeline/pumps	General Labour	hrs	48	\$45	\$2,160	
		Trades Labour	hrs	98	\$80	\$7,840	\$10,000
	Remove pipeline	Truck D250E	hrs	100	\$200	\$20,000	
		Cat 235 Excavator	hrs	100	\$200	\$20,000	
		General Labour	hrs	200	\$45	\$9,000	\$49,000
	Dismantle Building	Cat 235 Excavator	hrs	16	\$200	\$3,200	
		General Labour	hrs	20	\$45	\$900	\$4,100
	Misc. Supplies & Tools	Misc.	l.s.		\$1,000	\$1,000	\$1,000
	Recontour alignment	Cat D9H Dozer	hrs	16	\$210	\$3,360	\$3,360
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$4,722	\$4,722
	Sub-Total						\$72,182
6.2	Main Dam						
	Pump down impounded water, over spillway (using reclaim pumps)	General Labour	hrs	96	\$45	\$4,320	\$4,320
	Misc. Supplies & Tools	Misc.	l.s.		\$5,000	\$5,000	\$5,000
	Build coffer dam and install pump-around system	Misc.	l.s.		\$10,000	\$10,000	\$10,000
	Operate system until new structure is ready						
	Stockpile rip rap from downstream shell	Unit Cost Basis	cu.m	10,000	\$10	\$100,000	\$100,000
	Breach Dam: push material using dozer into new areas	Custom Rate E	cu.m	25,000	\$2	\$50,000	
	and load, haul & dump and contour material in new area	Unit Cost Basis	cu.m	31,000	\$4.50	\$139,500	\$189,500
	Construct stream channel at original grade - haul and place rip rap	Unit Cost Basis	cu.m	1,125	\$3	\$3,375	
		Unit Cost Basis	cu.m	1,125	\$10	\$11,250	\$14,625
	Haul and place overburden on slopes of new area u/s of MWD	Unit Cost Basis	cu.m	15,000	\$2	\$30,000	\$30,000
	Stabilize slopes with erosion barriers	Unit Rates	per sq. m	15,000	\$3	\$45,000	\$45,000
	Misc. Supplies & Tools	Misc.	l.s.		\$3,000	\$3,000	\$3,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$28,101	\$28,101
	Sub-Total						\$429,546
Total Estimated Cost in Reclaiming Water Dam							\$501,728

Note:

Main dam reclamation involves two methodologies: 40,000 m³ will be pushed by dozer, 35,000 m³ loaded and hauled upslope. Costing assumes stockpile of overburden located immediately adjacent and upslope of dam area that can be pushed into area after dam removal as part of final reclamation plan.

Table 8.1-7
Mill & Ancillary Facilities, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	MILL AND ANCILLIARY FACILITIES						
7.1	Mill Building						
	Remove salvageable equipment	General Labour	hrs	550	\$45	\$24,750	
		Trades Labour	hrs	600	\$80	\$48,000	
		Crane Support	hrs	40	\$145	\$5,800	\$78,550
	Decontaminate Building-hosing and clean-up	General Labour	hrs	160	\$45	\$7,200	\$7,200
	Dismantle Building	General Labour	hrs	1000	\$45	\$45,000	
		Trades Labour	hrs	600	\$80	\$48,000	
		Cat 235 Excavator	hrs	120	\$200	\$24,000	
		Crane Support	hrs	60	\$145	\$8,700	\$125,700
	Concrete Demolition	Blaster	hrs	40	\$60	\$2,400	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	20	\$210	\$4,200	\$10,600
	Misc. Supplies & Tools	Misc.	l.s.		\$11,000	\$11,000	\$11,000
	Scrap haul to solid waste facility	Cat 235 Excavator	hrs	50	\$200	\$10,000	
		Truck D250E	hrs	100	\$200	\$20,000	\$30,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$18,414	\$18,414
	Subtotal:						\$281,464
		Subtract 50% for Salvage Value					\$140,732
7.2	Generator & Filter Buildings & Concentrate Shed						
	Remove salvageable equipment	General Labour	hrs	240	\$45	\$10,800	
		Trades Labour	hrs	240	\$80	\$19,200	\$30,000
		Crane Support	hrs	24	\$145	\$3,480	
	Salvage and remove powerline and poles	l.s.			\$27,500	\$27,500	\$30,980
	Dismantle Buildings	General Labour	hrs	160	\$45	\$7,200	
		Trades Labour	hrs	80	\$80	\$6,400	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		Crane Support	hrs	30	\$145	\$4,350	\$25,950
	Concrete Demolition	Blaster	hrs	40	\$60	\$2,400	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	20	\$210	\$4,200	\$10,600
	Misc. Supplies & Tools	Misc.	l.s.		\$10,000	\$10,000	\$10,000
	Scrap haul to solid waste facility	Cat 235 Excavator	hrs	10	\$200	\$2,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$6,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$7,947	\$7,947
	Subtotal:						\$121,477
		Subtract 50% for Salvage Value					\$60,739
7.3	Fuel Storage Area						
	Cleanout tanks-remove sludges, pressure wash	General Labour	hrs	60	\$45	\$2,700	
		Removal to Licensed facility	l.s.		\$10,000	\$10,000	\$12,700
	Remove bulk fuel storage and piping facilities	General Labour	hrs	100	\$45	\$4,500	
		Trades Labour	hrs	120	\$80	\$9,600	
		Crane Support	hrs	30	\$145	\$4,350	
		Support Equipment	l.s.		\$2,500	\$2,500	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		General Labour-sort & load	hrs	40	\$45	\$1,800	
		Tractor Trailer (lowbed)	hrs	30	\$100	\$3,000	\$33,750
	Fold and Bury Liner	Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	100	\$210	\$21,000	\$25,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,002	\$5,002
	Subtotal:						\$76,452
7.4	Mill Reagents						
	Load and return extra reagents/chemicals	General Labour	hrs	100	\$45	\$4,500	
		Support Equipment	l.s.		\$2,500	\$2,500	
		Disposal Cost-bulk materials	l.s.		\$5,000	\$5,000	
		Disposal Cost-lab-pacs	pallets	2	\$2,000	\$4,000	\$16,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,120	\$1,120
	Subtotal:						\$17,120
7.5	Reclaim Entire Mill Site Area						
	Test soils for contamination	Environmental Scientist	hrs	25	\$95	\$2,375	
		Analytical Costs	l.s.		\$2,000	\$2,000	\$4,375
	Haul any contaminated soils to Land Treatment Facility	Cat 235 Excavator	hrs	10	\$200	\$2,000	
		Truck D250E	hrs	10	\$200	\$2,000	\$4,000
	Re-contour area and slopes to bury footings and establish drainage	Cat D9H Dozer	hrs	100	\$210	\$21,000	\$21,000
	Haul and place overburden cap	Unit Rate	cu.m	50000	\$4.50	\$225,000	\$225,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$17,806	\$17,806

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-8

Mill Water Pond, Estimated Closure Costs for Year 0

[illegible]

Table 8.1-9
Main Access Road. Estimated Closure Costs for Year 0

Scenario 3 - Decommission Entire Access Road (27 KM)							
Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
9.3	ACCESS ROAD - 27 KM SECTION						
9.3.1	Road Surface						
	Scarify - 27 km	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,796	\$1,796
	Subtotal:						\$27,446
9.3.2	Big Creek Bridge						
	Remove bridge decking and span	General Labour	hrs	50	\$45	\$2,250	
		Crane	hrs	40	\$145	\$5,800	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$18,050
	Cut off piles	General Labour	hrs	50	\$45	\$2,250	\$2,250
	Re-contour	Cat 235	hrs	30	\$200	\$6,000	
		D9H Dozer	hrs	30	\$210	\$6,300	\$12,300
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,282	\$2,282
	Subtotal:						\$34,882
9.3.3	Barge Ramps						
	Remove all gravel	Cat 235	hrs	20	\$200	\$4,000	\$4,000
	Re-countour areas and scarify	D9H Dozer	hrs	30	\$210	\$6,300	\$6,300
	Shoreline restoration	Misc.	I.s.		\$5,000	\$5,000	\$5,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,071	\$1,071
	Subtotal:						\$16,371
9.3.4	Culverts						
	Culvert excavation (40 small culverts)	Cat 235 Excavator	hrs	100	\$200	\$20,000	\$20,000
	Culvert removal	General Labour	hrs	140	\$45	\$6,300	
		Haul Truck D250E	hrs	100	\$200	\$20,000	\$26,300
	Minto Creek Culvert Removal & Streambank Restoration	Trades Labour	hrs	40	\$80	\$3,200	
		General Labour	hrs	75	\$45	\$3,375	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	\$14,575
	Recontour slopes and drainage	D9H Dozer	hrs	70	\$210	\$14,700	\$14,700
	Stabilize slopes	General Labour	hrs	200	\$45	\$9,000	
	Erosion barriers	Unit Cost Basis	per sq. m.	1,000	\$3	\$3,000	\$12,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,130	\$6,130
	Subtotal:						\$93,705
Total Estimated Cost for Access Road Closure (Scenario 3)							\$172,404

Table 8.1-10
Miscellaneous Sites and Facilities, Estimated Closure Costs for Year 0

Note:
Land treatment facility is a licensed facility and will be reclaimed as per license terms and conditions

Table 8.1-11

Reclamation Research and Revegetation, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Units	Quantity	Unit Rates	Cost	Total Adjusted
11.1	REVEGETATION ACTIVITIES					
11.1.0	Determination of Revegetation Plan for Current Site					
	Issuance of a plan for all site areas for regulatory review and approval	Misc	1		\$5,000	\$5,000
						\$5,000
11.1.1	Main Waste Rock Dump (final total surface area of 37.8ha)					
	Seed and fertilize w/ labour	ha	10.0	\$2,260	\$22,600	
	Re-seed	ha	5.0	\$2,260	\$11,300	
	Re-forest	ha	10.0	\$1,750	\$17,500	\$51,400
	Sub-Total					\$51,400
11.1.2	Ice-Rich Overburden Dump (toe berm surface area of 1.5ha)					
	Seed and fertilize w/ labour	ha	1.5	\$2,260	\$3,390	
	Re-seed	ha	0.8	\$2,260	\$1,808	
	Re-forest	ha	1.5	\$1,750	\$2,625	\$7,823
	Sub-Total					\$7,823
11.1.3	Ore Stockpiles and Pads (final total surface area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$43,526
	Sub-Total					\$43,526
11.1.4	Contractor's Shop and Office Area (disturbed area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.3	\$2,260	\$9,718	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$44,204
	Sub-Total					\$44,204
11.1.5	Tailings Area (initial prepared area of 8.0 ha)					
	Seed and fertilize w/ labour	ha	8.0	\$2,260	\$18,080	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.0	\$1,750	\$14,000	\$41,120
	Sub-Total					\$41,120
11.1.6	Main Water Dam (total dam surface area 3.3 ha)					
	Seed and fertilize w/ labour	ha	3.3	\$2,260	\$7,458	
	Re-seed	ha	1.7	\$2,260	\$3,842	
	Re-forest	ha	3.3	\$1,750	\$5,775	\$17,075
	Sub-Total					\$17,075
11.1.7	Mill Area (total surface area of 7.6 ha)					
	Seed and Fertilize w/ labour	ha	7.6	\$2,260	\$17,176	
	Re-seed	ha	3.8	\$2,260	\$8,588	
	Re-forest	ha	7.6	\$1,750	\$13,300	\$39,064
	Subtotal:					\$39,064
11.1.8	Miscellaneous Sites - Camp, Airstrip, Waste Facilities, Explosives Site (area for reclamation of 5.8ha)					
	Seed and fertilize w/ labour	ha	5.8	\$2,260	\$13,108	
	Re-seed	ha	2.9	\$2,260	\$6,554	
	Re-forest	ha	5.8	\$1,750	\$10,150	\$29,812
	Subtotal:					\$29,812
11.1.9	Access Road					
	Scenario 1 - No Deactivation					
	No revegetation					
	Subtotal:					\$0
	Scenario 2 - Deactivate from Minto Creek to Mine Site					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	2.0	\$2,260	\$4,520	\$4,520
	Subtotal:					\$4,520
	Scenario 3 - Deactivate Entire Road					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	6.0	\$2,260	\$13,560	\$13,560
	Subtotal:					\$13,560
Total Estimated Cost for Reclamation Research and Revegetation						
	Scenario 1 - No Access Road Deactivation					\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site					\$283,544
	Scenario 3 - Deactivate Entire Access Road					\$292,584

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-12
Site Management and Monitoring, Estimated Closure Costs for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	SITE MANAGEMENT						
12.1	Onsite Management						
	Project Management and Engineering - Included in PME Costs in each Closure Component						
	Pickup truck	Light truck	monthly	30	\$2,500	\$75,000	\$75,000
	Sundry equipment maintenance	Unit Cost Basis	yearly	5	\$5,000	\$25,000	\$25,000
	Power and heat	Unit Cost Basis	monthly	15	\$5,500	\$82,500	\$82,500
	General Administrative expenses	Unit Cost Basis	monthly	30	\$2,000	\$60,000	\$60,000
	Camp Costs (5 year period)	Unit Cost Basis	manday	5130	\$60	\$307,800	\$307,800
	Subtotal:						\$550,300
12.2	Transport Costs						
	Employee transport costs	Unit Cost Basis	monthly	30	\$3,000	\$90,000	\$90,000
	Barge operating costs	Unit Cost Basis	monthly	12	\$10,000	\$120,000	\$120,000
	Subtotal:						\$210,000
12.3	Compliance Monitoring and Reporting						
	Water Quality Monitoring (Post Mine Closure) (50:50 sampling labour/analyses costs split)						
	Years 1-5 (monthly during open season)	Misc.	monthly	30	\$3,000	\$90,000	
	Years 6-10 (quarterly - spring/summer/fall)	Misc.	quarterly	15	\$3,000	\$45,000	
	Years 11-15 (once annually - post spring freshet)	Misc.	yearly	5	\$3,000	\$15,000	\$150,000
	Disbursements (non-labour/non-analytical)	Misc.	l.s.	15	\$3,000	\$45,000	\$45,000
	LTF Monitoring and Maintenance (years 1-5)	Misc.	yearly	5	\$3,500	\$17,500	\$17,500
	Enhanced Groundwater/Foundation monitoring below TF and Waste Rock Dumps	Misc.	yearly	15	\$2,000	\$30,000	\$30,000
	Geo-technical Inspections (annually yrs 1-5, bi-annual yrs 6-15)	Misc.	l.s.	10	\$5,000	\$50,000	\$50,000
	Reclamation Inspections (annually yrs 1-15)	Misc.	l.s.	15	\$3,000	\$45,000	\$45,000
	Biological Monitoring - Closure implementation	Misc.	l.s.		\$9,000	\$9,000	
	Years 1-5 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 6-10 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 11-15 (Every two years)	Misc.	bi-annual	3	\$2,500	\$7,500	\$46,500
	Subtotal:						\$384,000
12.4	Post Closure Maintenance						
	Misc. maintenance work related to the site after closure (Yr1-5)	Misc.	yearly	5	\$10,000	\$50,000	\$50,000
	Misc. maintenance work related to the site after closure (Yr6-15)	Misc.	per year	10	\$5,000	\$50,000	\$50,000
	Subtotal:						\$100,000
Total Estimated Cost for Post Closure Site Management							\$1,244,300

Note:

Camp Costs calculation based on "Table 7-1 Site Decommissioning and Reclamation Seasonal Personnel Requirements" using a 90 day work year

MINTO MINE CLOSURE COSTING - YEAR 0

Table 8.1-13
Supporting Studies for Year 0

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
13.1	Permafrost Foundation Monitoring						
13.1.1	Enhanced subsurface monitoring program in and below waste rock dumps (WRD)						
	preparing detailed monitoring program	Misc.	I.s.		\$2,000	\$2,000	
	undertake additional monitoring as per program(covered in T. 12)	Misc.	yearly		\$2,000	\$2,000	\$4,000
	Enhanced Adaptive Management Plan for WRD	Misc.	I.s.	1	\$4,000	\$4,000	\$4,000
13.1.2	Enhanced subsurface monitoring program in and below Tailings Facility (TF)						
	preparing detailed monitoring program	Misc.	I.s.		\$2,000	\$2,000	
	undertake additional monitoring as per program (covered in T. 12)	Misc.	yearly	1	\$2,000	\$2,000	\$4,000
	Enhanced Adaptive Management Plan for TF	Misc.	I.s.	1	\$4,000	\$4,000	\$4,000
	Subtotal:						\$16,000
Total Estimated Cost for Supporting Studies							\$16,000

Note:

Monitoring equipment such as thermistors, piezometers, etc. will be installed during construction of these facilities

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-1

Summary Table of Estimated Closure Costs for Year 2

Table #	Description	Total Cost
3	Overburden & Waste Rock Dumps	\$342,555
4	Open Pit and Haul Roads	\$99,778
5	Tailings Area and Diversion Structures	\$216,140
6	Main Water Dam	\$473,373
7	Mill and Ancillary Facilities	\$582,043
8	Mill Pond	\$98,066
9	Main Access Road	
	Scenario 1 - No Access Road Deactivation	\$2,140
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$104,908
	Scenario 3 - Deactivate Entire Access Road	\$172,404
10	Miscellaneous Sites and Facilities	\$143,257
11	Reclamation Research and Revegetation	
	Scenario 1 - No Access Road Deactivation	\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$283,544
	Scenario 3 - Deactivate Entire Access Road	\$292,584
12	Post Closure Site Management	\$1,244,300
13	Supporting Studies	\$16,000

Total Closure Costs		
	Scenario 1 - No Access Road Deactivation	\$3,496,675
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$3,603,963
	Scenario 3 - Deactivate Entire Access Road	\$3,680,499

Total Closure Costs (Including Percentage Contingency Allowance on Above Elements)		12%
	Scenario 1 - No Access Road Deactivation	\$3,916,276
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$4,036,439
	Scenario 3 - Deactivate Entire Access Road	\$4,122,159

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-2
Minto Mine Closure Unit Rates for Year 2

Equipment Rates		
Equipment	Rates/hr	Rate/mo
D9H Dozer	\$210	
Haul Truck D250E	\$200	
Tandem Haul Truck	\$100	
Cat 235 Excavator	\$200	
Cat 16H grader	\$171	
988B Loader	\$170	
Tractor Trailer (lowbed)	\$100	
30 ton Crane	\$145	
Hiab Flatdeck truck	\$75	
Cat 950 loader	\$120	
Pickup Truck		\$2,500
Personnel Rates		
Personnel	Rates/hr	Rate/mo
Blaster	\$60	
General Labourer	\$45	
Trades Labourer	\$80	
Site Supervisor	\$95	
Design Engineer	\$130	
Environmental Scientist	\$95	
Project Manager		\$9,700
Camp Labourer		\$4,000
Site Caretaker		\$6,100
Environmental Monitor		\$5,000
Revegetation Rates		
Revegetation Seed Mix	\$13.00	per kg
Revegetation Seed Mix - 50kg/ha	\$510.00	per ha
Fertilizer	\$1.00	per kg
Fertilizer - 250kg/ha	\$250.00	per ha
Tree Seedlings (1,000 seedlings per ha)	\$1,750.00	per ha
Seed/Fertilizer Application	\$1,500.00	per ha
Erosion Barrier	\$3.00	per square m
Revegetation cost per ha. Including application cost	\$2,260.00	per ha
Contractor Unit Rates & Camp Costs		
Load, Haul and place soil cover	\$5.00	cu.m
Load, Haul & Place rock cover	\$7.00	cu.m
Custom Rate A (Load, haul and place from IROD - MWD / LGO)	\$6.00	cu.m
Custom Rate B (Load, haul and place IROD - HGO/MainWater Dam)	\$4.50	cu.m
Custom Rate C (Load, haul and place IROD - CSA)	\$3.00	cu.m
Custom Rate D (Push from TFOD - TF)	\$2.00	cu.m
Custom Rate E (Push from MWD - U/S MWD)	\$2.00	cu.m
Load and Haul Rip Rap	\$10.00	cu.m
Place Riprap	\$3.00	cu.m
Freight run to Whitehorse	\$1,000.00	per load
Camp Cost	\$60.00	per day per person
Power and Heat	\$5,500.00	per month
Employee Transport Costs	\$3,000.00	per month
Barge Operating Cost	\$10,000.00	per month

Note:

Custom Unit Rates have been developed specifically for Minto Mine, taking into account such factors as haul distance, grade, machinery required, time required, etc.

Table 8.2-3
Waste Rock and Overburden Dumps, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WASTE ROCK AND OVERBURDEN DUMPS						
3.1	Main Waste Rock Dump (s 5.1.1.2)						
	Roll crest and recontour	Cat D9H Dozer	hrs	175	\$210	\$36,750	\$36,750
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13750	\$6.00	\$82,500	\$82,500
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$8,348	\$8,348
	Sub-Total						\$127,598
3.2	Low Grade Ore Stockpile and Pad (s 5.1.3.2)						
	Recontour Stockpile and Pad	Cat D9H Dozer	hrs	50	\$210	\$10,500	\$10,500
	Construct runoff collection ditch to divert water to open pit	Cat D9H Dozer	hrs	10	\$210	\$2,100	
		Cat 235 Excavator	hrs	16	\$200	\$3,200	
	Haul and place rip rap	Haul rip rap	unit rate basis	415	\$10	\$4,150	
		Place rip rap	unit rate basis	415	\$3	\$1,245	\$10,695
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13000	\$6.00	\$78,000	\$78,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,944	\$6,944
	Sub-Total						\$106,139
3.3	Ice-Rich Overburden Dump (s 5.1.2.2)						
	Recontour spoil pile behind berm	Cat D9H Dozer	hrs	16	\$210	\$3,360	\$3,360
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$235	\$235
	Sub-Total						\$3,595
3.4	High Grade Ore Stockpile Pad (s 5.1.3.2)						
	Recontour stockpile and pad	Cat D9H Dozer	hrs	20	\$210	\$4,200	\$4,200
	Haul and place overburden for revegetation	Custom Rate B	cu.m.	8500	\$4.50	\$38,250	\$38,250
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,972	\$2,972
	Sub-Total						\$45,422
3.5	Contractor's Shop and Work Area (s 5.1.4.2)						
	Remove salvageable equipment	General Labour	hrs	60	\$45	\$2,700	
		Truck D250E	hrs	20	\$200	\$4,000	
		Trades Labour	hrs	48	\$80	\$3,840	\$10,540
	Dismantle buildings	General Labour	hrs	60	\$45	\$2,700	
		Cat 235 Excavator	hrs	30	\$200	\$6,000	\$8,700
	Haul building pieces off site - equipment	Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$2,000
	Scrap haul to site landfill	Truck D250E	hrs	20	\$200	\$4,000	\$4,000
	Bury footings - haul and place fill, locally sourced	Unit Basis	cu.m.	2500	\$5	\$12,500	\$12,500
	Recontour	Cat D9H Dozer	hrs	15	\$210	\$3,150	\$3,150
	Haul and place overburden for revegetation	Custom Rate C	cu.m.	5000	\$3	\$15,000	\$15,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$3,912	\$3,912
	Sub-Total						\$59,802
Total Estimated Cost in Reclaiming Overburden and Waste Rock Dumps							\$342,555

Note:

Costing incorporates progressive reclamation during production phase

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-4

Open Pit and Haul Roads, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	OPEN PIT AND HAUL ROADS						
4.1	Ultimate Pit (s 5.2.1.2)						
	Remove pit pumps and pipe column/general cleanup	General Labour	hrs	90	\$45	\$4,050	
		Support equipment	l.s.		\$1,500	\$1,500	\$5,550
	Secure pit access - boulder placement	Cat 235 Excavator	hrs	25	\$200	\$5,000	
		Truck D250E	hrs	25	\$200	\$5,000	\$10,000
	Construct exit channel into Mill Pond system	Cat 235 Excavator	hrs	20	\$200	\$4,000	
	Riprap shoulder exiting pit	Unit Cost Basis	cu.m.	50	\$15	\$750	\$4,750
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,421	\$1,421
	Sub-Total						\$21,721
4.2	Haul Roads (s 5.2.2.2)						
	Remove culverts and haul away	General Labour	hrs	40	\$45	\$1,800	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$9,800
	Recontour slopes	Cat D9H Dozer	hrs	150	\$210	\$31,500	\$31,500
	Scarify surfaces	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Stabilize slopes - erosion barriers - material	Unit Cost Basis	sq.m.	2,000	\$3	\$6,000	\$6,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,107	\$5,107
	Sub-Total						\$78,057
Total Estimated Cost in Reclaiming Open Pit and Haul Roads							\$99,778

Note:

Linear disturbances to be scarified / decompacted and allowed to naturally revegetate

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-5

Tailings Area and Diversion Structures, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	TAILINGS AREA						
5.1	5.1 Tailings Deposit						
	Push overburden from TFOD - TF	Custom Rate D	cu.m	60000	\$2.00	\$120,000	\$120,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$8,400	\$8,400
	Sub-Total						\$128,400
5.2	5.2 South Diversion Ditch						
	Widen south diversion ditch	Cat 235 Excavator	hrs	50	\$200	\$10,000	\$10,000
	Haul and place riprap	Unit Rate	cu.m	2400	\$10	\$24,000	\$24,000
	HDPE Liner	Unit Rate	sq. m	4800	\$10	\$48,000	\$48,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,740	\$5,740
	Sub-Total						\$87,740
Total Estimated Cost in Reclaiming Tailings Area							\$216,140

Note:

Costing assumes stockpiling overburden along downhill slope of south diversion ditch during production phase. Down slope tailings perimeter rip rap blanket will be advanced as tailings facility accumulates during production phase.

MINTO MINE CLOSURE COSTING - YEAR 2

**Table 8.2-6
Main Water Dam, Estimated Closure Costs for Year 2**

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WATER DAM						
6.1	Reclaim System						
	Remove salvageable equipment - pipeline/pumps	General Labour	hrs	48	\$45	\$2,160	
		Trades Labour	hrs	98	\$80	\$7,840	\$10,000
	Remove pipeline	Truck D250E	hrs	100	\$200	\$20,000	
		Cat 235 Excavator	hrs	100	\$200	\$20,000	
		General Labour	hrs	200	\$45	\$9,000	\$49,000
	Dismantle Building	Cat 235 Excavator	hrs	16	\$200	\$3,200	
		General Labour	hrs	20	\$45	\$900	\$4,100
	Misc. Supplies & Tools	Misc.	l.s.		\$1,000	\$1,000	\$1,000
	Recontour alignment	Cat D9H Dozer	hrs	16	\$210	\$3,360	\$3,360
	Project Management & Engineering	7% of Total Cost			7.00%	\$4,722	\$4,722
	Sub-Total						\$72,182
6.2	Main Dam						
	Pump down impounded water, over spillway (using reclaim pumps)	General Labour	hrs	96	\$45	\$4,320	
	Misc. Supplies & Tools	Misc.	l.s.		\$5,000	\$5,000	\$9,320
	Build coffer dam and install pump-around system	Misc.	l.s.		\$10,000	\$10,000	\$10,000
	Operate system until new structure is ready						
	Stockpile rip rap from downstream shell	Unit Cost Basis	cu.m	10,000	\$10	\$100,000	\$100,000
	Breach Dam: push material using dozer into new areas	Custom Rate E	cu.m	25,000	\$2	\$50,000	
	and load, haul & dump and contour material in new area	Unit Cost Basis	cu.m	31,000	\$4.50	\$139,500	\$189,500
	Pond sediment - characterization	Analytical Costs	l.s.		\$5,000	\$5,000	
		Technician	hrs	60	\$75	\$4,500	\$9,500
	Construct stream channel at original grade - haul and place rip rap	Unit Cost Basis	cu.m	1,125	\$3	\$3,375	
		Unit Cost Basis	cu.m	1,125	\$10	\$11,250	\$14,625
	Haul and place overburden on slopes of new area u/s of MWD	Custom Rate E	cu.m	15,000	\$2	\$30,000	\$30,000
	Stabilize slopes with erosion barriers	Unit Cost	per sq. m	3,000	\$3	\$9,000	\$9,000
	Misc. Supplies & Tools	Misc.	l.s.		\$3,000	\$3,000	\$3,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$26,246	\$26,246
	Sub-Total						\$401,191
Total Estimated Cost in Reclaiming Water Dam							\$473,373

Note:

Main dam reclamation involves two methodologies: 25,000 m³ will be pushed by dozer, 31,000 m³ loaded and hauled upslope. Costing assumes stockpile of overburden located immediately adjacent and upslope of dam area that can be pushed into area after dam removal as part of final reclamation plan.

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-7
Mill & Ancillary Facilities, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	MILL AND ANCILLIARY FACILITIES						
7.1	Mill Building						
	Remove salvageable equipment	General Labour	hrs	550	\$45	\$24,750	
		Trades Labour	hrs	600	\$80	\$48,000	
		Crane Support	hrs	40	\$145	\$5,800	\$78,550
	Decontaminate Building-hosing and clean-up	General Labour	hrs	160	\$45	\$7,200	\$7,200
	Dismantle Building	General Labour	hrs	1000	\$45	\$45,000	
		Trades Labour	hrs	600	\$80	\$48,000	
		Cat 235 Excavator	hrs	120	\$200	\$24,000	
		Crane Support	hrs	60	\$145	\$8,700	\$125,700
	Concrete Demolition	Blaster	hrs	40	\$60	\$2,400	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	20	\$210	\$4,200	\$10,600
	Misc. Supplies & Tools	Misc.	l.s.		\$11,000	\$11,000	\$11,000
	Scrap haul to solid waste facility	Cat 235 Excavator	hrs	50	\$200	\$10,000	
		Truck D250E	hrs	100	\$200	\$20,000	\$30,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$18,414	\$18,414
	Subtotal:						\$281,464
		Subtract 50% for Salvage Value					\$140,732
7.2	Generator & Filter Buildings & Concentrate Shed						
	Remove salvageable equipment	General Labour	hrs	240	\$45	\$10,800	
		Trades Labour	hrs	240	\$80	\$19,200	
		Crane Support	hrs	24	\$145	\$3,480	\$33,480
	Salvage and remove powerline and poles		l.s.		\$27,500	\$27,500	\$27,500
	Dismantle Buildings	General Labour	hrs	160	\$45	\$7,200	
		Trades Labour	hrs	80	\$80	\$6,400	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		Crane Support	hrs	30	\$145	\$4,350	\$25,950
	Concrete Demolition	Blaster	hrs	40	\$60	\$2,400	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	20	\$210	\$4,200	\$10,600
	Misc. Supplies & Tools	Misc.	l.s.		\$10,000	\$10,000	\$10,000
	Scrap haul to solid waste facility	Cat 235 Excavator	hrs	10	\$200	\$2,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$6,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$7,947	\$7,947
	Subtotal:						\$121,477
		Subtract 50% for Salvage Value					\$60,739
7.3	Fuel Storage Area						
	Cleanout tanks-remove sludges, pressure wash	General Labour	hrs	60	\$45	\$2,700	
		Removal to Licensed facility	l.s.		\$10,000	\$10,000	\$12,700
	Remove bulk fuel storage and piping facilities	General Labour	hrs	100	\$45	\$4,500	
		Trades Labour	hrs	120	\$80	\$9,600	
		Crane Support	hrs	30	\$145	\$4,350	
		Support Equipment	l.s.		\$2,500	\$2,500	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		General Labour-sort & load	hrs	40	\$45	\$1,800	
		Tractor Trailer (lowbed)	hrs	30	\$100	\$3,000	\$33,750
	Fold and Bury Liner	Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	100	\$210	\$21,000	\$25,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,002	\$5,002
	Subtotal:						\$76,452
7.4	Mill Reagents						
	Load and return extra reagents/chemicals	General Labour	hrs	120	\$45	\$5,400	
		Support Equipment	l.s.		\$2,500	\$2,500	
		Disposal Cost-bulk materials	l.s.		\$10,000	\$10,000	
		Disposal Cost-lab-pacs	pallets	4	\$2,000	\$8,000	\$25,900
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,813	\$1,813
	Subtotal:						\$27,713
7.5	Reclaim Entire Mill Site Area						
	Test soils for contamination	Environmental Scientist	hrs	35	\$95	\$3,325	
		Analytical Costs	l.s.		\$3,000	\$3,000	\$6,325
	Haul any contaminated soils to Land Treatment Facility	Cat 235 Excavator	hrs	15	\$200	\$3,000	
		Truck D250E	hrs	15	\$200	\$3,000	\$6,000

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-8

Mill Water Pond, Estimated Closure Costs for Year 2

[illegible]

Table 8.2-9
Main Access Road, Estimated Closure Costs for Year 2

Scenario 3 - Decommission Entire Access Road (27 KM)							
Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
9.3	ACCESS ROAD - 27 KM SECTION						
9.3.1	Road Surface						
	Scarify - 27 km	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,796	\$1,796
	Subtotal:						\$27,446
9.3.2	Big Creek Bridge						
	Remove bridge decking and span	General Labour	hrs	50	\$45	\$2,250	
		Crane	hrs	40	\$145	\$5,800	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$18,050
	Cut off piles	General Labour	hrs	50	\$45	\$2,250	\$2,250
	Re-contour	Cat 235	hrs	30	\$200	\$6,000	
		D9H Dozer	hrs	30	\$210	\$6,300	\$12,300
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,282	\$2,282
	Subtotal:						\$34,882
9.3.3	Barge Ramps						
	Remove all gravel	Cat 235	hrs	20	\$200	\$4,000	\$4,000
	Re-countour areas and scarify	D9H Dozer	hrs	30	\$210	\$6,300	\$6,300
	Shoreline restoration	Misc.	I.s.		\$5,000	\$5,000	\$5,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,071	\$1,071
	Subtotal:						\$16,371
9.3.4	Culverts						
	Culvert excavation (40 small culverts)	Cat 235 Excavator	hrs	100	\$200	\$20,000	\$20,000
	Culvert removal	General Labour	hrs	140	\$45	\$6,300	
		Haul Truck D250E	hrs	100	\$200	\$20,000	\$26,300
	Minto Creek Culvert Removal & Streambank Restoration	Trades Labour	hrs	40	\$80	\$3,200	
		General Labour	hrs	75	\$45	\$3,375	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	\$14,575
	Recontour slopes and drainage	D9H Dozer	hrs	70	\$210	\$14,700	\$14,700
	Stabilize slopes	General Labour	hrs	200	\$45	\$9,000	
	Erosion barriers	Unit Cost Basis	per sq. m.	1,000	\$3	\$3,000	\$12,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,130	\$6,130
	Subtotal:						\$93,705
Total Estimated Cost for Access Road Closure (Scenario 3)							\$172,404

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-10
Miscellaneous Sites and Facilities, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	MISCELLANEOUS SITES AND FACILITIES						
10.1	Airstrip						
	Scarify airstrip	Cat 16H Grader	hrs	20	\$171	\$3,420	\$3,420
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$239	\$239
	Natural revegetation	n/a	n/a				
	Subtotal:						\$3,659
10.2	Mine Camp and Related Infrastructure						
	Remove salvageable equipment	General Labour	hrs	704	\$45	\$31,680	\$31,680
	Dismantle buildings	General Labour	hrs	1200	\$45	\$54,000	
		Cat 235 Excavator	hrs	120	\$200	\$24,000	\$78,000
	Haul scrap to Solid Waste Facility	Truck D250E	hrs	20	\$200	\$4,000	
		Cat 235 Excavator	hrs	10	\$200	\$2,000	\$6,000
	Reclaim Septic System	Labour	hrs	10	\$45	\$450	
		Cat 235 Excavator	hrs	2	\$200	\$400	\$850
	Site Clean-Up	General Labour	hrs	500	\$45	\$22,500	\$22,500
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$9,732	\$9,732
	Subtotal:						\$74,381
10.3	Explosives Plant Site						
	Remove salvageable equipment	General Labour	hrs	100	\$45	\$4,500	
		Trades Labour	hrs	50	\$80	\$4,000	\$8,500
	Dismantle buildings	General Labour	hrs	200	\$45	\$9,000	
		Cat 235 Excavator	hrs	30	\$200	\$6,000	\$15,000
	Haul scrap to Solid Waste Facility	Truck D250E	hrs	30	\$200	\$6,000	
		Cat 235 Excavator	hrs	10	\$200	\$2,000	\$8,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,205	\$2,205
	Subtotal:						\$16,853
10.4	Exploration Sites and Trails						
	Natural revegetation	n/a	n/a				
	Subtotal:						\$0
10.5	Land Treatment Facility						
	Prepare and submit closure plan	Misc	I.s.		\$2,000	\$2,000	\$2,000
	Characterize final soil hydrocarbon concentrations	Misc	I.s.		\$3,000	\$3,000	\$3,000
	Recontour	Cat D9H Dozer	hrs	2	\$210	\$420	\$420
	Haul and place overburden cap from nearby	Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	
		Cat D9H Dozer	hrs	6	\$210	\$1,260	\$9,260
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,028	\$1,028
	Subtotal:						\$15,708
10.6	Solid Waste Facility						
	Prepare detailed closure plan	Misc	I.s.		\$2,000	\$2,000	\$2,000
	Characterize final waste area	Misc	I.s.		\$2,000	\$2,000	\$2,000
	Remove recyclables and special waste materials	Tractor Trailer (lowbed)	hrs	40	\$100	\$4,000	\$4,000
	Recontour	Cat D9H Dozer	hrs	2	\$210	\$420	\$420
	Haul and cover with adjacent fill and place overburden cap	Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$8,000
	Compaction of cover	Cat D9H Dozer	hrs	6	\$210	\$1,260	\$1,260
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,238	\$1,238
	Subtotal:						\$18,918
10.7	Site Roads						
	Recontour	Cat 235 Excavator	hrs	30	\$200	\$6,000	\$6,000
	Scarify	Cat 16H Grader	hrs	40	\$171	\$6,840	\$6,840
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$899	\$899
	Subtotal:						\$13,739
Total Estimated Cost in Reclaiming Miscellaneous Sites and Facilities							\$143,257

Note:
Land treatment facility is a licensed facility and will be reclaimed as per license terms and conditions

Table 8.2-11
Reclamation Research and Revegetation, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Units	Quantity	Unit Rates	Cost	Total Adjusted
11.1	REVEGETATION ACTIVITIES					
11.1.0	Determination of Revegetation Plan for Current Site					
	Issuance of a plan for all site areas for regulatory review and approval	Misc	1		\$5,000	\$5,000
	Sub-Total					\$5,000
11.1.1	Main Waste Rock Dump (final total surface area of 37.8ha)					
	Seed and fertilize w/ labour	ha	10.0	\$2,260	\$22,600	
	Re-seed	ha	5.0	\$2,260	\$11,300	
	Re-forest	ha	10.0	\$1,750	\$17,500	\$51,400
	Sub-Total					\$51,400
11.1.2	Ice-Rich Overburden Dump (toe berm surface area of 1.5ha)					
	Seed and fertilize w/ labour	ha	1.5	\$2,260	\$3,390	
	Re-seed	ha	0.8	\$2,260	\$1,808	
	Re-forest	ha	1.5	\$1,750	\$2,625	\$7,823
	Sub-Total					\$7,823
11.1.3	Ore Stockpiles and Pads (final total surface area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$43,526
	Sub-Total					\$43,526
11.1.4	Contractor's Shop and Office Area (disturbed area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.3	\$2,260	\$9,718	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$44,204
	Sub-Total					\$44,204
11.1.5	Tailings Area (initial prepared area of 8.0 ha)					
	Seed and fertilize w/ labour	ha	8.0	\$2,260	\$18,080	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.0	\$1,750	\$14,000	\$41,120
	Sub-Total					\$41,120
11.1.6	Main Water Dam (total dam surface area 3.3 ha)					
	Seed and fertilize w/ labour	ha	3.3	\$2,260	\$7,458	
	Re-seed	ha	1.7	\$2,260	\$3,842	
	Re-forest	ha	3.3	\$1,750	\$5,775	\$17,075
	Sub-Total					\$17,075
11.1.7	Mill Area (total surface area of 7.6 ha)					
	Seed and Fertilize w/ labour	ha	7.6	\$2,260	\$17,176	
	Re-seed	ha	3.8	\$2,260	\$8,588	
	Re-forest	ha	7.6	\$1,750	\$13,300	\$39,064
	Subtotal:					\$39,064
11.1.8	Miscellaneous Sites - Camp, Airstrip, Waste Facilities, Explosives Site (area for reclamation of 5.8ha)					
	Seed and fertilize w/ labour	ha	5.8	\$2,260	\$13,108	
	Re-seed	ha	2.9	\$2,260	\$6,554	
	Re-forest	ha	5.8	\$1,750	\$10,150	\$29,812
	Subtotal:					\$29,812
11.1.9	Access Road					
	Scenario 1 - No Deactivation					
	No revegetation					
	Subtotal:					\$0
	Scenario 2 - Deactivate from Minto Creek to Mine Site					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	2.0	\$2,260	\$4,520	\$4,520
	Subtotal:					\$4,520
	Scenario 3 - Deactivate Entire Road					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	6.0	\$2,260	\$13,560	\$13,560
	Subtotal:					\$13,560
Total Estimated Cost for Reclamation Research and Revegetation						
	Scenario 1 - No Access Road Deactivation					\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site					\$283,544
	Scenario 3 - Deactivate Entire Access Road					\$292,584

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-12
Site Management, Estimated Closure Costs for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	SITE MANAGEMENT						
12.1	Onsite Management						
	Project Management and Engineering - Included in PME Costs in each Closure Component						
	Pickup truck	Light truck	monthly	30	\$2,500	\$75,000	\$75,000
	Sundry equipment maintenance	Unit Cost Basis	yearly	5	\$5,000	\$25,000	\$25,000
	Power and heat	Unit Cost Basis	monthly	15	\$5,500	\$82,500	\$82,500
	General Administrative expenses	Unit Cost Basis	monthly	30	\$2,000	\$60,000	\$60,000
	Camp Costs (5 year period)	Unit Cost Basis	manday	5130	\$60	\$307,800	\$307,800
	Subtotal:						\$550,300
12.2	Transport Costs						
	Employee transport costs	Unit Cost Basis	monthly	30	\$3,000	\$90,000	\$90,000
	Barge operating costs	Unit Cost Basis	monthly	12	\$10,000	\$120,000	\$120,000
	Subtotal:						\$210,000
12.3	Compliance Monitoring and Reporting						
	Water Quality Monitoring (Post Mine Closure) (50:50 sampling labour/analyses costs split)						
	Years 1-5 (monthly during open season)	Misc.	monthly	30	\$3,000	\$90,000	
	Years 6-10 (quarterly - spring/summer/fall)	Misc.	quarterly	15	\$3,000	\$45,000	
	Years 11-15 (once annually - post spring freshet)	Misc.	yearly	5	\$3,000	\$15,000	\$150,000
	Disbursements (non-labour/non-analytical)	Misc.	I.s.	15	\$3,000	\$45,000	\$45,000
	LTF Monitoring and Maintenance (years 1-5)	Misc.	yearly	5	\$3,500	\$17,500	\$17,500
	Enhanced Groundwater/Foundation monitoring below TF and Waste Rock Dumps	Misc.	yearly	15	\$2,000	\$30,000	\$30,000
	Geo-technical Inspections (annually yrs 1-5, bi-annual yrs 6-15)	Misc.	I.s.	10	\$5,000	\$50,000	\$50,000
	Reclamation Inspections (annually yrs 1-15)	Misc.	I.s.	15	\$3,000	\$45,000	\$45,000
	Biological Monitoring - Closure implementation	Misc.	I.s.		\$9,000	\$9,000	
	Years 1-5 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 6-10 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 11-15 (Every two years)	Misc.	bi-annual	3	\$2,500	\$7,500	\$46,500
	Subtotal:						\$384,000
12.4	Post Closure Maintenance						
	Misc. maintenance work related to the site after closure (Yr1-5)	Misc.	yearly	5	\$10,000	\$50,000	\$50,000
	Misc. maintenance work related to the site after closure (Yr6-15)	Misc.	per year	10	\$5,000	\$50,000	\$50,000
	Subtotal:						\$100,000
Total Estimated Cost for Post Closure Site Management							\$1,244,300

Note:

Camp Costs calculation based on "Table 7-1 Site Decommissioning and Reclamation Seasonal Personnel Requirements" using a 90 day work year

MINTO MINE CLOSURE COSTING - YEAR 2

Table 8.2-13
Supporting Studies for Year 2

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
13.1	Permafrost Foundation Monitoring						
13.1.1	Enhanced subsurface monitoring program in and below waste rock dumps (WRD)						
	preparing detailed monitoring program	Misc.	I.s.		\$2,000	\$2,000	
	undertake additional monitoring as per program(covered in T. 12)	Misc.	yearly		\$2,000	\$2,000	\$4,000
	Enhanced Adaptive Management Plan for WRD	Misc.	I.s.	1	\$4,000	\$4,000	\$4,000
13.1.2	Enhanced subsurface monitoring program in and below Tailings Facility (TF)						
	preparing detailed monitoring program	Misc.	I.s.		\$2,000	\$2,000	
	undertake additional monitoring as per program (covered in T. 12)	Misc.	yearly	1	\$2,000	\$2,000	\$4,000
	Enhanced Adaptive Management Plan for TF	Misc.	I.s.	1	\$4,000	\$4,000	\$4,000
	Subtotal:						\$16,000
Total Estimated Cost for Supporting Studies							\$16,000

Note:

Monitoring equipment such as thermistors, piezometers, etc. will be installed during construction of these facilities

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-1

Summary Table of Estimated Final Closure Costs

Table #	Description	Cost
3	Overburden & Waste Rock Dumps	\$340,415
4	Open Pit and Haul Roads	\$99,778
5	Tailings Area and Diversion Structures	\$169,060
6	Main Water Dam	\$473,373
7	Mill and Ancillary Facilities	\$783,513
8	Mill Pond	\$98,066
9	Main Access Road	
	Scenario 1 - No Access Road Deactivation	\$2,140
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$104,908
	Scenario 3 - Deactivate Entire Access Road	\$172,404
10	Miscellaneous Sites and Facilities	\$235,728
11	Reclamation Research and Revegetation	
	Scenario 1 - No Access Road Deactivation	\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$283,544
	Scenario 3 - Deactivate Entire Access Road	\$292,584
12	Post Closure Site Management	\$1,244,300

Total Closure Costs		
	Scenario 1 - No Access Road Deactivation	\$3,725,396
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$3,832,685
	Scenario 3 - Deactivate Entire Access Road	\$3,909,220

Total Closure Costs (Including Percentage Contingency Allowance on Above Elements)		12%
	Scenario 1 - No Access Road Deactivation	\$4,172,444
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site	\$4,292,607
	Scenario 3 - Deactivate Entire Access Road	\$4,378,327

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-2
Minto Mine Final Closure Unit Rates

Equipment Rates		
Equipment	Rates/hr	Rate/mo
D9H Dozer	\$210	
Haul Truck D250E	\$200	
Tandem Haul Truck	\$100	
Cat 235 Excavator	\$200	
Cat 16H grader	\$171	
988B Loader	\$170	
Tractor Trailer (lowbed)	\$100	
30 ton Crane	\$145	
Hiab Flatdeck truck	\$75	
Cat 950 loader	\$120	
Pickup Truck		\$2,500
Personnel Rates		
Personnel	Rates/hr	Rate/mo
Blaster	\$60	
General Labourer	\$45	
Trades Labourer	\$80	
Site Supervisor	\$95	
Design Engineer	\$130	
Environmental Scientist	\$95	
Project Manager		\$9,700
Camp Labourer		\$4,000
Site Caretaker		\$6,100
Environmental Monitor		\$5,000
Revegetation Rates		
Revegetation Seed Mix	\$13.00	per kg
Revegetation Seed Mix - 50kg/ha	\$510.00	per ha
Fertilizer	\$1.00	per kg
Fertilizer - 250kg/ha	\$250.00	per ha
Tree Seedlings (1,000 seedlings per ha)	\$1,750.00	per ha
Seed/Fertilizer Application	\$1,500.00	per ha
Erosion Barrier	\$3.00	per square m
Revegetation cost per ha. Including application cost	\$2,260.00	per ha
Contractor Unit Rates & Camp Costs		
Load, Haul and place soil cover	\$5.00	cu.m
Load, Haul & Place rock cover	\$7.00	cu.m
Custom Rate A (Load, haul and place from IROD - MWD / LGO)	\$6.00	cu.m
Custom Rate B (Load, haul and place IROD - HGO/MainWater Dam)	\$4.50	cu.m
Custom Rate C (Load, haul and place IROD - CSA)	\$3.00	cu.m
Custom Rate D (Push from TFOD - TF)	\$2.00	cu.m
Custom Rate E (Push from MWD - U/S MWD)	\$2.00	cu.m
Load and Haul Rip Rap	\$10.00	cu.m
Place Riprap	\$3.00	cu.m
Freight run to Whitehorse	\$1,000.00	per load
Camp Cost	\$60.00	per day per person
Power and Heat	\$5,500.00	per month
Employee Transport Costs	\$3,000.00	per month
Barge Operating Cost	\$10,000.00	per month

Note:

Custom Unit Rates have been developed specifically for Minto Mine, taking into account such factors as haul distance, grade, machinery required, time required, etc.

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-3
Waste Rock and Overburden Dumps, Estimated Final Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WASTE ROCK AND OVERBURDEN DUMPS						
3.1	Main Waste Rock Dump (s 5.1.1.2)						
	Roll crest and recontour	Cat D9H Dozer	hrs	175	\$210	\$36,750	\$36,750
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13750	\$6.00	\$82,500	\$82,500
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$8,348	\$8,348
	Sub-Total						\$127,598
3.2	Low Grade Ore Stockpile and Pad (s 5.1.3.2)						
	Recontour Stockpile and Pad	Cat D9H Dozer	hrs	50	\$210	\$10,500	\$10,500
	Construct runoff collection ditch to divert water to open pit	Cat D9H Dozer	hrs	10	\$210	\$2,100	
		Cat 235 Excavator	hrs	16	\$200	\$3,200	
	Haul and place rip rap	Haul rip rap	unit rate basis	415	\$10	\$4,150	
		Place rip rap	unit rate basis	415	\$3	\$1,245	\$10,695
	Haul and place overburden for revegetation	Custom Rate A	cu.m.	13000	\$6.00	\$78,000	\$78,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,944	\$6,944
	Sub-Total						\$106,139
3.3	Ice-Rich Overburden Dump (s 5.1.2.2)						
	Recontour spoil pile behind berm	Cat D9H Dozer	hrs	16	\$210	\$3,360	\$3,360
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$235	\$235
	Sub-Total						\$3,595
3.4	High Grade Ore Stockpile Pad (s 5.1.3.2)						
	Recontour stockpile and pad	Cat D9H Dozer	hrs	20	\$210	\$4,200	\$4,200
	Haul and place overburden for revegetation	Custom Rate B	cu.m.	8500	\$4.50	\$38,250	\$38,250
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,972	\$2,972
	Sub-Total						\$45,422
3.5	Contractor's Shop and Work Area (s 5.1.4.2)						
	Remove salvageable equipment	General Labour	hrs	60	\$45	\$2,700	
		Truck D250E	hrs	20	\$200	\$4,000	
		Trades Labour	hrs	48	\$80	\$3,840	\$10,540
	Dismantle buildings	General Labour	hrs	60	\$45	\$2,700	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	\$6,700
	Haul building pieces off site - equipment	Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$2,000
	Scrap haul to site landfill	Truck D250E	hrs	20	\$200	\$4,000	\$4,000
	Bury footings - haul and place fill, locally sourced	Unit Basis	cu.m.	2500	\$5	\$12,500	\$12,500
	Recontour	Cat D9H Dozer	hrs	15	\$210	\$3,150	\$3,150
	Haul and place overburden for revegetation	Custom Rate C	cu.m.	5000	\$3	\$15,000	\$15,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$3,772	\$3,772
	Sub-Total						\$57,662
Total Estimated Cost in Reclaiming Overburden and Waste Rock Dumps							\$340,415

Note:

Costing incorporates progressive reclamation during production phase

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-4
Open Pit and Haul Roads, Estimated Final Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	OPEN PIT AND HAUL ROADS						
4.1	Ultimate Pit (s 5.2.1.2)						
	Remove pit pumps and pipe column/general cleanup	General Labour	hrs	90	\$45	\$4,050	
		Support equipment	l.s.		\$1,500	\$1,500	\$5,550
	Secure pit access - boulder placement	Cat 235 Excavator	hrs	25	\$200	\$5,000	
		Truck D250E	hrs	25	\$200	\$5,000	\$10,000
	Construct exit channel into Mill Pond system	Cat 235 Excavator	hrs	20	\$200	\$4,000	
	Riprap shoulder exiting pit	Unit Cost Basis	cu.m.	50	\$15	\$750	\$4,750
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,421	\$1,421
	Sub-Total						\$21,721
4.2	Haul Roads (s 5.2.2.2)						
	Remove culverts and haul away	General Labour	hrs	40	\$45	\$1,800	
		Cat 235 Excavator	hrs	20	\$200	\$4,000	
		Truck D250E	hrs	20	\$200	\$4,000	\$9,800
	Recontour slopes	Cat D9H Dozer	hrs	150	\$210	\$31,500	\$31,500
	Scarify surfaces	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Stabilize slopes - erosion barriers - material	Unit Cost Basis	sq.m.	2,000	\$3	\$6,000	\$6,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,107	\$5,107
	Sub-Total						\$78,057
Total Estimated Cost in Reclaiming Open Pit and Haul Roads							\$99,778

Note:

Linear disturbances to be scarified / decompacted and allowed to naturally revegetate

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-5

Tailings Area and Diversion Structures, Estimated Final Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	TAILINGS AREA						
5.1	5.1 Tailings Deposit						
	Push overburden from TFOD - TF	Custom Rate D	cu.m	38000	\$2.00	\$76,000	\$76,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,320	\$5,320
	Sub-Total						\$81,320
5.2	5.2 South Diversion Ditch						
	Widen south diversion ditch	Cat 235 Excavator	hrs	50	\$200	\$10,000	\$10,000
	Haul and place riprap	Unit Rate	cu.m	2400	\$10	\$24,000	\$24,000
	HDPE Liner	Unit Rate	sq. m	4800	\$10	\$48,000	\$48,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$5,740	\$5,740
	Sub-Total						\$87,740
Total Estimated Cost in Reclaiming Tailings Area							\$169,060

Note:

Costing assumes stockpiling overburden along downhill slope of south diversion ditch during production phase. Down slope tailings perimeter rip rap blanket will be advanced as tailings facility accumulates during production phase.

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-6
Main Water Dam, Estimated Final Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	WATER DAM						
6.1	Reclaim System						
	Remove salvageable equipment - pipeline/pumps	General Labour	hrs	48	\$45	\$2,160	
		Trades Labour	hrs	98	\$80	\$7,840	\$10,000
	Remove pipeline	Truck D250E	hrs	100	\$200	\$20,000	
		Cat 235 Excavator	hrs	100	\$200	\$20,000	
		General Labour	hrs	200	\$45	\$9,000	\$49,000
	Dismantle Building	Cat 235 Excavator	hrs	16	\$200	\$3,200	
		General Labour	hrs	20	\$45	\$900	\$4,100
	Misc. Supplies & Tools	Misc.	l.s.		\$1,000	\$1,000	\$1,000
	Recontour alignment	Cat D9H Dozer	hrs	16	\$210	\$3,360	\$3,360
	Project Management & Engineering	7% of Total Cost			7.00%	\$4,722	\$4,722
	Sub-Total						\$72,182
6.2	Main Dam						
	Pump down impounded water, over spillway (using reclaim pumps)	General Labour	hrs	96	\$45	\$4,320	
	Misc. Supplies & Tools	Misc.	l.s.		\$5,000	\$5,000	\$9,320
	Build coffer dam and install pump-around system	Misc.	l.s.		\$10,000	\$10,000	\$10,000
	Operate system until new structure is ready						
	Stockpile rip rap from downstream shell	Unit Cost Basis	cu.m	10,000	\$10	\$100,000	\$100,000
	Breach Dam: push material using dozer into new areas	Custom Rate E	cu.m	25,000	\$2	\$50,000	
	and load, haul & dump and contour material in new area	Unit Cost Basis	cu.m	31,000	\$4.50	\$139,500	\$189,500
	Pond sediment - characterization	Analytical Costs	l.s.		\$5,000	\$5,000	
		Technician	hrs	60	\$75	\$4,500	\$9,500
	Construct stream channel at original grade - haul and place rip rap	Unit Cost Basis	cu.m	1,125	\$3	\$3,375	
		Unit Cost Basis	cu.m	1,125	\$10	\$11,250	\$14,625
	Haul and place overburden on slopes of new area u/s of MWD	Custom Rate E	cu.m	15,000	\$2	\$30,000	\$30,000
	Stabilize slopes with erosion barriers	Unit Cost	per sq. m	3,000	\$3	\$9,000	\$9,000
	Misc. Supplies & Tools	Misc.	l.s.		\$3,000	\$3,000	\$3,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$26,246	\$26,246
	Sub-Total						\$401,191
Total Estimated Cost in Reclaiming Water Dam							\$473,373

Note:

Main dam reclamation involves two methodologies: 25,000 m3 will be pushed by dozer, 31,000 m3 loaded and hauled upslope. Costing assumes stockpile of overburden located immediately adjacent and upslope of dam area that can be pushed into area after dam removal as part of final reclamation plan.

Table 8.3-7
Mill & Ancillary Facilities, Estimated Final Closure Costs

[illegible]

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-8

Mill Water Pond, Estimated Final Closure Costs

[illegible]

Table 8.3-9
Main Access Road, Estimated Final Closure Costs

Scenario 3 - Decommission Entire Access Road (27 KM)							
Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
9.3	ACCESS ROAD - 27 KM SECTION						
9.3.1	Road Surface						
	Scarify - 27 km	Cat 16H grader	hrs	150	\$171	\$25,650	\$25,650
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,796	\$1,796
	Subtotal:						\$27,446
9.3.2	Big Creek Bridge						
	Remove bridge decking and span	General Labour	hrs	50	\$45	\$2,250	
		Crane	hrs	40	\$145	\$5,800	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	
		Tractor Trailer (lowbed)	hrs	20	\$100	\$2,000	\$18,050
	Cut off piles	General Labour	hrs	50	\$45	\$2,250	\$2,250
	Re-contour	Cat 235	hrs	30	\$200	\$6,000	
		D9H Dozer	hrs	30	\$210	\$6,300	\$12,300
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$2,282	\$2,282
	Subtotal:						\$34,882
9.3.3	Barge Ramps						
	Remove all gravel	Cat 235	hrs	20	\$200	\$4,000	\$4,000
	Re-countour areas and scarify	D9H Dozer	hrs	30	\$210	\$6,300	\$6,300
	Shoreline restoration	Misc.	I.s.		\$5,000	\$5,000	\$5,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$1,071	\$1,071
	Subtotal:						\$16,371
9.3.4	Culverts						
	Culvert excavation (40 small culverts)	Cat 235 Excavator	hrs	100	\$200	\$20,000	\$20,000
	Culvert removal	General Labour	hrs	140	\$45	\$6,300	
		Haul Truck D250E	hrs	100	\$200	\$20,000	\$26,300
	Minto Creek Culvert Removal & Streambank Restoration	Trades Labour	hrs	40	\$80	\$3,200	
		General Labour	hrs	75	\$45	\$3,375	
		Cat 235 Excavator	hrs	40	\$200	\$8,000	\$14,575
	Recontour slopes and drainage	D9H Dozer	hrs	70	\$210	\$14,700	\$14,700
	Stabilize slopes	General Labour	hrs	200	\$45	\$9,000	
	Erosion barriers	Unit Cost Basis	per sq. m.	1,000	\$3	\$3,000	\$12,000
	Project Management & Engineering	7% of Total Cost	%		7.00%	\$6,130	\$6,130
	Subtotal:						\$93,705
Total Estimated Cost for Access Road Closure (Scenario 3)							\$172,404

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-10

Miscellaneous Sites and Facilities, Estimated Final Closure Costs

[illegible]

Table 8.3-11
Reclamation Research and Revegetation, Estimated Final Closure Costs

Item No.	Work Item Description	Units	Quantity	Unit Rates	Cost	Total Adjusted
11.1	REVEGETATION ACTIVITIES					
11.1.0	Determination of Revegetation Plan for Current Site					
	Issuance of a plan for all site areas for regulatory review and approval	Misc	1		\$5,000	\$5,000
						\$5,000
11.1.1	Main Waste Rock Dump (final total surface area of 37.8ha)					
	Seed and fertilize w/ labour	ha	10.0	\$2,260	\$22,600	
	Re-seed	ha	5.0	\$2,260	\$11,300	
	Re-forest	ha	10.0	\$1,750	\$17,500	\$51,400
	Sub-Total					\$51,400
11.1.2	Ice-Rich Overburden Dump (toe berm surface area of 1.5ha)					
	Seed and fertilize w/ labour	ha	1.5	\$2,260	\$3,390	
	Re-seed	ha	0.8	\$2,260	\$1,808	
	Re-forest	ha	1.5	\$1,750	\$2,625	\$7,823
	Sub-Total					\$7,823
11.1.3	Ore Stockpiles and Pads (final total surface area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$43,526
	Sub-Total					\$43,526
11.1.4	Contractor's Shop and Office Area (disturbed area of 8.6 ha)					
	Seed and fertilize w/ labour	ha	8.6	\$2,260	\$19,436	
	Re-seed	ha	4.3	\$2,260	\$9,718	
	Re-forest	ha	8.6	\$1,750	\$15,050	\$44,204
	Sub-Total					\$44,204
11.1.5	Tailings Area (initial prepared area of 8.0 ha)					
	Seed and fertilize w/ labour	ha	8.0	\$2,260	\$18,080	
	Re-seed	ha	4.0	\$2,260	\$9,040	
	Re-forest	ha	8.0	\$1,750	\$14,000	\$41,120
	Sub-Total					\$41,120
11.1.6	Main Water Dam (total dam surface area 3.3 ha)					
	Seed and fertilize w/ labour	ha	3.3	\$2,260	\$7,458	
	Re-seed	ha	1.7	\$2,260	\$3,842	
	Re-forest	ha	3.3	\$1,750	\$5,775	\$17,075
	Sub-Total					\$17,075
11.1.7	Mill Area (total surface area of 7.6 ha)					
	Seed and Fertilize w/ labour	ha	7.6	\$2,260	\$17,176	
	Re-seed	ha	3.8	\$2,260	\$8,588	
	Re-forest	ha	7.6	\$1,750	\$13,300	\$39,064
	Subtotal:					\$39,064
11.1.8	Miscellaneous Sites - Camp, Airstrip, Waste Facilities, Explosives Site (area for reclamation of 5.8ha)					
	Seed and fertilize w/ labour	ha	5.8	\$2,260	\$13,108	
	Re-seed	ha	2.9	\$2,260	\$6,554	
	Re-forest	ha	5.8	\$1,750	\$10,150	\$29,812
	Subtotal:					\$29,812
11.1.9	Access Road					
	Scenario 1 - No Deactivation					
	No revegetation					
	Subtotal:					\$0
	Scenario 2 - Deactivate from Minto Creek to Mine Site					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	2.0	\$2,260	\$4,520	\$4,520
	Subtotal:					\$4,520
	Scenario 3 - Deactivate Entire Road					
	Revegetate and fertilize banks at culvert excavations, including labour	ha	6.0	\$2,260	\$13,560	\$13,560
	Subtotal:					\$13,560
Total Estimated Cost for Reclamation Research and Revegetation						
	Scenario 1 - No Access Road Deactivation					\$279,024
	Scenario 2 - Deactivate Access Road from Minto Creek to Mine Site					\$283,544
	Scenario 3 - Deactivate Entire Access Road					\$292,584

MINTO MINE CLOSURE COSTING - FINAL CLOSURE

Table 8.3-12
Site Management, Estimated Final Closure Costs

Item No.	Work Item Description	Equipment / Labour	Units	Quantity	Unit Rates	Cost	Total Adjusted
	SITE MANAGEMENT						
12.1	Onsite Management						
	Project Management and Engineering - Included in PME Costs in each Closure Component						
	Pickup truck	Light truck	monthly	30	\$2,500	\$75,000	\$75,000
	Sundry equipment maintenance	Unit Cost Basis	yearly	5	\$5,000	\$25,000	\$25,000
	Power and heat	Unit Cost Basis	monthly	15	\$5,500	\$82,500	\$82,500
	General Administrative expenses	Unit Cost Basis	monthly	30	\$2,000	\$60,000	\$60,000
	Camp Costs (5 year period)	Unit Cost Basis	manday	5130	\$60	\$307,800	\$307,800
	Subtotal:						\$550,300
12.2	Transport Costs						
	Employee transport costs	Unit Cost Basis	monthly	30	\$3,000	\$90,000	\$90,000
	Barge operating costs	Unit Cost Basis	monthly	12	\$10,000	\$120,000	\$120,000
	Subtotal:						\$210,000
12.3	Compliance Monitoring and Reporting						
	Water Quality Monitoring (Post Mine Closure) (50:50 sampling labour/analyses costs split)						
	Years 1-5 (monthly during open season)	Misc.	monthly	30	\$3,000	\$90,000	
	Years 6-10 (quarterly - spring/summer/fall)	Misc.	quarterly	15	\$3,000	\$45,000	
	Years 11-15 (once annually - post spring freshet)	Misc.	yearly	5	\$3,000	\$15,000	\$150,000
	Disbursements (non-labour/non-analytical)	Misc.	I.s.	15	\$3,000	\$45,000	\$45,000
	LTF Monitoring and Maintenance (years 1-5)	Misc.	yearly	5	\$3,500	\$17,500	\$17,500
	Enhanced Groundwater/Foundation monitoring below TF and Waste Rock Dumps	Misc.	yearly	15	\$2,000	\$30,000	\$30,000
	Geo-technical Inspections (annually yrs 1-5, bi-annual yrs 6-15)	Misc.	I.s.	10	\$5,000	\$50,000	\$50,000
	Reclamation Inspections (annually yrs 1-15)	Misc.	I.s.	15	\$3,000	\$45,000	\$45,000
	Biological Monitoring - Closure implementation	Misc.	I.s.		\$9,000	\$9,000	
	Years 1-5 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 6-10 (Annually)	Misc.	yearly	5	\$3,000	\$15,000	
	Years 11-15 (Every two years)	Misc.	bi-annual	3	\$2,500	\$7,500	\$46,500
	Subtotal:						\$384,000
12.4	Post Closure Maintenance						
	Misc. maintenance work related to the site after closure (Yr1-5)	Misc.	yearly	5	\$10,000	\$50,000	\$50,000
	Misc. maintenance work related to the site after closure (Yr6-15)	Misc.	per year	10	\$5,000	\$50,000	\$50,000
	Subtotal:						\$100,000
Total Estimated Cost for Post Closure Site Management							\$1,244,300

Note:

Camp Costs calculation based on "Table 7-1 Site Decommissioning and Reclamation Seasonal Personnel Requirements" using a 90 day work year

Table 8.4-1

Estimated Progressive Reclamation Costs - During Operations

Work Item Description	Total Area for Reclamation	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost	Area for Progressive Reclamation	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost	
	Total for Mine Life									Year 1							
PROGRESSIVE RECLAMATION ACTIVITIES		Earthworks	Revegetation							Earthworks	Revegetation						
Main Waste Rock Dump	37.8	32.3	32.05							0.25	0						
Roll crest and recontour				Cat D9H Dozer	hrs	646	\$210	\$135,660	\$135,660			Cat D9H Dozer	hrs	5	\$210	\$1,050	\$1,050
Haul and place overburden for revegetation				Cat 235 Excavator	hrs	129.2	\$200	\$25,840				Cat 235 Excavator	hrs	1	\$200	\$200	
				Truck D250E	hrs	258.4	\$160	\$41,344				Truck D250E	hrs	2	\$160	\$320	
				Cat D9H Dozer	hrs	646	\$210	\$135,660	\$202,844			Cat D9H Dozer	hrs	5	\$210	\$1,050	\$1,570
EPCM				7% of Total Cost	%		7.00%	\$23,695	\$23,695			7% of Total Cost	%		7.00%	\$183	\$183
Revegetation																	
Seed and fertilize w/ labour				Mix #3 (non-linear)	ha	32.05	\$1,971	\$63,171	\$63,171			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-seed				Mix #3 (non-linear)	ha	16.025	\$1,971	\$31,585	\$31,585			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-forest				Tree seedings	ha	16.025	\$1,500	\$24,038	\$24,038			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total									\$480,993								\$2,803
Ice-Rich Overburden Dump (Toe Berm)	7.9	1.2	0.95							0.25	0						
Haul and place overburden for revegetation				Cat 235 Excavator	hrs	4.8	\$200	\$960				Cat 235 Excavator	hrs	1	\$200	\$200	
				Truck D250E	hrs	9.6	\$160	\$1,536				Truck D250E	hrs	2	\$160	\$320	
				Cat D9H Dozer	hrs	24	\$210	\$5,040	\$7,536			Cat D9H Dozer	hrs	5	\$210	\$1,050	\$1,570
EPCM				7% of Total Cost	%		7.00%	\$528	\$528			7% of Total Cost	%		7.00%	\$110	\$110
Revegetation																	
Seed and fertilize w/ labour				Mix #3 (non-linear)	ha	0.95	\$1,971	\$1,872	\$1,872			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-seed				Mix #3 (non-linear)	ha	0.475	\$1,971	\$936	\$936			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-forest				Tree seedings	ha	0.475	\$1,500	\$713	\$713			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total									\$11,585								\$1,680
Tailings Area	38.5	30.9	30.65							0.25	0						
Haul and place overburden cap for revegetation				Cat 235 Excavator	hrs	123.6	\$200	\$24,720				Cat 235 Excavator	hrs	1	\$200	\$200	
				Truck D250E	hrs	247.2	\$160	\$39,552				Truck D250E	hrs	2	\$160	\$320	
				Cat D9H Dozer	hrs	618	\$210	\$129,780	\$194,052			Cat D9H Dozer	hrs	5	\$210	\$1,050	\$1,570
EPCM				7% of Total Cost	%		7.00%	\$13,584	\$13,584			7% of Total Cost	%		7.00%	\$110	\$110
Revegetation																	
Seed and fertilize w/ labour				Mix #3 (non-linear)	ha	30.65	\$1,971	\$60,411	\$60,411			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-seed				Mix #3 (non-linear)	ha	15.325	\$1,971	\$30,206	\$30,206			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-forest				Tree seedings	ha	8.875	\$1,500	\$13,313	\$13,313			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total									\$311,565								\$1,680
Test Plots and Reclamation Trials	4	-	4							-	3						
Seeding and re-seeding w/ fertilizer and labour					ha	4	\$1,971	\$7,884	\$7,884				ha	3	\$1,971	\$5,913	\$5,913
Soils testing					yrs	7	\$500	\$3,500	\$3,500				yrs	1	\$500	\$500	\$500
Summer student - wages and support costs					yrs	6	\$12,000	\$72,000	\$72,000				yrs	1	\$12,000	\$12,000	\$12,000
Revegetation program - consulting fees					yrs	8	\$10,000	\$80,000	\$80,000				yrs	1	\$20,000	\$20,000	\$20,000
Sub-Total									\$163,384								\$38,413
Total Estimated Cost for Progressive Reclamation										Total							\$44,576
\$967,526																	

Table 8.4-1 (CONT'D)

Estimated Progressive Reclamation Costs - During Operations

Work Item Description	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
	Year 2								Year 3							
PROGRESSIVE RECLAMATION ACTIVITIES	Earthworks	Revegetation							Earthworks	Revegetation						
Main Waste Rock Dump	8	8							5.55	5.55						
Roll crest and recontour			Cat D9H Dozer	hrs	160	\$210	\$33,600	\$33,600			Cat D9H Dozer	hrs	111	\$210	\$23,310	\$23,310
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	32	\$200	\$6,400				Cat 235 Excavator	hrs	22.2	\$200	\$4,440	
			Truck D250E	hrs	64	\$160	\$10,240				Truck D250E	hrs	44.4	\$160	\$7,104	
			Cat D9H Dozer	hrs	160	\$210	\$33,600	\$50,240			Cat D9H Dozer	hrs	111	\$210	\$23,310	\$34,854
EPCM			7% of Total Cost	%		7.00%	\$5,869	\$5,869			7% of Total Cost	%		7.00%	\$4,071	\$4,071
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	8	\$1,971	\$15,768	\$15,768			Mix #3 (non-linear)	ha	5.55	\$1,971	\$10,939	\$10,939
Re-seed			Mix #3 (non-linear)	ha	4	\$1,971	\$7,884	\$7,884			Mix #3 (non-linear)	ha	2.775	\$1,971	\$5,470	\$5,470
Re-forest			Tree seedings	ha	4	\$1,500	\$6,000	\$6,000			Tree seedings	ha	2.775	\$1,500	\$4,163	\$4,163
Sub-Total	\$119,361								\$82,807							
Ice-Rich Overburden Dump (Toe Berm)	0.95	0.95							0	0						
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	3.8	\$200	\$760				Cat 235 Excavator	hrs	0	\$200	\$0	
			Truck D250E	hrs	7.6	\$160	\$1,216				Truck D250E	hrs	0	\$160	\$0	
			Cat D9H Dozer	hrs	19	\$210	\$3,990	\$5,966			Cat D9H Dozer	hrs	0	\$210	\$0	\$0
EPCM			7% of Total Cost	%		7.00%	\$418	\$418			7% of Total Cost	%		7.00%	\$0	\$0
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	0.95	\$1,971	\$1,872	\$1,872			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-seed			Mix #3 (non-linear)	ha	0.475	\$1,971	\$936	\$936			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-forest			Tree seedings	ha	0.475	\$1,500	\$713	\$713			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total	\$9,905								\$0							
Tailings Area	0	0							2	2						
Haul and place overburden cap for revegetation			Cat 235 Excavator	hrs	0	\$200	\$0				Cat 235 Excavator	hrs	8	\$200	\$1,600	
			Truck D250E	hrs	0	\$160	\$0				Truck D250E	hrs	16	\$160	\$2,560	
			Cat D9H Dozer	hrs	0	\$210	\$0	\$0			Cat D9H Dozer	hrs	40	\$210	\$8,400	\$12,560
EPCM			7% of Total Cost	%		7.00%	\$0	\$0			7% of Total Cost	%		7.00%	\$879	\$879
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	2	\$1,971	\$3,942	\$3,942
Re-seed			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	1	\$1,971	\$1,971	\$1,971
Re-forest			Tree seedings	ha	0	\$1,500	\$0	\$0			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total	\$0								\$19,352							
Test Plots and Reclamation Trials	-	1							-	0						
Seeding and re-seeding w/ fertilizer and labour				ha	1	\$1,971	\$1,971	\$1,971				ha	0	\$0	\$0	\$0
Soils testing				yrs	1	\$500	\$500	\$500				yrs	1	\$500	\$500	\$500
Summer student - wages and support costs				yrs	1	\$12,000	\$12,000	\$12,000				yrs	1	\$12,000	\$12,000	\$12,000
Revegetation program - consulting fees				yrs	1	\$10,000	\$10,000	\$10,000				yrs	1	\$10,000	\$10,000	\$10,000
Sub-Total	\$24,471								\$22,500							
Total Estimated Cost for Progressive Reclamation																
Total									Total							
\$153,737									\$124,659							

Table 8.4-1 (CONT'D)

Estimated Progressive Reclamation Costs - During Operations

Work Item Description	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
	Year 4								Year 5							
PROGRESSIVE RECLAMATION ACTIVITIES	Earthworks	Revegetation							Earthworks	Revegetation						
Main Waste Rock Dump	5.5	5.5							5.5	5.5						
Roll crest and recontour			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$23,100			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$23,100
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	22	\$200	\$4,400				Cat 235 Excavator	hrs	22	\$200	\$4,400	
			Truck D250E	hrs	44	\$160	\$7,040				Truck D250E	hrs	44	\$160	\$7,040	
			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$34,540			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$34,540
EPCM			7% of Total Cost	%		7.00%	\$4,035	\$4,035			7% of Total Cost	%		7.00%	\$4,035	\$4,035
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	5.5	\$1,971	\$10,841	\$10,841			Mix #3 (non-linear)	ha	5.5	\$1,971	\$10,841	\$10,841
Re-seed			Mix #3 (non-linear)	ha	2.75	\$1,971	\$5,420	\$5,420			Mix #3 (non-linear)	ha	2.75	\$1,971	\$5,420	\$5,420
Re-forest			Tree seedings	ha	2.75	\$1,500	\$4,125	\$4,125			Tree seedings	ha	2.75	\$1,500	\$4,125	\$4,125
Sub-Total								\$82,061								\$82,061
Ice-Rich Overburden Dump (Toe Berm)	0	0							0	0						
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	0	\$200	\$0				Cat 235 Excavator	hrs	0	\$200	\$0	
			Truck D250E	hrs	0	\$160	\$0				Truck D250E	hrs	0	\$160	\$0	
			Cat D9H Dozer	hrs	0	\$210	\$0	\$0			Cat D9H Dozer	hrs	0	\$210	\$0	\$0
EPCM			7% of Total Cost	%		7.00%	\$0	\$0			7% of Total Cost	%		7.00%	\$0	\$0
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-seed			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0
Re-forest			Tree seedings	ha	0	\$1,500	\$0	\$0			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total								\$0								\$0
Tailings Area	2	2							8.9	8.9						
Haul and place overburden cap for revegetation			Cat 235 Excavator	hrs	8	\$200	\$1,600				Cat 235 Excavator	hrs	35.6	\$200	\$7,120	
			Truck D250E	hrs	16	\$160	\$2,560				Truck D250E	hrs	71.2	\$160	\$11,392	
			Cat D9H Dozer	hrs	40	\$210	\$8,400	\$12,560			Cat D9H Dozer	hrs	178	\$210	\$37,380	\$55,892
EPCM			7% of Total Cost	%		7.00%	\$879	\$879			7% of Total Cost	%		7.00%	\$3,912	\$3,912
Revegetation																
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	2	\$1,971	\$3,942	\$3,942			Mix #3 (non-linear)	ha	8.9	\$1,971	\$17,542	\$17,542
Re-seed			Mix #3 (non-linear)	ha	1	\$1,971	\$1,971	\$1,971			Mix #3 (non-linear)	ha	4.45	\$1,971	\$8,771	\$8,771
Re-forest			Tree seedings	ha	0	\$1,500	\$0	\$0			Tree seedings	ha	0	\$1,500	\$0	\$0
Sub-Total								\$19,352								\$86,117
Test Plots and Reclamation Trials	-	0							-	0						
Seeding and re-seeding w/ fertilizer and labour				ha	0	\$0	\$0	\$0				ha	0	\$0	\$0	\$0
Soils testing				yrs	1	\$500	\$500	\$500				yrs	1	\$500	\$500	\$500
Summer student - wages and support costs				yrs	1	\$12,000	\$12,000	\$12,000				yrs	1	\$12,000	\$12,000	\$12,000
Revegetation program - consulting fees				yrs	1	\$10,000	\$10,000	\$10,000				yrs	1	\$10,000	\$10,000	\$10,000
Sub-Total								\$22,500								\$22,500
Total Estimated Cost for Progressive Reclamation									Total							
									\$123,913							
									Total							
									\$190,678							

Table 8.4-1 (CONT'D)

Estimated Progressive Reclamation Costs - During Operations

Work Item Description	Area for Progressive Reclamation		Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost	Area for Progressive Reclamation	Equipment / Labour	Units	Quantity	Unit Cost	Cost	Total Cost
	Year 6								Year 7						
PROGRESSIVE RECLAMATION ACTIVITIES	Earthworks	Revegetation							Earthworks	Revegetation					
Main Waste Rock Dump	5.5	5.5							2	2					
Roll crest and recontour			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$23,100			Cat D9H Dozer	hrs	40	\$210	\$8,400
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	22	\$200	\$4,400				Cat 235 Excavator	hrs	8	\$200	\$1,600
			Truck D250E	hrs	44	\$160	\$7,040				Truck D250E	hrs	16	\$160	\$2,560
			Cat D9H Dozer	hrs	110	\$210	\$23,100	\$34,540			Cat D9H Dozer	hrs	40	\$210	\$8,400
EPCM			7% of Total Cost	%		7.00%	\$4,035	\$4,035			7% of Total Cost	%		7.00%	\$1,467
Revegetation															
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	5.5	\$1,971	\$10,841	\$10,841			Mix #3 (non-linear)	ha	2	\$1,971	\$3,942
Re-seed			Mix #3 (non-linear)	ha	2.75	\$1,971	\$5,420	\$5,420			Mix #3 (non-linear)	ha	1	\$1,971	\$1,971
Re-forest			Tree seedings	ha	2.75	\$1,500	\$4,125	\$4,125			Tree seedings	ha	1	\$1,500	\$1,500
Sub-Total	\$82,061								\$29,840						
Ice-Rich Overburden Dump (Toe Berm)	0	0							0	0					
Haul and place overburden for revegetation			Cat 235 Excavator	hrs	0	\$200	\$0				Cat 235 Excavator	hrs	0	\$200	\$0
			Truck D250E	hrs	0	\$160	\$0				Truck D250E	hrs	0	\$160	\$0
			Cat D9H Dozer	hrs	0	\$210	\$0	\$0			Cat D9H Dozer	hrs	0	\$210	\$0
EPCM			7% of Total Cost	%		7.00%	\$0	\$0			7% of Total Cost	%		7.00%	\$0
Revegetation															
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	0	\$1,971	\$0
Re-seed			Mix #3 (non-linear)	ha	0	\$1,971	\$0	\$0			Mix #3 (non-linear)	ha	0	\$1,971	\$0
Re-forest			Tree seedings	ha	0	\$1,500	\$0	\$0			Tree seedings	ha	0	\$1,500	\$0
Sub-Total	\$0								\$0						
Tailings Area	9.75	9.75							8	8					
Haul and place overburden cap for revegetation			Cat 235 Excavator	hrs	39	\$200	\$7,800				Cat 235 Excavator	hrs	32	\$200	\$6,400
			Truck D250E	hrs	78	\$160	\$12,480				Truck D250E	hrs	64	\$160	\$10,240
			Cat D9H Dozer	hrs	195	\$210	\$40,950	\$61,230			Cat D9H Dozer	hrs	160	\$210	\$33,600
EPCM			7% of Total Cost	%		7.00%	\$4,286	\$4,286			7% of Total Cost	%		7.00%	\$3,517
Revegetation															
Seed and fertilize w/ labour			Mix #3 (non-linear)	ha	9.75	\$1,971	\$19,217	\$19,217			Mix #3 (non-linear)	ha	8	\$1,971	\$15,768
Re-seed			Mix #3 (non-linear)	ha	4.875	\$1,971	\$9,609	\$9,609			Mix #3 (non-linear)	ha	4	\$1,971	\$7,884
Re-forest			Tree seedings	ha	4.875	\$1,500	\$7,313	\$7,313			Tree seedings	ha	4	\$1,500	\$6,000
Sub-Total	\$101,654								\$83,409						
Test Plots and Reclamation Trials	-	0							-	0					
Seeding and re-seeding w/ fertilizer and labour				ha	0	\$0	\$0	\$0				ha	0	\$0	\$0
Soils testing				yrs	1	\$500	\$500	\$500				yrs	1	\$500	\$500
Summer student - wages and support costs				yrs	1	\$12,000	\$12,000	\$12,000				yrs	0	\$12,000	\$0
Revegetation program - consulting fees				yrs	1	\$10,000	\$10,000	\$10,000				yrs	1	\$10,000	\$10,000
Sub-Total	\$22,500								\$10,500						
Total Estimated Cost for Progressive Reclamation															
Total									Total						
\$206,215									\$123,749						

8.5 UPDATED FINANCIAL SECURITY

YG has recently developed a policy respecting mine site reclamation and closure with one of the stated principles that “adequate security must be provided by the project proponent at each stage of mine development reclamation and closure consistent with the requirements of relevant legislation and Yukon financial security guidelines” (YG Mine Reclamation and Closure Policy, 2005). Typically requirements for mine security bonding are conditions of the Type A Water Use Licence or Yukon Quartz Mining Production Licence. Minto intends to adhere to the principles for mine reclamation and closure and security requirements in accordance with YG’s policy.

Minto’s Type A Water Use Licence (QZ96-006, Part B) outlines the requirements for security for the project as follows:

- The Licencee shall provide security in the total amount of \$4,450,000 (four million, four hundred and fifty thousand dollars).
- The schedule for payment of security is as follows:
 - \$50,000 within thirty days of the effective date of this licence, and
 - \$750,000 (seven hundred and fifty thousand dollars) on or before the start up date, and
 - \$2,550,000 (two million, five hundred and fifty thousand dollars) to be paid in twenty four quarterly installments of \$106,250 (one hundred and six thousand, two hundred and fifty dollars). The first payment shall be made within three months of the start up date and subsequent payments shall be made every three months thereafter.
 - \$800,000 (eight hundred thousand dollars) payable on the first anniversary of the start up date, and

- \$300,000 (three hundred thousand dollars) payable on the fifth anniversary of the start up date.

To date, the Company has posted \$450,000 with YG for security bonding. An additional \$200,000 is required within 6 months of further site development with an additional \$100,000 required 30 days before mill start-up. This accelerated security requirement was required by YG under the YQMA and is considered a component of the \$750,000 security required under the Type A Water Use Licence.

As a result of negotiations based on the closure cost estimates for Year 0 (Start Up) presented in the previous section, EMR has required that a total of \$3,676,530 be in place prior to commercial operations commencing. This amount effectively ensures that security requirements under both major project licences are met.

In addition, the Yukon Quartz Mining Production Licence requires that Minto submit a Closure Plan. This Plan presents detailed cost estimates in Section 8 for closure measures. Closure costs will be reviewed every two years in accordance with the Quartz Mining Production Licence.

The Company will discuss road decommissioning requirements with the SFN, which will ultimately refine the final closure costs associated with the access road decommissioning.

9.0 CLOSURE

This plan has been prepared in accordance with Section 14.0 of Quartz Mining License QLM-9902 and Section 78 of Water Use License QZ-06-006, in accordance with normal scientific and engineering principles.

Please contact the undersigned if you have any questions at (867) 668-6463.

Respectfully Submitted,


ACCESS CONSULTING GROUP

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Note: Other documents reviewed include those listed in Table 1-1 Global Information List.

Minto Explorations Ltd.

Minto Project, Yukon

Detailed Decommissioning and Reclamation Plan

Appendix A

Environmental Setting

Excerpt from:

**Minto Project, Yukon *Site Inspection & Compilation of Environmental Information* Prepared by
Access Mining Consultants Ltd. For DIAND, Renewable Resources Waste Management Program
March 2000**

4.0 ENVIRONMENTAL COMPONENTS

The following section presents a summary of environmental biophysical information for the project area. Where available, additional data has been used and incorporated to present the current knowledge of the area.

4.1 CLIMATE

A basic meteorological station was established at the mine site in 1993 (elevation: 884 m, 2900 ft). Only intermittent temperature and precipitation data is available (September–October 1993 and June–August 1994). Meteorological information for the Project area was collected manually and consisted of snow surveys and a weather station that measured precipitation and temperature. Due to the paucity of site specific climatic information, long-term synthetic data for various parameters was generated using regional information from the Pelly Ranch (Fort Selkirk) monitoring station. This information is presented in greater detail in Volume II of the Initial Environmental Evaluation prepared by Hallam Knight Piesold, (HKP, 1994).

Temperatures at the mine site are typical of northern inland climates, having low average temperatures and seasonal extreme low temperatures. Precipitation levels are described as moderate. The meteorological database for the Project area is limited. Table 1 presents a summary of key meteorological information for the Project area.

Table 1 Minto Project Area Meteorological Information

Site Elevation	716 to 793 (m)
Regional Station Used To Generate Synthetic Data	Pelly Ranch
Distance to Carmacks Climate Station [Elevation of 525 m]	80 km southeast
Distance to Pelly Ranch (Fort Selkirk) Climate Station [Elevation of 454 m]	20 km northwest
Mean Monthly Temperature Range	-30.9°C to 12.1°C
Annual Mean Temperature	-7.3°C
Orographic Factors	Long-term synthetic values for mean annual precipitation generated using an orographic factor of + 8% per 100 m elevation gain using Pelly Ranch as basis
Annual Precipitation	378 mm
Precipitation as Snow	157 mm (41.5%)
Precipitation as Rain	221 mm (58.5%)
Probable Maximum 24-hour Precipitation	183 mm
Snowmelt Periods	80% April, 20% May
Mean Annual Pond Evaporation	409mm

Note: Pelly Ranch data was chosen as the basis for analysis because of the close proximity of the meteorological station and the Project site, a reasonable correlation between station and site precipitation records, and a reasonable correlation between station precipitation and site runoff.

4.2 TERRESTRIAL RESOURCES

4.2.1 *Surficial Geology / Terrain Hazards*

The following discussion of terrain hazards at the Minto Project Site was taken directly from Volume II of Hallam Knight Piesold's Initial Environmental Assessment, 1994.

Surficial Geology

The Minto area is considered part of the Pelly River Ecoregion and lies within the Dawson Range on the west side of the Klondike Plateau. Erosion surfaces are dissected by narrow stream valleys. The topography is gently rolling with relief up

to 2000 ft (600 m). The ore body is located beneath a small stream valley, known as Minto Creek, and extends beneath the toe of the south-facing slope on the left hand side of the creek. The bottom of the valley in the region of the ore body is at an elevation of approximately 2650 ft (922 m). On either side of Minto Creek, the topography rises at slopes generally of approximately 20° to the rounded tops of the surrounding hills which are at a maximum elevation of 3250 ft (1131 m). The site is located within the discontinuous widespread permafrost subzone and extensive areas within the general region are underlain by permafrost. Permafrost is extensively distributed throughout the site with the majority located on north aspect slopes. Within the area of the open pit, overburden has been measured to be as thick at 280 feet (85.3 m) with permafrost extending to a depth of 60 feet (18.3 m).

The area west of the Yukon River and north of Carmacks, including the Minto area, was not covered during the last continental glaciation (Wisconsin Drift) and as a result, glacial till soils are not present. However, a study by Bostock (1970) on the glaciation of central Yukon indicates that two older drifts, the Klaza and Reid Advances may have partially encroached on the upper region of Minto Creek. Gravel deposits, terraces and few erratics indicate that glaciation extended above 3000 ft (1044 m), from south of the mouth of Dark Creek, north to Wolverine Creek. Due to the lack of glaciation, bedrock exposure is poor and generally limited to the tops of ridges where it forms blocky, castellated outcrops.

Soils in the Minto area have developed from saprolite, colluvial and fluvial parent materials. Where drainage is impeded, gleysols or gleyed brunisols tend to develop. On well drained materials, eutric or dystric brunisols predominate, although some podzols may also occur. Regosols may occur on recent fluvial deposits.

The predominant bedrock type in the development area is granodiorite; derived materials are generally coarse textured, basic, well to moderately drained, and have low inherent fertility. Organic content in soils is expected to be low except in the upper few centimeters.

Overburden within the plant site consists predominantly of micaceous, organic, silty sand and of sand and fine gravel, derived predominantly through *in situ* weathering of the upper surface of the bedrock. Bedrock is encountered at depths of 2 to 11 feet (0.7 to 3.8 m) below surface. Overburden in the vicinity of the proposed open pit has a maximum thickness of 280 feet (97.4 m). Soils consist of frozen micaceous silt and fine sand with varying amounts of organic constituents throughout. Overburden in the vicinity of the tailings storage facility also consists of frozen silts and sands and is approximately 200 feet (96 m) in thickness. Overburden material is described as consisting of 30% fine gravels, 40% coarse sands and 10% medium sands. In all cases, the overburden is covered by a moss and topsoil layer. Bedrock below these layers is granodiorite.

Debris Flow

Solifluction is slow downward movement (mud flow or creep) of water-saturated, near surface soil and surface vegetation from higher to lower elevations. Solifluction areas on the Minto Project site are underlain at shallow depth by permafrost, which retards subsurface drainage. The active layer becomes saturated with surface and shallow subsurface drainage from the adjacent slopes. When subjected to these conditions, the active layer creeps during the spring and summer months, even on very gentle slopes. This slow downslope creep of the saturated surface mantle is commonly referred to as solifluction.

Slope Stability

South aspect scree slopes in lower Minto Creek are comprised of a minimal vegetative layer consisting of grasses and some low growing shrubs such as kinnikinnick, juniper and soopalallie. Active erosion was observed in these areas. Extensive regions of burn, combined with steep slopes, thin overburden layers and solifluction may result in some north aspect slopes being unstable during the spring thaw and summer months.

Avalanche Hazard

The Minto Project is within an area that receives very low levels of precipitation. Regionally, snowfall averages 185 mm annually. The potential for the occurrence of an avalanche are very low.

Forest Fires

Due to the dry climate and frequent electrical storm events that occur in the summer months, forest fires are very common in the Minto area. Many areas are in varying degrees of seral succession of vegetation. Two burns have occurred in the Minto Creek watershed between 1950 and 1980, and two further burns since 1980.

Permafrost

The Minto Project lies in the southerly boundary of the discontinuous permafrost zone. From site investigations by Golder (1976), it was determined that permafrost is extensively distributed throughout the site with the majority located on north aspect slopes. Within the area of the open pit, overburden has been measured to be as thick as 280 feet (85.3 m) with permafrost extending to a depth of 60 feet (18.3 m). A significant percentage of the permafrost is clear segregated ice with water content close to the liquid limit and will not be suitable as construction material. Permafrost of the same sort is found within the proposed tailings and waste rock storage areas.

4.2.2 Wildlife and Waterfowl

Information on wildlife in the Project area has been gathered from various sources including the IEE for the Minto Project (prepared by Hallam Knight Piesold, 1994), YTG-Renewable Resources, and other reports on the Project and surrounding area. Additional information was provided by the SFN and other local residents, as part of data gathered from First Nation interviews.

Numerous aerial and ground surveys were conducted in 1994 by Hallam Knight Piesold. Some were conducted in association with the Yukon Territorial Government, Fish and Wildlife Branch of Renewable Resources. In general, it was noted during these surveys that wildlife distributions follow vegetation zone classifications. Three distinct habitat classifications, based on the predominant vegetation communities, exist in the Minto Project area. These include: mixed coniferous/deciduous forest zone, black spruce/willow/sedge zone, and areas of regenerative forests.

Wildlife species likely to be present within the Minto Project area are presented in Table 2. Although not all of these species were observed in the 1994 surveys it is suggested, by the availability of habitat and historical record, that these species are likely to be present at one time or another. This information was also confirmed during SFN interviews.

The Project area does not likely contain key habitat for either moose or caribou. However, moose utilization of the area has been reported. Moose may use new vegetative growth in the extensive burn areas for feeding during the growing season, and occasionally foraging on tall shrubs during the winter. The low-gradient areas near the Yukon River, including the area through which the access road passes, may also provide foraging habitat. Moose are also known to use some islands of the Yukon River for calving. YTG-Renewable Resources estimates the local density of moose to be approximately 40 moose/1000 km².

Migration corridors have been qualified as key habitat for woodland caribou. Populations of these ungulates in the region are represented by the Klaza and the Tatchun/Glenyon herds. Key winter range habitat has been identified for the Klaza herd in the headwaters of Big Creek, some 15 km west of the Project. The herd consists of approximately 955 animals (1994 estimate). The results of radio collaring/tracking and home range mapping by YTG-Renewable Resources suggests that the herd does not enter the Minto Project area. However the Tatchun/Glenyon herd maintains a home range that may intersect portions of the access road.

Mule deer are designated as 'specially protected wildlife' due to their low abundance in the Yukon. Mule deer are commonly found in burn areas and south aspect slopes. Physical observations of Mule deer presence, in the Project area, has been limited to two groups of pellets observed in the vicinity of Minto Creek in 1994.

A population of Dall sheep inhabit the east bank of the Yukon river between Minto Landing and the Pelly River confluence. This area is considered key winter habitat for the species. It is anticipated that the Minto Project will have no significant effects upon this sheep population as no Project activities occur in this area.

Table 2 Wildlife Species in the Vicinity of the Minto Project Area

Ungulates	
Moose	<i>Alces alces</i>
Woodland caribou	<i>Rangifer tarandus</i>
Dall sheep	<i>Ovis dalli dalli</i>
Mule deer	<i>Odocoileus hemionus</i>
Carnivores and Furbearers	
Grizzly bear	<i>Ursus horribilis</i>
Black bear	<i>Ursus americanus</i>
Coyote	<i>Canis latrans</i>
Wolf	<i>Canis lupus</i>
Lynx	<i>Lynx canadensis</i>
Red fox	<i>Vulpes vulpes</i>
Wolverine	<i>Gulo luscus</i>
Marten	<i>Martes americana</i>
Least weasel	<i>Mustela rixosa</i>
Mink	<i>Mustela vison</i>
Muskrat	<i>Ondatra zibethicus</i>
River otter	<i>Lutra canadensis</i>
Beaver	<i>Castor canadensis</i>
Squirrel	<i>Tamiascurus hudsonieus</i>
Snowshoe hare	<i>Lepus americanus</i>
Game Birds	
Spruce grouse	<i>Dendragapus canadensis</i>
Ruffed grouse	<i>Bonada umbellus</i>
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>
Willow ptarmigan	<i>Lagopus lagopus</i>
White-tailed ptarmigan	<i>Lagopus leucurus</i>
Rock ptarmigan	<i>Lagopus mutus</i>
Canada goose	<i>Branta canadensis</i>
Mallard duck	<i>Anas platyrhynchos</i>
Northern pintail	<i>Anas acuta</i>
Green-winged teal	<i>Anas crecca</i>
American widgeon	<i>Anas americana</i>

Adapted from Table 10.1 (Minto Explorations Ltd. IEE, Volume II
Environmental Setting)

Large carnivores, such as bears and wolves have been observed in the Project area. A female grizzly with two cubs has been observed in the upper Minto Creek drainage, Black bears have been sighted in the lower Minto Creek watershed during the summer months. A variety of smaller furbearers can also be found associated with the various Project area habitats. This is consistent with the observation of continued trapping in the area.

Big Game harvest levels and the trapping and outfitting concessions in the Project area are shown in Figure 8.

Waterfowl are not known to use the Project area for any length of time due to the lack of suitable habitat (i.e. wetlands). However, key habitat for waterfowl does exist in the area of the Wilczek Lakes, approximately 30 km east of the Project area (Hallam Knight Piesold, 1994).

SFN members do however confirm that a large number of waterfowl do inhabit the slough and wetland areas along the Yukon River. Other game birds are found in the Project area, with specific sightings of sharp-tailed grouse and spruce grouse. Raptors in the area primarily utilize the Yukon River Corridor, as there is a lack of suitable alpine habitat in the Project area. One pair Peregrine Falcons (listed in Canada as 'endangered') is currently known to utilize the Yukon River near the Minto Project area. The Yukon River shores are also home to eagles and osprey, with eagles nests reported near the Project area along the Yukon River.

4.2.3 Vegetation

The Minto Project lies within the Yukon Plateau (Central) Ecozone/Pelly River Ecoregion. The area forest types commonly include Black and white spruce, paper birch (cooler sites), aspen and balsam poplar (disturbed sites - pioneering species), and lodgepole pine (frequently in competition with deciduous species in burned areas). Mosses dominate coniferous forest floors, with willows and ericaceous shrubs becoming more prevalent as forest stand density decreases. Lichens tend to dominate in rocky Alpine areas. Alpine areas begin at elevations of 1350-1500 m. Sedges and tussocks occur in moist, low-gradient areas and under Black spruce, which also thrive in moist substrates.

The first 10-18 kilometers of the Project access road traverses a low gradient, moist habitat, as discussed above (associated with the ancient Yukon River floodplain). The remaining portion of the road ascends the Minto Creek drainage, terminating in the sub-alpine/alpine reaches of the

watershed. It is here that the local forests are regenerating as a result of successive forest fires. The Minto Project area has been burned by four separate forest fires over the last 40 years. The upper Minto Creek area was burned in 1980, while another fire occurred in 1995 in the lower Minto Creek area (within 300m of the confluence with the Yukon River). Figure 6 outlines the extent of burn areas as a result of various forest fires. Vegetation surveys and mapping were completed as part of the IEE (HKP, 1994). No further vegetation studies have been completed in the Project area, although MEL has initiated a test re-vegetation program as part of the company's reclamation efforts.

4.3 HYDROLOGY AND WATER QUALITY

4.3.1 *Surface Water Hydrology and Water Quality*

Hydrological and water quality information for the Project area has been collected by B.C. Research and Environment Canada (1975-1976). Further data was collected by Hallam Knight Piesold from 1993-1995. Additional hydrological and water quality data is now being collected by MEL as part of their Water Use Licence (QZ96-006) surveillance network. Figure 5 provides the location of these monitoring stations.

Although of limited quantity, the water quality data base appears to show some similarity across sampling events. Historical water quality monitoring data exists for Minto Creek, Big Creek, Unnamed Creek A & B, Wolverine Creek, and the Yukon River. These water samples were collected and analyzed on several occasions during 1975 and 1976 (conducted by B.C. Research and Environment Canada). Water quality data collected during the Initial Environmental Evaluation consists of several sampling occasions from September 1993 to October 1995, primarily on Minto Creek (MEL & DIAND). Further data was collected by Minto Explorations in 1998 as part of the monitoring requirements of their Water Use Licence (QZ96-006). Two water quality monitoring stations were sampled in Minto Creek during the October, 1999 inspection to document existing stream chemistry prior to full scale mine production in the area.

During the course of the environmental data compilation, little information or data was found regarding Yukon River winter ice conditions at Minto Landing, the site of the proposed winter ice bridge crossing.

4.3.1.1 *MINTO CREEK*

Minto Creek is an ephemeral watercourse with a mainstream length of approximately 17km. Three staff gauges were installed along Minto Creek (at Environmental Monitoring Stations W1, W2 & W3) to gather baseline hydrological information. During a fishery survey in 1994, the watercourse was divided up into seven (7) reaches (Minto Explorations Ltd., IEE Volume II). Lower reaches of the watercourse show lower flows than the upper reaches. This is presumably due to reduced runoff retention times in the upper regions of the drainage as a result of the burn areas and also due to the high streambed infiltration that occurs within the lower reaches.

Hydrological studies conducted as part of the 1994 IEE, by Hallam Knight Piesold also indicate that a significant amount of infiltration of Minto Creek flow is occurring in the upper reaches of the watershed. Up to 75% of the surface runoff may be entering the subsurface regime, resulting in a large amount of attenuation. As such, a reasonable estimate of maximum flow that would be expected at the Minto Creek crossing of the access road at km 15.7 is approximately 5 m³/sec. This compares to a 1:100 year flood event, assuming approximately 50% surface flow is lost to upstream subsurface attenuation (Minto Explorations Ltd., IEE Volume II).

In the absence of long-term and complete records of streamflow for the study area streams, a regional hydrological analysis was completed using a combination of data collected on site and data collected at the hydrometric networks of the Water Survey of Canada (WSC) and the Water Resources Division of DIAND. Regional streamflow and precipitation records were used to generate synthetic long-term flow values (Minto Project IEE Volume II, 1994). Hydrological information gathered on Minto Creek is presented in Table 3. Table 4 presents the seasonal streamflow distributions for Minto Creek.

The existing Water Use License (QZ96-006) requires flow monitoring at a number of stations in the Minto Creek drainage. During the October, 1999 site inspection, flow monitoring station W2 was found in a state of disrepair.

Table 3 Measured Minto Creek Streamflow Data

Gauge Location	Catchment Area (km ²)	Mean Basin Elevation (m)	Flow (m ³ /s)					Unit Area Flow (mm)				
			29-Sep-93	15-May-94	5-Jun-94	7-Jul-94	11-Aug-94	29-Sep-93	15-May-94	5-Jun-94	7-Jul-94	11-Aug-94
Minto Creek (Station W1)	4.75	885	0.035	0.119	0.029	0.042	0.005	0.637	2.165	0.527	0.764	0.091
Minto Creek (Station W3)	10.38	-	0.028	0.101	0.029	0.04	0.011	0.236	0.841	0.241	0.333	0.092
Minto Creek (Station W2)	42.18	775	0.06	0.312	0.061	0.095	n/a	0.123	0.639	0.125	0.195	n/a

Streamflow data adapted from Table 4.2 (Minto Explorations Ltd. IEE, Volume II Environmental Setting)

Table 4 Minto Creek Seasonal Streamflow Distributions (Measured and generated long-term values)

Environmental Monitoring Station	Years of Record	unit	January	February	March	April	May	June	July	August	September	October	November	December	Annual Total
Big Creek (WSC Site #09AH003)	1975-83, 93	m ³ /s	0.30	0.20	0.10	2.00	26.80	17.30	19.40	13.30	10.00	3.80	1.30	0.60	7.90
		mm	0.40	0.20	0.20	2.90	40.40	26.00	29.20	20.00	15.00	5.80	1.90	0.90	143.00
		%	0.30	0.20	0.20	2.10	28.20	18.20	20.40	14.00	10.50	4.00	1.30	0.60	100.00
Minto Creek Station W2 (measured)	1994	m ³ /s	-	-	-	-	-	0.10	0.04	0.04	0.02	-	-	-	-
		mm	-	-	-	-	-	6.50	2.60	2.30	1.40	-	-	-	-
Minto Creek Station W2 (estimated)	1994	m ³ /s	-	-	-	-	-	0.09	0.06	0.01	0.03	-	-	-	-
		mm	-	-	-	-	-	5.60	3.80	0.90	2.20	-	-	-	-
Minto Creek Station W2 (estimated)	Synthetic Long-term	m ³ /s	0.00	0.00	0.00	0.20	0.09	0.06	0.09	0.06	0.04	0.00	0.00	0.00	0.05
		mm	0.00	0.00	0.00	12.00	5.00	4.00	5.00	4.00	3.00	0.00	0.00	0.00	34.00
		%	0.00	0.00	0.00	37.00	16.00	11.00	16.00	10.00	8.00	1.00	0.00	0.00	100.00

Streamflow distribution data adapted from Table 4.4 (Minto Explorations Ltd. IEE, Volume II Environmental Setting)

Table 5 presents the results of water quality analysis conducted as a part of the 1999 site inspection, as well as the water quality data from the 1998-1999 Annual Report to the Yukon Territory Water Board for water use licence QZ96-006 (for Minto Creek water quality monitoring sites W2 and W3 only). Water quality monitoring data collected at other locations in the Project area have been included in its entirety, as Appendix A. Figure 5 shows the current and historic environmental monitoring sites.

Water quality in the Minto Creek drainage is characterized as neutral to slightly basic pH, moderately hard, moderately high in total suspended and dissolved solids, and moderately to highly conductive. Concentrations of anions, nutrients, and cyanide/cyanogen-like compounds have been found to be moderate to high. Metal concentrations are generally moderately high with iron, copper, and aluminum present in high concentrations and in exceedance of the CCME Guidelines for the Protection of Freshwater Aquatic Life, particularly in the upper reaches of Minto Creek near the orebody (Minto Project IEE Volume II, 1994) (CCME, 1999)

Water quality samples were collected at Station W3 – Upper Minto Creek and the lower reach of Minto Creek, Station W2 on October 13, 1999 (Figure 5). Samples were analyzed for physical parameters, nutrients, residues, total and dissolved metals, and shipped for analysis to Norwest Labs of Vancouver the following day. Water samples taken during the October 1999 site inspection showed elevated concentrations for nutrients and metal concentrations, with cadmium, copper, iron, and selenium again exceeding CCME concentrations for the protection of freshwater aquatic life. These water quality results are consistent with previous sampling results; however, higher metal concentrations were encountered at W2 (lower Minto Creek) as opposed to W3 (upper Minto Creek).

MINTO PROJECT, YUKON, SITE INSPECTION and COMPILATION OF ENVIRONMENTAL INFORMATION

Table 5 Minto Creek Water Quality

Location															
W2	W2	W2	W2	W2	W2	W2	W2	W3	W3	W3	W3	W3	W3	CCME Guideline	
Minto IEE*	DIAND*	DIAND*	MAR*	MAR*	9-Aug-98	13-Oct-99	ACG*	MEAN	Minto IEE*	DIAND*	DIAND*	W3	ACG*		MEAN
1993-94	15-Jun-95	25-Jul-95	2-May-98	2-May-98	9-Aug-98	13-Oct-99			1993-94	15-Jun-95	25-Jul-95				
Physical Tests															
Conductivity (microS/cm)															
Hardness (mg/l)															
Turbidity (NTU)															
Water Analysis (mg/l)															
Total Alkalinity															
Ammonium-N															
Chloride (dissolved)															
Fluoride (dissolved)															
Sulphate (dissolved)															
Nitrate-N (+ Nitrite-N)															
Nitrite Nitrogen															
pH (units)															
Phosphorus-Orthophosphate															
Total Dissolved Phosphate															
Total Phosphorus															
Total Dissolved Solids															
Total Suspended Solids															
Dissolved Parameters (mg/l)															
Dissolved Organic Carbon															
Total Organic Carbon															
Total Metals (mg/l)															
Aluminum (Al)															
Antimony (Sb)															
Arsenic (As)															
Barium (Ba)															
Beryllium (Be)															
Bismuth (Bi)															
Boron (B)															
Cadmium (Cd)															
Calcium (Ca)															
Chromium (Cr)															
Cobalt (Co)															
Copper (Cu)															
Iron (Fe)															
Lead (Pb)															
Lithium (Li)															
Magnesium (Mg)															
Manganese (Mn)															

MINTO PROJECT, YUKON, SITE INSPECTION and COMPILATION OF ENVIRONMENTAL INFORMATION

Table 5 Minto Creek Water Quality

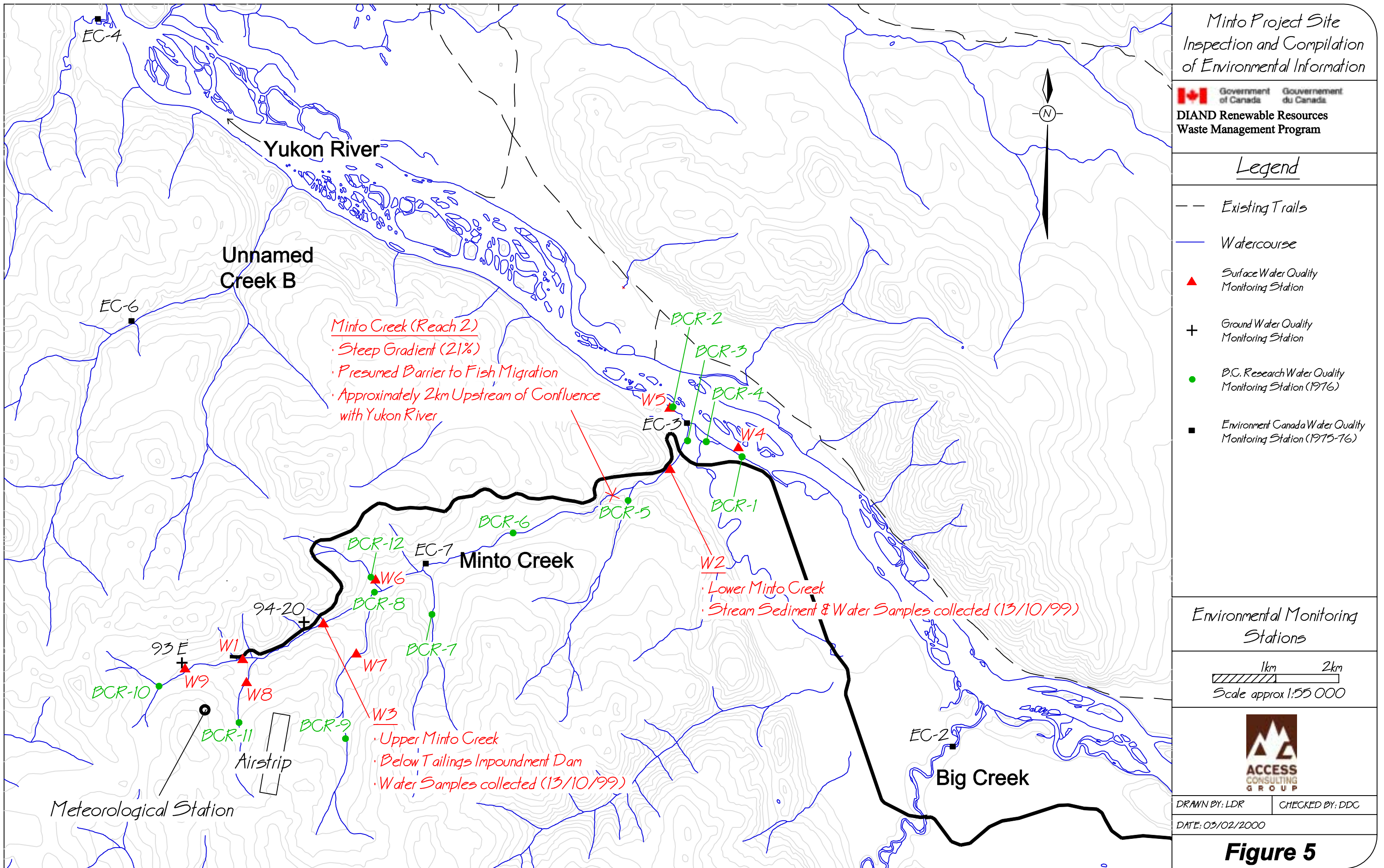
Location													
W2	W2	W2	W2	W2	W2	W2	W2	W2	W3	W3	W3	W3	CCME Guideline
Minto IEE*	DIAND*	DIAND*	DIAND*	MAR*	MAR*	9-Aug-98	13-Oct-99	ACG*	MEAN	Minto IEE*	DIAND*	DIAND*	W3
1993-94	15-Jun-95	25-Jul-95	2-May-98	2	2	2	1.0	1.0	0.99	1993-94	15-Jun-95	25-Jul-95	13-Oct-99
Mercury (Hg)	0.0001	0.0005	0.01	0.2	0.2	0.2	0.02	0.02	0.0036	0.0003	0.0005	0.01	0.02
Molybdenum (Mo)	0.0006	0.0050	0.001	0.05	0.03	0.03	0.005	0.005	0.0153	0.0014	0.0001	0.0002	0.0001
Nickel (Ni)	0.004	0.0010	0.0031	0.05	0.05	0.05	0.002	0.002	0.0025	0.007	0.001	0.0019	0.0005
Phosphorus		0.06	0.06	0.3	0.3	0.3	0.06	0.06	0.06			0.01	0.0033
Potassium (K)		0.98	0.98	2	2	2	1.0	1.0	0.99			0.01	0.01
Selenium (Se)	0.0003	0.0005	0.01	0.2	0.2	0.2	0.02	0.02	0.0036	0.0003	0.0005	0.01	1.05
Silicon (Si)	6.3	4.7	0.0	4.9	5.3	5.3	6.4	6.4	4.6	7.7	4.9	6.1	6.3
Silver (Ag)	0.0001	0.0001	0.0001	0.01	0.01	0.01	0.001	0.001	0.0001	0.0001	0.0001	0.0001	0.0003
Sodium (Na)		4.51	3.0	7.0	7.0	7.0	5.46	4.9925	4.9925			8.9	8.905
Strontium (Sr)	0.1942	0.289	0.213	0.129	0.321	0.321	0.219	0.2275	0.2275	0.206	0.334	0.266	0.272
Sulphur (S)							4.1	4.1	4.1			11.2	11.2
Thallium (Tl)		0.001	0.001	0.2	0.2	0.2	0.003	0.001	0.001			0.0001	0.003
Thorium (Th)							0.005	0.005	0.005				0.005
Tin (Sn)			0.03	0.03	0.03	0.03	0.005	0.005	0.005				0.05
Titanium (Ti)	0.01		0.03	0.03	0.01	0.01	0.013	0.0177	0.0177		0.01	0.013	0.0115
Uranium	0.0004	0.001					0.06	0.0007	0.0007	0.0005	0.0018	0.06	0.0011
Vanadium (V)	0.015	0.03	0.003	0.03	0.03	0.03	0.003	0.0128	0.0128	0.015	0.03	0.001	0.0123
Zinc (Zn)	0.0061	0.005	0.01	0.013	0.005	0.005	0.003	0.0074	0.0074	0.0108	0.005	0.003	0.006
Zirconium (Zr)							0.001	0.001	0.001			0.001	0.001
Dissolved Metals (mg/l)													
Aluminum (Al)	0.0335	0.019	0.065				0.02	0.0344	0.0344	0.0422	0.018	0.01	0.02
Antimony (Sb)	0.0001	0.0001	0.0005				0.02	0.0002	0.0002	0.0001	0.0001	0.0004	0.0002
Arsenic (As)	0.0004	0.0003	0.4				0.02	0.1336	0.1336	0.0004	0.0003	0.02	0.0003
Barium (Ba)	0.0457	0.059	0.0458				0.0448	0.0488	0.0488	0.0576	0.059	0.0501	0.0523
Beryllium (Be)	0.0025	0.005	0.0001				0.0002	0.0025	0.0025	0.0025	0.005	0.0001	0.0002
Bismuth (Bi)	0.05	0.1	0.001				0.02	0.0503	0.05	0.05	0.1	0.0001	0.05
Boron (B)	0.05	0.1					0.01	0.053	0.05	0.05	0.1	0.01	0.053
Cadmium (Cd)	0.0001	0.0002	0.0001				0.0005	0.0001	0.0001	0.0001	0.0002	0.0001	0.0005
Calcium (Ca)	24.2	32.4	19.5				27.5	25.9	25.9	28.0	42.9	29.3	34.0
Chromium (Cr)	0.0005	0.001	0.0016				0.001	0.001	0.001	0.0005	0.001	0.0014	0.001
Cobalt (Co)	0.0005	0.001	0.0001				0.001	0.0005	0.0005	0.0005	0.001	0.0002	0.0006
Copper (Cu)	0.0038	0.003	0.003				0.003	0.0032	0.0032	0.0056	0.003	0.004	0.0005
Iron (Fe)	0.3393	0.032	0.099				0.139	0.1523	0.1523	0.7596	0.038	0.093	0.09
Lead (Pb)	0.0005	0.001	0.0002				0.005	0.0006	0.0006	0.0005	0.001	0.0002	0.0006
Lithium (Li)			0.0013				0.002	0.0017	0.0017		0.001	0.003	0.002
Magnesium (Mg)	8.0	11.1	7.3				8.4	8.7	8.7	10.5	16.1	12.9	13.3
Manganese (Mn)	0.0148	0.006	0.0122				0.0067	0.0104	0.0104	0.137	0.025	0.0136	0.0468
Molybdenum (Mo)	0.0005	0.001	0.001				0.005	0.0008	0.0008	0.001	0.001	0.002	0.0013
Nickel (Ni)	0.001	0.001	0.0023				0.002	0.0014	0.0014	0.0011	0.001	0.0017	0.0002

MINTO PROJECT, YUKON, SITE INSPECTION and COMPILATION OF ENVIRONMENTAL INFORMATION

Table 5 Minto Creek Water Quality

Location																	CCME Guideline																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
W2	W2	W2	W2	W2	W2	W2	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Minto IEE*	DIAND*	DIAND*	MAR*	MAR*	2-May-98	9-Aug-98	13-Oct-99	ACG*	MEAN	Minto IEE*	DIAND*	DIAND*	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W

*Source of information: **DIAND**=Water Resources, **Minto IEE**=Minto Explorations (IEE Volume II, 1994), **ACG**=Access Consulting Group, **Minto Annual Report**=1998/1999 Annual Report to the Yukon Territory
Note: **Bold** and shaded values represent those samples exceeding CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME, 1999). CCME guidelines are for total metals and some Water analysis parameters only.





Environmental Monitoring Station W2 – Disturbed Housing for Hydrometric Datalogger

4.3.2 *Groundwater Hydrology and Water Quality*

Little information exists in regards to groundwater hydrology in the Minto Creek Drainage. However, attempts to quantify groundwater quality led to the installation of a pair of two (2) inch groundwater wells. They are located within the mineral deposit area and are designated 93-E (83.4m depth) and 94-20 (36.4m depth). Comparison of water quality parameters indicate that the ground water in the area is similar in quality to the near-deposit surface watercourses, except for elevated turbidity, alkalinity, fluoride, and sulphate concentrations. Monitoring data collected at these wells is also included in Appendix B. The location of the ground water monitoring wells is shown in Figure 5.

4.4 AQUATIC RESOURCES

4.4.1 *Fishery Resources*

Fish species found in the Yukon River include chinook, coho, and chum salmon, rainbow trout, lake trout, least cisco, round whitefish, inconnu, Arctic grayling, northern pike, burbot, longnose sucker, and slimy sculpin. Of these species only slimy sculpins and Arctic grayling were found in Minto Creek during the 1994 fishery survey. Minto Creek has been classified as a Type II habitat by the Yukon Fisheries Protection Authorization. This habitat designation is applicable to

the lower 1.5 km portion of the watercourse as steep gradients prevent fish from further migration upstream (Volume II Minto Project IEE). Since Minto Creek is an ephemeral watercourse, freezing completely during the winter, it is unlikely that any over wintering habitat for fish exists along the creek. No fish were found in reaches above the 1.5 km mark of the creek that provides the barrier to fish migration. The location of the barrier to fish migration on Minto Creek is shown on Figure 5.

Numerous locations along the Yukon River, including the confluence of Big Creek provide spawning and rearing habitat for the aforementioned fish species, including important commercial and subsistence species such as chinook and chum (dog) salmon. These areas have been identified as a result of consultation with SFN members, government fish habitat data, and other personal communications. Figure 6 provides more information on the uses and the location of Yukon River fish and fish habitat in the Minto Project area.

4.4.2 *Benthic Macroinvertebrates*

Benthic macroinvertebrate samples were collected along Minto Creek on several occasions during June 1975 and September 1976 by the Department of Fisheries and Oceans and Environment Canada, and by Environmental Protection Service in 1977. The most recent sampling occurred in August 1994, by Hallam Knight Piesold. The following discussion and presentation of results has been adapted from Minto Explorations Ltd. IEE, Volume II, Environmental Setting.

Benthic invertebrate communities that develop in a particular habitat reflect the relative success of those species that have adapted to suit that particular environment. Community structures of these species change as the habitat in which they reside changes, be it as a result of seasonal hydrology or water quality fluctuations or environmental disturbances. Routine sampling can track these temporal and spatial trends in species composition and abundance. The relative sensitivity of the various invertebrate inhabitants to ambient water chemistry and the changes discussed above can also be used as indicators of water quality (Minto Explorations Ltd. IEE, Vol. II).

Sampling occurred along Minto Creek at benthic sampling stations, designated B1 to B6, which correspond to water quality monitoring stations W1, W2, W3, W7, W8 and W9, respectively (see

Figure 5). Samples were preserved, stained, and sent to Dr. Charles Low in Victoria, BC for taxonomic analysis and enumeration.

Table 6 presents the numerical, statistical, and qualitative analysis results conducted as a part of the benthic invertebrate studies.

Once taxonomic identification of the samples was determined, species abundance and number of taxa were determined for each sample. Statistical analyses such as richness, diversity, dominance, and equitability indices were generated for the data set. In addition, relative abundance values and tolerance categories were determined.

Groups/species of benthic invertebrates exhibit various tolerances to disturbance, natural or otherwise. Species with a low tolerance range are susceptible to disturbance and therefore represent the best and most immediate indicators of environmental change. Organisms in the facultative and tolerant categories are more able to exploit habitat in which seasonal fluctuations or disturbances occur. With the exception of Station B4, benthic communities in Minto Creek contain a large portion of facultative species, followed by lower percentages of sensitive and tolerant species, respectively.

In general, all sites contained a well-rounded representation of sensitive, facultative, and tolerant species (Minto Explorations Ltd. IEE, Vol. II). Dipteran taxa (flies) were well represented in the facultative category; however, the facultative species composition consisted primarily of other insects and invertebrates. Populations of copepods enumerated in Minto Creek indicate a relatively large quantity of pool habitat (high numbers, specifically standing water).

It should be noted that as portions of the Minto Creek watershed recover from previous forest fires, changes in riparian and in-stream ecosystems might occur. Subsequently, benthos populations and species distributions within the watershed may also change.

Table 6 Minto Creek Benthic Community Characteristics

	B1	B2	B3	B4	B5	B6
Density (#/m²)						
Sensitive	1381	3489	1302	14453	2342	345
Facultative	3496	5802	1173	4673	10395	13608
Tolerant	421	36	162	1014	1277	950
Total	5298	9327	2637	20140	14014	14903
% Composition						
Sensitive	26.07	37.41	49.39	71.76	16.71	2.32
Facultative	65.99	62.21	44.47	23.2	74.18	91.31
Tolerant	7.94	0.39	6.14	5.04	9.11	6.37
# of Species	44	43	38	34	33	31
Shannon-Weiner Diversity	3.88	3.69	3.76	2.59	3.56	2.82
Dominance	0.11	0.11	0.13	0.38	0.13	0.27
Equitability	0.71	0.68	0.72	0.51	0.71	0.57
Richness	5.89	5.34	5.61	3.82	3.87	3.6
TU Diversity	0.892	0.894	0.873	0.623	0.871	0.732
Variance	0.027	0.015	0.049	0.319	0.03	0.165

Adapted from Table 7.3 Minto Explorations Ltd. IEE, Vol. II Environmental Setting

4.4.3 *Periphyton*

Periphytic alga are simple aquatic organisms which inhabit the substrate and water column of various water bodies. These organisms manufacture energy via photosynthesis and represent the base of the food chain within any aquatic community. As with benthic invertebrates, community species distributions and populations of periphyton can vary both temporally and spatially and as a result of seasonal hydrology or water quality fluctuations or environmental disturbances.

Information pertaining to species distribution and community structure of periphytic organisms in Minto Creek was gathered during the same period as the benthic invertebrate studies conducted in 1994. Five sites were established for periphyton sampling designated P1-P5, corresponding to water quality sampling sites W1, W2, W3, W5 and W9 on Minto Creek.

Concentrations of chlorophyll 'a' were determined to estimate algal biomass and therefore primary productivity in sections of the Minto Creek watershed. The highest mean concentrations of chlorophyll 'a' were detected in the upper reaches of Minto Creek where there is little vegetative cover and an abundance of sunlight exposure to the creek. The lowest concentrations of chlorophyll 'a' were detected at P3 (W3). Table 7 summarizes the results of the periphyton sampling, displaying chlorophyll concentrations calculated from the various sampling sites.

Table 7 Minto Creek Periphyton Chlorophyll 'a' Content
(micrograms/cm²)

Replicate	Site P1	Site P2	Site P3	Site P4	Site P5
1	0.187	0.059	0.094	0.352	0.375
2	0.208	0.112	0.141	<0.01	0.181
3	0.132	0.637	0.098	0.153	1.104
4	0.059	0.077	0.073	0.092	0.0189
5	0.941	0.473	0.022	0.081	0.167
6	0.061	0.312	0.047	0.077	0.334
Mean	0.265	0.278	0.079	0.126	0.392
Standard Deviation	0.045	0.053	0.206	0.109	0.142

Note: Adapted from Minto Explorations Ltd. IEE, Vol. II, Environmental Setting, Table 8.1

Taxonomic identification and relative abundance rankings of the various alga samples has provided information on community composition and complexity. In general, samples from most of the sites on Minto Creek contained very little periphyton, indicating a relatively unproductive environment. This may be due to nutrient availability limitations and/or habitat disturbances as the result of seasonal scouring from high flow events, for example (i.e. substantial freshet). Species composition here is similar to other Southwest Yukon streams (Minto Explorations IEE, Vol. II). *Nitzschia* spp. were the most prevalent species, especially at sites P2 and P3 (downstream of the orebody).

4.4.4 *Stream Sediments*

Stream sediments were sampled at the lower reach of Minto Creek (Station W2) on October 13, 1999. The sediments were sampled in triplicate and shipped for analysis to Norwest Labs of Vancouver the following day. ICP semi-trace metal analysis in solids and a wet sieve analysis were conducted on the samples. Another sampling of Minto Creek sediments was conducted in 1994 during the collection of baseline information for the Minto Project IEE.

Sediments in Minto Creek consist primarily of sand with some gravels and minimal fractions silts and clays (Volume II Minto Project IEE, 1994). Results from the 1994 sediment analysis showed high levels of arsenic in the lowest reach of Minto Creek, high levels of chromium and zinc one (1) kilometer downstream of the proposed tailings dam, and high levels of copper in the vicinity of the ore body in the upper reaches of the creek. Results of the 1999 analysis, restricted to the lower reach of Minto Creek, showed similarly high concentrations of arsenic and chromium. However, only one replicate for each of chromium and arsenic exceeded CCME Sediment Quality Guidelines for the Protection of Aquatic Life, in 1999 (CCME, 1999). No stream sediments were collected elsewhere on site.

The results of this analysis and that of October 1999 are presented in Table 8.

Table 8 Results of Stream Sediment Analysis at Lower Minto Creek - Station W2

Source	Location						CCME Guidelines
	W2 Replicate #1	W2 Replicate #2	W2 Replicate #3	W2 Replicate #1	W2 Replicate #2	W2 Replicate #3	
	ACG	ACG	ACG	Minto IEE	Minto IEE	Minto IEE	
	13-Oct-99	13-Oct-99	13-Oct-99	1994	1994	1994	
Physical Tests							
Moisture %				21.00	18.10	16.30	
Particle Size							
Gravel - % (>2.00 mm)				25.00	27.50	34.00	
Sand - % (2.00 - 0.063 mm)				64.00	64.00	58.50	
Silt - % (0.063 mm - 4 um)				7.59	6.56	5.74	
Clay - % (<4 um)				1.99	1.93	1.75	
Wet Sieve for Solids (% Retained)							
10 Mesh (2mm)	86.2	57.4	62.8				
18 Mesh (1mm)	4.3	12.5	6.3				
35 Mesh (0.5mm)	3.7	14.3	8.4				
60 Mesh (0.25mm)	2.8	9.6	9.6				
140 Mesh (0.1mm)	1.5	4.4	7.2				
270 Mesh (0.053mm)	0.8	1.1	3				
Total Metals (mg/L)							
Mercury (Hg)				0.01	0.01	0.02	
Metals in Solids (micrograms/gram)							
Aluminum (Al)	13100	12600	11400				
Antimony (Sb)	<2	<2	<2	0.32	0.29	0.25	
Arsenic (As)	2	6	<2	4.57	4.66	4.09	5.9
Barium (Ba)	184	196	169				
Beryllium (Be)	0.3	0.3	0.3				
Bismuth (Bi)	<5	<5	<5				
Cadmium (Cd)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6
Calcium (Ca)	9590	6610	7530				
Chromium (Cr)	37.6	25	26.3	13.40	15.00	13.70	37.3
Cobalt (Co)	6.7	5.7	6.2				
Copper (Cu)	10.9	10.3	13	14.20	14.20	13.00	35.7
Iron (Fe)	15000	13000	14000				
Lead (Pb)	4	5	3	2.60	2.20	<2	35
Lithium (Li)	5	3.8	5.1				
Magnesium (Mg)	5290	3840	5290				
Manganese (Mn)	439	470	367				
Molybdenum (Mo)	<1	<1	<1	<4.0	<4.0	<4.0	
Nickel (Ni)	13.5	10	14.7				
Phosphorus	841	445	835				
Potassium (K)	2920	2960	2340				
Selenium (Se)	<2	<2	<2				
Silicon (Si)	447	817	114				
Silver (Ag)	<0.5	<0.5	<0.5	<2.0	<2.0	<2.0	
Sodium (Na)	1940	3130	1650				
Strontium (Sr)	78	79	59				
Sulphur (S)	100	60	140				
Thorium	<1	2	<1				
Tin (Sn)	2	2	2				
Titanium (Ti)	989	518	683				
Uranium	<5	<5	<5				
Vanadium (V)	44	30	36				
Zinc (Zn)	30.9	22.8	30.7	30.40	28.90	29.00	123
Zirconium (Zr)	9.6	6.4	8.3				

Note: Bold and shaded values represent those samples exceeding CCME Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME, 1999). CCME guidelines are for total metals.

4.5 ARCHAEOLOGY AND TRADITIONAL LAND USE

4.5.1 *General Project Area*

Areas of archeological interest near Minto are represented by four sites identified during an archeological survey conducted by Sheila Greer, in 1994 (Minto Project IEE, Vol. II, 1994). Three of the sites exist on the east side of the Yukon River, outside of the mine development area, while the other is located near the mouth of Minto Creek. No sites were identified or suspected of existing along the Project access road or within the mine site area. The reader is referred to the Minto Project IEE Volume II by Hallam Knight Piesold for a more detailed discussion archeology and historical anthropology of the Minto area (1994).

Interviews of SFN members were conducted as part of the compilation of environmental information for the Project area. The Project area lies within the traditional territory of the SFN and comprises part of land claim settlement parcels R-6A (Type A settlement lands), R-44A and R-40B, specifically the upper reaches of Minto Creek.

4.5.2 *Selkirk First Nation Interview Results*

The SFN continues to use the Project area for various activities including fishing, hunting, berry picking, and spiritual fulfillment. As a result, their current and historical knowledge of the area the SFN represents a valuable source of baseline information.

Interviews were conducted with elders and knowledgeable band members in the community of Pelly Crossing to gather local and traditional knowledge about the Project area. The interview process was initiated by introduction of the study goals to the prospective candidate. Each person interviewed was provided a description of the Project area and given some background regarding the Minto Project itself. Upon acceptance to participate, the person would be asked a series of questions presented in a questionnaire format. A site map of the area facilitated discussion and response to interview questions.

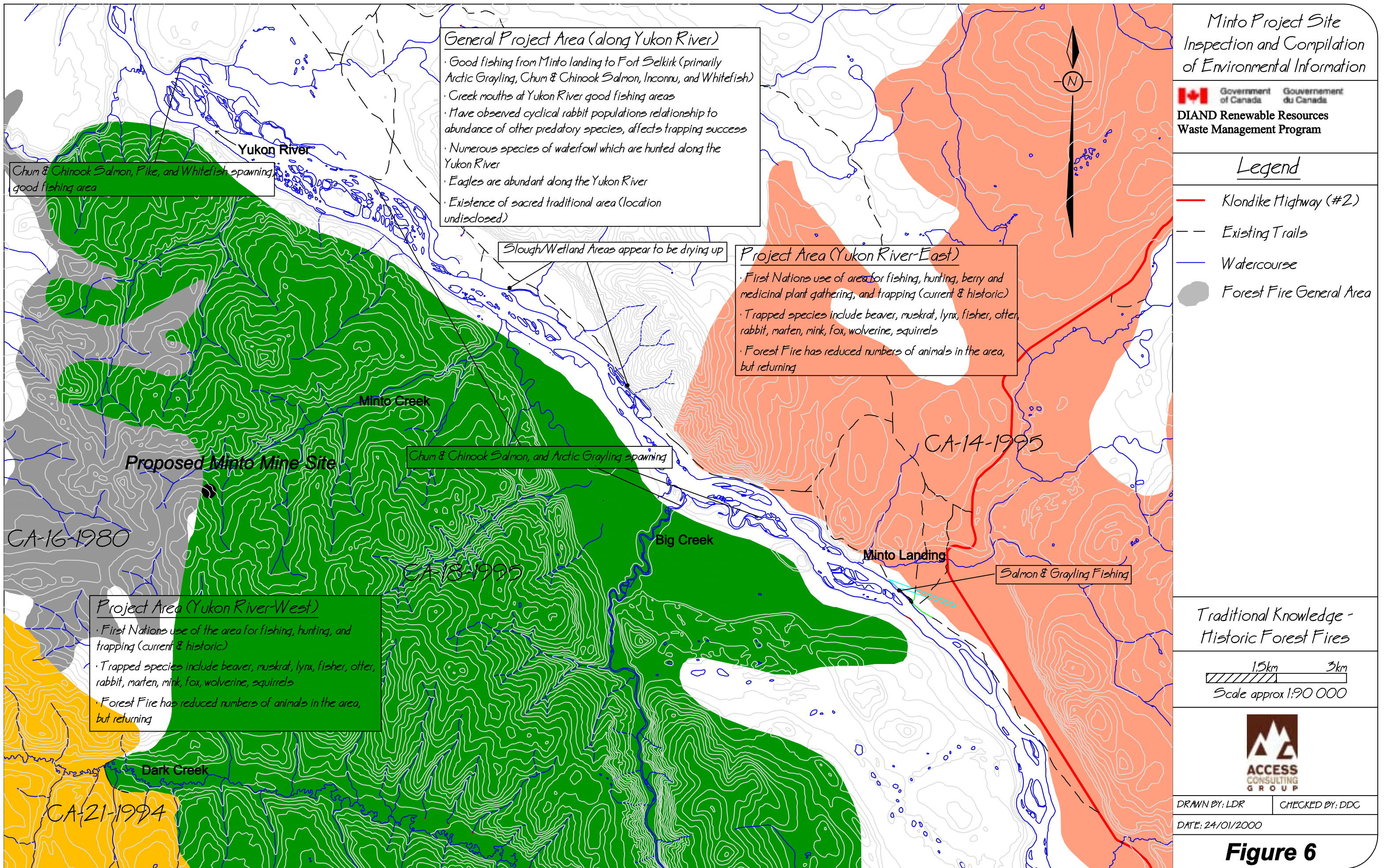
Twelve SFN members from Pelly Crossing were interviewed, including nine elders, by Nancy Alfred, a SFN member. Table 9 provides the list of interview participants. Interview questions consisted of natural resource based questions such as knowledge of and participation in various resource extraction activities (hunting, fishing, trapping, plant and berry gathering, etc.). Other questions solicited information regarding the knowledge of temporal and spatial trends observed regarding animal, plant and fish abundances and locations. There were no significantly negative responses to the posed questions, however a general sense of concern regarding the Minto Project was expressed. The respondents use the area for subsistence and other cultural activities and are keen on seeing it remain a site of continued cultural land use.

Respondents indicated on a map of the Project area where they know of, or they have, conducted various cultural land use activities. The results of this questionnaire are summarized in Figure 6.

A copy of the original questionnaire and the associated results are included as Appendix C.

Table 9 List of Interview Participants

Kitty Johnathan	Elder
Tommy Joe	Elder
George McGinty	SFN Member
Maria VanBibber	Elder
Alex Joe	Elder
Franklin Roberts	Elder
Danny Roberts	Elder
Daniel Luke	SFN Member
Darryl Johnny	SFN Member
Annie McGinty	Elder
Mary Blanchard	Elder
Johnny Simon	SFN Member



4.6 CURRENT LAND USE & CULTURAL RESOURCES

4.6.1 Land Tenure

Land tenure in the general vicinity of the Minto Project is limited to areas east of the Yukon River. Much of the Minto Landing area is held under title by the SFN. Other settlement lands and site specific land selections by the SFN are also located in the region. Several fee simple titled properties also exist in the area that are held by non-first nation persons. Figure 7 displays land tenure in the Project area. Detailed land tenure information for the Minto Landing area is provided in Figure 8.

The SFN has several tracts of settlement land adjacent to or within the Project area (Figure 7). The importance of the area for traditional and historic use is reflected in the lands chosen by the SFN. SFN concerns were addressed in September of 1997, upon the signing of a co-operation agreement with MEL. The SFN remains a strong supporter of the Project.

4.6.2 Mining

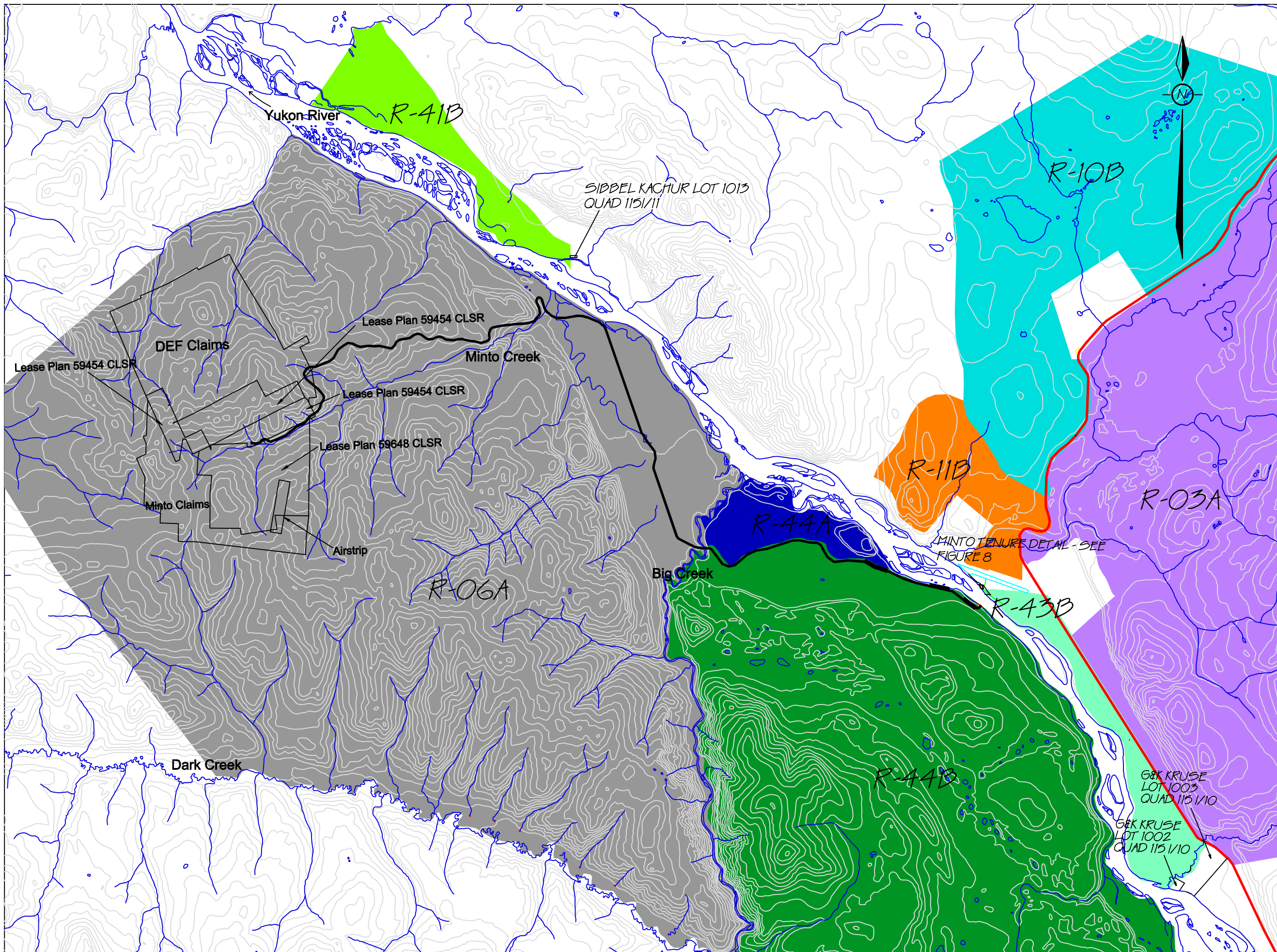
Mining in the immediate Project area is limited to the proposed Minto Project (currently in development). However, south of the Project area there is placer mining in the Big Creek watershed, and the proposed Carmacks Copper Project open pit copper mine in the Williams Creek watershed.

Mineral claims and leases were acquired by MEL from ASARCO Inc., Teck Corporation, and Falconbridge. Claim boundaries and lease numbers are shown in Figure 2.

4.6.3 Forestry

There are currently no permitted forestry activities in the Project area. Regional forest uses are limited to commercial permits to log burn-areas near Minto and harvest of fuel-wood for domestic use (DIAND-Field Operations, 2000).

MEL conducted a survey of harvest potential for fire killed fuel wood. The results of this survey indicated that there was sufficient fire killed fuel wood within the quartz claim boundaries to supply fuel wood for 100 years. This estimate was based on a volume of 725 m³ of timber necessary to fire a one to two (1-2) million BTU per hour boiler/furnace at the mine site. The survey also suggested that a 30-year timber supply having 'good potential' exists in the area.



Minto Project Site
Inspection and Compilation
of Environmental Information

 Government of Canada
Gouvernement du Canada
DIAND Renewable Resources
Waste Management Program

Legend

-  Klondike Highway (#2)
-  Existing Trails
-  Watercourse
-  Selkirk First Nations Settlement Lands

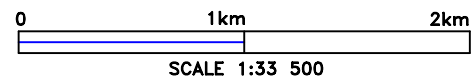
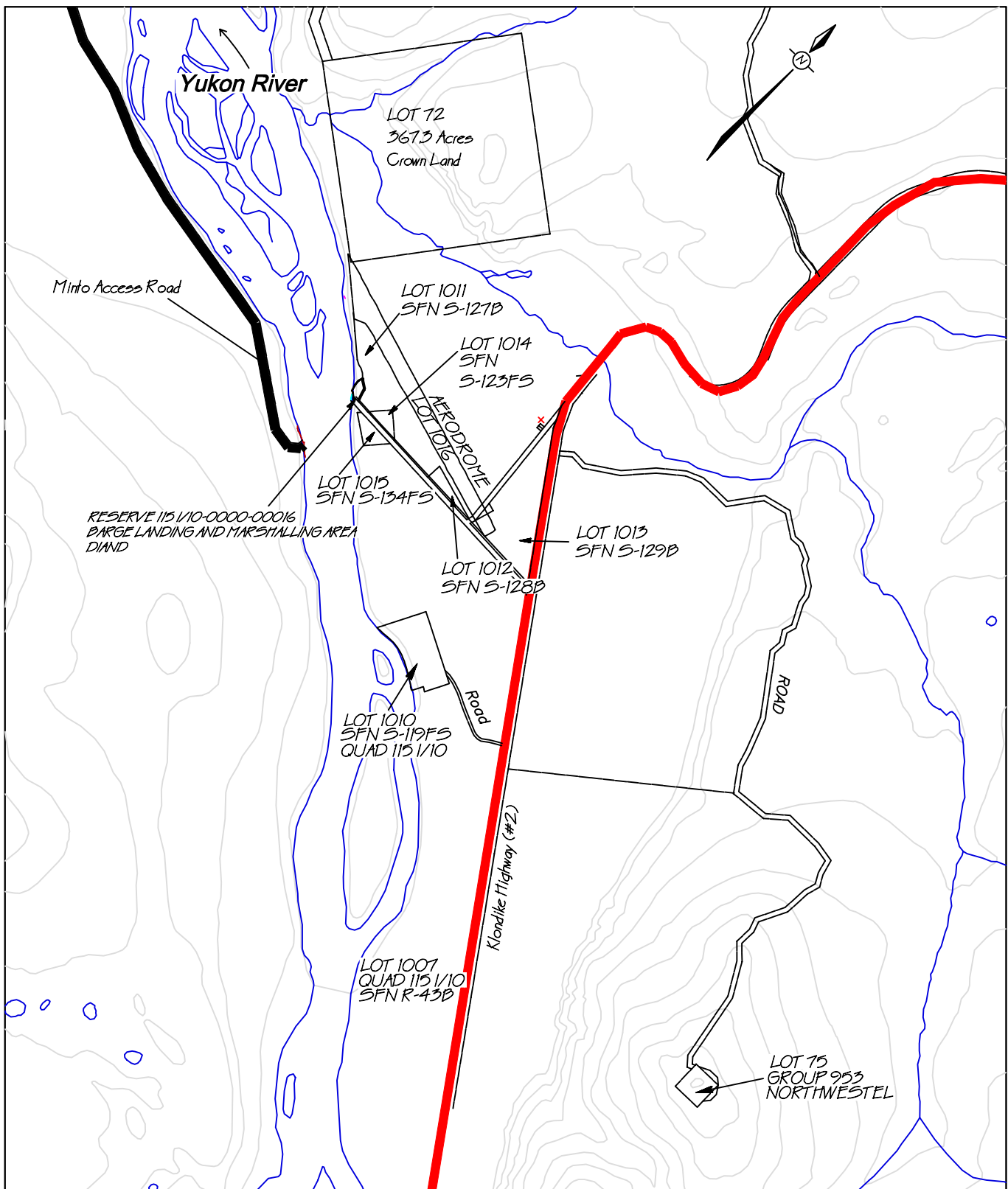
Minto Project Area Land
Tenure

15km 3km
Scale approx 1:80 000



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Figure 7



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DIAND Renewable Resources
Waste Management Program

Minto Project Site Inspection and Compilation of
 Environmental Information

Minto Landing - Land Tenure Detail

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Figure 8

4.6.4 *Trapping and Outfitting*

Trapping remains an important economic and subsistence activity for many SFN members and Yukoners in the Project area. Several Registered Trapping Concessions are held in the Project area. These include: RTC #136: Heinz Sauer, RTC#139: Danny Joe, RTC #142: OPEN, RTC #143: Johnny Sam, RTC #145: Glen and Jim Bullied, RTC #146: Geo and Ken M^cGinty, RTC #147: Kathleen Sam.

Trapper access to the Project area has been identified and will be maintained, according to compensation agreements negotiated with the Project proponent.

Only two outfitting concession falls within the Project area, Registered Outfitting Concessions #13 – Held by Tim Mervyn (Mervyn Outfitting) and #14 – Held by Curt Thompson (Trophystone Safaris).

Trapping and outfitting concessions, as well as game zone locations and historical records of big game harvests in the area are presented in Figure 9.

4.6.5 *Recreation and Other Land Uses*

The Yukon River, in the vicinity of Minto Landing and the Minto Project access route, currently hosts recreational activities such as fishing, hunting, hiking and canoeing/rafting. The nearby Minto Resorts, owned and operated by the SFN, provides camping and other outdoor adventure excursions for visitors to the area. Minto Landing is also a starting point for tourist excursions down-river to historic Fort Selkirk. The Yukon River is also used as a transportation corridor for freight and other cargo. Land use on the western shores of the Yukon River is limited, as vehicle access to the western shore is available only in winter over river ice, or during open water by barge.

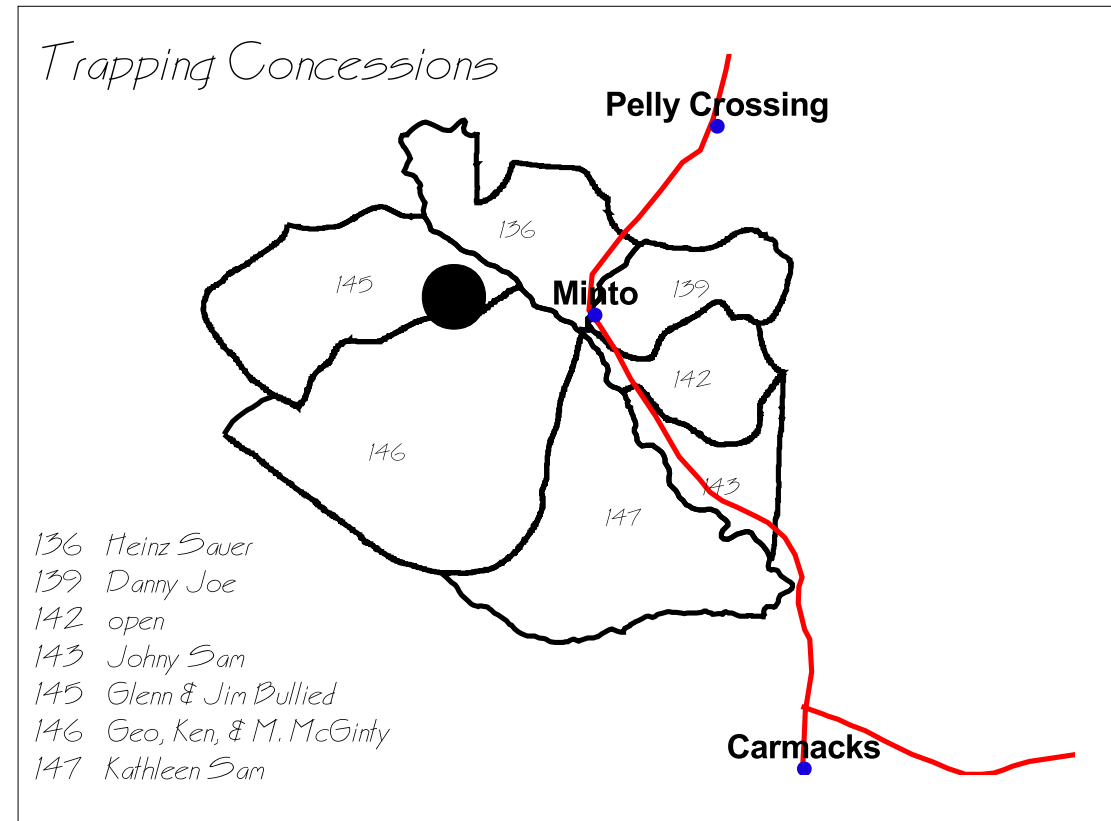
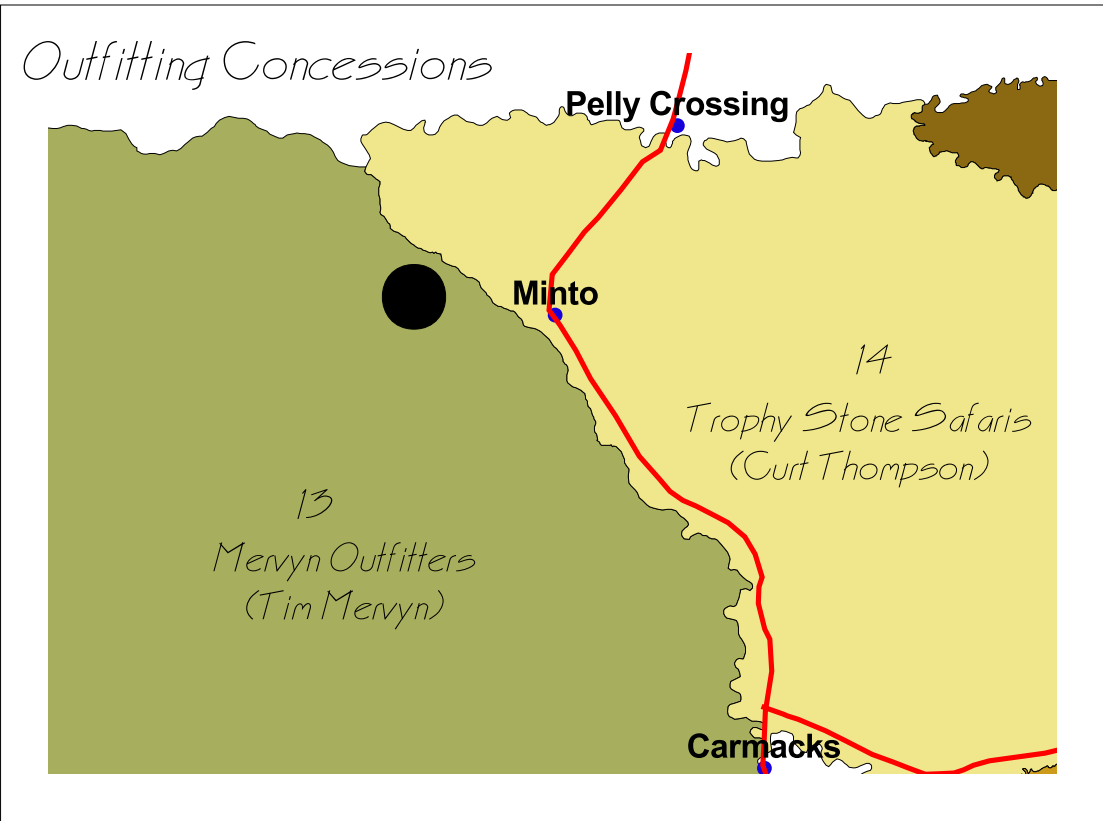
4.6.6 *Cultural Land Use Activities*

Annual salmon fishing occurs at Minto Landing and other sites along the Yukon River. Members of the SFN were seen catching chum salmon at Minto Landing during the site inspection. The Minto landing area is used for various cultural activities throughout the year, including berry

picking, trapping, hunting, and spiritual activities. Figure 6 displays the location of some of the current cultural land use activities in the area.

As part of the Minto mine development Project, a comprehensive cooperation agreement was signed with the SFN and MEL on September 16, 1997 (Minto Exploration Ltd., 1997).

Please refer to Section 4.5 for a more detailed discussion of cultural land use activities in the Project area.



Minto Project Site
Inspection and Compilation
of Environmental Information



DIAND Renewable Resources
Waste Management Program

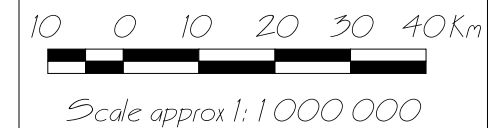
Legend

- Minto Project Location
- Highway



Big Game Harvest Levels (1980 to 1998)																			
Game Zone 3-20	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Black Bear	0	2	0	3	1	1	1	2	2	2	3	2	1	1	0	1	1	1	1
Grizzly	0	0	1	0	0	0	1	2	0	2	0	1	0	0	2	1	3	2	
Caribou	0	0	0	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Moose	1	3	3	3	4	2	0	6	3	3	1	0	1	2	1	4	2	1	5
Game Zone 4-13	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Black Bear	0	2	0	1	2	2	1	1	2	2	1	0	1	0	1	0	1	1	0
Grizzly	3	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Caribou	0	0	0	0	5	0	1	0	0	1	0	0	1	1	0	0	0	0	0
Moose	1	2	1	2	4	0	1	0	0	1	5	1	2	2	1	3	1	3	1
Game Zone 5-22	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Black Bear	1	3	0	0	1	0	4	2	3	0	0	1	0	0	0	0	1	0	0
Grizzly	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Caribou	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	1	1	5	6	2	1	1	3	1	0	0	0	1	1	0	0	0	0	0
Game Zone 5-24	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Black Bear	1	1	0	1	1	1	0	2	0	0	0	0	2	0	0	0	2	0	0
Grizzly	0	0	0	0	2	0	0	1	0	0	1	0	1	0	0	0	0	1	0
Caribou	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Moose	2	2	8	5	0	2	2	6	1	0	0	0	0	1	1	0	0	0	1

Game Management,
Trapping, and Outfitting Concessions



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Figure 9