Doris North

Closure and Reclamation Plan

Report Prepared for

Hope Bay Mining Ltd.

Report Prepared by

SRK Consulting (Canada) Inc.
1CH008.065
August 2012

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1 Introduction

The Doris North Project was an advanced exploration program undertaken by Hope Bay Mining Ltd. The project is located in Nunavut on Inuit Owned Land administered by the Kitikmeot Inuit Association (KIA), in the West Kitikmeot Region of Nunavut, approximately 120 km southwest of Cambridge Bay (Figure 1). The Doris North Project is authorized under Nunavut Water Board (NWB) Type B Water Licence 2AM-DOH0713. The Doris North Project is operated by Hope Bay Mining Limited (HBML) a wholly owned subsidiary of Newmont Mining Corporation (NMC). The site is currently in care and maintenance.

This document presents the closure obligations and the plan for closing for all facilities, and demonstrates how the closure obligations will be met. This plan differs from the Closure Plan submitted by Miramar in 2005 (AMEC 2005, Appendix A) as supporting document for the Final Environmental Impact Statement (Miramar 2005). The AMEC (AMEC 2005) closure plan described closure of the Doris North project had it produced and milled ore in the Doris North deposit. The project never advanced to this stage. The project was only an advanced exploration program with a decline that ends in ore faces. The mill was not constructed and tailings were not produced. The underground bulk sampling program at Doris North produced waste rock and ore which are located on dedicated rock pads. This plan focuses on the closure of the site as it currently exists.

1.1 Background

Construction of the Doris North Project began in 2008 with the intent of bringing the site into production by 2013. The Project was put into care and maintenance in 2012. A number of facilities and structures were constructed to support the proposed mine. These facilities and structures are described below.

1.2 Description of Existing Facilities

Facilities are grouped by areas: Roberts Bay area, Doris North Camp, and Tail Lake. These areas are linked by all-weather roads. Other facilities were constructed along the roads. The areas are described in more detail below.

1.2.1 Roberts Bay

The Roberts Bay area includes the port and associated facilities for the project. A rock fill jetty was constructed for barging operations. Two bulk fuel storage facilities are located at Roberts Bay, one containing a single 5 million liter tank, and a second one housing a total of three 5 million liter tanks. A mechanical shop, vehicle repair complex, a waste management facility, laydown and vehicle parking areas are also located at Roberts Bay. A sandy beach area located approximately 1.5 km west of the jetty was used for explosives off-loading and storage. All structures and facilities were built on bedrock or rock fill pads.

1.2.2 Doris Camp

The Doris Camp is located approximately 5 km south of Roberts Bay, and consists of:

- 180 man camp,
- offices,
- power generators,
- bulk fuel storage area,
- warehousing,
- underground mining support facilities,
- vehicle parking,
- material laydown, and
- helicopter operations area.

All buildings and structures are located on rock pads to protect permafrost. The rock pads were constructed to ensure positive drainage and prevent permanent ponding. The milling and processing plant was not constructed.

A diversion berm incorporating an impermeable liner was constructed upstream of the camp to divert noncontact runoff from Doris Mountain. Runoff from the camp pads and underflow through the pads are collected and managed as described in the Interim Water Management Plan (SRK 2012).

The rock fill of the pads is non-acid generating and non-mineralised (SRK 2007) and is from Quarries #2 and #4.

An underground decline and portal are located at the east end of the camp. A vent raise was also constructed to supply heating and ventilation for the underground workings. All waste rock and ore from the bulk sampling program is stockpiled on rock pads east of the camp.

Facilities located near the camp include the landfarm and burn pan area, the overburden dump, the core storage area, the Reagent Storage pads, the temporary explosives mixing facility and washbay, and the all-weather Airstrip. All of these facilities are constructed on rock pads.

1.2.3 Tail Lake Area

The Tail Lake area is located approximately 1 kilometer east of Doris Camp, and is accessible via the Secondary Road (aka Tail Lake Road). The North Dam, the Frozen Core plant, and the Tail Lake access road are located in this area. The North Dam is a rock fill dam with a permanently frozen core constructed for tailings storage. The Tail Lake Reclaim Barge Access Road was constructed entirely on dry land, but part of the road is submerged because the water level in Tail Lake has risen from the construction of the dam.

1.3 Permits and Leases

The Doris North Camp and adjacent facilities are operated in accordance with the Water License No. 2AM-DOH0713 and subsequent amendments granted by the Nunavut Water Board, and the Kitikmeot Inuit Association Land Lease Agreement. Table 1-1 below provides a summary of the requirements for closure as set forth in the Water License and how this document addressed each of these requirements.

Table 1-1 Table of Concordance

License Ref.	License Conditions (2AM-DOH0713)	Closure Plan Ref	Closure Plan Response/Specification
Part L. 4. a	Detailed description, including maps and other visual representations, of the pre-construction conditions for each site, accompanied by a detailed description of the proposed final landscape, with emphasis on the reclamation of surface drainage over the restored area.	Figures 2 through 7; Section 2.1	As-built figures and undisturbed ground contour maps are attached to this document.
Part L. 4. b	A description of progressive reclamation and details of the reclamation scheduling.	n/a	This plan presents final reclamation. Some progressive reclamation may be performed under Care and Maintenance (C&M).
Part L. 4. c	Implications of any water quality model re-calibration results on the Tailings Impoundment Area (TIA) discharge strategy and any adaptive management measures that may be required.	2.2.5, Appendix B	No tailings were disposed in the TIA. The Water Quality Model was updated to predict the discharge water quality from Tail Lake during C&M.
Part L. 4. d	An evaluation of closure and reclamation measures for each mine component including the goals, objectives, closure criteria and the rationale for selection of the preferred measures.	2.2	Requirement satisfied by submission of this Updated Closure and Reclamation Plan
Part L. 4. e	A comprehensive assessment of materials suitability, including geochemical and physical characterization, and schedule of availability for reclamation needs, with attention to cover materials, including maps where appropriate, showing sources and stockpile locations of all reclamation construction material and any water related mitigation required during implementation.	2.2	Only rock stockpiled in Quarry 2 and overburden soils from the Doris Overburden Dump will be used for reclamation.
Part L. 4. f	An assessment and description of any required post closure treatment for drainage water that is not acceptable for discharge from any of the reclaimed mine components.	2.2.5	Ore and Waste Rock piles will be covered with impermeable liner to prevent infiltration. No impacted water is expected from these piles.
Part L. 4. g	Contingency measures for all reclamation components including action thresholds that are linked to the monitoring programs.	3.1.10	Sampling and testing of reclamation areas for hydrocarbon and other contamination will determine if further action is required.

Table 1-1 Table of Concordance (Continued)

License Ref.	License Conditions (2AM-DOH0713)	Closure Plan Ref	Closure Plan Response/Specification
Part L. 4. h	Monitoring programs to assess reclamation performance and environmental conditions including monitoring locations for surface water and groundwater, parameters, schedules and overall timeframes.	4.0	Post closure monitoring program will be implemented.
Part L. 4. i	QA/QC procedures for managing the demolition landfill and other waste disposal areas.	3.1.8, 3.1.9	No waste disposal area will be constructed on site. All waste will be disposed of in licensed facilities off site or burned in accordance with approved procedures.
Part L. 4. j	All Waste Rock classified as mineralized be returned underground as backfill through progressive reclamation procedures, unless otherwise approved by the Board in writing.	3.6.8	Appropriate approval for above ground waste rock storage will be obtained.
Part L. 4. k	Underground mine plans and sections, including areas of backfill, the type of material placed and volumes should also be included.	n/a	No underground backfill required. Only decline accessing the ore was completed.
Part L. 4. l	Protocol for the disposal of any contaminated soil into the underground mine at closure.	3.1.10	No contaminated soils will be disposed of underground.
Part L. 4. m	An assessment of the long-term physical stability of all remaining project components including the north and south dams.	3.7.1	The South Dam was not constructed. The North Dam will be monitored during C&M and closure per the North Dam Construction Completion Report. When water quality objectives in Tail Lake are met the dam will be breached. Periodic geotechnical inspections will be performed in the first 5 years after breaching.
Part L. 4. n	Detailed criteria for the final breaching of the North Dam.	3.7.1	The breach will be 20 m wide, cut to the original ground elevation of 28.3 masl with 4H:1V side slopes.
Part L. 4. o	A revised closure and reclamation cost estimate.	Appendix C	Requirement satisfied by submission of this Updated Closure and Reclamation Plan and the attached Updated Cost Estimate.
Part L. 4. p	A detailed implementation schedule for completion of reclamation work.	5.0	Reclamation will occur during the C&M period or upon closure of the entire Hope Bay Project.

Table 1-1 Table of Concordance (Continued)

License Ref.	License Conditions (2AM-DOH0713)	Closure Plan Ref	Closure Plan Response/Specification
Part L. 5	Review and revise plan as required by operational/technology changes. Revisions to be submitted in the form of an Addendum, to be included with the Annual Report.	n/a	The mine is currently under C&M and there are no active operations on site.
Part L. 6	Submit to the Board a Final Mine Closure and Reclamation Plan within eighteen (18) months of the start of ore processing.	n/a	The mine is currently under C&M. No ore processing will be done at site.
Part L. 6. a	Soil Quality Remediation Objectives along with CCME Guidelines and the Government of Nunavut Environmental Guideline for Site Remediation.	3.1.10	The Soil Quality Remediation Objectives are aligned with the requirements for Industrial Use Land as defined by CCME Guidelines for Coarse Grained Soils.
Part L. 6. b	Environmental Site Assessment plans in accordance with Canadian Standards Association (CSA) criteria.	n/a	If needed, an Environmental Site Assessment Plan will be submitted prior to undertaking the Site Investigation.
Part L. 6. c	Evaluation of the Human Health and Ecological Risk Assessment.	n/a	This evaluation will be part of the Site Investigation to be implemented prior to reclamation.
Part L. 7	If not approved by the Board, revised Plan must be resubmitted to the Board for approval within thirty (30) days of receiving notification of the Board's decision	n/a	Pending receipt of review comments from NWB once the Closure Plan has been submitted.
Part L. 8	Complete all reclamation work in accordance with the Plan(s) referred to in this Part as and when approved by the Board	n/a	Closure work can proceed after the plan is approved by NWB.
Part L. 9	Implement progressive reclamation, including revegetation as soon as practically possible	n/a	Entire site will be reclaimed. Progressive reclamation may be performed as part of the C&M activities.

1.4 Closure Objective

This report describes activities to be undertaken for final closure and reclamation of the Doris Camp and nearby areas. The overall closure objective is to establish stable chemical and physical conditions that protect the environment and human health. The site will be monitored and maintained post closure to ensure these conditions have been met.

Some infrastructure at the site is a substantial contribution to the development of Nunavut and will remain after closure. The roads, fuel storage, airstrip, port/jetty and rock pads can be used by other projects in the area or if the site itself is again considered as a mine. The rock pads have also altered the thermal characteristics of the ground on which they are built. Removing the rock pads, roads or airstrip would result in large areas of permafrost degradation. For these reasons, this infrastructure will remain.

2 Scope of Work

2.1 Scope

Figure 1 shows the geographic location of the Hope Bay site, while Figures 2 through 7 show the site layout and details of the Doris North area. The Doris North Project has been ordered into the work breakdown structure (WBS) shown in Table 2-1. The WBS is used to organize the closure cost estimate (Appendix C).

Table 2-1 Work Breakdown Structure

Work Area	Facility	WBS Code
Roberts Bay	Jetty	RB-001
	Roberts Bay TankFarm	RB-002
	Quarry 1 Tank Farm	RB-003
	Mechanical Shop Complex	RB-004
	Waste Management Facility	RB-005
	Laydown Area	RB-006
	Overburden Dump	RB-007
	Fuel Transfer Access Road	RB-008
	Communications Tower	RB-009
	Beach Laydown Area	RB-010
	Orbit Drill Shop	RB-011
Airstrip	Airstrip	AS-001
	South Apron	AS-002
	North Apron	AS-003
	Explosives Mixing Facility	AS-004
Reagent Pads	Equipment Laydown Area	PR-001
	Materials Laydown Area	PR-002
	Ammonium Nitrate Storage Area	PR-003
	Geotech Drill Shop	PR-004
	Westarc Drill Shop	PR-005
Waste Management Area	Land Farm	WM-001
	Batch Plant Pad	WM-002
	Burn Pan	WM-003
Quarry #2	Crusher	Q2-001
	Overburden Dump	Q2-002
	Treated Sewage Discharge Areas	Q2-003

Table 2-1 Work Breakdown Structure (Continued)

Work Area	Facility	WBS Code
Doris Camp	Accommodation Complex	DC-001
	Tank Farm	DC-002
	Permanent Power Generator	DC-003
	Backup Power Generator	DC-004
	Sewage Treatment Plant	DC-005
	Fire Water Storage Tank	DC-006
	Muster Station	DC-007
	Warehouse / Core Shack	DC-008
	Offices & Mine Dry Complex	DC-009
	Temporary Water Management Pond	DC-010
	Portal and Underground Works	DC-011
	Underground Wash Bay	DC-012
	Swick Shop	DC-013
	Water Intake Structure and Pumping Facility	DC-014
	Sedimentation/Pollution Control Pond	DC-015
	Underground Support Mechanical Shop	DC-016
	Fresh Water Pipelines	DC-017
	Helicopter Support Facilities	DC-018
	Waste Rock Pile	DC-019
	Ore Pile	DC-020
	Runoff Diversion Berm	DC-021
	Sewage Discharge Line	DC-022
	Sedimentation Berm	DC-023
	Sumps	DC-024
North Dam	Frozen Core Dam	ND-001
	Tail Lake Access Road	ND-002
	Frozen Core Plant	ND-003
Vent Raise	Vent Raise	VR-001
	Ventilation and Heating Facilities	VR-002
	Fuel Storage Area	VR-003
Doris Windy Road	All Weather Road	DW-001
	Quarry A	DW-002
	Quarry B	DW-003
	Quarry D	DW-004
	Explosives Storage Facility	DW-005
Secondary Road	Secondary Road	SR-001
Doris Mountain	Communications Towers	DM-001

The reclamation strategies for the various components of the mine infrastructure and supporting facilities are summarized below.

2.2 Facility Closure Strategies

All material used for reclamation will be sourced from existing stockpiles. Stockpiled run of quarry and crushed rock are from Quarry #2. A detailed geochemical characterization of Quarry #2 was previously performed (SRK 2007). Where overburden soils will be used for reclamation, a sampling and testing program will be implemented to ensure that the overburden material is suitable for reclamation purposes.

2.2.1 Rock Fill Pads

The reclamation objective is to ensure long-term physical stability and to protect the permafrost. Reclamation of the rock fill pads will be limited to regrading to ensure positive drainage and prevent ponding. Permafrost will have migrated into the rock pads and the underlying tundra vegetation has died. Removal of the pads is not practical, because it would accelerate permafrost degradation because tundra vegetation under the pads has died. Revegetation of the pads is not practical, because the rock pads cannot support vegetation.

2.2.2 Airstrip and All-weather Roads

The airstrip and all roads built using rock fill will be left in place as part of the future industrial development of the area. The surface will be graded to prevent permanent ponding. The bridges and the arch culvert will be removed for safety.

2.2.3 Fuel Storage Areas

The bulk fuel storage facilities will be left in place for future industrial land use.

The temporary fuel storage facilities (aviation fuel, day tanks, etc.) will be decommissioned and reclaimed. The granular protective cover will be tested to determine if remediation is required. The impermeable liners will be removed and containment berms levelled to conform to the original topography as much as possible, and to prevent permanent ponding

2.2.4 Buildings and Facilities

All buildings will be dismantled or demolished and the debris will either be burned or removed from site for disposal in a licensed facility. All facilities will be decommissioned, demolished, levelled, and processed for offsite shipment. When demolition is complete, all remaining material and debris will be cleared.

2.2.5 Water Management Structures

Existing water management structures will be maintained until post-closure water quality objectives are met. Until these objectives are met, impacted site runoff will be managed according to the current water management plan (SRK 2012). The primary sources of constituent loading are the waste rock and ore piles. Structures for managing seepage or runoff from the waste rock and ore piles will be maintained until final closure of waste rock and ore piles (see Section 3.6.8). Impacted runoff of the Doris North camp is collected and pumped to Tail Lake.

Water quality in Tail Lake is not affected by tailings because tailings were never produced by the Doris North Project. Tail Lake water that meets the water quality of the Water License is discharged to Doris Creek to maintain the water level behind the North Dam. Once the runoff water from the Doris Camp pads meets the water quality objectives of the Water License, the collection sumps and the pipeline to Tail Lake will be decommissioned. The Pollution Control Pond and the North Dam will be breached to re-establish the natural drainage path. The Water Quality Model (Appendix B) was updated to predict the discharge water quality from Tail Lake for 5 years under care and maintenance.

In summary, when post-closure water quality objectives are met, all water management structures will be decommissioned, breached, or removed to restore the natural drainage paths where possible. Where the natural drainage path cannot be restored, measures will be taken to prevent accumulation and permanent ponding in order to prevent permafrost degradation. Erosion protection and sediment control measures will be installed where necessary.

3 Closure Activities

The overall closure activities to be undertaken in the fulfillment of closure obligations are summarized in this section. The activities are described grouped by geographic location of the various facilities and buildings.

3.1 Roberts Bay Area (RB)

The location and the layout of the Roberts Bay area are shown on Figures 4 and 5.

3.1.1 Salvage

Reusable equipment and supplies will be salvaged from Roberts Bay site prior to demolition and prepared for shipping off site to a point of sale.

3.1.2 Demolition

All utilities to structures and facilities will be dismantled and the structures emptied prior to demolition. Buildings will be demolished and the waste material segregated into burnable and non-burnable waste and disposed of as described in Section 3.1.9. No salvage value was credited in the cost estimate. Structures and facilities to be demolished are

- Mechanical Shop Complex,
- Waste Management Facility,
- Communications Tower, and
- Orbit Drilling Shop.

The concrete floor of the main Mechanical Shop will be left in place. All seacan containers will be removed.

3.1.3 Decommissioning and Reclamation of Tank Farms

Both the Roberts Bay Tank Farm (RBTF) and the Quarry #1 Tank Farm (Q1TF) are infrastructure that will remain after closure.

3.1.4 Jetty

The rock fill jetty is infrastructure that will be left in place. On-shore and off-shore mooring point and buoys will be left in place.

The surface of the jetty extending onto the shore, as well as the jetty access road and nearby laydown will be regraded and crowned to ensure positive drainage.

3.1.5 Overburden Dump and Sedimentation Berm

The Roberts Bay Overburden Dump is comprised mainly of oversize rock from the excavation of the RBTF and pockets of overburden soils. The top of the Overburden Dump was covered with a layer of crushed rock and was used as overflow vehicle parking area. The 2H:1V side slopes are constructed of oversize rock and are stable.

All materials and waste will be collected and disposed of as appropriate. The safety berms will be breached to allow free drainage. The top surface will be regraded to ensure positive drainage.

The sedimentation berm will be breached to original ground level to restore natural flow paths.

3.1.6 Laydown Area

The overhead electrical cables will be decommissioned, and the posts removed. All waste and materials will be collected and disposed of as appropriate. The surface will be regraded for positive drainage and to prevent permanent ponding.

3.1.7 Beach Laydown Area

The beach laydown area was used to land barges and store explosives. The magazines will be removed and the area scarified where necessary to promote revegetation.

3.1.8 Collection and Disposal of Demolition Debris and Non-Hazardous Waste

Structures will be demolished and non-hazardous demolition waste will be segregated in two piles: wood waste and other non-hazardous waste.

Wood waste will either be chipped or burned. Wood waste suitable for burning may be transported to an approved burn pan location. Prior to on site burning appropriate approvals and permissions will be attained from the NWB. Chipped wood may be used for reclamation purposes such as being mixed with drill cuttings, overburden or other material and used to fill depressions.

All remaining non-hazardous waste will be loaded in seacans and prepared for shipment off site. Materials shipped off site will be disposed of in a licensed facility in accordance with appropriate Federal, Provincial, Territorial, or Municipal non-hazardous waste regulations.

3.1.9 Collection and Disposal of Hazardous Waste

Hazardous wastes and chemicals remaining on site will be collected and stored in appropriately sealed containers and/or empty drums. This includes any remaining fuel, hydraulic oil, antifreeze, batteries, and other lubricating fluids and/or chemicals. Reusable items will be shipped off site to a third party destination. Unusable items will be packaged and manifested at the Waste Management Facility for transport to a licensed facility in accordance with appropriate Federal, Provincial, Territorial, or Municipal hazardous waste regulations.

3.1.10 Remediation of Hydrocarbon Contaminated Soils

Field investigations will be completed prior to site closure by qualified personnel to define the extent of contamination. An assessment of remediation options will be conducted once the full extent and nature of the contamination is determined. Localized areas with limited contamination will be bioremediated in situ. If large contiguous areas of contamination are found, excavation and off site removal will be considered. Excavations will be backfilled with rock, overburden, drill cuttings, wood chips and/or a mixture of these to prevent surface water ponding and ensure permafrost preservation.

The option to encapsulate impacted soils in place is also preserved should it be demonstrated that hydrocarbon risk is minimal and/or other remediation methods are ineffective or inappropriate for a given area.

The Nunavut Environmental Guidelines, Industrial land use, coarse-grained soils (Government of Nunavut, 2009) will be used for determining if soil remediation is required.

3.1.11 Drainage Control

Rock pads will be regraded to blend into the original terrain and prevent permanent ponding of water after the structures have been removed and the area has been cleared of all debris. In the summer prior to regrading, the areas should be staked in the field to be easily identified during the winter reclamation work.

No new disturbance will be created during this regrading effort. Any remaining depressions which cannot be re-graded will be backfilled with suitable fill. All tracks and trails on the tundra associated with the existing Roberts Bay facilities will be ripped and/or scarified to promote natural revegetation, reduce erosion potential, and ensure the restoration of natural drainage pathways. Where there is sufficient soil substrate to support vegetation, the area will be revegetated as appropriate.

3.2 Airstrip Area (AS)

3.2.1 Salvage

Reusable equipment and supplies will be salvaged from the airstrip prior to demolition and prepared for shipping off site to a third party destination or point of sale. This may include airstrip lighting, approach lighting, generator, communication equipment, mobile equipment, etc.

3.2.2 Demolition

Structures on the North Apron and the Explosives Mixing Facility will be demolished and non-hazardous demolition waste will be disposed of as detailed in Section 3.1.8. All hazardous waste will be collected and disposed of as detailed in Section 3.1.10.

3.2.3 Drainage Control

The surface of the airstrip, aprons, and temporary explosive mixing facility pad and access road will be regraded to ensure positive drainage.

3.3 Reagent Pads Area (RP)

3.3.1 Reagent Pads

Reusable vehicles, equipment, and supplies will be salvaged from both the Upper and Lower Reagent Pads and shipped off site to a third party destination or point of sale. Unusable items will be disposed of as appropriate for non-hazardous or hazardous waste, as detailed in sections 3.1.8 and 3.1.10. All empty containers will be used for shipping materials and waste off site.

The surface of the pads will be regraded to ensure positive drainage.

3.3.2 Ammonium Nitrate (AN) Storage Area

All Ammonium Nitrate storage containers will be shipped off site to a third party destination or point of sale. The HDPE liner will be removed, sectioned, and disposed of as detailed in Section 3.1.8. The containment berms will be levelled and the area regraded to ensure positive drainage.

3.3.3 Westarc and Geotech Drilling Shops

The tent buildings will be demolished and the waste will be disposed of as appropriate. All materials and equipment will be removed and the area graded for positive drainage. The footprint of the shops and the immediate vicinity will be tested for contaminants and appropriate actions will be taken based on the test results.

3.4 Landfarm and Burn Pan Area (WM)

The general area of the waste management area will be regraded to ensure positive drainage. The core boxes stored on the south end of the pad will remain in place.

3.4.1 Land Farm

The solid waste contained within the Land Farm ponds will be tested for contaminants. If it exceeds the appropriate remediation criteria, it will be loaded in megabags and shipped off site for disposal in appropriate disposal facility. The contaminated water contained within the ponds will be tested, treated as appropriate, and discharged when water quality criteria are met.

The liner of the Land Farm will be removed, cleaned, cut in pieces and disposed of as non-hazardous waste.

The protective cover layer will be removed, tested, and if it meets the appropriate reclamation criteria will be used as backfill. If the testing program finds that the cover material is contaminated, it will be placed in megabags and shipped to an offsite facility licensed to dispose of such contaminants.

Containment berm will be levelled and the area regraded to ensure positive drainage.

3.4.2 Batch Plant Pad

All waste remaining on the batch plant pad will be collected and placed in appropriate containers for disposal, as detailed in sections 3.1.8 and 3.1.9. The pad area will be regraded to ensure positive drainage.

3.4.3 Burn Pan

The burn pan will be demolished and the debris disposed of as non-hazardous waste. The residual ashes will be placed in appropriate sealed containers and disposed of as appropriate. The area will be regraded to prevent permanent ponding.

3.5 Quarry #2 Area (Q2)

All vertical faces in the quarry will be scaled. Safety berms will be left in place but breached for drainage. The area will be inspected by a qualified inspector, to ensure no loaded holes remain on site.

3.5.1 Crusher

The crusher will be dismantled and prepared for shipping off site. The area will be cleaned of all debris and waste. Waste will be disposed of as described in Sections 3.1.8 and 3.1.9.

3.5.2 Overburden Dump

The side slopes of the overburden dump will be re-graded to 3H:1V and contoured for drainage control. Erosion protection measures will be installed as appropriate. The dump will be revegetated. The culvert in the dump access road will be removed, and a swale established to restore natural drainage.

The Sedimentation Berm downstream of the dump will be breached to restore the natural drainage path.

3.5.3 Treated Sewage Discharge Areas

Areas where vegetation has died and permafrost degraded at the Sewage Treatment Plant (STP) discharge point will be backfilled with a suitable fill material to prevent permanent ponding. Areas of minor some vegetation has died will be revegetated.

3.6 Doris Camp Area (DC)

3.6.1 Salvage

Reusable equipment and supplies will be salvaged from the camp buildings and facilities prior to demolition and prepared for shipping off site to a third party destination or point of sale.

3.6.3 Demolition

All utilities will be dismantled and the structures emptied prior to demolition. Non-hazardous and hazardous waste will be segregated as discussed in Section 3.1.9. Tanks used for heating fuel storage will be drained, removed, and temporarily placed within the lined area of the tank farm. If possible and/or if needed, furniture, utilities, and structures will be salvaged. Where possible salvageable structures will be moved intact, or they will be carefully dismantled and catalogued for re-assembly. Unusable or unwanted buildings will be demolished. The resulting waste material will be segregated into burnable and non-burnable waste and disposed of as described in Section 3.1.8. For the purposes of cost estimating none of these items are assumed to have salvage value. The following structures and facilities will be demolished

- Accommodation Complex,
- Permanent Power Generator,
- Backup Power Generator,
- Sewage Treatment Plant,
- Fire Water Tank
- Muster Station,
- Warehouse / Core Shack,
- Office and Mine Dry Complex,
- Underground Wash Bay,
- Swick Shop,
- Water Intake Structure and Pumping Facility,
- Underground Support Mechanical Shop, and
- Helicopter Support Facilities.

3.6.4 Tank Farm

The Doris Tank Farm will be left intact as part of the major site infrastructure.

3.6.5 Water Management Structures

The water management structures are as follows:

- Sedimentation Pond,
- Pollution Control Pons,
- Temporary Pond,
- Sumps #1 & #2, and
- Diversion Berm.

The ponds will be breached to be free draining. The sumps will be decommissioned and backfilled. The liner of the Sedimentation Pond and Temporary Pond will be entirely removed and disposed of as non-hazardous waste. The liner in the downstream berm of the Pollution Control Pond will be left in place outside of the breach. The waste rock used for the construction of the Temporary pond will be consolidated within the waste rock pile on Pad I.

The Doris Diversion Berm will be left in place and reshaped to blend in with the natural topography. Removal or breaching it would increase the volume of water that could potentially be ponding upstream of the Ore Pad. The Diversion Berm was designed for free drainage, and removing the culvert at the west end would not require it to be maintained.

To eliminate the risk of water ponding upstream of the ore pad (Pad Q), a trench will be cut through the rock fill of the pads to convey runoff onto the tundra south of the camp pads. The proposed alignment is shown in Figures 6 and 7.

3.6.6 Portal and Underground Works

All underground utilities and installations will be removed and disposed of as appropriate. The entrance of the underground portal will be sealed with a 15m thick rockfill plug, according to regulations. The pad in front of the portal will be regraded to promote positive drainage and prevent permanent ponding.

3.6.7 Pipelines

The heat traced pipelines for potable water and sewage discharge will be sectioned and disposed of as non-hazardous waste. The heat tracing cables and controllers will be removed and disposed of as appropriate.

3.6.8 Waste Rock and Ore Piles

Part of the waste rock will be used for the 15 m thick backfill for sealing the underground workings. Waste rock and ore management options will be assessed for the remaining material. One option is consolidating, contouring and covering the piles with an impermeable liner and a 0.3 m thick protective layer of crushed rock. Other options include moving the piles to Tail Lake for sub-aqueous disposal, or leaving the waste rock and ore in place. Additional options may also be considered. All above ground storage options are subject to approval. A design and/or description of the final waste rock and ore disposal or storage alternative will be included in the application for approval.

3.7 North Dam Area (ND)

3.7.1 Frozen Core Dam

The Frozen Core Dam will be breached. The water level in Tail Lake will be lowered to (or below) the natural water level to facilitate the dam breach. The breach will be 20 m wide, cut to the original ground elevation (of 28.3 masl) with 4H:1V side slopes. The cut in the dam will be clad in rip-rap for erosion protection. All instrumentation will be removed and salvaged or disposed of, as appropriate. The thermosyphon radiators will be dismantled, and the support superstructure cut and removed. The thermosyphon evaporator pipes and the ad-freeze piles will be left in place.

3.7.2 Frozen Core Plant

The plant pad will be graded to ensure positive drainage.

3.7.3 Tail Lake Access Road

The road surface will be crowned to ensure positive drainage.

3.8 Vent Raise Area (VR)

3.8.1 Salvage

All reusable equipment will be salvaged and prepared for shipping to a point of sale off site. For the purpose of the cost estimate, no salvage value is credited to the equipment.

3.8.2 Demolition

All structures will be demolished and the waste will be disposed of as appropriate, according to Section 3.1.8.

3.8.3 Vent Raise

Ducts, pipes, and cables entering the vent raise will be removed. A 0.5 m thick reinforced concrete plug will be installed to seal the vent raise.

3.8.4 Fuel Storage Area

The EnviroTank will be decommissioned, drained, and hauled to Roberts Bay for shipping off site. The liner of the secondary containment area will be cleaned, removed, cut into pieces, and disposed of as non-hazardous waste. The area will be backfilled and regraded to prevent permanent ponding.

3.9 Doris Windy Road Area (DW)

3.9.1 Doris Windy All Weather Road (AWR)

The AWR will be left in place. The bridges and arch culvert will be removed.

3.9.2 Rock Quarries

Other than the first 1.5 km, the AWR was built with rock sourced from three quarries along the road: Quarry A, Quarry B, and Quarry D. The quarries will be decommissioned and reclaimed. All vertical faces in the quarries will be scaled. Safety berms will be left in place. The area of each quarry will be inspected by a qualified inspector, to ensure no loaded holes are remaining on site.

3.9.3 Explosives Storage Facility (Quarry A)

The explosives magazines will be removed and hauled to Roberts Bay for shipping off site. The access gate will be demolished, and the pads will be graded for positive drainage.

3.10 Secondary Road Area (SR)

The bridge over Doris Creek will be removed, as well as the pipe culvert east of the bridge. The crest of the road will be crowned for positive drainage.

3.11 Doris Mountain Communication Towers (DM)

The Doris Mountain communication towers will be decommissioned, dismantled, and hauled to Roberts Bay for shipping off site. The reusable communication equipment will be dismantled and salvaged. All other waste will be disposed of as appropriate. The concrete foundation blocks and the guy wire anchor blocks will be left in place.

4 Post Closure Monitoring and Maintenance

Monitoring to confirm that the closure objectives are met includes the following:

- The site should be visually inspected by a Professional Engineer annually for three consecutive years to ensure that permafrost degradation areas have stabilized.
- The ore and waste rock covers should be regularly inspected by a qualified inspector to ensure the physical integrity of the cover is maintained.
- The site should be inspected by an Arctic vegetation specialist to confirm suitability of the re-vegetation efforts. Inspections should be completed at the following intervals, unless otherwise recommended by the vegetation expert: Year 1, Year 3, Year 7 and Year 10 post closure.
- Annual seep sampling program should be continued to detect any changes in the leachate chemistry downstream of the remediated areas.

Post closure monitoring will be conducted every two years for ten years. Maintenance will be performed on areas that monitoring identifies as needing repairs.

5 Schedule

Closure of the Doris North site will occur during the care and maintenance period or upon closure of the entire Hope Bay Project. Removal of waste from site, and equipment demobilization will be completed after decommissioning. Closure activities could be completed in one construction season.

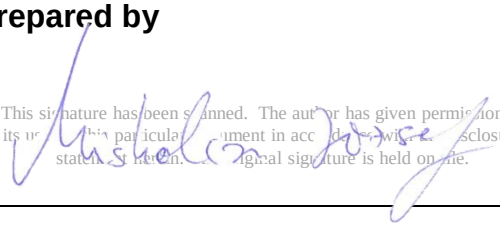
6 Cost Estimate and Scheduling

Appendix C provides details of the estimated costs for closure of Doris Camp. The estimated closure cost for Doris North site is $7.5 million in undiscounted 2012 Canadian dollars.

A contingency of 20% of the direct costs (excluding waste shipping and disposal fees) is also included. The purpose of the contingency is to account for costs that are uncertain given the current level of information. These items may include hydrocarbon impacted soil remediation and material quantity estimates.

This report, *"Doris North Closure and Reclamation Plan, Doris North Project, Hope Bay, Nunavut"* has been prepared by SRK Consulting (Canada) Inc.

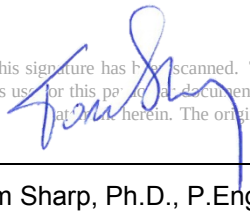
Prepared by



Iozsef Miskolczi, EIT

Consultant

Reviewed by



Tom Sharp, Ph.D., P.Eng. (NU)

Principal Consultant

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

"This report and the opinions and conclusions contained herein ("Report") contains the expression of the professional opinion of SRK Consulting (Canada) Inc. ("SRK") as to the matters set out herein, subject to the terms and conditions of the agreement dated [HBML.BOC-CM.PSA.003, September 30, 2008] (the "Agreement") between Consultant and Hope Bay Mining Ltd. ("Hope Bay Mining"), the methodology, procedures and sampling techniques used, SRK's assumptions, and the circumstances and constraints under which Services under the Agreement were performed by SRK. This Report is written solely for the purpose stated in the Agreement, and for the sole and exclusive benefit of Hope Bay Mining, whose remedies are limited to those set out in the Agreement. This Report is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. In addition, this report is based in part on information not within the control of SRK. Accordingly, use of such report shall be at the user's sole risk. Such use by users other than Hope Bay Mining and its corporate affiliates shall constitute a release and agreement to defend and indemnify SRK from and against any liability (including but not limited to liability for special, indirect or consequential damages) in connection with such use. Such release from and indemnification against liability shall apply in contract, tort (including negligence of SRK whether active, passive, joint or concurrent), strict liability, or other theory of legal liability; provided, however, such release, limitation and indemnity provisions shall be effective to, and only to, the maximum extent, scope or amount allowable by law."

7 References

AMEC 2005. *Preliminary Mine Closure and Reclamation Plan Doris North Project - Hope Bay Belt Nunavut, Canada*. Report prepared for Miramar Hope Bay Limited, AMEC Project No. VM00259A, October 2005.

Government of Nunavut. 2009. Environmental Guideline for Contaminated Site Remediation. Department of Sustainable Development Environmental Protection Service.

Miramar 2005. *Final Environmental Impact Statement Doris North Project, Nunavut, Canada*. Prepared by Miramar Hope Bay Limited, October 2005.

SRK Consulting (Canada) Inc. 2007.*Geochemical Characterization of Quarry Materials, Doris North Project, Hope Bay, Nunavut, Canada (Revised March 2007)*. Report prepared for Miramar Hope Bay Limited. SRK Project Number: 1CM014.008.241. March 2007.

SRK Consulting (Canada) Inc. 2012. *Interim Water Management Plan, Doris North Project, Hope Bay, Nunavut, Canada*. Report prepared for Hope Bay Mining Ltd. Project Number: 1CH008.047. November 2011.

Figures

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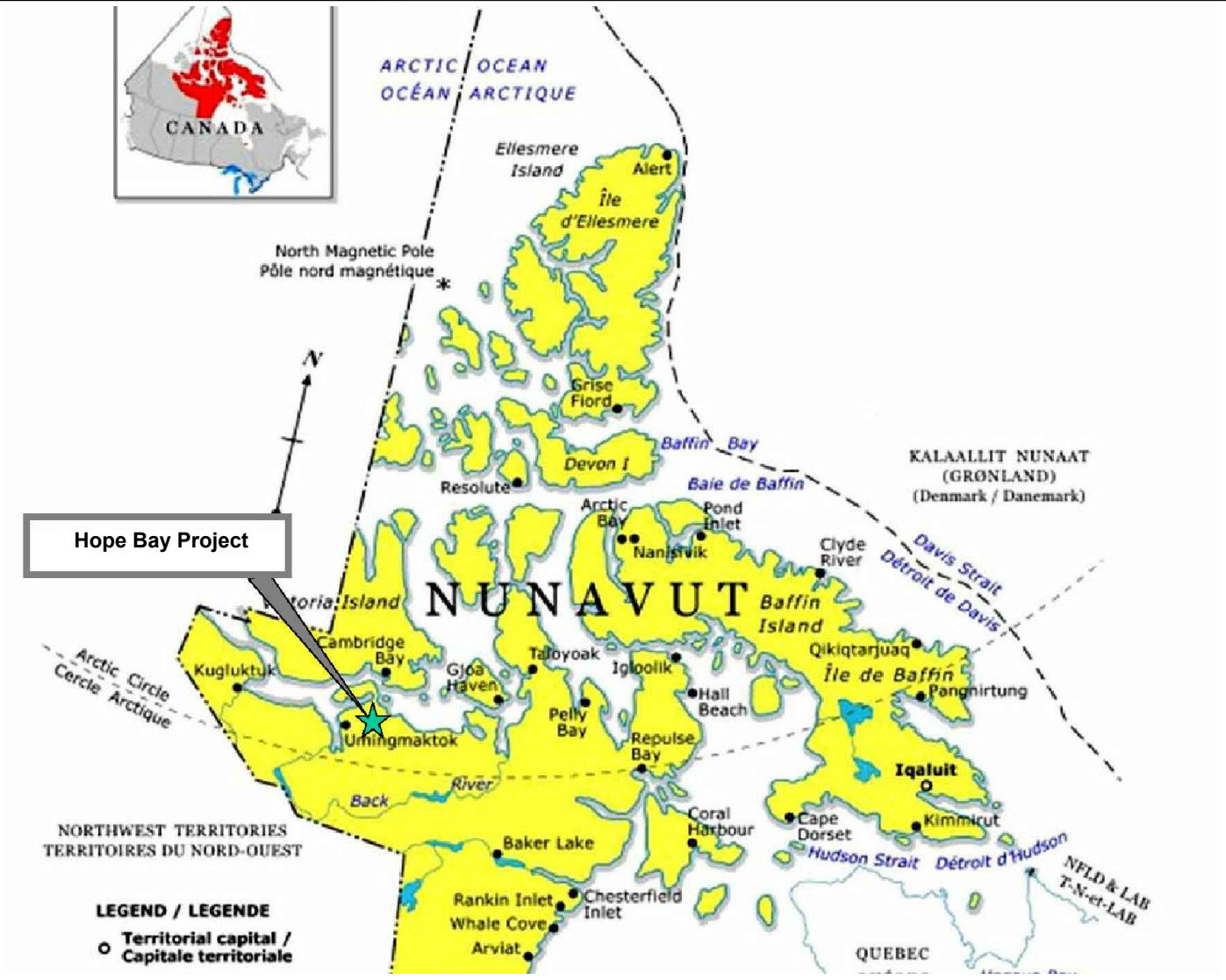
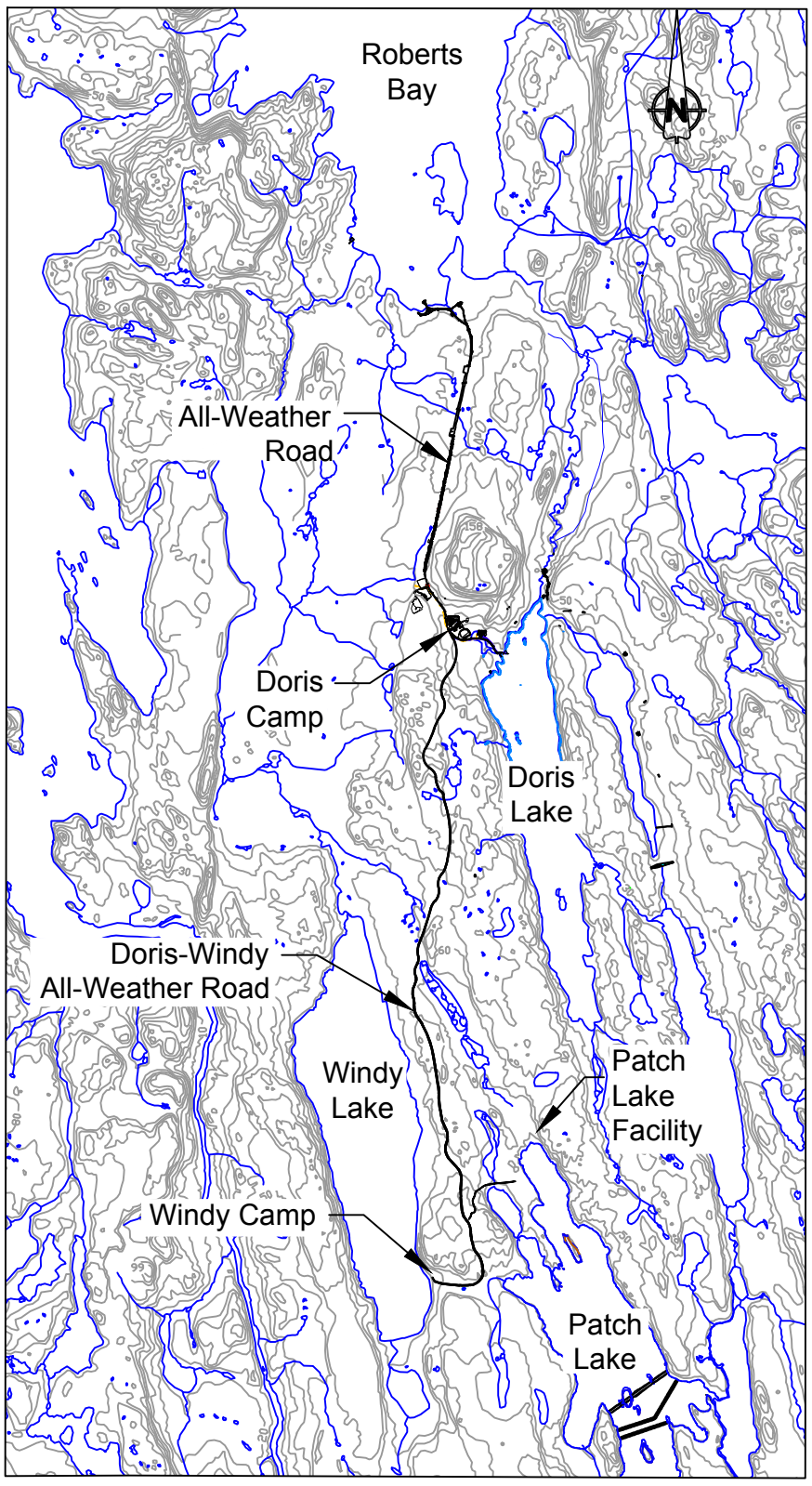


LOCATION MAP



GENERAL SITE LAYOUT

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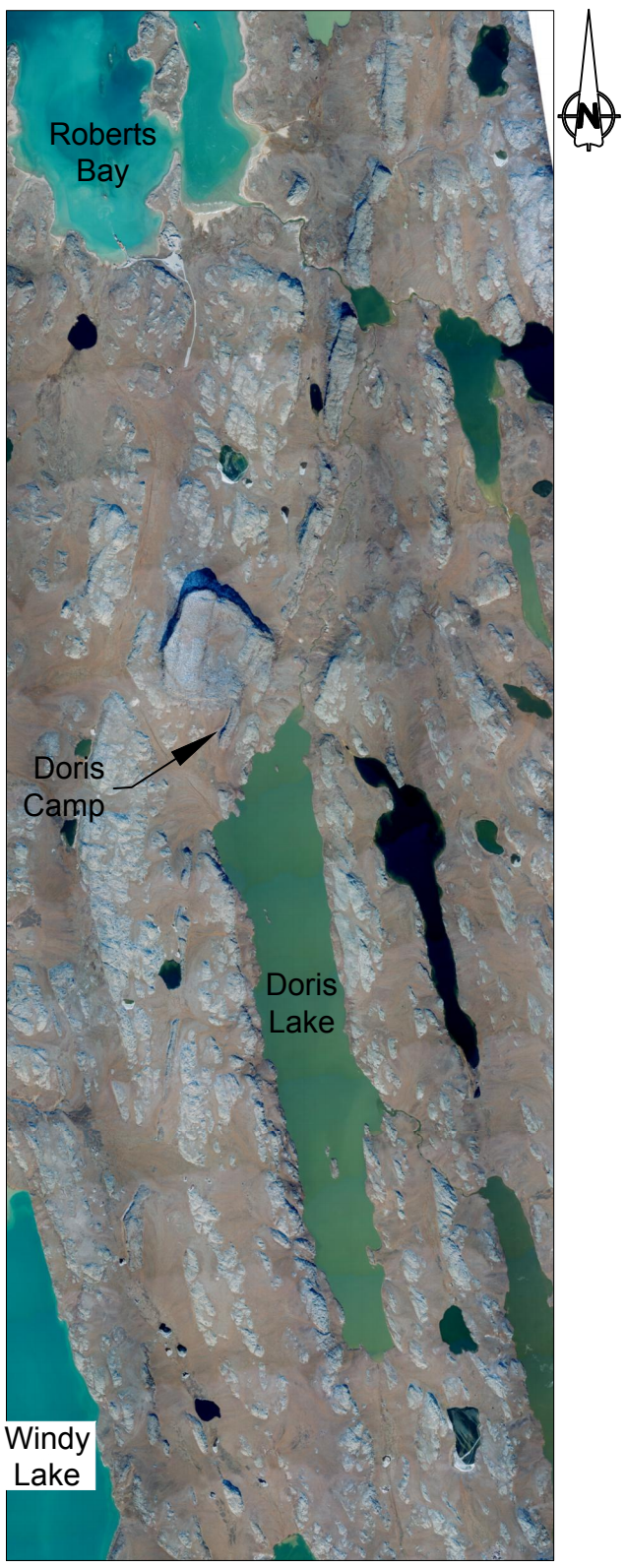
Scale in Metres



DETAIL A

Not To Scale

Topographic Information Supplied by BHP World Minerals Inc.
National Topographic Series (NTS) Maps
North American Datum (NAD) 1927

srk consulting

NEWMONT NORTH AMERICA

SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: Figure1_1CH008.065-400_SA_20120706.dwg

HOPE BAY MINING LTD.

DORIS NORTH PROJECT

Doris North Closure Plan
Location Map

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	1

Roberts Bay

Roberts Bay

See Airstrip Inset

Airstrip

See Upper & Lower Reagent Inset

DM - 001

See North Dam Inset

Reagent Pad

Doris Camp

Quarry A Inset

Doris Lake

Tail Lake

DW - 003

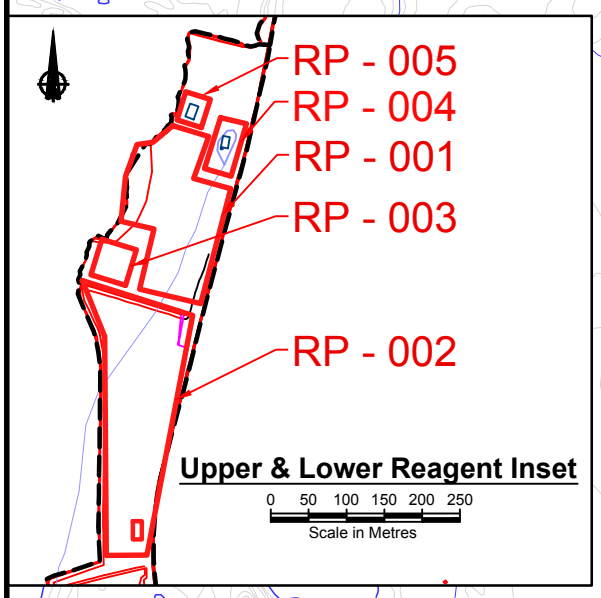
DW - 001

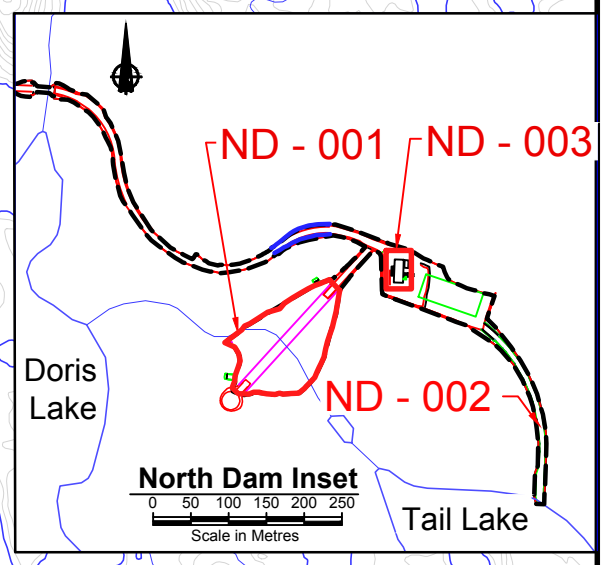
Windy Lake

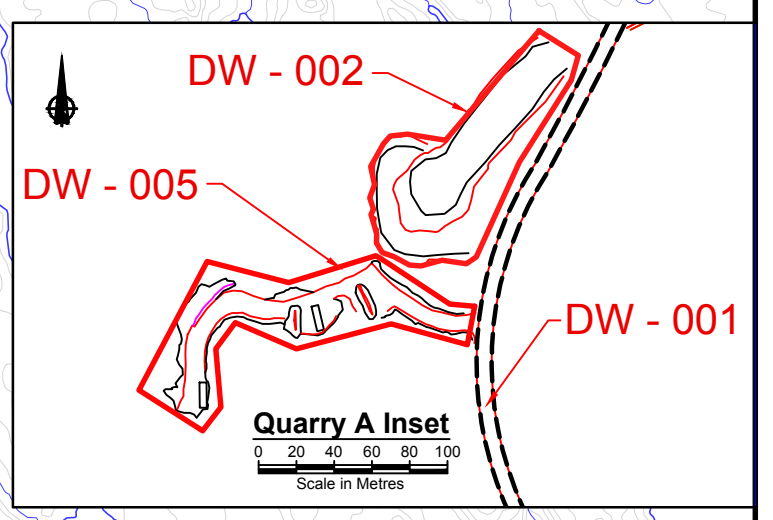
DW - 004

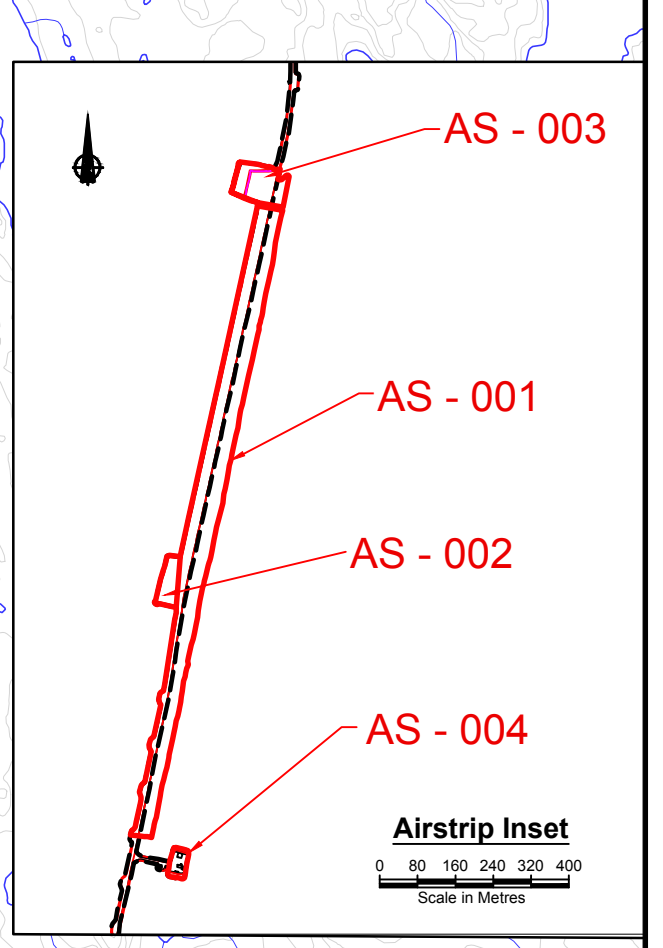
WINDY CAMP

Patch Lake









Work Area	Facility	WBS Code
Reagent Pads	Equipment Laydown	RP-001
	Materials Laydown	RP-002
	Ammonium Nitrate Storage Area	RP-003
	Geotech Drill Shop	RP-004
	Westarc Drill Shop	RP-005
Doris Windy Road	AWR	DW-001
	Quarry A	DW-002
	Quarry B	DW-003
	Quarry D	DW-004
	Explosives Storage Facility	DW-005
Doris Mountain	Communications Towers	DM-001
Airstrip	Airstrip	AS-001
	South Apron	AS-002
	North Apron	AS-003
	Explosives Mixing Facility	AS-004
North Dam	Frozen Core Dam	ND-001
	Tail Lake Access Road	ND-002
	Frozen Core Plant	ND-003

OVERALL SITE PLAN

0 200 400 600 800 1000

Scale in Metres

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SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: 1CH008.065_Doris_N_Closure_Plan.dwg

NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

DORIS NORTH PROJECT

Doris North Closure Plan
Doris North
Work Breakdown Structure

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	2

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Roberts Bay

Roberts Bay

See Airstrip Inset

Airstrip

See Upper & Lower Reagent Inset

See North Dam Inset

Reagent Pad

Doris Camp

Tail Lake

Quarry A Inset

Doris Lake

Windy Lake

WINDY CAMP

Patch Lake

Upper & Lower Reagent Inset
0 50 100 150 200 250
Scale in Metres

Doris Lake

North Dam Inset
0 50 100 150 200 250
Scale in Metres

Tail Lake

Quarry A Inset
0 20 40 60 80 100
Scale in Metres

Airstrip Inset
0 80 160 240 320 400
Scale in Metres

OVERALL SITE PLAN
0 200 400 600 800 1000
Scale in Metres

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SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: 1CH008.065_Doris_N_Closure_Plan.dwg

NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

DORIS NORTH PROJECT

Doris North Closure Plan
Doris North Area
Terrain Configuration before Construction

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	3

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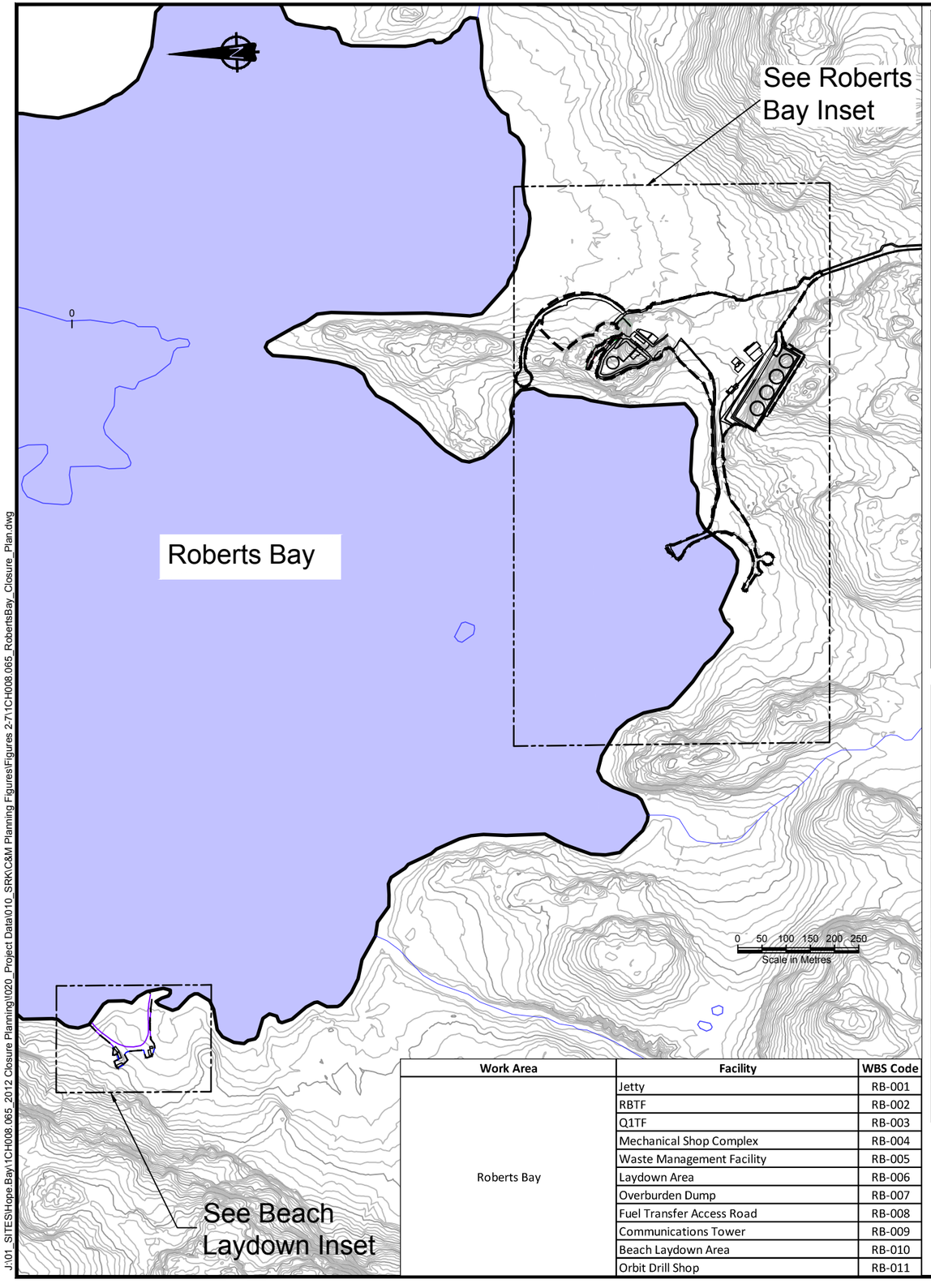

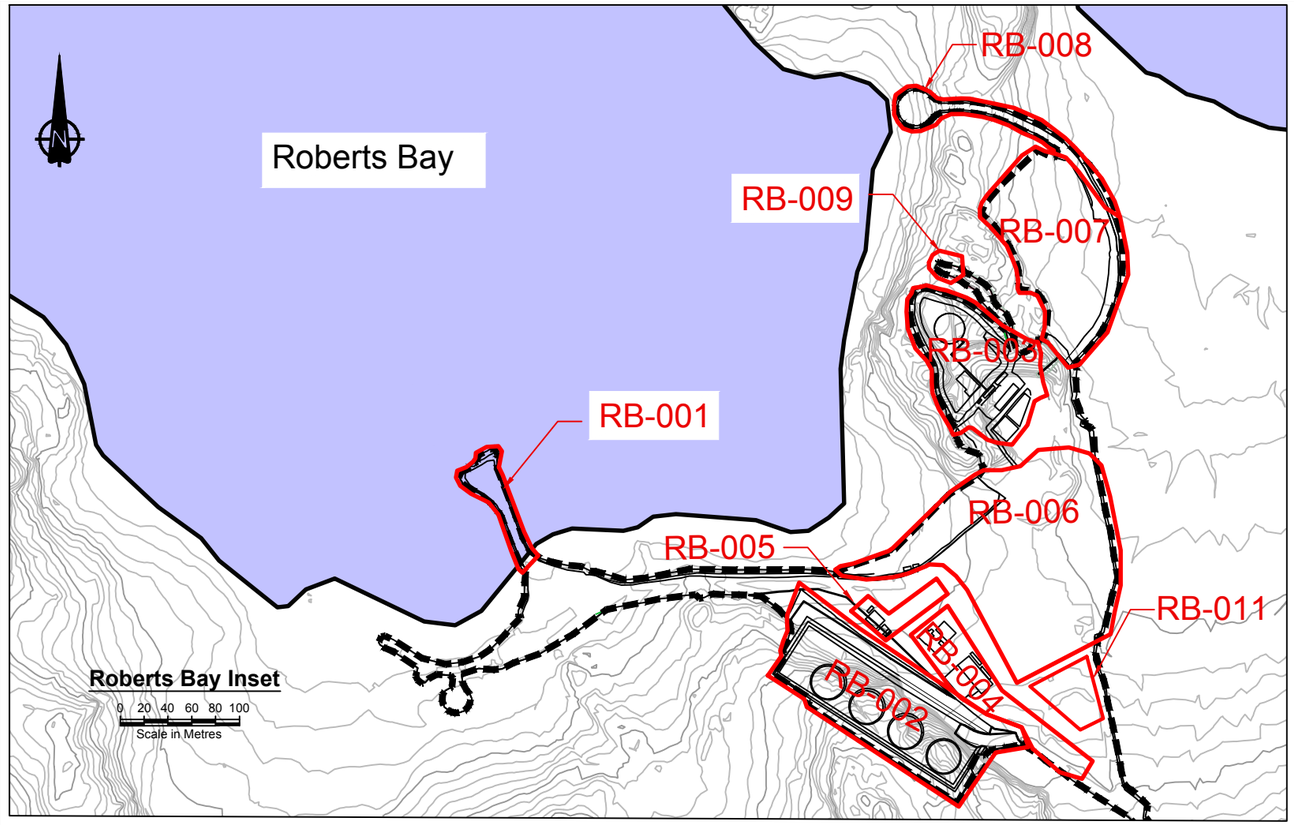

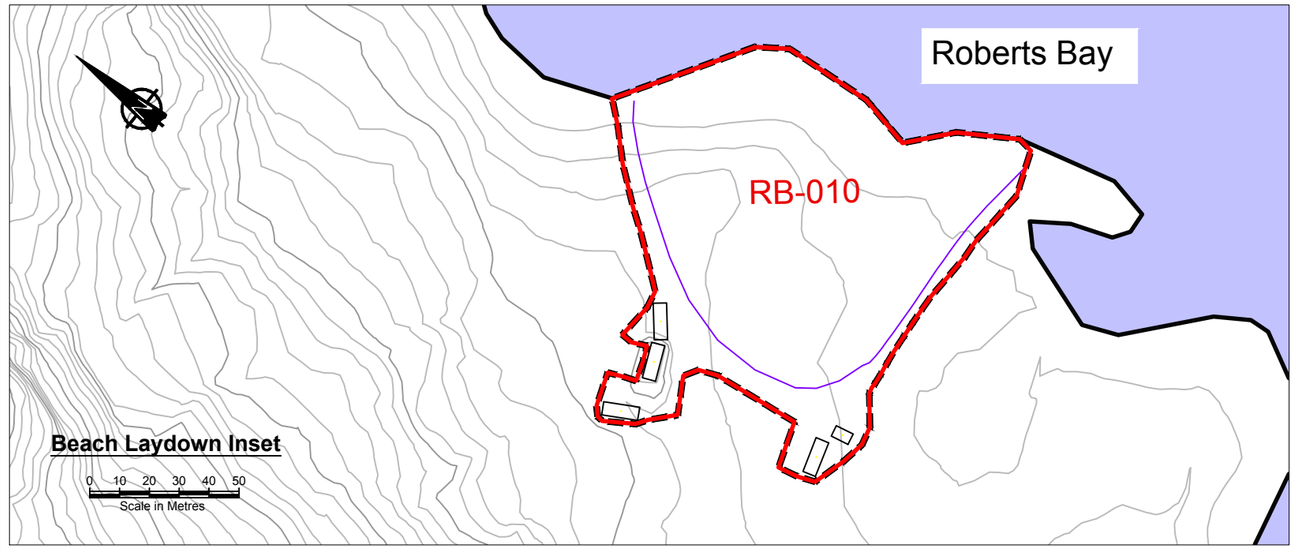

Work Area	Facility	WBS Code
Roberts Bay	Jetty	RB-001
	RBTF	RB-002
	Q1TF	RB-003
	Mechanical Shop Complex	RB-004
	Waste Management Facility	RB-005
	Laydown Area	RB-006
	Overburden Dump	RB-007
	Fuel Transfer Access Road	RB-008
	Communications Tower	RB-009
	Beach Laydown Area	RB-010
	Orbit Drill Shop	RB-011

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SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: 1CH008.065_RobertsBay_Closure_Plan.dwg

NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

DORIS NORTH PROJECT

Doris North Closure Plan
Roberts Bay Plan
Work Breakdown Structure

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	4

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See Roberts Bay Inset

Roberts Bay

0

0 50 100 150 200 250
Scale in Metres

See Beach Laydown Inset

Roberts Bay

Roberts Bay Inset

0 20 40 60 80 100
Scale in Metres

Roberts Bay

Beach Laydown Inset

0 10 20 30 40 50
Scale in Metres

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SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: 1CH008.065_RobertsBay_Closure_Plan.dwg

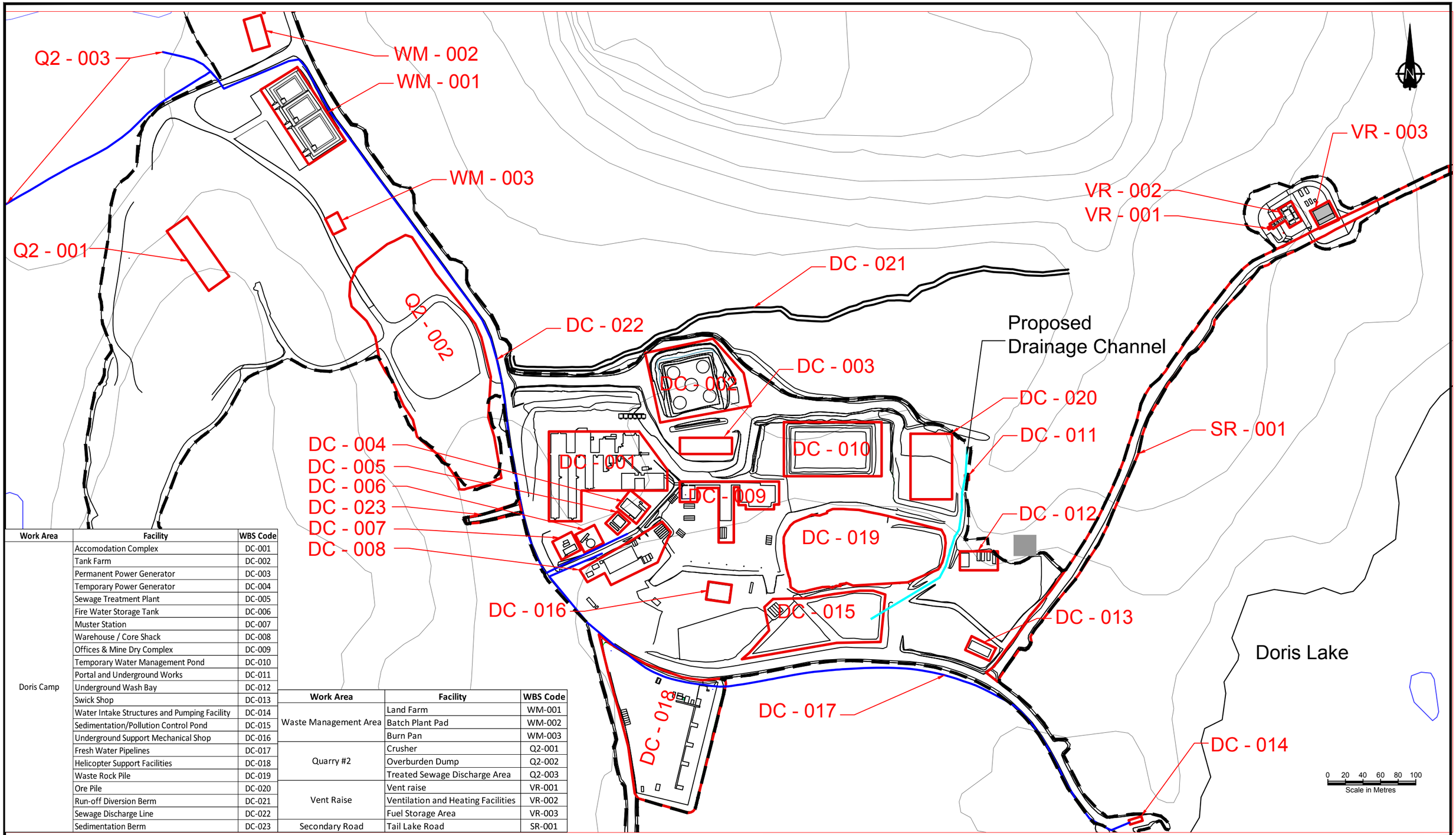
NEWMONT NORTH AMERICA

HOPE BAY MINING LTD.

DORIS NORTH PROJECT

Doris North Closure Plan
Roberts Bay Plan
Terrain Configuration before Construction

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	5



Work Area	Facility	WBS Code
Doris Camp	Accomodation Complex	DC-001
	Tank Farm	DC-002
	Permanent Power Generator	DC-003
	Temporary Power Generator	DC-004
	Sewage Treatment Plant	DC-005
	Fire Water Storage Tank	DC-006
	Muster Station	DC-007
	Warehouse / Core Shack	DC-008
	Offices & Mine Dry Complex	DC-009
	Temporary Water Management Pond	DC-010
	Portal and Underground Works	DC-011
	Underground Wash Bay	DC-012
	Swick Shop	DC-013
	Water Intake Structures and Pumping Facility	DC-014
	Sedimentation/Pollution Control Pond	DC-015
	Underground Support Mechanical Shop	DC-016
	Fresh Water Pipelines	DC-017
	Helicopter Support Facilities	DC-018
	Waste Rock Pile	DC-019
	Ore Pile	DC-020
	Run-off Diversion Berm	DC-021
	Sewage Discharge Line	DC-022
	Sedimentation Berm	DC-023

Work Area	Facility	WBS Code
Waste Management Area	Land Farm	WM-001
	Batch Plant Pad	WM-002
	Burn Pan	WM-003
Quarry #2	Crusher	Q2-001
	Overburden Dump	Q2-002
	Treated Sewage Discharge Area	Q2-003
Vent Raise	Vent raise	VR-001
	Ventilation and Heating Facilities	VR-002
	Fuel Storage Area	VR-003
Secondary Road	Tail Lake Road	SR-001

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FILE NAME: 1CH008.065_DorisCamp_Closure_Plan.dwg

NEWMONT NORTH AMERICA

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DORIS NORTH PROJECT

Doris North Closure Plan
Doris Camp
Work Breakdown Structure

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	6

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SRK JOB NO.: 1CH008.065 Task 200

FILE NAME: 1CH008.065_DorisCamp_Closure_Plan.dwg

NEWMONT NORTH AMERICA

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DORIS NORTH PROJECT

Doris North Closure Plan
Doris Camp
Terrain Configuration Before Construction

DATE:	APPROVED:	FIGURE:
July 6, 2012	IM	7

Appendix A
Miramar 2005 Doris North Closure Plan

Miramar
MINING CORPORATION

Preliminary Mine Closure and Reclamation Plan
Doris North Project – Hope Bay Belt
Nunavut, Canada

Prepared for:

Miramar Hope Bay Limited
North Vancouver, BC

October 2005

Miramar
MINING CORPORATION

Preliminary Mine Closure and Reclamation Plan
Doris North Project – Hope Bay Belt
Nunavut, Canada

Prepared for:

Miramar Hope Bay Limited
889 Harbourside Drive
North Vancouver, BC
V7P 3S1

Prepared by:

AMEC Earth & Environmental,
a division of AMEC Americas Limited
2227 Douglas Road
Burnaby, BC
V5C 5A9

amec

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN

DORIS NORTH PROJECT – HOPE BAY BELT
NUNAVUT, CANADA

Submitted to:

Miramar Hope Bay Limited
North Vancouver, BC

Prepared by:

AMEC Earth & Environmental,
a division of AMEC Americas Limited
Burnaby, BC

October 2005

VM00259A

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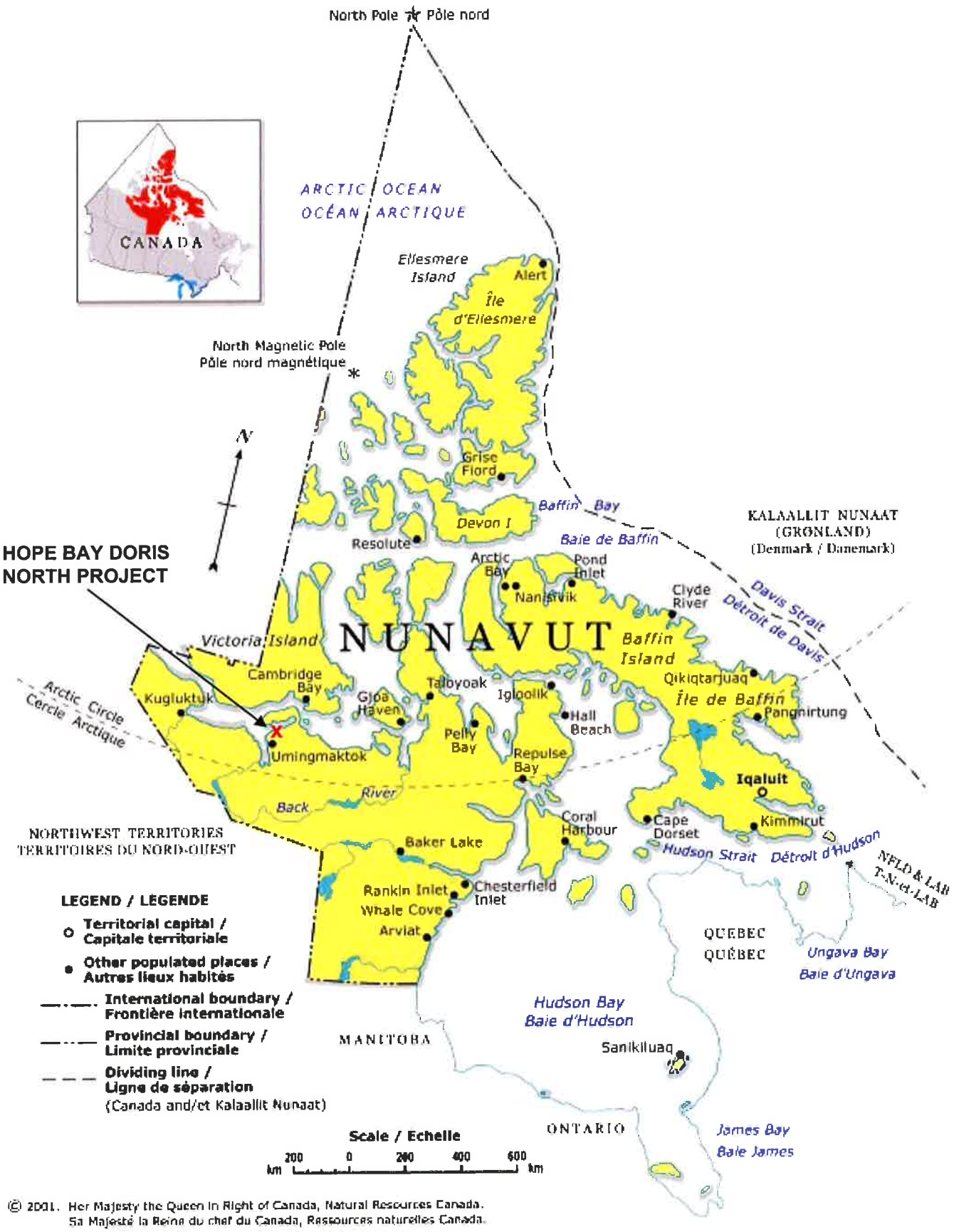
1.0 BACKGROUND

1.1 Scope

Miramar Hope Bay Limited (MHBL) owner and operator of the Doris North Project, is proposing to develop an underground gold mine at Doris Lake, Nunavut, located about 160 km southwest of Cambridge Bay. The centre of the Project is 160 km north of the Arctic Circle at latitude 67° 30' N and longitude 107° W (see Figure 1.1 and 1.2). The Project is currently under a Part 5 review by the Nunavut Impact Review Board (NIRB) as set out in the Nunavut Land Claim Agreement.

MHBL has prepared this Mine Closure and Reclamation Plan (Closure Plan) for inclusion in the Environmental Impact Statement (EIS) report to facilitate public review by NIRB. It should be noted that the Doris North Mine has not yet been constructed. This Closure and Reclamation Plan is intended to outline how this mine will be closed and reclaimed should construction proceed. This exercise is intended to ensure that issues associated with the effective closure and reclamation of the site are considered in sufficient detail at the earliest possible stage in the mine development process thereby influencing mine design to take into account environmental issues related to mine closure and reclamation.

The Closure Plan is considered to be a "living" document. It is anticipated that the Plan will undergo further revision over the next 3 years. It will continue to be updated and refined as the Doris North Project moves through the Water License permitting process, construction, commissioning, into operation and approaches final closure in 2010. The level of detail of closure and reclamation planning contained within the Plan will continue to increase with subsequent revisions. Those revisions will incorporate the lessons learnt at each phase of the mine development process. Moreover, the revisions will also reflect the input form the Kitikmeot Inuit Association as representative of the land owner (the Inuit), local communities, NTI and other stakeholders who have an interest in how the Doris North Project is ultimately reclaimed. This document provides a basis for continuing discussions with stakeholders regarding closure and reclamation that were initiated during the Environmental Assessment process.

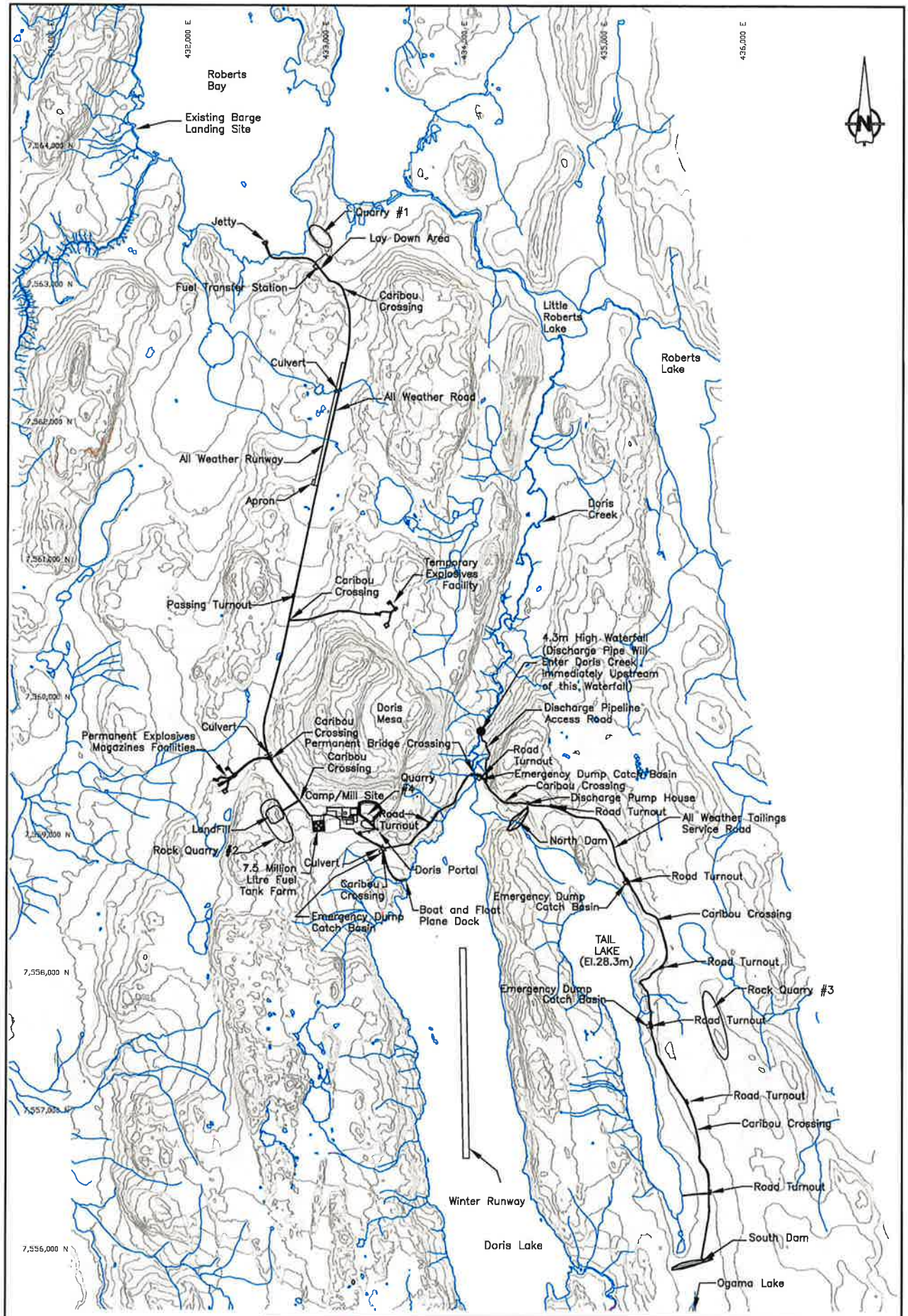


MIRAMAR HOPE BAY LIMITED

Hope Bay Doris North Project
Nunavut, Canada

Location Map

PROJECT	DATE:	APPROVED	FIGURE
2CH005.03	Dec 2002	EMR	1.1



SCALE 1 : 25,000

200 0 200 400 600 800 1000 METRES

Contour Interval = 1m
UTM Projection: NAD83 Zone 13

SRK Consulting
Engineers and Scientists

MIRAMAR HOPE BAY LIMITED

DORIS NORTH PROJECT
Preliminary Tailings Dam Design

Overall Site Infrastructure Layout

PROJECT NO.	DATE	APPROVED	FIGURE
1CM014.006	Sept. 2005	M.M.N.	1.2

1.2 Objectives

In 2002 the Department of Indian and Northern Affairs Canada (DIAND) published a "Mine Site Reclamation Policy for Nunavut" – "*A policy for the protection of the environment and disposition of liability relating to mine closures in Nunavut*". This policy sets out the principles and objectives that guide how DIAND will apply its authority in matters relating to the management of the environmental and liability issues relating to mine closure and reclamation in Nunavut. The policy attempts to tell the mining industry what is expected from project proponents in relation to reclamation planning in project design and what proponents can expect from regulatory decision makers, thereby "fixing the goal posts" and thereby reducing ad hoc, case-by-case interpretation. MHBL have incorporated, wherever possible, the principles and guidelines as set out in this policy into it's planning for the abandonment and restoration of the Doris North Project.

In June 2005, the Water Resources Division of Indian and Northern Affairs Canada issued "Draft *Mine Reclamation Guidelines for the Northwest Territories*". These guidelines are intended to update a 1990 NWT Water Board publication "Guidelines for Abandonment and Restoration Planning for Mining in the Northwest Territories". The revised guidelines have been released in draft form for comment. The guidelines are intended to assist proponents of mining projects in understanding the expectations of DIAND for closure and reclamation planning in the Northwest Territories and Nunavut. The guidelines acknowledge that there are also land owners and other agencies, such as First Nations, Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, Government of Nunavut and various co-management boards who play a role in the reclamation of lands and waters which are affected by mining activities.

The Mine Reclamation Policy for Nunavut was developed for the protection of the environment and the disposition of liability relating to mine closures. The policy states that all mines in Nunavut should be planned, operated, closed and decommissioned in an environmentally sound manner in accordance with current mine closure and reclamation practices.

These practices include:

- Submission of a mine reclamation plan to regulators and landowners, approval of the plan before the commencement of mine production, regular plan updates, and annual progress reclamation reports;
- Progressive mine reclamation, consistent with the approved plans and current mine reclamation practices;
- Financial assurance that fully covers the outstanding liabilities at any period of the mine operations; and
- Sites that are reclaimed and monitored at the financial expense of the mining company.

Mining is considered to be a temporary use of the land. At closure, the mine site and the land affected by the mining operations are to be reclaimed to achieve the following objectives (listed in order of priority):

- Protection of public health and safety through the use of safe and responsible reclamation practices;
- Reduction or elimination of environmental effects once the mine ceases operation;
- Re-establish conditions that permit the land to return to a similar pre-mining land use; and
- Reduce the need for long-term monitoring and maintenance by establishing physical and chemical stability of disturbed areas.

These broad reclamation objectives are drawn from the Draft Mine Reclamation Guidelines for the NWT that were prepared and issued for discussion by Indian and Northern Affairs Canada (INAC) in June of 2005. Miramar Hope Bay Limited (MHBL) has adopted these objectives as the basis for establishing site specific reclamation objectives for the Doris North Project.

The goal of reclamation is to prevent progressive degradation of a closed mining site, and to enhance natural recovery of areas affected by mining. Landscape reclamation is driven by the following specific objectives:

- To establish stable landforms;
- To protect the water resources in the local area;
- To facilitate natural recovery of areas affected by mining and the mining related activities at the project site; and
- To re-establish productive use of the land and water in the vicinity of the mine site for future generations in a manner that is consistent with the pre-development use of the land and water. In this case, productive use refers to use of the area by wildlife and for traditional activities as practised by the local communities and First Nations prior to the development of the mine.

This does not mean that the mine will not result in a permanent change to the landscape. Certain features of the mine, such as the quarries, will become permanent changes to the current landscape. Other features, such as roads, airstrips and building pads, will alter the landscape for many years (perhaps centuries) until natural forces obliterate or disguise their presence even after they are reclaimed. In other words, reclamation cannot totally remove the entire disturbance caused by development and operation of the mine.

Reclamation cannot return the site to a pristine condition. Reclamation can however ensure that these disturbances are not causing degradation of the surrounding water, air and land after the mine no longer continues to operate.

The establishment of stable landforms (primarily establishment of stable slopes and drainage pathways) through proper engineering practises will reduce the requirements for prolonged maintenance of the mine site after reclamation is complete. It is MHBL's intention to create a stable site where long term care and maintenance is reduced to the minimal practical extent. In other words, it is MHBL objective that reclamation be completed at the Doris North Project in a manner where future maintenance requirements are minimal, limited to periodic site visits, inspections and periodic maintenance of erosion damage and cleaning of drainage pathways. No long term maintenance presence on site is a key objective of reclamation planning for the Doris North Project. The objective is to get as close as possible to a "maintenance free" site through proper reclamation techniques, in other words to strive for a "walk away" reclaimed site. This means that drainage pathways, such as drainage swales and ditches, will be designed wherever possible and practical to be self-cleaning or immune to erosion problems that could otherwise require an ongoing maintenance requirement.

The targeted post-closure land use for the Doris North Project is wildlife habitat. This end land use is a reflection of the current use of the tundra area surrounding the Project site by wildlife (both resident and migratory). It is acknowledged that local communities and First Nations make use of the surrounding area for traditional activities and reclamation of the Doris North will target leaving a reclaimed site that is protective of the surrounding water, air and land to enable such traditional activities to continue.

It is also recognized that aesthetics (how a reclaimed site looks) is of concern to the Inuit, local communities, and other stakeholders. This concern is acknowledged by MHBL and aesthetics have been considered in the design of the specific reclamation activities to be applied at the Doris North Project site. The first and foremost approach in this respect is to leave a "clean" site. In other words, all remaining potentially hazardous materials (chemicals, reagents, hydrocarbons, explosives, etc.) will be removed from the site after mining ceases. These products will be transported south for use elsewhere (re-cycling) or for appropriate disposal in a licensed disposal facility. All non-hazardous materials such as buildings, demolition debris, steel, vehicles, general garbage and debris will be removed from the surface and disposed of in the appropriate non-hazardous landfill sites to be constructed within Quarry 2. This landfill will then be closed out and covered with a "clean" cap of quarried rock. It is expected that permafrost will become established within the closed out landfill in a short time frame after closure. Precipitation runoff will be directed away from the reclaimed landfill by a series of upslope berms. All building foundations and above ground concrete structures will be demolished and removed so that only rock fill pads remain as evidence of the existing use of the site as a mine. There will be visual changes to the pre-development landscape primarily associated with the remaining remnants of the airstrip, site roads and building and laydown rock fill pads. Roads will be reclaimed to allow restoration of natural drainage pathways in a low maintenance fashion (i.e., no culverts, bridges or berms) but the gravels used to construct the roads, airstrip and building pads will largely remain in place and be evident for many years before natural processes obliterate or disguise their presence.

The Tail Lake tailings impoundment will be reclaimed as a lake similar in appearance to the pre-development lake however the South Dam and remnants of the North Dam will remain although they will no longer hold back any water (i.e., they will no longer function as dams). Tail Lake will

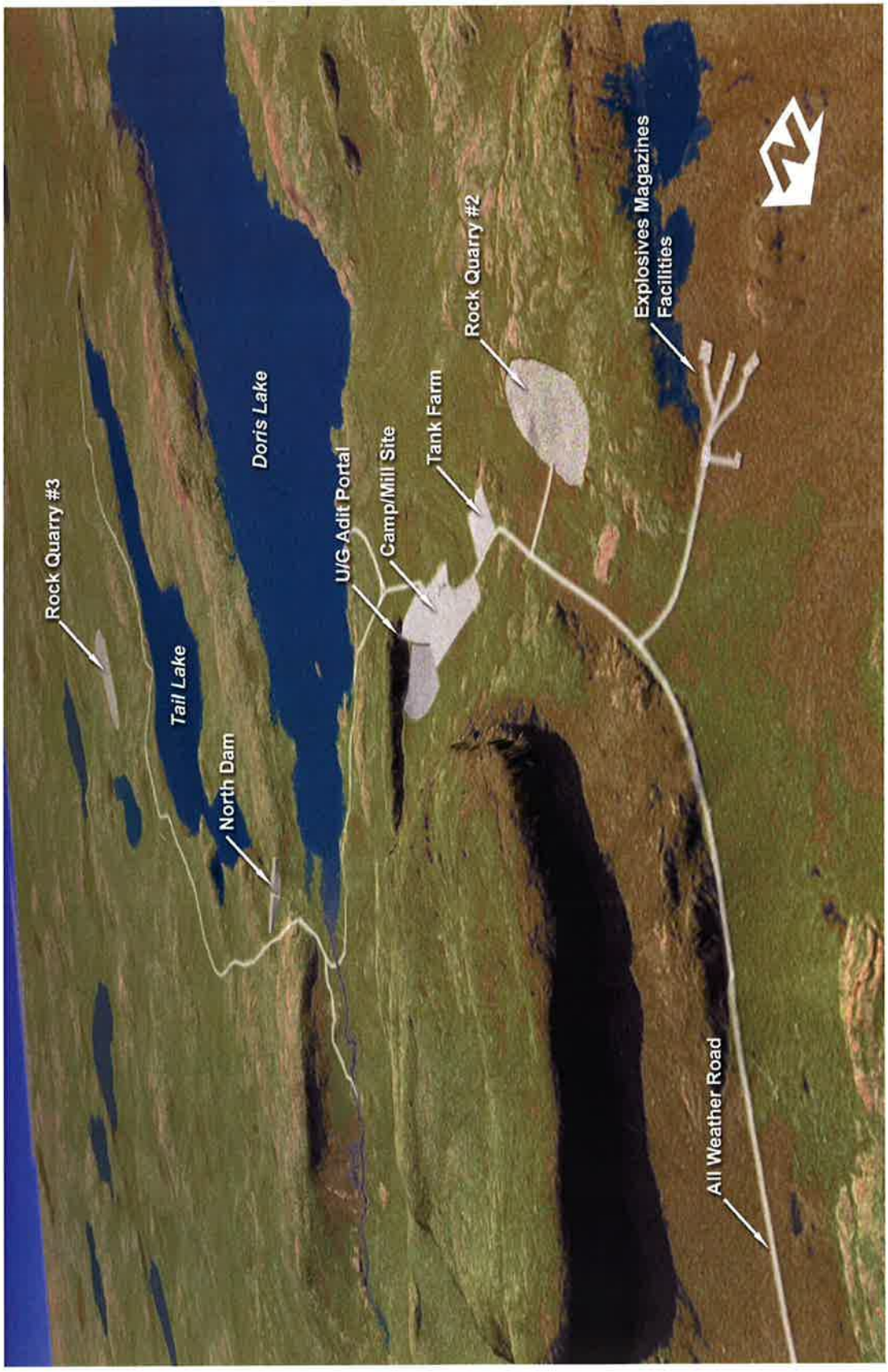
return to its predevelopment water level with drainage flowing back through the original outflow channel into Doris Lake. The impounded tailings solids will be under a 4 meter cover of water and thus not visible on surface. Water quality will return to levels close to background. The water will not be harmful to aquatic life, wildlife or human consumption after reclamation. The lake will ultimately be able to support a fish population but it will take many years for sediment to cover the stored tailings and for benthic organisms and vegetation to re-establish on the lake bottom, both pre-conditions for the re-establishment of a fish population within the lake.

Figures 1.3 through 1.7 show the expected condition of the Doris North Project once reclamation has been complete. The jetty has been removed. The buildings and all other man made equipment and materials have been removed. The Tail Lake north dam has been breached and the lake allowed to return to its pre-development water level.

Figure 1.3 shows the mill and camp site after the buildings have been removed. Tail Lake is shown in the background once the North Dam has been breached. Figure 1.4 is a similar view looking towards the North (towards Roberts Bay). Figure 1.5 shows Tail Lake once the North Dam has been breached and the lake has returned to the pre-development elevation of 28.3 m leaving a permanent 4 m water cover over top of the tailings.

Figure 1.6 is a view of the Doris North Project after reclamation looking south from Roberts Bay towards Doris Lake. The jetty has been partially removed and is no longer visible as the remaining rockfill is submerged under 0.3 to 0.5 m of water.

Figure 1.7 is a close up of the plant site area once the buildings and fuel tank farm have been removed. The temporary waste rock stockpile has all been returned into the underground mine and the mine opening (adit) has been sealed.



Doris North Mine Closure & Reclamation Plan
Nunavut, Canada

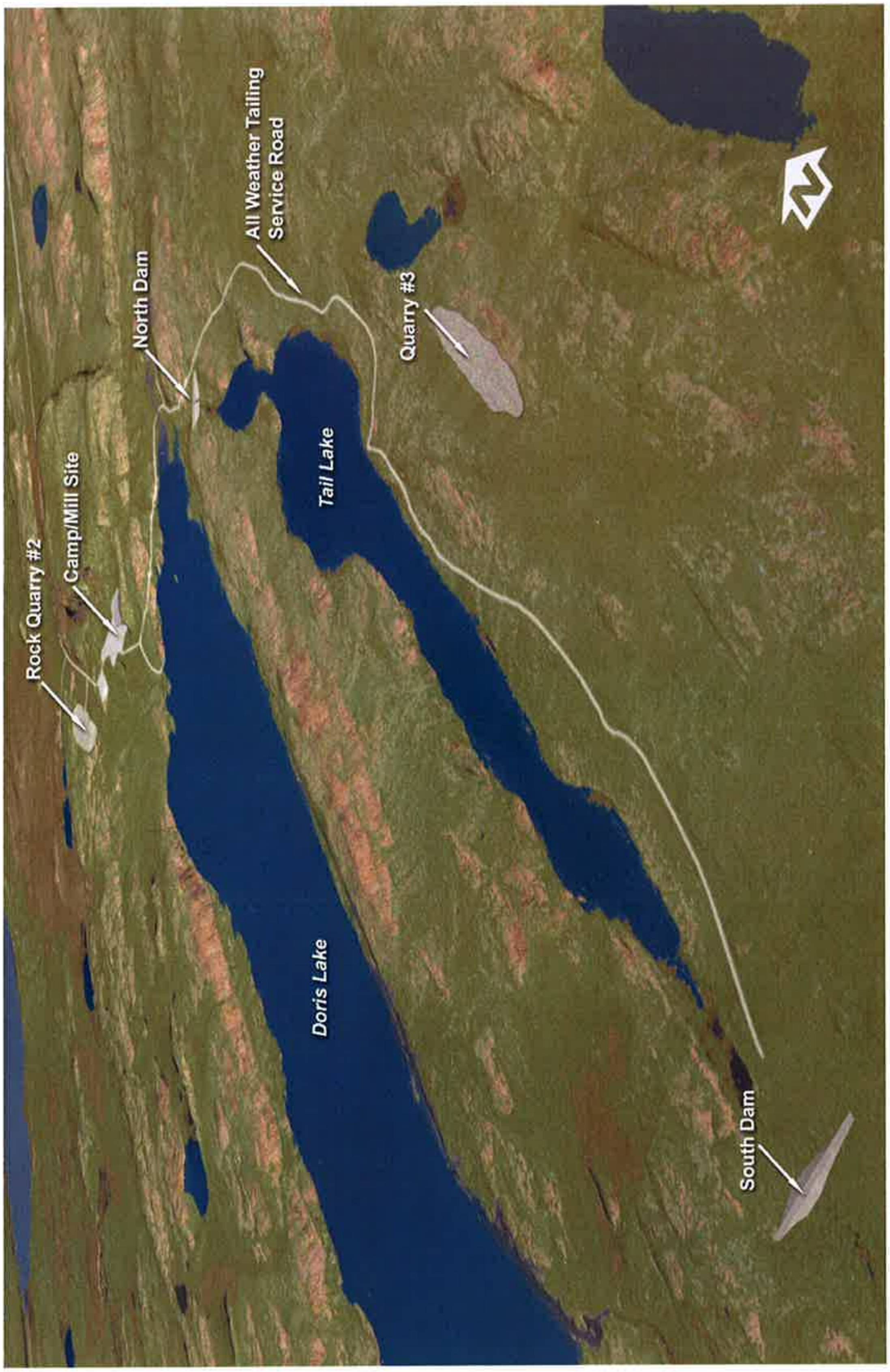
View of Doris North Project Site Showing Expected Post-Closure Site Condition

MIRAMAR HOPE BAY LIMITED

PROJECT:	DATE:	APRROVED:	FIGURE:
VM00259A	Oct 2005	LTC	**1.3**

Doris North Mine Closure & Reclamation Plan Nunavut, Canada			
View of Doris North Project Site Looking North After Reclamation			
PROJECT: VM00259A	DATE: Oct 2005	APRROVED: LTC	FIGURE: **1.4**

MIRAMAR HOPE BAY LIMITED



Doris North Mine Closure & Reclamation Plan
Nunavut, Canada

Tail Lake Looking North Showing Expected Post-Closure Condition

MIRAMAR HOPE BAY LIMITED

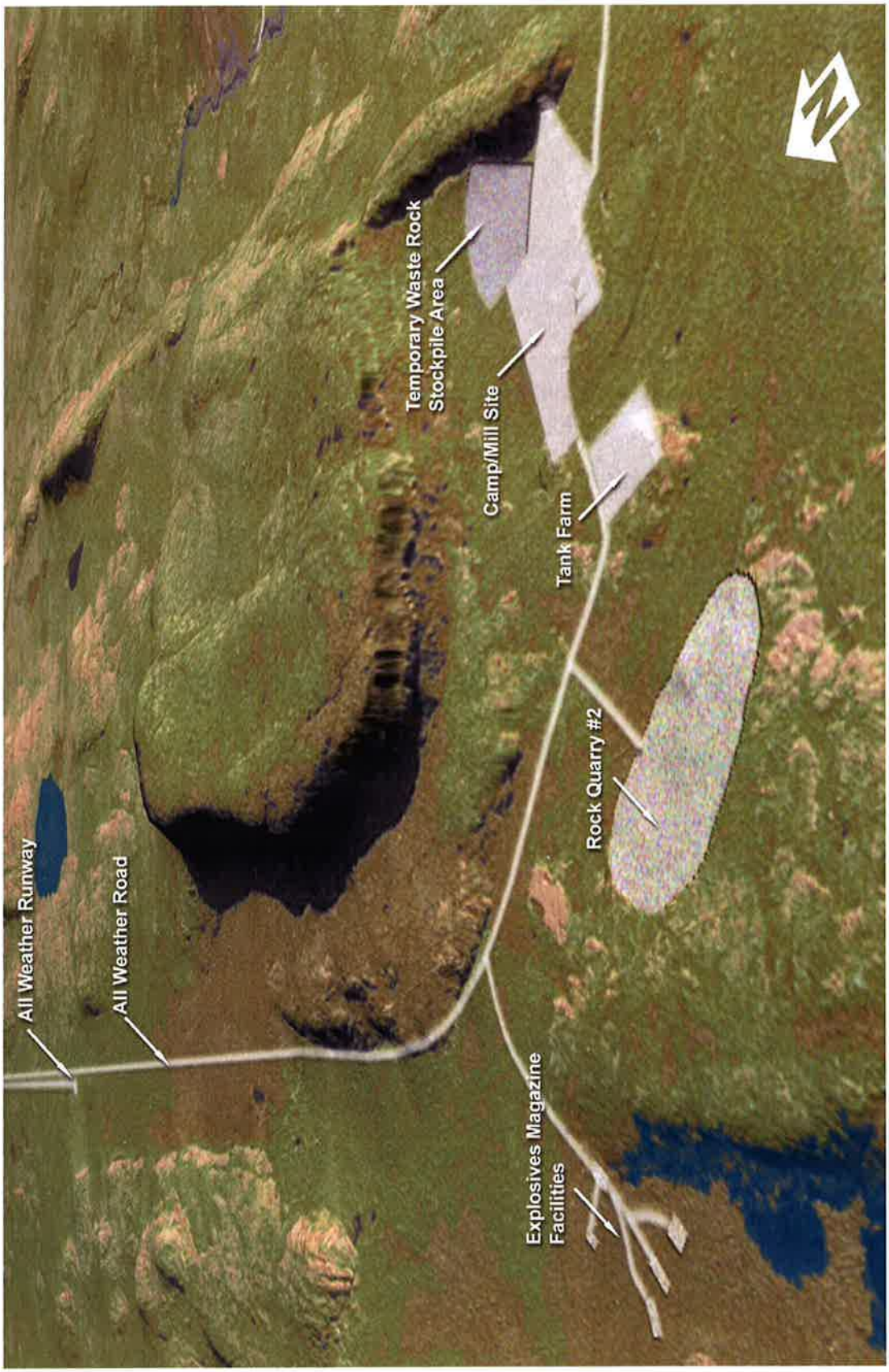
PROJECT:	DATE:	APRROVED:	FIGURE:
VM00259A	Oct 2005	LTC	**1.5**

MIRAMAR HOPE BAY LIMITED

Doris North Mine Closure & Reclamation Plan
Nunavut, Canada

View of Doris North Site After Reclamation
Looking South From Roberts Bay

PROJECT:	DATE:	APRROVED:	FIGURE:
VM00259A	Oct 2005	LTC	**1.6**



Doris North Mine Closure & Reclamation Plan
Nunavut, Canada

View of Post Closure
Doris North Plant Site

MIRAMAR HOPE BAY LIMITED

PROJECT:	DATE:	APRROVED:	FIGURE:
VM00259A	Oct 2005	LTC	1.7

1.3 Rationale and Approach

MHBL have incorporated, where applicable, the guiding principles, objectives and standards set out in the INAC guiding documents discussed in Section 1.2 in the preparation of the Closure and Reclamation Plan for the Doris North Project.

The Closure and Reclamation Plan will comply with the conditions of mining permits, regulations, and industry standards that are applicable to this Project. The following principles have been established to guide the development of the overall closure plan:

- Plan and implement in accordance with all applicable regulations;
- Apply cost effective and appropriate closure and reclamation practices to reduce environmental risks and allow traditional use of the land;
- Conduct studies to predict post-closure environmental effects;
- Maintain a program of progressive closure and reclamation as an integral part of project operations; and
- Incorporate new reclamation methods and procedures.

MHBL is committed to reducing the residual environmental effects at the site upon closure. Consequently, the mine plan has been developed in conjunction with the closure and reclamation plan. Reclamation work will form an integral part of the mine plan. Furthermore reclamation will be carried out progressively during the life of the project where practical. All surface facilities have been designed to minimize restoration requirements following mine closure, and to enhance the natural recovery of the areas affected by mining.

Mine decommissioning and restoration will be carried out using conventional state-of-the-art, northern mine construction and reclamation techniques. MHBL plans to select closure technologies and design elements that not only comply with accepted protocols and standards, but will also use best available technologies that are practical for use at this site.

This report provides a description of the anticipated decommissioning and reclamation activities for the site, during and following completion of underground mining. This Closure and Reclamation Plan describes the areas of disturbance that require reclamation, summarizes the proposed strategy and schedule for decommissioning and reclamation of each area, and outlines the work to be carried out. The specific details of the mine reclamation plan are likely to evolve as mining progresses. Consequently, this plan will be updated periodically during the mine life.

Key closure and reclamation issues for this project are summarized as follows:

1. All buildings and equipment will be demolished and/or removed from the site as part of final reclamation. Demolition debris with no salvage value will be buried in an on-site demolition landfill. All buildings and equipment will be cleaned of potentially hazardous materials prior to demolition. All remaining inventory of petroleum products, reagents, chemicals, etc. will be removed from the site as part of final reclamation. Consequently no buildings, equipment, hydrocarbons or chemicals will remain at the site once reclamation has been completed;

2. Potential acid rock drainage (ARD) and metal leaching (ML) will be minimized through the placement of all potentially acid generating waste rock into the underground mine where it will remain in a frozen state due to the presence of permafrost (or underwater should future global warming trends cause permanent thawing of the permafrost and subsequent flooding of the closed mine workings at some point in the future). All mill tailings will be permanently stored under a minimum 4-meter deep water cover in the reclaimed tailings containment area (Tail Lake). These actions will retard the rate of ongoing sulphide mineral oxidation and prevent the future release of contaminants into groundwater and surface water from these materials due to oxidation/weathering. Consequently no-long term water treatment requirements are envisioned once reclamation has been completed. The successful implementation of this strategy will minimize requirements for long-term post-closure water monitoring.

3. Fresh water use will be minimized during the mine's operating life by recycling as much water as practical from the tailings containment area for use as process water in the mill and by using a recycled brine solution underground for all drilling and mining activity. Consequently the volume of potentially contaminated water requiring management at closure will be kept to a minimum.

1.4 Land Use Objectives and Alternatives

The key objectives of the reclamation plan are to:

- Protect public health and safety through the use of safe and responsible reclamation practices;

- Reduce or eliminate environmental effects once the mine ceases operations;

- Re-establish conditions that permit the land to return to a similar pre-mining land use; and

- Reduce the need for long-term monitoring and maintenance by establishing physical and chemical stability of disturbed areas.

The Doris North Project is a remote site in an Arctic setting. Pre-development land use can be classified as wildlife habitat with occasional use by Inuit people for subsistence hunting and fishing. MHBL's closure objectives are to return the land after mining and reclamation have

been completed to healthy, self-sustaining wildlife habitat suitable for use by Inuit people for subsistence hunting and fishing.

Alternative land use objectives considered include:

- Use of the site as a continued base for mineral exploration in the region. This may be viable in the short term but not sustainable over the long term. The viability of a local exploration base will diminish as the area is explored and the distance between prospective properties and the base camp becomes greater.

This closure and reclamation plan are predicated upon the objective of removing all facilities from the Doris North Project site and leaving the site in a chemically and physically stable condition so that wildlife and fish can safely reside in and use this area as habitat without adverse health impacts to themselves or to the Inuit people who may use this wildlife for subsistence purposes.

The present reclamation guidelines for Nunavut (Draft Mine Reclamation Guidelines for the NWT, INAC 2005) provide direction on methodologies of reclamation procedures and provide broad reclamation objectives and criteria but there is still a need to establish site specific reclamation criteria for each mine site against which reclamation progress can be measured. In other words, there is need to develop site specific criteria that can be used by the mine owner, the land owner (Kitikmeot Inuit Association), regulatory agencies, the Inuit of the West Kitikmeot, local communities, and other stakeholders to know when each portion of the mine site has been successfully reclaimed to an acceptable standard (i.e., to provide a benchmark to allow all parties to know when reclamation has been successfully completed). To date, these site specific criteria have not been developed by the regulatory agencies.

MHBL acknowledges that such site specific reclamation criteria need to be developed in consultation with the Kitikmeot Inuit Association, local communities, and other stakeholders including the regulatory agencies. This section is thus intended to provide a starting point for the development of these site specific reclamation criteria for the Doris North Project. They have not been discussed with the Kitikmeot Inuit Association, local communities, and other stakeholders. MHBL is committed to undertake this process during the assessment and permitting process so that the next refinement of the Mine Closure and Reclamation Plan is based on site specific reclamation criteria that have been developed in consultation with the Kitikmeot Inuit Association, local communities, and other stakeholders. This would then leave sufficient time prior to the planned mine closure in 2010 for detailed reclamation planning to be adjusted to meet these site specific reclamation criteria.

For this phase MHBL has put forward suggested site specific reclamation criteria for use at the Doris North Project that can act as a basis for future dialogue and consultation.

Reclamation criteria will be used to assess the final reclamation obligations for closure of the Doris North Project. These criteria will establish benchmarks that will be used to determine when decommissioning, reclamation and monitoring programs have been completed and remaining liability has been removed. The objective is to reach a "maintenance free" reclaimed site where minimal active management or maintenance is required.

Completion of reclamation is the time at which all reclamation criteria have been met. To facilitate this process, MHBL have adopted an approach similar to that used at Ekati that looks at three stages of reclamation:

- **Stage 1: Decommissioning Stage** – removal of contaminants, removal of buildings and structures, creation of a stable water management or drainage system across the reclaimed site and the creation of geotechnically safe landforms;

- **Stage 2: Reclamation Stage** – the return of the disturbed site to a form and productivity level that conforms to the defined end land use for each component of the mine site. Enhancement of natural revegetation and post-closure environmental monitoring programs are in place, as and where required; and

- **Stage 3: Completion Criteria Conformance** – reclamation is complete and environmental monitoring is in place to measure for reclamation success and to demonstrate that the site specific reclamation criteria have and will continue to be achieved in a sustainable fashion. At this phase the land owner (the KIA) and other regulatory agencies will be asked to confirm that the reclamation criteria have been met.

The proposed site specific reclamation criteria for the Doris North Project are set to ensure that closure and reclamation of the site meets the overall objectives for mine site reclamation in Nunavut as established in the draft Mine Reclamation Guidelines for the NWT put forward by INAC in June 2005. The objectives of the site specific reclamation criteria can be considered under the following four categories:

- Physical stability;

- Chemical stability;

- Ecological sustainability; and

- Climate and geographic stability.

1.4.1 Physical Stability

Physical stability is ensured by protecting the surface against wind and water erosion, providing for surface drainage, minimizing hazardous conditions, and contouring the surface to meet land capability objectives. Physical structures such as underground mine openings, sedimentation ponds, drainage ditches, breached dams, spillways, quarry slopes, and rock pads will meet the following requirements:

- Be physically stable and designed in accordance with acceptable design criteria;

- Pose minimal hazard to the public and wildlife health and safety as a result of failure or physical deterioration;

- Continue to perform the function for which they were designed; and
- Have stable land surfaces with minimal surface erosion.

1.4.2 Chemical Stability

The reclaimed mine site at the Doris North Project site will be chemically stable. This means surface waters will be protected against significant adverse environmental effects resulting from discharges. In addition, discharges will not endanger public and wildlife health and safety, nor result in unacceptable deterioration of environmental resources.

Aspects to be monitored closely will include short-term and long-term changes in the geochemistry of quarried and underground waste rock used in the construction of roads, dams and building pads, seepage and runoff from these facilities, and the chemistry of surface water draining from the site. Potential effects due to any acid rock drainage, metal leaching and flushing of other chemicals via surface runoff will be mitigated. Control and mitigation measures will be specific to the source and contaminant types. The success of physical reclamation at the Doris North Project site will influence chemical and physical stability.

1.4.3 Ecological Sustainability

The ecological sustainability of the reclaimed site and potential effects on the surrounding environment are closely related to methods of reclamation, the end land use, and the physical and chemical characteristics of the site. Ecological sustainability at Doris North is reached when mining related physical or chemical impediments to the establishment of natural ecological processes are removed thereby allowing the establishment of self-sustaining and productive ecosystem (including progressive natural changes in habitats) vegetation, aquatic and wildlife habitats to establish. Vegetation, aquatic and wildlife habitats would be stable, self-sustaining, and productive, and meet the agreed stakeholder requirements.

1.4.4 Climate and Geographic Stability

Regional and local climatic information will be used to resolve questions concerning aspects such as hydrology and permafrost growth. The effects of climate on mine closure measures include: precipitation and extreme events such as floods, freeze-thawing and aggradation of permafrost into mine infrastructure. Precipitation affects the overall water balance of the site and hence influences the chemical and physical stability of the site together with its contaminant transport parameters. Extreme events influence erosion and subsequently the physical stability of the site.

The effects of geography on mine reclamation include proximity of local populations and resource users downstream of the mine, the proximity of surface water which will influence their susceptibility to contaminants of concern released from the reclaimed mine components and the geographic location of reclaimed mine components in relation to watersheds.

1.5 Land Reclamation Units and Proposed Site Specific Reclamation Criteria

It is convenient to separate mining facilities into components (land reclamation units) to design and plan reclamation work. For the Doris North Project, mining facilities have been divided into the following five land reclamation units:

- The underground mine workings;
- The Tail Lake tailings containment area and site water management facilities;
- Buildings and equipment;
- Infrastructure such as the airstrip, site roads, and laydown areas;
- The site non-hazardous waste landfill area and quarries.

Proposed site specific reclamation criteria for each of the six land reclamation units at the Doris North Project are presented in Table 1.1.

Table 1.1: Proposed Site Specific Reclamation Criteria for the Doris North Project

Land Reclamation Unit	Proposed Site Specific Reclamation Criteria			
	Physical Stability Requirements	**Chemical Stability Requirements**	**Ecological Sustainability Requirements**	**Climatic and Geographic Stability Requirements**
Underground Mine Workings	1) Salvageable equipment removed. All other equipment cleaned of hydrocarbons and other hazardous contaminants. 2) All mine entries sealed to prevent any future inadvertent access by humans or large wildlife using a combination of engineered concrete caps and/or backfill for raises and a backfilled rock plug in the adit portal.	1) All potentially hazardous materials removed from the UG mine; prior to waste rock deposition. 2) All chemical/hydrocarbon spills and contaminants remediated or removed; prior to waste rock deposition. 3) Placement of all potentially acid generating waste rock into the underground mine where it will remain in a frozen state due to the presence of permafrost. 4) Should future global warming trends cause permanent thawing of the permafrost, allow subsequent natural flooding of the closed mine workings to minimize ARD generation.	1) Wildlife unable to enter or come into contact with UG mine workings to protect wildlife health and safety.	1) Permafrost is not required to be sustained within the closed out underground mine workings. 2) Dry underground mine conditions are not required in the event of global warming.
Tail Lake tailings containment area and site water management facilities	1) Stable dam side slopes with adequate geotechnical factor of safety for closure. 2) No significant wind or water erosion. 3) Dams in the water management pond breached to re-establish hydrologic flow. 4) Site drainage systems on the reclaimed site set to direct precipitation into the surrounding water courses under all precipitation events including extreme events without causing significant erosion or damage to the drainage structures left behind. 5) All non-required catch basins, sedimentation	1) No significant level of contaminants in outflow from the reclaimed Tail Lake. 2) Water license discharge requirements are being met without ongoing active water treatment of seepage and drainage. 3) Site drainage consistently meets water discharge criteria and results in no significant adverse impact on water quality in the surrounding water courses and water bodies	1) Separation of wildlife and humans from contact with the underlying tailings deposited within Tail Lake. 2) No opportunity for significant transfer of contaminants to wildlife through water. 3) Water quality draining from the reclaimed site remains protective of aquatic life in the surrounding water bodies and presents no significant adverse risk to the health of wildlife.	1) Ability to shed all precipitation including extreme events without causing significant erosion or pickup of contaminants. 2) Hydrologic flow re-established under all precipitation conditions including extreme events without resulting in significant erosion.

Land Reclamation Unit	Proposed Site Specific Reclamation Criteria			
	Physical Stability Requirements	**Chemical Stability Requirements**	**Ecological Sustainability Requirements**	**Climatic and Geographic Stability Requirements**
	ponds and drainage structures removed or in filled so that no significant erosion occurs under all precipitation events including extreme events.			
Buildings and Equipment	1) All potentially hazardous materials removed from the mine site and shipped south for re-cycling or proper disposal. 2) Buildings and equipment cleaned prior to demolition and all hazardous materials recovered, packaged and removed prior to demolition. 3) All equipment and buildings demolished and the demolition debris encapsulated within an appropriate landfill within Quarry 2. 4) Site clean of all equipment, steel, containers, debris and concrete. All removed and buried within the landfill. 5) All concrete foundations and slabs broken up and buried within the landfill or used as UG backfill. 6) All fuel storage facilities cleaned of hydrocarbons, then demolished and removed for encapsulation within the landfill. 7) No significant erosion of rockfill building pads after removal of buildings.	1) All hazardous materials removed. 2) All chemical/hydrocarbon spills remediated or removed. 3) No significant adverse water quality in drainage across former building pads and areas. 4) All liners and berms from within fuel tank farms removed and buried within landfill. 5) All identified contaminated soils will be excavated and dependant on their level of contamination they will be either remediated on site, removed from site for off-site disposal in a licensed facility or disposed of in the underground mine or landfill so that no significant contaminant release occurs with future site drainage from these sources.	1) No contact of wildlife or humans with contaminated soils due to removal and/or placement of separation barriers. 2) No significant health risks to wildlife or humans from the reclaimed building areas. It may be desirable to leave the residual building pads in an un-vegetated state so that they do not attract wildlife for browsing for many years even centuries.	1) Site drainage restored across the remaining building pads through creation of permanent no maintenance swales or drainage channels to meet all precipitation events including extreme events without causing ponding or significant erosion in these areas.

Land Reclamation Unit	Proposed Site Specific Reclamation Criteria			
	Physical Stability Requirements	**Chemical Stability Requirements**	**Ecological Sustainability Requirements**	**Climatic and Geographic Stability Requirements**
Infrastructure (airstrip, roads and laydown areas)	1) All culverts and bridges removed and new drainage swales or channels created that are maintenance free and will not result in significant erosion. 2) All side berms removed and shoulder slopes regraded to prevent erosion and allow safe wildlife passage.	1) No ARD or significant contaminant release from the rock fill left in place within the roads, airstrip and laydown areas. 2) All chemical spills and contaminants remediated or removed.	1) No contact of wildlife or humans with contaminated soils due to removal and/or placement of separation barriers. 2) No significant health risks to wildlife or humans from the reclaimed roads, airstrip and laydown areas.	1) Site drainage restored across the remaining roads, airstrip and laydown rock fill areas through creation of permanent no maintenance swales or drainage channels to meet all precipitation events including extreme events without causing ponding or significant erosion in these areas
Non-Hazardous Landfill Area and Quarries	1) Non-hazardous landfill site fully buried within Quarry 2. A separation barrier of quarried rock placed on top of the landfill to separate contact with the surrounding environment. 2) No significant wind or water erosion of the reclaimed landfill area. 3) Stable wall slopes within the reclaimed quarries.	1) No adverse drainage from the landfill area and quarries into the surrounding water courses.	1) No contact of wildlife or humans with the contents of the reclaimed landfill area due to the placement of a suitable stable separation barrier (cover). 2) No significant health or safety risks to wildlife or humans from the reclaimed landfill area and quarries.	1) Permafrost development and maintenance within the reclaimed landfill. 2) Ability to shed all precipitation including extreme events without causing significant erosion or pickup of contaminants.

1.6 Likely Effects of Continued Mining in Hope Bay Belt on Closure Plan

The reclamation plan assumes the worst case scenario specifically that at the end of the Doris North reserve there is no ongoing exploration or mining activity on the remainder of the Hope Bay belt. In the more optimistic scenario, MHBL will continue to develop additional reserves on the Belt which would continue the life of the Doris North site. MHBL has indicated that where possible from a practical and economic standpoint, the Doris North mill and camp would continue to be used as the centre for processing other reserves found on the belt. In this case the reclamation plan will be adjusted as needed to accommodate the extended facility life. MHBL will remove all of the Doris North buildings and facilities once all further activity on the Hope Bay Belt was completed.

At some point continued use of Tail Lake to receive tailings from an expanded project (tailings from the processing of other ores on the Belt) will result in the deposition technique moving from sub-aqueous to sub-aerial as the full storage capacity of the lake was reached and tailings were deposited above the pre-development water level. Final closure of Tail Lake would then move from a water cover to the placement of a quarried rock separation barrier to isolate the dry tailings from the surrounding environment. This event will be addressed during the assessment and permitting of future development projects on the Hope Bay Belt.

2.0 SITE INFORMATION

2.1 Proponent Information

The Doris North Project, a resource component of the overall Hope Bay Belt, is owned by Miramar Hope Bay Limited, a wholly owned subsidiary of Miramar Mining Corporation (MAE-TSE).

Project Operator:
Miramar Hope Bay Limited.
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2.2 Land Tenure Information

The proposed Doris North Project and all components of the supporting infrastructure will be constructed on Inuit owned land (with the exception of the jetty that extends into Roberts Bay and is thus on foreshore crown land. The Hope Bay mineral exploration rights property comprises an area of 1,078 km^2 and forms one large contiguous block that is approximately 80 km long by up to 20 km wide. The entire land package at Hope Bay has been maintained in good standing. A summary of the current land status at Hope Bay is shown in Table 2.1.

Table 2.1: Land Tenure Information for MHBL's Hope Bay Belt Holdings

Tenure Type	No. Title	Area (ha)	Area (acres)
Federal Mineral Claims	54	35,701	88,215
Federal Mining Leases and Leases Pending	19	16,150	39,906
Inuit Exploration Agreements	7	55,976	138,317
Total	80	107,827	266,438

Notes:

Data obtained from Miramar Hope Bay Limited

3.0 PRE-DEVELOPMENT ENVIRONMENTAL BASELINE

The following section provides a description of the pre-development environmental condition and land use of the Doris North Project area. It is intended to provide the reader with an understanding or "snap shot" of; (i) the physical conditions at the project site; (ii) of the aquatic, terrestrial and wildlife resource condition, use and habitat in the project area; and (iii) a description of how the land and its resources are currently being used prior to project development.

3.1 Physical Environment

Environmental baseline studies in the project area were carried out from 1995 to 1998 by the Project's previous owner, BHP and in 2000 through 2005 by MHBL.

3.1.1 Climate and Air Quality

MHBL, and others, have been collecting climate data for in the Project area for its camps at Doris North and Boston since 1993. This site-specific climate data has been combined with data from three longer-term regional weather stations operated by Environment Canada (Lupin, Cambridge Bay, and Kugluktuk) to develop annual climate profiles for the Project planning process.

The Project area has a low arctic ecoclimate with a mean annual temperature or –12.1°C with winter (October to May) and summer (June to September) mean daily temperature ranges of -50°C to +11°C and -14°C to +30°C, respectively; and mean annual precipitation ranges from 94 mm to 207.3 mm. Annual lake evaporation (typically occurring between June and September) is estimated to be 220 mm.

Air quality monitoring was initiated in the Project area site in May 2003. Total suspended particulate (TSP) measured in August 2003 indicated that ambient TSP concentrations were consistently low, ranging from 3.9 to 5.5 µg/m³, which is less than 5% of the federal objective (120 µg/m³) for TSP. These results are consistent with other particulate monitoring data gathered at remote sites in northern Canada. Concentrations of sulphur dioxide, oxides of nitrogen and fine particulates are also expected to be low in the Project Area.

3.1.2 Climate Change

The Department of Indian and Northern Affairs Canada (INAC) commissioned a technical report on the "Implication of Global Warming and the Precautionary Principle in Northern Mine Design and Closure" (BGC 2003). The Intergovernmental Panel on Climate Change (IPCC) concluded that the temperature trends indicate that some global climate change has already occurred (IPPC 1995). Their predictions for the year 2100 estimate a global mean temperature increase between 1.5°C and 4.5°C, with a "best estimate" of 2.5°C. This translates into a predicted increase of up to 6°C in the winter, 4.2°C in the spring and about 1°C in the summer and fall. These increases would raise the mean ambient temperature by 3.1°C. The predictions advanced by IPCC show that climate change would eventually modify the thermal regime that currently exists in the Project area. Continuous permafrost in the Project area will remain, but the surface "active" layer (the surficial layer that thaws annually) may deepen in response to the

milder mean annual temperature predicted. Inuit elders report longer summers and milder winters in recent years.

3.1.3 Geomorphology

The Project area is coastal lowland with numerous lakes and ponds separated by glacial landforms and parallel running geological intrusions of diabase dykes and sills. The drainage basins are generally long and narrow and predominantly oriented along the north-south axis. The local topography ranges from sea level at Roberts Bay to 158 m at the summit of Doris mesa, 3 km inland. The ridge separating Doris and Tail lake drainages rises to 70 m above sea level.

3.1.4 Surficial Geology, Permafrost Conditions and Seismic Risk

Bedrock ridges, oriented north/south parallel with the dominant strike of bedrock units, show the erosive effects of the northward flowing Pleistocene (Keewatin Lobe) continental glacier ice over 10,000 years ago. The surficial active layer over continuous permafrost is approximately 2 m thick. Drill core results indicate soils below the active layer contain interstitial and segregated ground ice. Most of the soils are marine in origin and include clay, silt and some sand. Drill core results along the proposed road corridor between Roberts Bay and Tail Lake shows bedrock as deep as 20 m below surface (Thurber Engineering, 2003). Surface materials include frost-churned mineral and organic soils mantled by a thin cover of tundra vegetation. Patterned ground masks the underlying soils. Small, frost-heaved clay-silt polygons are common. Linear frost cracks occur in raised marine spit deposits. Ice wedge polygons are common. The entire area lies below the post-glacial marine limit of 200 masl. Pleistocene deposits, including till, are buried beneath Holocene marine sediments deposited during the post-glacial marine emergence. Some glacial deposits show evidence of alterations by marine wave action.

Continuous permafrost extends to -560 m. (Heginbottom *et. al.*, 1995). Ground temperature measurements in the Project area indicate an active zone thickness ranging between 1.5 to 2.6 m and the depth of zero annual amplitude varying between 11 and 17 m (Golder 2001; EBA 1996). The geothermal gradient measured at the Boston Camp is approximately 18°C km^{-1}, which also indicates a depth of continuous permafrost of approximately –560 m.

The Project area occurs in the seismically "Stable" zone of Canada. This region has too few earthquakes to define reliable seismic source zones.

3.1.5 Bedrock Geology

The Hope Bay Belt occurs in the Slave Structural Province, a geological sub-province of the Canadian Shield. The region is underlain by the late Archean Hope Bay Greenstone Belt. This geological formation ranges from 7 - 20 km in width and over 80 km in length. It is oriented in a north-south direction. The late Archean Hope Bay Greenstone Belt lies entirely within the faulted Bathurst Block forming the northeast portion of the Slave Structural Province. The belt is mainly comprised of mafic metavolcanic (mainly meta-basalts) and meta-sedimentary rocks that are bound by Archean granite intrusives and gneisses. Archean volcanic greenstone hosts many of Canada's precious and base metal mines (*e.g.*, Yellowknife, Timmons, Rouyn-Noranda).

3.1.6 Doris North Deposit Geology

The geology of the Doris North zone comprises a network of quartz veins more than 2 km in length. The Doris Hinge zone occurs where the Doris Central and Doris Lakeshore veins meet in a zone of mineralization 4 – 5 m wide and ranges in thickness for a few centimeters to over 40 m. It is visible at surface as a quartz outcrop at least 600 m long, plunging north at 10° and truncated by a cross cutting diabase dyke. The basaltic host rock is folded in shallow north-south trends, which also plunge north. Diabase dykes and sills of Proterozoic age in the basalt host rock range from 1 to 6 m thick. Most of the gold mineralization is hosted in quartz vein systems. Sulphide in these veins is low, averaging < 2% pyrite.

3.1.7 Geochemistry

Acid rock drainage (ARD) can occur when sulphide minerals contained in rock are exposed to air and water. It can cause environmental degradation if allowed to enter natural water bodies. Metal leaching can also occur under near neutral conditions if the rock contains readily soluble metals. Samples of rock from the Doris North deposit as well as from adjacent areas around the mineralized zone were tested by acid-base accounting (ABA) analysis. In general, all waste rock extracted from outside the mineralized zone such as from the development of the underground access ramp will have low acid generating potential. All of the rock types identified as having high or uncertain acid generating potential are either from the mineralized zone or from areas immediately adjacent to the mineralized material, with one minor exception. The exception is a possible small dyke of mafic volcanic rock in the path of the proposed access decline. This intrusion has a total sulphur concentration in excess of 1% and is identified as potentially acid generating.

MHBL will segregate all waste rock brought to surface from the underground mine workings and return this rock into the mine as backfill during the mine's operating life.

ABA testing indicates that mill tailing will have low acid generating potential. Tests on potential quarry rock showed it is not likely to be acid generating or a source of metal leaching and so provides a clean, chemically stable construction rock.

3.1.8 Groundwater Conditions

The permafrost underlying the Project area is generally impervious to groundwater movements. Groundwater movement will only occur in the shallow active layer (1.5 to 2.6 m) during its seasonal thaw period. The mining design for the Doris North deposit will not encroach on the Doris Lake talik (the area underneath the lake that thaws or is not frozen) so groundwater from that source is not expected to report to underground workings.

3.1.9 Hydrology

The Project area is located primarily in the Doris Lake outflow drainage basin. The Tail Lake basin, part of the Doris basin, is the Project's planned tailings containment area. Peak flows typically occur in June during snowmelt. A second smaller peak may occur from rainfall in late August or early September. The streams in the study area are usually frozen with negligible flow from November until May. The mean flow from June to October for Tail, Doris, and Little Roberts Lake outflows are approximately 0.03, 0.85, and 1.73 m^3/s, respectively.

3.1.10 Water Quality

Water quality samples were collected from Project area lakes, streams, and the nearby marine environment between 1995 and 2005. The lakes in the area are soft water lakes with neutral to slightly acid pH and low to moderate acid sensitivity. Total phosphorous levels were low, indicating oligotrophic to mesotrophic conditions. Chloride, sodium, and potassium concentrations were elevated compared to typical lakes in the Slave Structural Province. Some metal levels (*i.e.*, total aluminum, iron, copper, cadmium, chromium, lead and manganese) in certain lakes exceed Canadian Water Quality Guidelines (CWQG) on a seasonal basis (Table 3.1). Metal concentrations were generally representative of lakes in undisturbed northern regions. In summer, the lakes were generally well mixed. Wind likely played an important role in maintaining well-mixed conditions. In shallow lakes, wind appeared to cause complete lake turnover. Winter data generally indicated a shallow upper layer of water at or near 0°C, with constant temperatures, not exceeding 2 to 3°C, throughout the remaining water column. The lakes were typically well aerated during the summer; depressed dissolved oxygen (DO) concentrations were recorded near-bottom in winter. With the exception of Ogama Lake, this DO depression occurred in lakes with relatively high total organic carbon (TOC) levels in sediments. This suggested that sediment oxygen demand (SOD) was the underlying cause.

Marine baseline water quality sampling was conducted in Roberts Bay between 1996 and 1998. The Roberts Bay baseline data indicated a thermally stratified and well aerated water column in shallow water during summer, temperatures near 9°C and DO concentrations greater than 11 mg/L. Turbidity and total suspended solids (TSS) levels were low during summer (1.4 NTU and 11 mg/L, respectively). Most median total metal concentrations in Roberts Bay were below detection limits and below the CWQG; exceptions were cadmium and chromium (0.0035 and 0.0026 mg/L, respectively).

Table 3.1: Baseline Water Quality Parameters That Exceeded Canadian Water Quality Guidelines in the Lakes of the Doris North Project Area

									Water Quality Guidelines[b]	
Parameter (units)	**Ice Covered (April to June)**				**Open Water (July to Sept)**				**Drinking**	
	Med	**Min**	**Max**	**n**	**Med**	**Min**	**Max**	**n**	**Water**	**Aquatic Life**
Doris Lake (1995 - 2003)										
pH (units)	7.06	6.47	7.66	11	7.19	**5.90**	7.80	33	6.5 - 8.5	6.5 - 9.0
Total Suspended Solids (mg/L)	4	<1	11	11	4	<1	11	33		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	**4.4**	**3.0**	**10.3**	7	**4.8**	**2.1**	**8.0**	20	1	long term increase <2
Total Aluminum (ug/L)	**9**	5	19	8	40	18	**120**	27		100
Total Arsenic (ug/L)	0.40	0.30	0.62	8	0.5	<0.1	**15.0**	27	25	5
Total Cadmium (ug/L)	<0.2	<0.05	**0.42**	12	<0.05	<0.05	<0.20	31	5	0.016
Total Chromium (ug/L)	<1	0.4	<1	8	0.5	<0.5	**3.5**	27	5	1
Total Copper (ug/L)	**3.0**	**2.0**	**5.0**	12	1.3	<0.5	**2.3**	31	≤1000	2
Total Iron (ug/L)	20	<10	40	8	90	40	**720**	27	≤300	300
Total Lead (ug/L)	<1	0.12	**4.00**	12	0.26	<0.05	**1.00**	31	10	1
Total Manganese (ug/L)	<5.0	1.8	<5.0	8	12.0	5.2	**191.0**	27	≤50	
Total Selenium (ug/L)	<0.50	<0.05	<0.5	8	0.50	<0.50	**4.00**	27	10	1
Total Zinc (ug/L)	12	2	**118**	5	2.5	<1	19.0	31	≤5000[d]	30
Tail Lake (1995 - 2003)										
pH (units)	7.15	6.94	7.39	4	7.31	**5.50**	7.90	17	6.5 - 8.5	6.5 - 9.0
Total Suspended Solids (mg/L)	2	<1	3	4	2	<1	7	17		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	**3.8**	0.8	**6.7**	4	**2.1**	0.3	**5.5**	14	1	long term increase <2
Total Aluminum (ug/L)	**110**	47	**170**	3	31	19	**309**	15		100
Total Cadmium (ug/L)	<0.2	<0.2	**0.2**	3	<0.10	<0.05	0.12	15	5	0.016
Total Chromium (ug/L)	**2**	<1	**3**	3	<0.5	<0.5	**2.3**	15	5	1
Total Copper (ug/L)	**4.8**	**4.0**	**7.0**	3	1.2	<0.5	**3.8**	15	≤1000	2
Total Iron (ug/L)	213	120	**300**	3	60	40	**300**	15	≤300	300
Total Lead (ug/L)	<1	<1	**1**	3	0.11	0.05	0.50	15	10	1
Total Selenium (ug/L)	<0.5	<0.5	<0.5	3	0.5	<0.5	**4.0**	15	10	1
Total Zinc (ug/L)	6	<5	7	3	<1	<1	**85**	15	≤5000[d]	30
Ogama Lake (1995 - 2000)										
pH (units)	6.94	**6.43**	7.38	7	7.10	6.64	7.35	6	6.5 - 8.5	6.5 - 9.0
Total Suspended Solids (mg/L)	2	<1	12	7	5	4	7	6		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	**8.8**	**4.1**	**13.2**	5	**9.5**	**6.3**	**12.1**	4	1	long term increase

									Water Quality Guidelines[b]	
Parameter (units)	**Ice Covered (April to June)**				**Open Water (July to Sept)**				**Drinking**	
	Med	**Min**	**Max**	**n**	**Med**	**Min**	**Max**	**n**	**Water**	**Aquatic Life**
										<2
Total Aluminum (ug/L)	**261**	**216**	**300**	5	**425**	**334**	**452**	5		100
Total Cadmium (ug/L)	**0.4**	<0.2	**0.8**	7	<0.20	<0.05	<0.20	7	5	0.016
Total Chromium (ug/L)	**1.8**	1.5	**2**	5	**1.7**	<1	**2.3**	5	5	1
Total Copper (ug/L)	**5**	**2**	**12**	7	**2.0**	<1	**3.9**	7	≤1000	2
Total Iron (ug/L)	**435**	200	**650**	5	**435**	270	**580**	5	≤300	300
Total Lead (ug/L)	**1.5**	<1	**3**	7	<1	0.2	<1	7	10	1
Total Manganese (ug/L)	**170**	17	**329**	5	17	8	25	5	≤50	
Patch Lake (1995 - 2000)										
pH (units)	7.13	**6.10**	7.52	11	7.10	**6.10**	7.82	13	6.5 - 8.5	6.5 - 9.0
Total Suspended Solids (mg/L)	1	<1	4	11	1	<1	12	13		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	0.9	0.5	**4.4**	7	**3.0**	**2.5**	**4.0**	7	1	long term increase <2
Total Aluminum (ug/L)	30	7	99	8	69	22	**182**	10		100
Total Cadmium (ug/L)	<0.2	<0.05	**0.2**	12	<0.2	<0.05	<0.2	14	5	0.016
Total Chromium (ug/L)	**1**	0.7	**2**	8	<1	0.5	**2.4**	10	5	1
Total Copper (ug/L)	**3.0**	1.0	**7.0**	12	1.0	<0.5	**2.7**	14	≤1000	2
Wolverine Lake (1995 - 2000)										
Total Suspended Solids (mg/L)	2	1	5	4	2			1		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	**2.0**	**1.1**	**2.9**	4	**2.7**			1	1	long term increase <2
Total Copper (ug/L)	**3.0**	**2.0**	**3.0**	4	<1			1	≤1000	2
Total Iron (ug/L)	**360**	**300**	**400**	4	280			1	≤300	300
Total Manganese (ug/L)	42	26	**58**	4	12			1	≤50	
Windy Lake (1995 - 2000)										
pH (units)	7.52	**6.33**	7.73	5	7.58	6.90	8.00	13	6.5 - 8.5	6.5 - 9.0
Total Suspended Solids (mg/L)	<1	<1	2	5	2	<1	19	13		Short-term increase, 25; long term increase < 5
Turbidity (NTU)	**1.2**	0.3	**2.1**	3	**1.8**	0.6	**5.0**	10	1	long term increase <2
Total Aluminum (ug/L)	14	9	19	4	42	12	**147**	11		100
Total Arsenic (ug/L)	0.40	0.20	0.6	4	1.0	0.1	**5.0**	11	25	5
Total Chromium (ug/L)	<1	<1	<1	4	**1.8**	<0.5	**5.3**	11	5	1
Total Copper (ug/L)	<2	<1	**2.0**	6	1.0	0.8	1.4	13	≤1000	2
Total Lead (ug/L)	**1**	<1	**1**	6	0.64	0.07	<1	13	10	1

Parameter (units)	Ice Covered (April to June)				Open Water (July to Sept)				Water Quality Guidelines[b] Drinking	
	Med	Min	Max	n	Med	Min	Max	n	Water	Aquatic Life
Total Selenium (ug/L)	<0.50	<0.50	<0.50	4	**2.0**	<0.5	**5.0**	11	10	1
Little Roberts Lake (1995 - 2003)										
Total Suspended Solids (mg/L)	-	11	21	2	3	<1	11	9		Short-term increase, 25; long-term increase < 5
Turbidity (NTU)	-	-	-	0	1.9	0.8	**5.8**	7	1	Long-term increase <2
Total Aluminum (ug/L)	-	-	-	0	**209**	**53**	**343**	5		100
Total Chromium (ug/L)	-	-	-	0	<1	<1	**2.7**	5	5	1
Total Copper (ug/L)	-	**3**	**9**	2	**2**	1	**3.4**	7	≤1000	2
Total Lead (ug/L)	-	<1	**1**	2	0.50	0.15	**4.0**	7	10	1
Total Selenium (ug/L)	-	-	-	0	0.25	<0.2	**2.80**	5	10	1
Total Zinc (ug/L)	**169**	10	**327**	2	<5	<5	8	7	≤5000[d]	30
Pelvic Lake (1995 - 2000)										
Total Suspended Solids (mg/L)	3	<1	5	3	7	4	10	6		Short-term increase, 25; long-term increase < 5
Turbidity (NTU)	**6.1**	**6.0**	**6.3**	3	**8.3**	**5.3**	**11.7**	6	1	Long-term increase <2
Total Aluminum (ug/L)	-	93	95	2	**147**	66	**338**	6		100
Total Copper (ug/L)	-	**13.0**	**14.0**	2	1.4	1.0	**2.0**	6	≤1000	2
Total Iron (ug/L)	-	80	110	2	298	170	**430**	6	≤300	300
Total Lead (ug/L)	-	**1**	**2**	2	**1.50**	0.08	**5.00**	6	10	**1**

Results listed in this table represent values measured outside the Canadian Council of Ministers of the Environment (CCME) guidelines. All other parameters measured were within the guidelines.

[a]Values in bold are equal to or greater than guidelines

[b]All guidelines are from CCME (1999, with 2000 updates), with the exception of the aquatic life guideline for chloride, which is from US EPA (1999). Tabled hardness and pH dependent guidelines were determined using median baseline water quality values (analytical results) from all lakes. Similarly, a temperature of 6.0 °C was used to calculate the ammonia guideline. Individual water quality values shown in this table were assessed against guidelines using median hardness and or pH for the period indicated. Average lake temperatures for ice cover (1.2 °C) and open water 10.3 °C) periods were used to assess ammonia concentrations.

[d] Aesthetic Objective

Additional water quality sampling was conducted by MHBL during 2003 and 2004. These programs have added data to the data base presented in Table 3.1. This additional data is reported in the following reports:

- Doris North Project Aquatic Studies 2003, prepared by Golder Associates (Report 03-1370-007, dated November 2003;
- Doris North Project Aquatic Studies 2004, prepared by Golder Associates (Report 04-1373-009, dated February 2005.

Sediment samples were collected in the lakes in the Project area. Metal concentrations in sediments were compared with the Canadian Interim Sediment Quality Guidelines (CISQG) for the Protection of Aquatic Life (CCME 1999). The CISQG recommends using two guidelines in assessing sediment quality: the Threshold Effect Level (TEL) – the concentration below which adverse effects are rare; and the Probable Effect Level (PEL) - the concentration above which adverse effects are likely. Most lake sediment metal levels fell below the CISQG. The exceptions were total chromium, total copper, total arsenic and total cadmium. Of these, total chromium values exceeding the guidelines were the most widespread geographically and temporally, with concentrations exceeding the CISQG PEL in three of the eight lakes (Doris, Tail and Patch). Overall sediment metal concentrations remained within the range of natural variability for the Slave Structural Province. Sediment TOC levels varied between lakes. For lake sediments with relatively elevated TOC (Doris and Tail Lakes), colour and mineralogy indicated that reducing conditions were predominant in the surface layer as well as underlying sediments. For lake sediments with relatively low to moderate TOC concentrations, colour and mineralogy indicated a strong redox gradient between an oxic surface layer and reducing underlying upper layer.

Roberts Bay sediment samples were primarily clay-sized. The exception was the shallowest station (Station S5) sample that consisted of primarily fine sand. TOC ranged from <0.05 to 0.72% dry weight, with no apparent relationship between water-column depth and TOC content. Total metal concentrations in Roberts Bay seabed sediments were, for the most part, within the sediment quality guidelines. Total chromium (66 mg/kg) and total copper (26 mg/kg) exceeded the CISQG TEL at two sites.

3.2 Biological Environment

3.2.1 Marine Biota and Marine Habitat

Marine biology studies conducted by MHBL and others provide descriptions for benthic invertebrates, fisheries resources, marine mammals, avifauna, and shoreline habitats. The benthic communities in Roberts Bay are dominated by Polychaeta, Nematodes, Pelecypoda, Cumacea and Amphipoda. Polychaeta (lugworms, tube worms and marine bristle worms) contributed to more than 50% of benthic community total numbers. The composition of benthic communities was found to be typical for Arctic and Antarctic regions. Ringed seals were the only marine mammal species identified during 1996 spring marine aerial surveys (Rescan, 1996). Marine habitat characterization along the shoreline of Roberts Bay was mapped (based on aerial observations). The southern shoreline around the mouth of Glenn and Little Roberts outflows was classified as good to excellent habitat for anadromous fish, such as Arctic char.

Coastal surveys for birds and bird colonies were flown in August 2000. No colonies were found in Roberts Bay. Numerous flocks of waterfowl, mostly molting eider and Canada geese were observed along the coast.

3.2.2 Freshwater Biota and Habitat

Aquatic biota were sampled in Doris, Tail, Ogama, Patch, Wolverine, Windy, Little Roberts, Roberts, and Pelvic lakes. A comparison of periphyton abundance among the study streams suggested that Doris, Ogama, and Windy outflows were highly productive and that Tail Outflow, closely followed by Pelvic Outflow, were the least productive. Phytoplankton chlorophyll *a* samples were collected to assess the productivity of lakes in the Project area. Tail Lake was the least productive of the lakes sampled with a mean chlorophyll a value of 0.75 mg/m^3, while Doris Lake had a mean value of 7.71 mg/m^3. The benthic communities of the lakes sampled are similar in many respects to the communities of other small lakes in the Canadian Arctic and sub-Arctic.

Seven fish species occur in the Doris North Project area: Arctic Char, broad whitefish, cisco, lake trout, lake whitefish, least cisco, and ninespine stickleback. Lake whitefish and cisco accounted for approximately 90% of the fish sampled in Doris, Ogama and Pelvic Lakes. Lake trout were more dominant in Patch and Windy Lakes. Only lake trout and ninespine stickleback inhabit Tail Lake. Fish populations in Little Roberts Lake included Arctic char, broad whitefish, least cisco, cisco, lake trout, lake whitefish, and ninespine stickleback. A waterfall (approximately 4.3 m in height) between Doris and Little Roberts lakes prevents passage of diadromous fish species such as Arctic char and broad whitefish into the Doris Lake drainage. Little Roberts Lake is used by Arctic char during their movements between Roberts Lake and the ocean.

Fish assemblages in streams in the Project area were dominated by Arctic char, ninespine stickleback and lake trout. Arctic char were the most common (61% of total catch); most of these fish were captured at a fish fence installed in Roberts Outflow during 2002 and 2003 to monitor the number of migratory Arctic char from Roberts Bay to Roberts Lake. Ninespine stickleback was second in abundance (23%) and was the most widely distributed species and encountered in each of the 14 streams sampled. Lake trout was third in abundance (13% of the total catch) and second in distribution (encountered in 10 of 14 streams). Juveniles and adults were present in the catch, suggesting that the larger streams provide both rearing and feeding habitat.

Baseline metal concentrations in fish tissue (dorsal muscle, liver, and kidney) were analyzed from lake trout, lake whitefish, and cisco sampled from Doris, Tail, Ogama, Patch, Windy, and Pelvic Lakes, from Arctic char in Roberts outflow and lake trout from Roberts Lake. In general, low levels of metal concentrations were documented, with the exception of arsenic and mercury. The highest mean concentration of arsenic (1.95 µg/g dry weight) was recorded in a lake trout liver from Windy Lake. Similarly, the highest mean mercury concentration (3.31 µg/g dry weight, was recorded in a lake trout liver from Patch Lake. Metal concentrations in fish tissues from Pelvic Lake (as selected as a control basin for long term monitoring) were similar or intermediate to corresponding levels from other study lakes. A small proportion of lake trout muscle tissue samples (8 of 113) from the study area lakes exceeded the Health Canada food consumption guideline of 0.5 µg/g wet weight (roughly equivalent to 2.5 µg/g dry weight) for

mercury (6 fish from Patch Lake, 1 from Doris Lake, and 1 from Roberts Lake). The maximum mercury concentration was 0.68 µg/g wet weight. Older and larger lake trout had greater concentrations of mercury in their tissues and these fish were most likely to have muscle mercury concentrations above the Health Canada guideline. All lake whitefish and Arctic cha muscle tissues contained mercury levels that were below Health Canada guidelines; the maximum concentrations were 0.22 µg/g and 0.036 µg/g wet weight, respectively.

The shoreline or littoral zones of Doris, Tail, Roberts and Little Roberts lakes were assessed for habitat characterization by aerial and ground surveys. Doris and Roberts lakes had the highest diversity and highest quality of littoral substrate types, based on the presence of sand, cobble, and boulder substrates that provide fair to high quality habitats (spawning, rearing, and feeding) for lake trout, Arctic char, and coregonid species. The littoral zone of Tail Lake was rated as poor to fair habitat for lake trout because of the predominance of bedrock substrates. Little Roberts Lake has the least diverse littoral habitat with silt and sand dominating the substrate; the entire shoreline was rated as fair quality fish habitat because these fine substrates provide some feeding habitat. Despite the rating of only fair, Little Roberts Lake had the highest diversity of fish species (7 species) of the lakes sampled in the Project area. Fish use Little Roberts Lake as a migratory corridor from the ocean to Roberts Lake and it is likely fish do not over winter in Little Roberts Lake due to the shallow water depths (mean depth of 2.0 m and max depth of 4.1 m) that likely result in the water freezing to the lake bottom.

None of the fish species that occur in the Project area are designated as endangered or threatened by COSEWIC (2004).

The shoreline or littoral zones of Doris, Tail, and Little Roberts lakes were assessed for fisheries habitat characterization by aerial survey. Doris Lake had the highest diversity of littoral substrate types based on the presence of sand, cobble, and boulder substrates that provide fair to high quality habitats (spawning, rearing, and feeding) for lake trout and coregonid species. Doris Lake has the most suitable shoreline habitat among the three surveyed lakes. The littoral zone of Tail Lake was rated as poor to fair habitat for lake trout and coregonids because of the predominance of bedrock substrates. Little Roberts Lake has the least diverse littoral habitat with silt and sand dominating the substrate; the entire shoreline was rated as fair quality fish habitat because these fine substrates provide feeding habitat. Despite the rating "fair", Little Roberts Lake had the highest diversity of fish species of the lakes sampled in the Project area, likely due to the passage for diadromous species from Roberts Bay.

Stream habitat assessments were conducted at 17 stream sites. Streams that interconnect lakes or flow into Roberts Bay appeared to support the highest diversity of fish habitat for rearing, adult feeding, spawning, and migration. The associated lakes likely provide over wintering habitat, which lacking in streams due to shallow depths. Most of the small inflow tributaries that did not feature a lake or pond upstream were found to be either ephemeral, run-off from melt waters, or provided only marginal rearing and feeding habitat near their mouths. Most lake outflows had a wide diversity of in-stream habitats with riffles and runs dominating, with lesser quantities of rapids in half the outflows. Migration habitat was rated as good to excellent in Little Roberts and Roberts outflows. The outflow from Tail Lake provided marginal fish habitat, with virtually no migration corridor to Doris Lake. The outflows from Roberts and Little Roberts lakes also provided adult feeding, rearing, and spawning habitats to populations of Arctic char that likely over-winter in Roberts Lake. Although Doris Outflow was diverse in fish

habitat and species, a 4.3 m waterfall approximately 400 m downstream of the lake prevents upstream migration isolating the fish populations in Doris Lake from diadromous migrants entering freshwater from Roberts Bay.

3.2.3 Vegetation

Vegetation in the Project area is characteristic of sub-arctic tundra vegetation. Three ecosystem units dominate the area: the ocean shoreline association; lowland ecosystems; and the rock outcrop and upland ecosystems. Several plant communities make up each of these ecosystems. Plant species identified include 19 shrubs, 92 herbs, 18 grasses, 32 sedges and rushes, 21 mosses and 8 species and/or genera of lichen. Inuit traditionally use many local plant species and understand the relationship between plants and caribou habitat requirements including the early showing of plants in snow free areas and the importance of such areas to caribou calving locations in the region. None of the local plants identified during the course of baseline studies are designated as endangered or threatened (COSEWIC, 2004).

3.2.4 Wildlife

The Project area provides habitat for a variety of mammals including: shrews, voles and lemmings, hares, ground squirrels, weasels, wolves and foxes, grizzly bears, caribou, and muskox. Many are year-round residents in the Project area while others such as caribou and musk-ox, are nomadic or migratory. Some large predators/scavengers such as grizzly bear, wolverine and wolf may have large ranges that extend across or beyond the Project area. The small mammal species present, including ground squirrels and Arctic hare, spend their entire life in a small area. Project area vole and lemming populations are cyclic affecting the abundance and productivity of both bird and mammal predators. Weasel populations will cycle in synchrony with vole and lemming populations. The dominant wildlife species in the Project area is caribou. Three herds occur in the region that could possibly interact with the Project. They include the Dolphin-Union herd, the Ahiak herd and the Bathurst herd. The Dolphin-Union herd is a herd that has special interests from a resource management and conservation perspective. The Project is generally situated on the fringes of all three herds.

The Project area also provides breeding habitat for a wide range of resident and migratory birds including songbirds, upland birds, shorebirds, waterfowl, seabirds and raptors. There is an abundance of raptors in the Project area including peregrine falcon, gyrfalcon and golden eagle. The Project area provides foraging and nesting habitat for a wide range of cliff nesting and ground nesting raptors. Some birds such as peregrine falcon, have been the focus of special conservation and management efforts since the 1970s.

3.3 Land/Water Use

The Doris North Project is situated entirely on Inuit Owned Lands administered by the KIA with minerals development authority vested with Nunavut Tunngavik Inc. (NTI). MHBL has submitted Project related applications to the following authorizing agencies:

- Kitikmeot Inuit Association (KIA) - Land Use Application;

- Nunavut Water Board (NWB) Water – Water Use License Application including Supplementary Questionnaire for Mine Development;

- Indian and Northern Affairs Canada – Foreshore Land Lease Application under the Territorial Lands Act for use of the ocean floor to construct and operate the marine jetty; and

- Fisheries and Oceans Canada - Application for Authorization for Works or Undertakings Affecting Fish Habitat.

3.4 Protected Areas

There are no protected areas in, or adjacent to the Project area. The closest designated land use restriction is the Queen Maud Gulf Bird Sanctuary located approximately 40 km east of the Hope Bay Belt.

3.5 Archaeology

West Kitikmeot has a diversity of archaeological and historic resources and such resources comprise an important aspect of Inuit culture, spirituality and perspectives with respect to relationships with the land. MHBL has completed comprehensive baseline surveys for historic and cultural resources in the Project area and have identified over 100 sites with some being in close proximity to Project features. Project features such as the road to Tail Lake from the plant site and two of the proposed quarries could affect up to four archaeological sites, none of which is considered to be of high value and thus can be mitigated through data collection.

4.0 PROJECT DESCRIPTION

4.1 Project Summary

Miramar Hope Bay Limited (MHBL) is proposing to construct, operate and reclaim a small underground gold mine (the Doris North Project) on the Canadian mainland in the West Kitikmeot region of Nunavut approximately 110 km southwest of Cambridge Bay and 75 km northeast of Umingmaktok. The Project is located on Inuit Owned Land at 68 09" deg. N x 106 40" deg. W, 5 km south of the head of Roberts Bay, an extension of Melville Sound which connects with Bathurst Inlet about 80 km west of the Project.

The Project consists of construction, operations, decommissioning and post closure phases, with exploration activities being conducted throughout the development and operations periods.

Mineral exploration on the 80 km long Hope Bay greenstone belt has been ongoing since the early 1990's. MHBL has been exploring for commercial mineral deposits in the area since 2000 when it acquired the right to conduct such exploration from BHP Minerals Ltd. Since then a number of prospective gold deposits have been found, out of which three significant mineralized areas have been identified: the Boston area, the Doris North area (includes Doris North, Doris Connector and Doris Central) and the Madrid area (includes the Naartok, Suluk and Madrid mineralized resource areas).

Exploration work conducted through 2001, indicated that the Doris North deposit had readily accessible higher ore grade resources than the Boston or Madrid mineralized areas and thus offered Miramar an opportunity to reach commercial production at a low capital outlay. A feasibility study was completed on developing the Doris North resource in early 2003. This feasibility study indicated that this resource could be economically developed as a small tonnage underground mine (subject of this document).

MHBL has continued exploration activity at other sites on the belt with primary focus on the Boston and Madrid areas. In 2005 the Company intends to spend approximately $13 million on drill programs designed to upgrade gold resources at the Boston and Madrid deposits to technical levels which, if results are positive, would be incorporated into feasibility studies in 2006. To date feasibility studies on the resources at these other two areas have not been completed and thus it is not known whether the resources identified in these areas can be commercially developed. However MHBL is encouraged by its exploration activity at both the Madrid and Boston areas and feels that there is good reason to be optimistic that sufficient resources will be identified at both of these sites to allow these deposits to also be brought into commercial production in the foreseeable future.

The Doris North Project will consist of an underground mine with a single adit and ramp access. The ore will be brought to surface where it will be stockpiled and processed through a crushing and milling plant with a nominal capacity of 668 t/day (design capacity of 800 TPD and an operating factor of 83.5%). The product will be shipped off site in the form of dore bars. This Project is expected to operate for 24 months, process 458,000 tonnes of ore yielding approximately 306,830 ounces of gold. The site is remote and there are no permanent or winter roads that link it to any neighbouring communities or facilities. Currently, there is no infrastructure development on the site, with the exception of an exploration camp on the east shore of Windy Lake, located approximately 10 km west of the project site. The primary access route to the property for fuel, equipment and supplies will be via the Arctic Ocean (sealift). The

proposed mill site is located approximately five kilometres from Roberts Bay. This area is accessible by ships and barges for a short ice-free shipping season. A jetty will be constructed in Roberts Bay as a landing facility for the sealift vessels. Equipment will be offloaded and stored in a lay down area close to the shore. Annual fuel supply will be trucked from the sealift vessels to a 7.5 million litre tank farm constructed at the plant site.

A 4.8 km all-weather road will link the Roberts Bay sealift landing site with the mill and camp location (plant site), allowing year-round haulage of supplies from the sealift landing site laydown area. The mill, crushing plant, fuel storage tank farm, camp, office complex, workshops, power generation plant, sewage treatment plant and all other operational mine infrastructure will be located in a central location adjacent to the underground mine adit. An all-weather airstrip, suitable for small aircraft will be constructed along the alignment of the main road between the plant site and Roberts Bay. During summer months the site will also be serviced by float planes and for that purpose a dock will be constructed on the shore of Doris Lake. This dock will be linked to the mill site with an all-weather road. During winter months an airstrip capable of handling larger aircraft will be constructed on the ice on Doris Lake and the site serviced from this airstrip.

Tailings produced during the milling process will be deposited in Tail Lake about five kilometres from the proposed mill location. Tailings deposition will be sub-aqueous, requiring the construction of two water retaining structures: the North and South Dams. The tailings will be contained in Tail Lake by constructing a low permeability frozen core "Ekati – style" dam across the outlet of Tail Lake to the north and by a similar second dam constructed across a topographic low point at the south end of the lake. An all-weather service road will be constructed along the east side of Tail Lake all the way to its southern end. The tailings pipeline will follow the roadway, and emergency tailings dump ponds will be constructed at strategic locations. Mill tailings will be treated in a water treatment plant within the mill to destroy residual cyanide and precipitate heavy metals before the tailings are discharged into Tail Lake. The water quality eventually discharged from Tail Lake will meet discharge standards established under the Metal Mining Effluent Regulation. Water quality within Doris Creek downstream of the waterfall will meet Federal water quality guidelines for the protection of freshwater aquatic life (fish and benthic invertebrates).

The Project is proposed to begin with initial equipment arriving by sea-lift in the fall of 2007. Development of the underground mine, construction of the road, building pads, airstrip, fuel storage facilities and the tailings dam would commence in the 1st quarter of 2008. The milling equipment, the other infrastructure components, remaining equipment and the first year's operating supplies would arrive on the 2008 sealift. Production would commence at the end of 2008 and continue through the end of 2010. A construction workforce peaking at 120 will be required to carry out construction and site development work from January through December 2008. During operations, milling and processing will need a total workforce of 24 from the 4th quarter of 2008 to the 1st quarter of 2011, underground mining will require a peak workforce of 60 from early 2008 through the end of 2010, while maintenance support, catering, supervision and administration will require a total workforce of 81. Of the total operating workforce it is expected that half would be on site at any given time. The Project is predicted to result in an increase in direct employment in Nunavut by 371 person-years, with 159 person-years of this total predicted to go to Aboriginal People (Howes, 2005). The Project is predicted to increase total (direct plus indirect) Territorial employment by 443 person-years; 371 person-year increase in employment in the Goods Industries (the same as the direct effect), a 71 person-year

increase in the Service Industries, and a 2 person-year increase in Public Administration (Howes, 2005).

The decommissioning phase of the Project will commence after all ore has been depleted, and will consist of reclamation and decommissioning activities related to all of the facilities constituting the Project.

Proposed Development

- A 24-month operating life based on currently known ore reserves;
- An underground mine producing approximately 458,000 tonnes of ore and 206,000 tonnes of waste rock;
- Non-Acid generating rock extracted from four quarry sites located in close proximity to the proposed infrastructure components will be used in construction of surface infrastructure (building pads, laydown areas and roads);
- An ore processing plant on site at a nominal rate of 690 tonnes per day (255,000 tonnes per annum) to produce ~306,830 ounces of gold over two years;
- Ore treatment by gravity separation, followed by froth flotation, cyanide leach of the flotation concentrate and recovery of the dissolved gold using activated carbon in a carbon-in-pulp (CIP) circuit;
- Gold bullion smelting at an on-site facility producing a gold dore; and
- Cyanide leach slurry from the CIP circuit will be treated within the mill using the Caro's Acid cyanide detoxification process. The detoxified leach slurry will be combined with the flotation tailings for co-disposal in the Tail Lake tailings containment area.

Access and Transportation

- Sealift of construction and operating supplies to an off-loading site at the south end of Roberts Bay, approximately 5 km from the Doris North Site;
- A rockfill jetty constructed in Roberts Bay for barge loading/off loading;
- A 4.8 km all-weather access road to be constructed from Roberts Bay to the Doris North Project site;
- A 914 m long airstrip to be constructed as a widened section of the all weather access road from Roberts Bay;
- Float and ski plane access on Doris Lake; and
- Ice strip for aircraft in winter on Doris Lake.

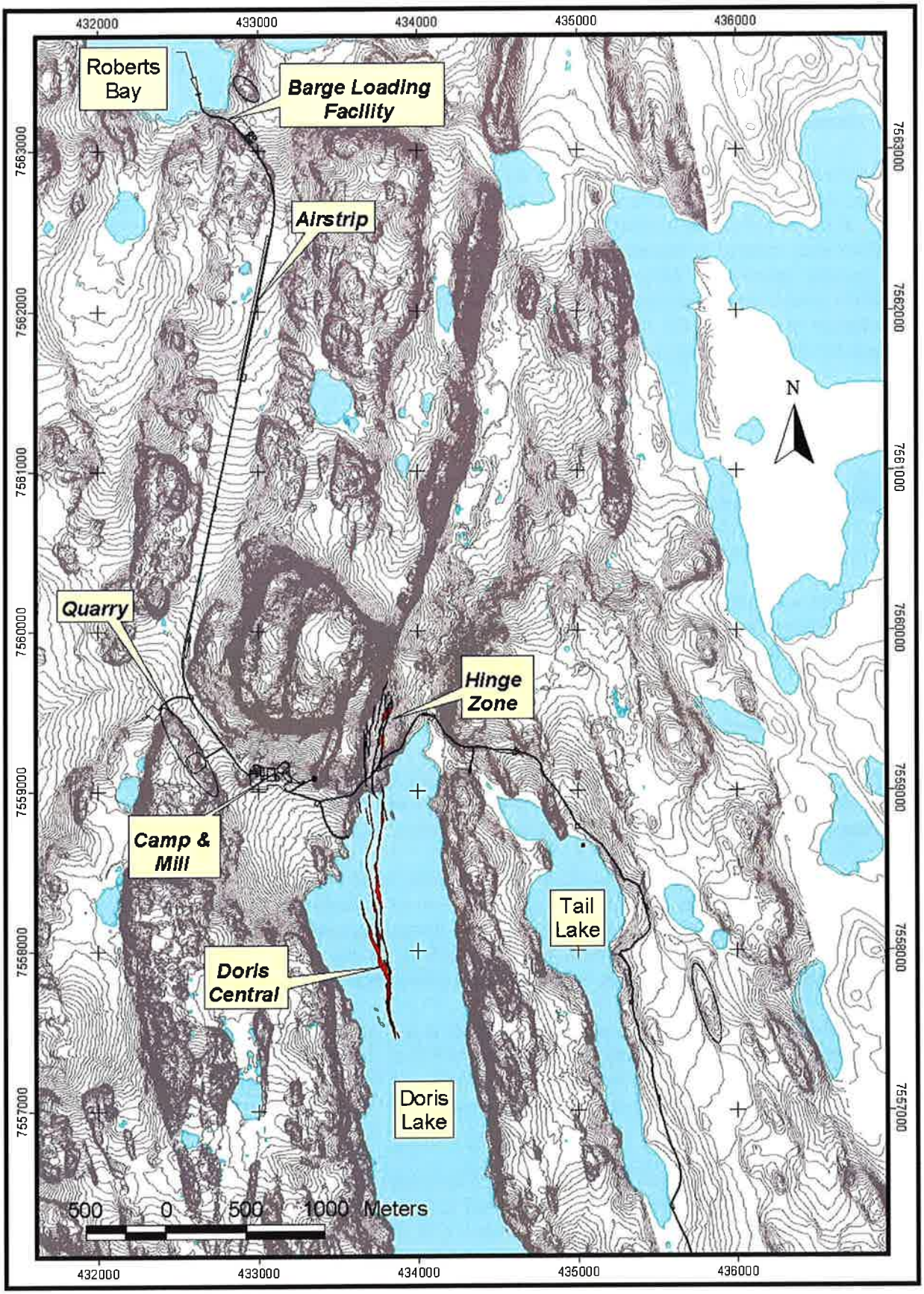
Utilities

- Power Supply - On-site installed diesel generators at the Doris North Project site (4 x 1.0 MW units);
- Freshwater Supply - Doris Lake;
- Process water - Approximately 50% of recycle water from the tailings containment area should be achievable for the first few years after which recycle may increase to 100%. The deficiency in process water would come from Doris Lake;
- 175-person accommodation camp on site.

4.2 Ore Reserves and Mine Life

The Doris North Project as proposed will be a small, short-life underground gold mine. The mine is expected to produce 458,000 tonnes of ore over a two-year mine life. This represents the known mineable reserve in the Doris Hinge ore zone. The expected diluted grade is 22.0 g/t gold with a predicted milling recovery of 94.9%. The surface expression of the ore deposit is shown in plan view in Figure 4.1.

MHBL sees the opportunity for future development in the Hope Bay Belt as very good. As of today, the only deposit for which a feasibility study has been completed at Hope Bay is Doris North. MHBL has examined possible extraction possibilities for the other resource centres including Boston, Naartok, Suluk, and Doris Central as possible extensions to the proposed Doris North Project. In examining these other deposits it was determined that processing of these ores within a single location provided for optimum project economics.



		Doris North Mine Closure & Reclamation Plan Nunavut, Canada			
		Surface Expression of Ore Zones			
MIRAMAR HOPE BAY LIMITED		PROJECT: VM00259A	DATE: Oct 2003	APPROVED: LTC	FIGURE: **4.1**

4.3 Underground Mine

Underground mining will be carried out by a combination of mechanized cut and fill and open stoping, assuming a minimum mining width of 2.5 m and external dilution averaging 17% at zero grade. A full spectrum of mining methods was considered. One of the most important aspects to consider was control of excavation geometry as this is a very high-grade deposit with variable and narrow geometry. Mining methods selected were, open stoping (drilling with electric hydraulic jumbo drills and jacklegs) and mechanized cut and fill. Mining methods were assigned to portions of the deposit based on shape of the mining solid and apparent vein variability defined by drilling. The selected methods are described below:

4.3.1 Open Stoping

Open stoping was chosen for all of the hinge area. It is a top-down mining method where the majority of the drilling will be done by electric-hydraulic jumbos using 4 m steel. A 3 m by 3 m pilot drift will be driven in ore, following the hanging wall near the apex of the hinge, and the ore along the sides will be slashed into the drift. Ground support, will be installed and the floor will be benched by drilling and blasting to recover all the ore.

The design allowed for a maximum of 20% in-stope-ramp grade on the hanging wall and footwall. Where the hinge plunged more steeply than could be followed with an in-stope-ramp at 20% grade, waste mined to maintain the 20% was included in the mining solid as internal dilution.

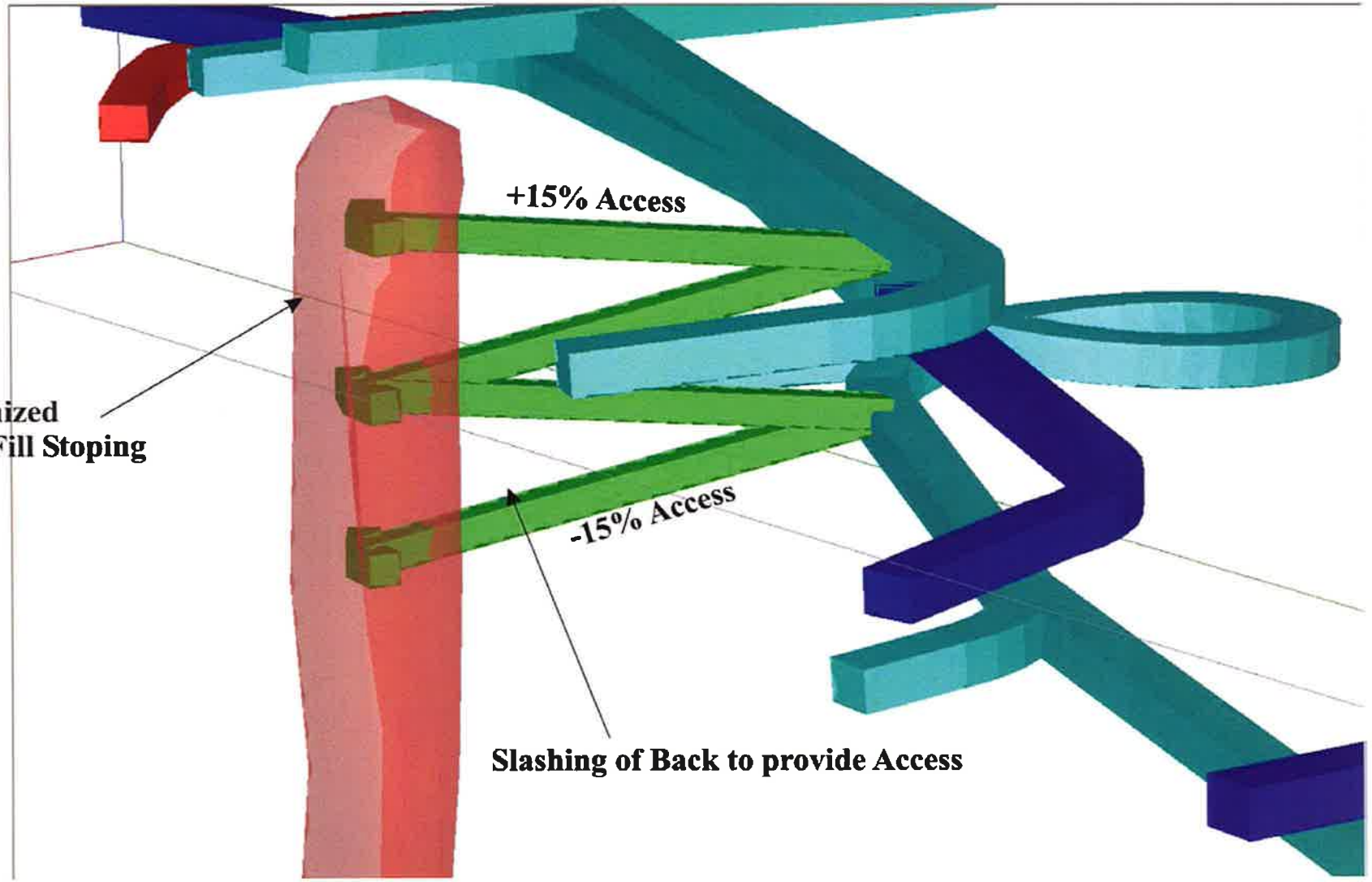
4.3.2 Mechanized Cut and Fill

Mechanized cut and fill using development waste for fill, was chosen for the remaining portions of the deposit. This method is highly flexible and will allow for dealing with irregularities in structure or grade. This mechanized cut and fill method is shown graphically in Figure 4.2.

A drift is driven along the ore structure at a planned width of 2.5 m. As it is an ore extraction drift, and not a travel way there is no legal minimum clearance required beyond the width of the equipment. Rock bolting is done along the ribs where necessary, and then a 3 lift is slashed down from the back, either by horizontal breasting, or by using uppers. Ground support is installed in the new back and ribs, and then the broken ore is mucked out using a scoop tram.

The initial access from the haulage system to a cut and fill stope is driven at minus 15% gradient and results in a decrease in elevation of 7.5 m. After each lift of ore is mucked out from the stope, the back of the access ramp is slashed and the broken muck is used to fill the ramp to provide level access to the stope at the elevation of the top of the next lift of fill (an increase of 3 m in elevation).

Waste rock is then placed in the stope, filling it to within 3 m of the new back, and the next lift is mined. When successive lifts have been mined to the point that the access ramp has increased in gradient to plus 15% a new access to the ore is driven at a gradient of minus 15%. In this way, the accesses to each stope will be spaced 15 m vertically apart.



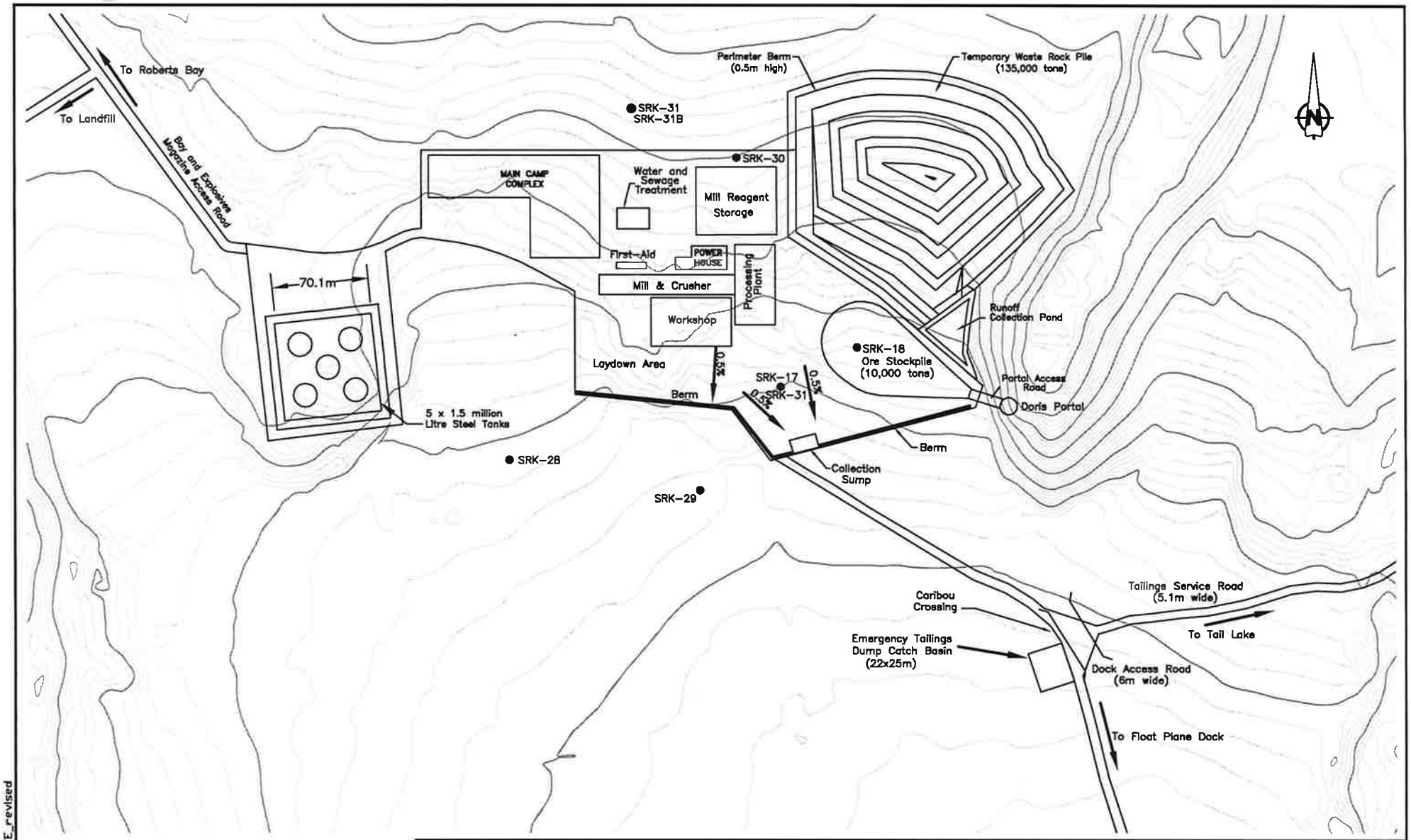
MIRAMAR HOPE BAY LIMITED

Doris North Mine Closure & Reclamation Plan
Nanavut, Canada

Cut and fill mining

PROJECT	DATE	APPROVED	FIGURE
VM00259A	Oct 2003	LTC	4.2

Underground mining for the Doris Hinge ore zone will commence with construction of a 4 m high by 5 m wide portal, collared at surface near the mill. The location of the ramp portal (Doris Portal) is shown in Figure 4.3. It will access the northeast trending ore zone by way of a decline ramp going down to the 2,991 m level (a vertical depth of approximately 36.5 m). The ramp will have a 10% slope and be approximately 900 m in length.



Contour Interval = 1m
UTM Projection: NAD83 Zone 13

SRK Consulting
Engineers and Scientists

MIRAMAR HOPE BAY LIMITED

DORIS NORTH PROJECT
Preliminary Surface Infrastructure Design

Detailed Plan Layout of Mill/Camp

PROJECT NO.	DATE	APPROVED	FIGURE
1CM014.006	Sept 2005	EMR	4.3

Dwg Ref: DETAIL-MILL-SITE_revised

Initial ventilation of the ramp development will use two 45 kW (60 HP) high pressure fans with 1.2 m (48") diameter vent tubing supplying the required 21 m^3/s (45,000 cfm) to 4 pieces of equipment: one 2-boom jumbo, one 3 m^3 load hull dump (low profile underground front end loader (LHD), one 30 tonne truck, and one utility vehicle.

When the main ramp reaches the orebody, approximately 500 m ramp length from surface, a temporary ventilation raise/escapeway (Vent #1) will be driven to surface. At the top of the vent raise a large diameter low pressure 45 kW (60 HP) main fan will be installed to force 47 m^3/s (100,000 cfm) up the main ramp. The auxiliary fans used for development will then be relocated to the bottom of the vent raise.

As the ramp development reaches the northern and southern extents of the mine, two additional ventilation raises/escapeway (Vent #2 and Vent #3) will be driven to surface. The temporary raise (Vent #1) will then be sealed off and the two new raises (Vent #2 and Vent #3) will each have a low pressure large diameter 45 kW (60 HP) fan mounted on top of them. The fan, which will have a total capacity of 85 m^3/s (180,000 cfm), will be adjusted to force a total of 70 m^3/s (150,000 cfm) through the ramp system and up to surface, sufficient to accommodate the mobile equipment which will be in use at that time, as required by the NWT/Nunavut Mine Safety Act and Regulations. Fresh air will be drawn off the main ramp with auxiliary fans and forced into the working stopes. This configuration will remain in place until the ore body is mined out.

The 3 dimensional cross-section of the proposed Doris North underground mine is shown in Figure 4.4. (looking northwest) and in Figure 4.5 (looking southwest). It should be noted that all of the underground workings required to mine the Doris Hinge zone will be to the north of Doris Lake; none of the mine workings will extend underneath Doris Lake. Consequently no groundwater inflow from Doris Lake is expected. The mine workings for the Doris North Project are located within permafrost and are sufficiently distant from Doris Lake that groundwater inflow is not expected to be significant (i.e., based on geotechnical investigations conducted in 2002/2003, it is believed that the talik zone caused by Doris Lake is limited to the perimeter of the lake.

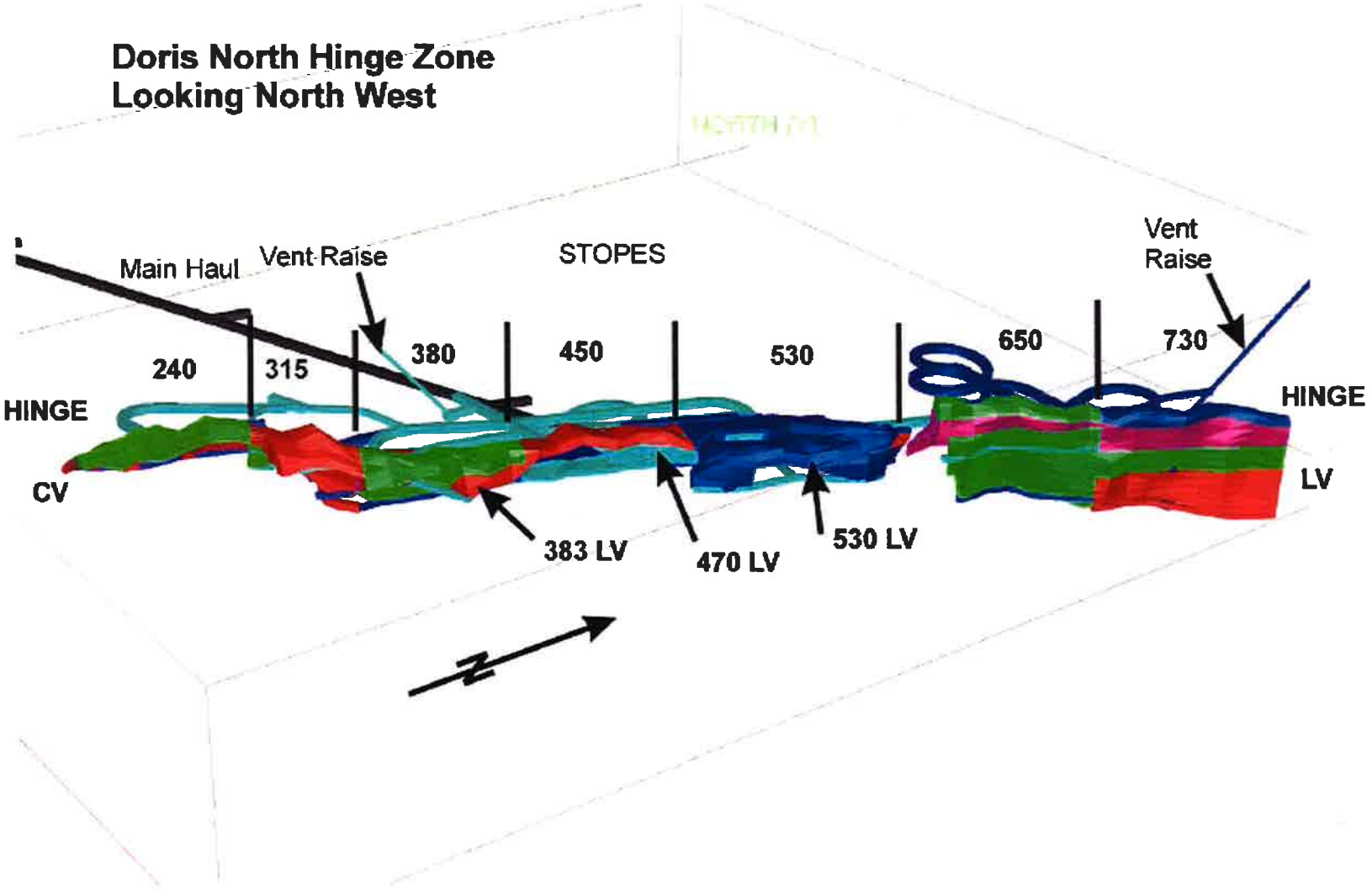


Figure 4.4 Doris Hinge Zone Mine Design Looking North West

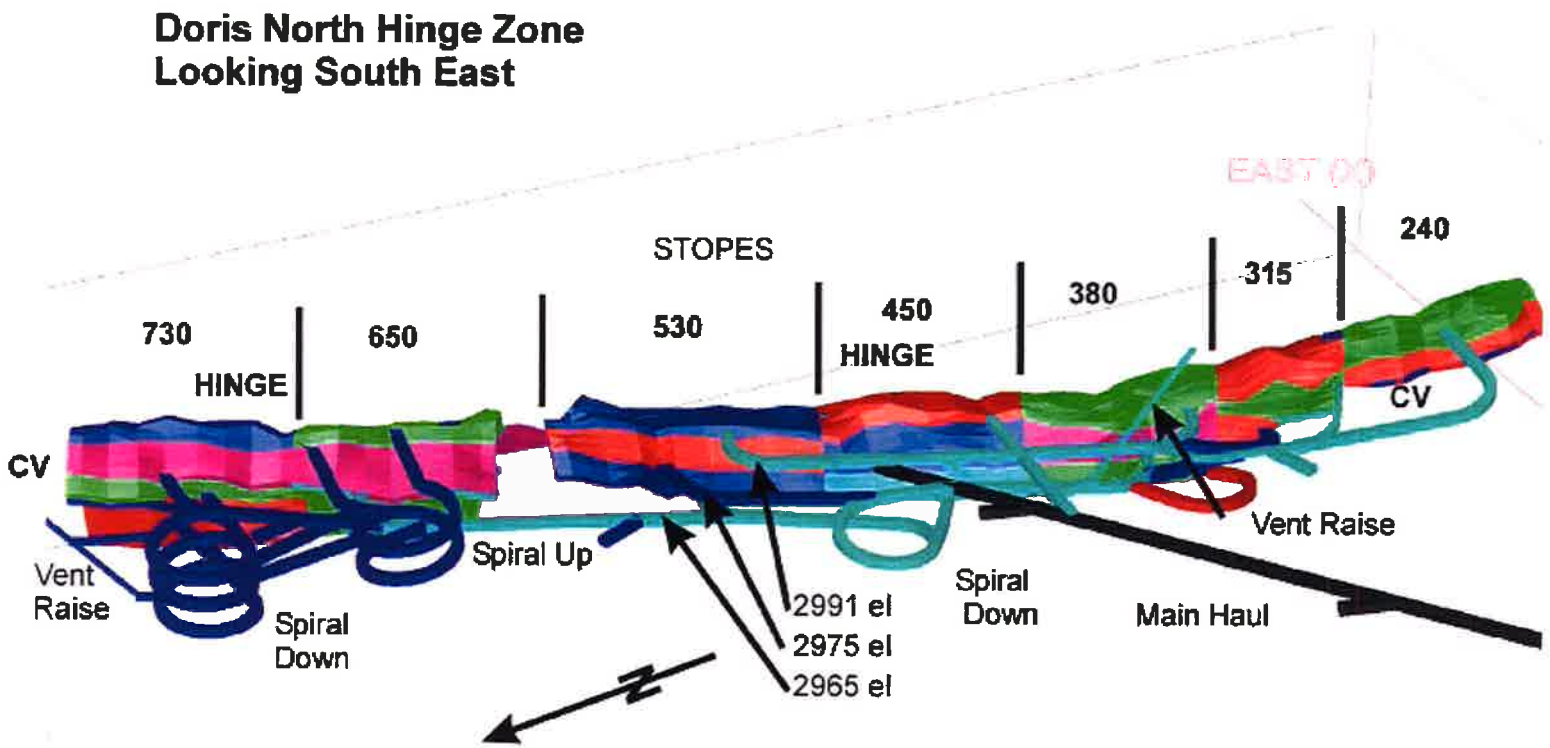


Figure 4.5 Doris North Hinge Zone Mine Design Looking Southeast

Water for drilling and dust suppression will be supplied from sumps and re-cycled to them. Due to the freezing conditions a brine solution will be used. The sumps will be charged by a 50 mm (2") line from the mill. Once a sump is full the pumping will stop and the line blown clean with compressed air to eliminate freeze-up. Potable water will be supplied in bottles.

A leaky feeder system will provide communication for the entire underground mine. The system will also allow radio contact directly to the maintenance shops. A second communications line (emergency phones) will be installed directly to the underground safety station and to an appropriate location on surface such as the security desk, the first aid room, or the surface mine rescue station.

Underground trucks will haul the ore from the underground mine to a stockpile located on surface near the ore processing plant.

The mining rate will be nominally 668 tonnes per day, with 458,000 tonnes of ore being extracted over the 24-month operating life. Mining is projected to be complete in the fourth quarter of 2010. The underground mine operations workforce is expected to consist of approximately 75 persons.

The major pieces of mobile equipment required for mine operations (mining and surface) will consist of:

- 2 double boom electric/hydraulic jumbo drills
- 3 single boom electric/hydraulic jumbo drills
- 3 - 3 m^3 scooptrams
- 4 - 1.5 m^3 scooptrams
- 2 - 20 tonne underground diesel haul truck
- 2 diesel powered portable air compressor units
- 1 scissors lift truck
- 4 underground equipped pick up trucks
- 1 966 Front-ed loader
- 1 road grader
- 1 20-person capacity minibus.

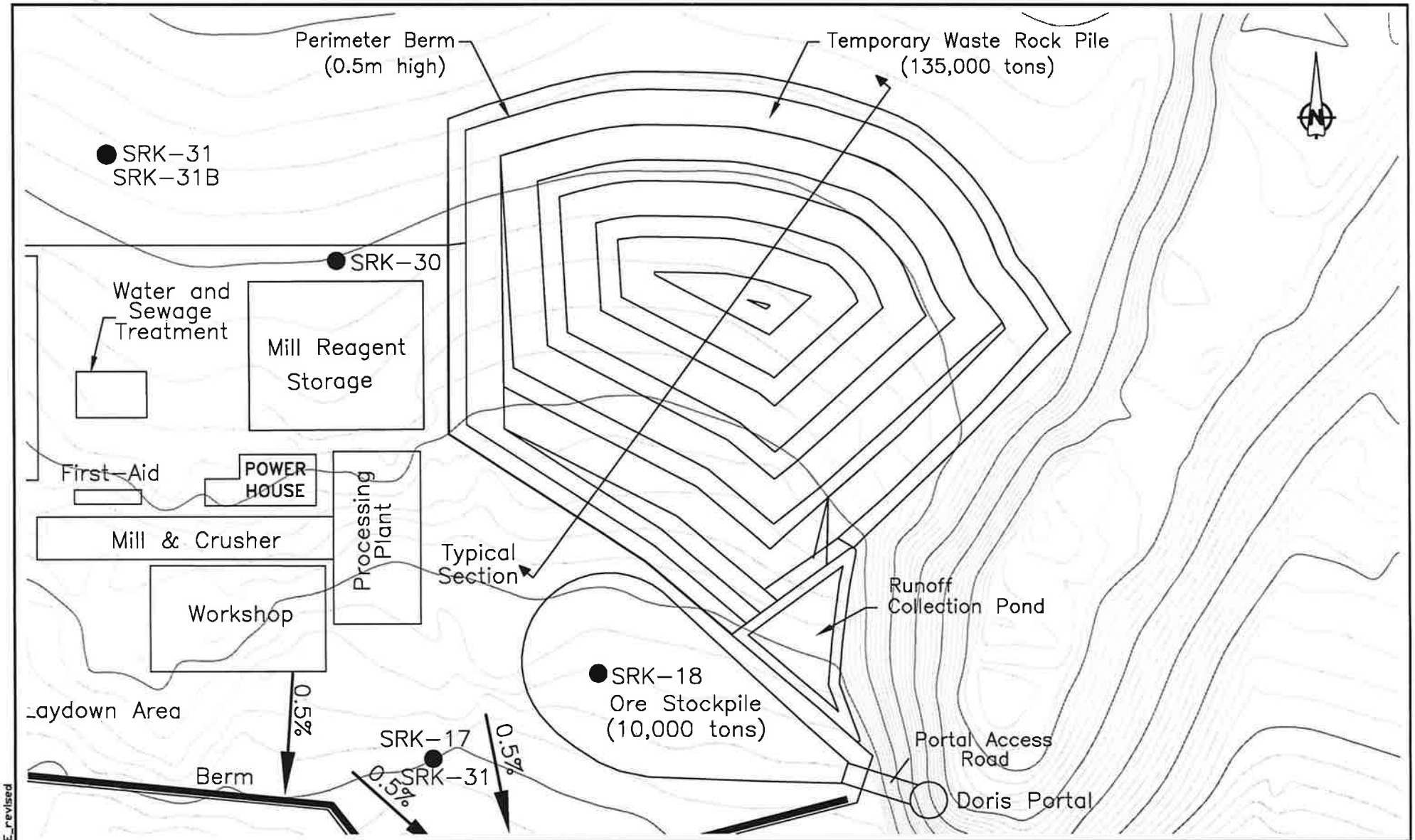
4.4 Waste Rock Management

Broken rock excavated by development of the ramp and underground mine workings will be placed into a temporary waste rock stockpile to be located immediately to the north of the mine adit portal (see Figure 4.3) and then returned into the underground mine as backfill during the mine life. As mining progresses it is expected that all development waste rock will be used internally as backfill within the mine workings.

The project will not involve the stripping or removal of any vegetation and/or overburden; a practice that could have serious impacts on permafrost degradation, resulting in the generation of mud and sediment that could potentially enter surface waters. It is proposed that rock fill building pads be constructed directly on top of the existing terrain. Consequently, no overburden stockpiles are proposed as part of this project.

4.5 Process Facilities

The mill and camp complex will be located in close proximity to each other and will be constructed partly on exposed bedrock and partly on permafrost tundra. Where facilities will be on permafrost the pad thickness will be at least 2.0 m. Figure 4.3 - Detailed Site Infrastructure Layout at Mill/Camp Location and Figure 4.6 - Detailed Plan Layout of Mill/Camp show the proposed layout of the facilities in this general area. The total pad and surface area is estimated to be 62,600 m^2, requiring approximately 55,100 m^3 of fill.



Dwg Ref: DETAIL-MILL-SITE_revised

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DORIS NORTH PROJECT
Preliminary Surface Infrastructure Design

Plan Layout of Temporary Waste Rock Pile

PROJECT NO.	DATE	APPROVED	FIGURE
1CM014.006	Oct. 2005	EMR	4.6

4.5.1 Ore Stockpile

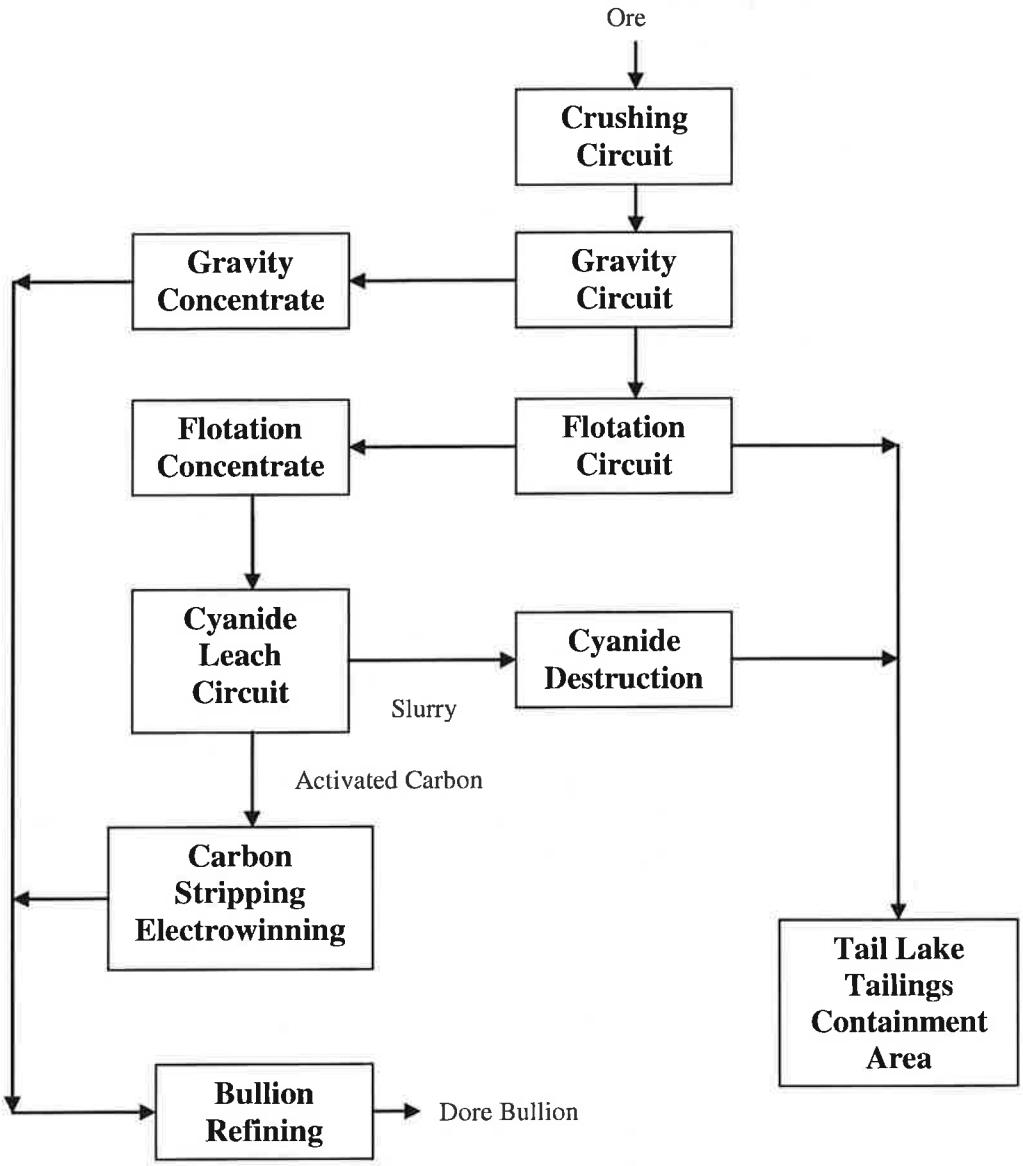
In the area between the portal and the crusher an ore stockpile pad measuring roughly 5,000 m^2 (100 m x 50 m) will be constructed (Figure 4.6). This ore stockpile of approximately 10,000 tonnes, or 15 days of mill feed will be end dumped by the underground haul trucks where ore will be drawn from the surface stockpile using a front-end loader and fed into the primary jaw crusher.

4.5.2 Surface Crushing and Ore Processing Facility (Mill)

The surface crushing plant and mill (approximately 2,715 m^2) will be located immediately west of the portal, on bedrock (Figure 4.3). The bedrock is already partially exposed in this area, and thus the foundation preparation will be limited to levelling of the site using precision blasting. The areas surrounding the mill and crusher complexes that are not on exposed bedrock will be levelled by infilling with run-of-mine quarry rock to form a final pad at least 2.0 m thick. This will serve to protect the underlying permafrost.

The ore processing equipment will be housed in a conventional steel clad, steel frame building, housing both the surface crushing facilities and the ore processing and gold recovery circuits. The mill and crusher floors will be concrete bunded structures with selected sumps to collect any spillage or wash water. The mill will be equipped with sumps designed to hold spillage equivalent to a minimum of 110% of the volume of the largest tank or vessel within that circuit. The mill will be arranged so that spillage is segregated by circuit, i.e., spillage from the cyanide leach circuit will be kept apart from spillage from the flotation circuit so that cyanide solution does not contaminate the flotation process thereby interfering with gold recovery and potentially bypassing the cyanide detoxification circuit. The individual sumps will be equipped with pumps designed to recover spillage for return to the appropriate circuits.

Figure 4.7 shows a block diagram of the proposed ore processing flow sheet. The mill is being designed for a rated capacity of 800 tonnes per day (36.2 tonnes/hour at an operating factor of 92%), however the nominal milling rate will be 668 tonnes per day (~ 27.8 tonnes per hour). Ore will be fed from the ore pad to the primary crusher by front-end loader. The product from the primary crusher will be conveyed to a crushed ore storage bin to be located indoors between the crushing plant and the mill. The crushed ore will be drawn from the storage bin by conveyor belt which will feed the ore into a SAG mill. The slurry output from the SAG mill will pass over a gravity concentrator and through cyclones to recover the "free milling" gold. It is projected that up to 40% of the gold contained in the ore will be recovered from the jigs, prior to the addition of any chemicals or reagents. The slurry output from the cyclones will be sent to a two-stage froth flotation process to recover the gold bearing sulphide minerals in the form of a flotation concentrate. The flotation circuit will reduce the mass of material going on for further processing to about 10% of the total weight of the ore processed. The remaining 90% will be discharged to the tailings containment area with no further treatment.



	Doris North Mine Closure & Reclamation Plan Nunavut, Canada			
	Block Diagram of Mill Process Flowsheet			
MIRAMAR HOPE BAY LIMITED	PROJECT: VM00259A	DATE: Oct 2005	APRROVED: LTC	FIGURE: **4.7**

The gold contained in the flotation concentrate will be extracted in a conventional agitated tank leach circuit using a dilute sodium cyanide solution to leach out the gold. The slurry from the leach circuit will be contacted with activated carbon in a carbon-in-leach (CIL) circuit to allow the dissolved gold to be adsorbed onto the surface of the activated carbon. The gold bearing activated carbon will be recovered from the leach slurry using screens.

The gold bearing activated carbon will then be stripped putting the gold back into a concentrated solution, known as pregnant solution. The pregnant solution will then pass through an electrowinning cell where the gold will be recovered from solution onto wire wool cathodes. The cathodes will be periodically cleaned with the resulting sludge smelted. The sludge from the cleaning of the electrowinning cell cathodes will be dried in an oven, mixed with fluxes (such as silica sand, borax and sodium nitrate) and smelted in a smelting furnace to produce gold bullion and a slag. Similarly, the gravity table concentrates will be mixed with fluxes and smelted on site to produce gold bullion and a slag. The slag will be recycled back to the milling process through the SAG mill and the bullion cast into dore bars which will be shipped off site to a custom refiner. Overall gold recovery in the milling process is projected to be 94.9%.

After recovery of the activated carbon, the cyanide leach circuit slurry will be treated in an effluent treatment circuit to detoxify the remaining cyanide. Cyanide detoxification will be achieved using the Caro's Acid process. In this detoxification process, free and weak acid dissociable cyanide complexes are oxidized to the much less toxic cyanide complex, cyanate (CNO). Metals are precipitated. The treated solution will then be combined with the flotation tailings slurry and pumped to the Tail Lake tailings containment area. The quality of the combined effluent discharged into the tailings containment area following cyanide detoxification is estimated to be: 0.29 mg/L Total CN (0.04 mg/L WAD CN), 32 mg/L CNO, <0.1 mg/L SCN, 1.0 mg/L Total Ammonia, 0.039 mg/L Total Cu, <0.05 mg/L Total Pb, 0.03 mg/L Total Nickel and 0.09 mg/L Total Zn.

4.5.3 Mill Reagents

The type and projected annual consumption of reagents to be used within the milling process are summarized as follows:

- 240 tonnes of sodium cyanide in 1 tonne tote bags;
- 48 tonnes of sodium hydroxide (caustic) in 1 tonne tote bags;
- 25 tonnes of copper sulphate in 1 tonne tote bags;
- 21 tonnes of frothing agent (for flotation) in drums;
- 4 tonnes of 3418A promoter in 1 tonne tote bags;
- 21 tonnes of Potassium Amyl Xanthate (PAX) collector in drums;
- 60 tonnes of hydrogen peroxide and 44 tonnes of sulphuric acid delivered in either 1000 litre bulk tanks or 208 litre drums for use in making Caro's Acid for cyanide detoxification;
- 46 tonnes sulphuric acid in drums;
- 262 tonnes of steel grinding media (steel balls) in barrels;
- 50 tonnes of activated carbon shipped in 1 tonne tote bags;
- 6 tonnes of smelting flux (borax, sodium nitrate, silica sand) in 1 tonne tote bags; and
- 1 tonne of steel wool cathodes.

4.5.4 Mill Workforce

The mill and assay lab work force is projected to be 31 persons, all owner personnel.

4.6 Surface Infrastructure

4.6.1 Service Complex (Workshop)

A 1,500 m^2 (30 m x 50 m) machine and maintenance shop and storeroom will be erected on site, in the vicinity of the camp and mill complex. The shop will be supplied with all tools and equipment required for service and maintenance of the underground mining equipment fleet. The shop will be linked to the mill and camp via Arctic Corridors, minimizing exposure of the workforce to the elements.

The workshop floor will be a concrete bunded structure with selected sumps to collect any spillage or wash water. These sumps will be emptied into the tailings feed line and pumped to Tail Lake.

4.6.2 Mill Reagent Storage Area

Mill reagents will be shipped and stored in 6.1 m x 2.4 m sea-can containers. A storage area measuring 1,890 m^2 (45 m x 42 m) will be provided immediately adjacent the mill for storing 20 containers single stacked, 2m apart (Figure 4.6). The mill reagent storage area has been sized based on the number of containers required to supply the mill for one year.

4.6.3 Mill and Camp Lay-down Area

An additional lay-down area for equipment and supplies, measuring 6,000 m^2 (100 x 60 m) will be constructed adjacent to the camp on the down slope side (Figure 4.3).

4.6.4 Camp & First Aid Station

A conventional 175-person capacity camp will be constructed at the Doris North Project site, consisting of a combination of modular skid mounted units linked together via Arctic Corridors (Figure 4.3). Rooms will be self contained, single occupancy rooms with attached bathrooms.

The kitchen and recreation facilities will be located in five additional modular skid mounted units joined to the rest of the camp via Arctic Corridor. The first aid station will be located in a separate modular unit connected to the rest of the facilities by an Arctic Corridor.

The camp will be located west of the mill complex (Figure 4.6) with access to the camp, mill complex and shop for workers provided via Arctic Corridors. Where bedrock is not present, the modular camp units will be placed on 2.0 m thick rock-fill pads to protect the underlying permafrost.

4.6.5 Office/Dry Complex

The office and dry facilities will comprise six modular skid mounted units joined together, and ultimately joined to the dorms via the Arctic Corridor. Three of these units will comprise the dry area, and three will be the office area. This office will be fully equipped with electrical and communication outlets.

4.6.6 Boat & Float Plane Dock

A boat and float plane dock will be constructed in the small bay on Doris Lake immediately southeast of the mill. The rockfill dock will consist of a 10 m wide by 40 m long extension of the dock access road. This extension will be constructed by placing quarry rock directly onto bottom sediments. This platform will extend approximately 10 m into Doris Lake to ensure a minimum water depth of 1.2 m immediately adjacent to the dock. A vertical dock face will be constructed using wooden cribbing to retain rock fill and provide an appropriate surface for aircraft to moor against. The platform height will be 0.5 m above the normal water level in Doris Lake. Mooring cleats will be embedded in the platform to provide contact points for securing float planes and watercraft.

4.6.7 Explosive Storage Facilities

MHBL will need to provide permanent and temporary storage for the following annual amounts of explosives and detonators on site;

- 38,000 kg of explosives,
- 39,000 detonators, and
- Peak annual supply of bulk ammonium of 700,000 kg.

An on-site AN/FO mixing plant will produce a maximum amount 10,000 kg at any one time. For design purposes the total amount of mixed product was assumed to be 20,000 kg which includes the weight of mixed explosives and half the weight of ammonium nitrate in the mixing plant building.

Regulations governing the storage and mixing of explosives require that powder and detonators are stored in independent magazines and that all bulk ammonium nitrate storage, explosives and detonator magazine and the mixing plant be separated by a minimum distances based on the amounts that are being stored (NRCan 1995).

In addition these regulations require the explosives storage and mixing facilities to be separated by minimum distances from permanently occupied buildings and roadways. These facilities (proposed permanent and temporary (construction) facilities) have been sited on spur roads off of the main road from Roberts Bay to ensure that these minimum setback distances are met as shown in Figure 1.2.

In interpreting the minimum distance requirements, it should be noted that the road between Roberts Bay and the mill site has been classified as a lightly traveled road based on the following:

- The road is used to haul goods from the annual sea-lift to the camp lay-down area (a couple of weeks every year)
- Fuel is only hauled along this road for a 2 week period every summer
- The road is used to transport personnel from the airstrip to the camp (3 to 4 scheduled flights a week)
- Explosives will be hauled to the mine along this roadway
- The transportation of explosives shall be in accordance with the Explosives Act

The actual explosives and detonator magazines will be Type 4 prefabricated magazines, contained within sea cans. The mixing plant will also be a pre-manufactured facility contained within a sea can.

The permanent explosives magazines and storage areas will be placed on 2 m thick rock fill pads while the temporary explosives magazines and storage areas will be founded on ice pads and accessed by an ice road. These pads will occupy the following approximate footprint;

- Detonator magazine = 430 m^2
- Powder magazine = 630 m^2
- Explosives magazine plant = 630 m^2
- Bulk ammonium nitrate storage area = 3,000 m^2

4.6.8 Power Generation Facilities

Electrical power for the project will be generated on-site by means of diesel electric generator units with a capacity of 4.0 MW (4 x 1.0 MW diesel electric generators). The units will be installed in a permanent steel structure (powerhouse) measuring approximately 384 m^2. This building will be constructed immediately adjacent to the mill and crusher building (Figure 4.3).

4.6.9 Fuel Handling and Storage Facilities

Every year 7.5 million litres of fuel will be shipped to Roberts Bay via sea-lift and pumped to a fuel truck at a contained fuel transfer station. The fuel transfer station will be located across the all weather access road from the Roberts Bay lay-down area, a minimum 100 m inshore from Robert's Bay. From the fuel transfer station, fuel would be hauled by standard fuel trucks via the all-weather access road to a permanent tank farm at the mill. The fuel transfer station will have an approximate footprint of 32.0 m by 16.5 m and be constructed on a HDPE lined pad with lined containment berms a minimum 0.5 m high. The containment berms will allow for the station to retain over 110% of the capacity of the largest fuel truck at 40,000 L. Ramp accesses for the fuel trucks will be located at opposite ends of station, allowing for safe drive through access. The access ramps will be 6 m wide and graded at a 5H:1V slope. The fuel transfer

station pad will be a minimum of 2.5 m thick to preserve the permafrost and be graded at a slope of 1% to a collection sump. The pad will be constructed with the same specifications as the permanent lay-down area. The HDPE liner will be placed at a depth of 0.3 m below the pad surface and be built to the same specifications as the permanent tank farm liner described in the following section.

Annually 7.5 million litres of fuel will be trucked from the fuel transfer station at Roberts Bay to a permanent tank farm at the mill site location (Figure 4.3). The regulations governing the bulk storage of fuel in aboveground storage tanks are in the process of being upgraded. The tank farm has been designed in accordance with the principles outlined in two working documents: Environment Canada's 'Proposed Federal Petroleum Products and Allied Petroleum Products Storage Tank Systems Regulations' (Environment Canada 2003) and the Canadian Council of Ministers of the Environment's (CCME's) Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products' (CCME 2003). While these documents are not yet in the legal standards, it is expected that all new fuel storage facilities will be required to adhere to the standards therein. These guidelines also refer to minimum safe distances from other buildings.

The 7.5 million litre capacity fuel tank farm (five 1.5 million litre steel tanks, measuring 14.8 m diameter and 9.8 m high) will be constructed on a level precision blasted surface, on a partially exposed bedrock section at the mill site. Founding the tank farm on bedrock eliminates the risk of foundation settlement which may lead to pipe rupture and fuel spills.

The tanks will be erected in an engineered containment area consisting of a HDPE lined pad, with minimum 0.8 m high lined containment berms, having sufficient capacity to retain 100% of the volume of the largest single fuel tank (1,500 m^3) plus 10% of cumulative volume of all additional tanks (600 m^3). The base of the containment area will be graded at 1% to a corner sump location that will be used to pump out storm water and snowmelt directly onto the tundra using a removable pump. Any fuel spills will be pumped to appropriate containers. A minimum pad thickness of 0.5 m will be placed at the base of the sump; pad thickness elsewhere is determined by 1% slope of pad floor.

To ensure capture of any fuel spills during transfer from tanker trucks to the storage tanks, a secondary fuel transfer station will be located inside the secondary containment berm. Ramp access for the fuel truck to the fuelling station will be located at one corner of the secondary containment berm. This ramp will be 6 m wide and will be graded at a 5H:1V slope to allow safe access for the fuel truck.

The tank farm will have a footprint area of approximately 5,041 m^2 (63.3 m x 63.3 m). The pad will be a minimum of 0.5 m thick with a minimum 0.8 m high containment berm surrounding the entire facility, for a total berm thickness of 3.1 m.

The HDPE liner will cover the entire inside area of the tank farm, including the inside slopes of the containment berms and the base of the sump. The liner will be installed between two layers of geotextile, which in turn will be placed between two 0.3 m layers of appropriately crushed pea gravel and/or geotextile. The primary construction material for the tank farm will be clean quarry material crushed to <38 mm.

The tank farm requires a small building to house a generator and provide general storage. For these purposes a 6.1 m x 2.4 m x 2.4 m metal sea container (seacan) will be located immediately adjacent to the tank farm at one corner of the secondary containment berm.

4.6.10 Quarries

Geotechnical drilling undertaken during 2003 has provided information on the foundation conditions at all proposed locations of the major surface infrastructure components. The information obtained from exploration and geotechnical drilling and thermistor installations suggests that the active layer over the permafrost is between 1.5 and 2.5 m thick. Thermal modelling suggests that in order to protect permafrost the minimum pad thickness will have to be between 2 and 2.5 m.

"Clean" (non acid generating and non-metal leaching) waste rock will be available from development of the underground mine access ramp. The quantity will be insufficient to meet all of the needs for site construction. Additional rock will be obtained from three quarry sites located close to the major infrastructure components. The location of the proposed quarries is shown on Figure 1.2:

- Quarry at the south end of Roberts Bay adjacent to the proposed sealift offloading jetty site (Q1);
- Quarry at the Doris North Project site west of the proposed camp (Q2);
- Quarry on the east side of Tail Lake close to the proposed tailings dam site (Q3); and
- Quarry at the mill site (levelling of a rock outcrop to found the mill building foundations (Q4).

The quarries will be drilled and blasted in benches, and the rock will be hauled to where it will be required. Table 4.1 provides details with regard to the volume of fill required. The construction rock properties have been assumed to be as follows; specific gravity = 2.50, swell = 40%, LCM (Load Cubic Metre) density = 1.79 Mg/m^3, moisture content = 4%, reconsolidation = 50%, and the reconsolidated (excavated cubic metre (ECM)) density = 2.08 Mg/m^3. Assuming an average powder factor of 0.9kg/BCM, 245 tonnes of ammonium nitrate (ANFO) will be required to complete the surface infrastructure construction.

Table 4.1: Estimated Quarry Rock Volumes (neat) for Surface Infrastructure Components

Infrastructure Component	General Detail	Estimated Quantity[1]		Footprint Surface[1] Area (m^2)
		ECM (m^3)	Dry Tonnes	
Jetty	6m wide traffic surface; 1.2:1 side slopes; 0.5m sediment consolidation; 103m length (SRK 2005b)	5,600	11,600	1,800
Jetty (contingency)	Allowance for excessive slumping and settlement during construction (SRK 2005b)	2,800	5,800	900
Beach lay-down area	60m x 100m surface area; 1.2:1 side slopes; 2.5m average thickness	16,300	33,800	6,700
Fuel transfer station	32m x 16.5m surface area; 1.2:1 side slopes, 3m average thickness; 0.8m high containment berm	2,000 (300 m^2 HDPE, 600 m^2 geotextile)	4,000	600
Tank farm at mill (7.5 million litre)	71m x 71m surface area; 1.2:1 side slopes; 0.5m average thickness; 0.8m high containment berm	5,200 (4,700 m^2 HDPE, 9,400 m^2 geotextile)	10,800	5,000
Tailings discharge decant road	5.1m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 378m length	5,700	11,900	2,400
Tailings discharge pump house pad	20m x 20m surface area; 1.2:1 side slopes; 2.0m average thickness	700	1,500	400
All-weather road (barge site to mill)	6m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 4.8km length	80,700	167,800	51,900
Road turnouts (2) (barge site to mill)	10m wide; 30m long; 1.2:1 side slopes; 2.0m average thickness	1,200	2,500	600
All-weather road (tailings service road)	5.1m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 5.9km length	88,500	184,100	59,000
Caribou crossings (8)	10m long; 5:1 approach slopes; 2.0m average thickness	2,500	5,200	2,500
Road turnouts (8) & turnaround (tailings service road)	10m wide; 30m long; 1.2:1 side slopes; 2.0m average thickness & 10m x 10m turnaround	5,000	10,500	3,100
Explosives magazine access road	5.1 m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 525m length	7,900	16,400	5,200
Float plane & boat dock service road	6m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 300m length	8,500	17,600	3,300
Landfill access road	6m wide traffic surface; 1.2:1 side slopes; 2.0m average thickness; 150m length	2,600	5,300	1,600
Bridge crossing and abutments (2)	10m wide traffic surface; 1.2:1 side slopes; 2.5m average thickness; 27m length	1,900	3,800	900
Permanent all-weather airstrip	23m wide traffic surface; 2.5:1 side slopes; 2.5 m average thickness; 914m length	66,900	139,100	32,500
Airstrip apron	17m x 40m surface area; 2.5:1 side slopes; 2.5m average thickness	2,000	4,100	1,600
Explosives magazines	3 pads, total 550m^2 surface area; 1.2:1 side slopes; 2.5m average thickness; safety berm; AN/FO pad	8,500	17,600	1,700
Mill and camp area	Mill Crusher Ore Stockpile Workshop Fuel tank farm Mill reagents storage Lay-down area Power supply Camp/Dry Mine office Sewage treatment plant Potable water treatment plant Waste rock pile pad and berm Waste rock pile pond berm	55,100 (1,000m^2 HDPE, 2,000m^2, geotextile)	114,600	62,600
Float plane & dock	10m x 30m surface area; 1.2:1 side slopes; 3.0m average thickness	900	1,900	1,000
Tailings emergency dump catch basins (4)	25.2m x 25.2m surface area; 2:1 side slopes; 2.0m average base thickness; 1m high containment berm	5,100 (1,200 m^2 HDPE, 1,200 m^2 geotextile)	10,600	4,400
North Dam	Refer to SRK (2005a) for details of this structure	65,400	136,100	12,100
South Dam	Refer to SRK (2005a) for details of this structure	42,100	87,400	12,800
Roberts Bay fish habitat	8 spurs with each 5m x 15m surface area; 0.5m thickness; and 6 rock spurs each with 5m x 20m surface area; 0.5m thickness (Golder 2005)	600	1,200	1,200
Doris Lake fish habitat	5 areas each with 25m x 25m surface area; 1.5m thickness; and 1 area with 30m x 30m surface area; 1.5m thickness (Golder 2005)	6,000	12,500	4,000
Shoreline protection	20% of 12.9 ha surface area (up to elev. 29.4m); 0.5m thickness (SRK 2005c)	7,600 (25,800m^2 geotextile)	15,800	15,300
TOTALS		**497,300**	**1,033,500**	**295,300**

The acid generating and metal leaching potential for the rock at these three quarry sites was characterized by acid base accounting and shake flask extraction testing conducted in 2002/2003. The proposed rock was characterized as having low acid generating and metal leaching potential. The three proposed quarry sites were geologically mapped in the summer of 2003. Representative chip samples were collected under the direction of a geologist from each of the rock types identified at each quarry site. All of the collected samples were subjected to whole rock analysis by XRF, trace metals content analysis, acid base accounting analysis including sulphur speciation and determination of inorganic carbonate content and for soluble metals content using the BC Ministry of Energy and Mines shake flask extraction procedure.

Acid base accounting testing indicated that the rock samples taken from all three proposed quarry sites are not likely to be acid generating (i.e., all three samples had low acid generating potential). Similarly shake flask extraction testing indicated that all three samples are not likely to be a significant source of metal leaching (i.e., the samples tested contained low levels of soluble metals and should not be a source of contaminant release).

A sample from the proposed mill site (Q4) was obtained through geotechnical drilling and from two holes (SRK-30 and SRK-31B). Samples from both holes were subjected to conventional ABA testing with the following results:

Sample	Paste pH	CO2 (Wt.%)	CaCO3 Equiv. (Kg CaCO3/Tonne)	Total Sulphur (Wt.%)	Sulphate Sulphur (Wt.%)	Sulphide Sulphur* (Wt.%)	Maximum Potential Acidity** (Kg CaCO3/Tonne)	Neutralization Potential (Kg CaCO3/Tonne)	Net Neutralization Potential (Kg CaCO3/Tonne)	Fizz Rating
SRK-30	8.8	2.49	56.6	0.09	<0.01	0.09	2.8	58.5	55.7	moderate
SRK-31B	8.5	5.91	134.3	0.14	<0.01	0.14	4.4	128.0	123.6	moderate

The quarry 4 material was similarly confirmed as being non-acid generating.

On this basis the selected quarry sites will allow for the production of a non-acid generating, chemically stable rock for use in the construction of the site infrastructure such as building pads, access roads and the airstrip. A program of ARD characterization will be conducted during construction to verify this conclusion.

4.6.11 Airstrips

The permanent all-weather airstrip must meet the minimum requirements of two design aircraft selected by MHBL; Dornier-228 and the De Havilland Twin Otter. A winter airstrip on Doris Lake will be sized to accommodate up to a Lockheed C-130/ L-100 Hercules. Both airstrips are to be equipped with lights for night use and with the instrumentation necessary to support IFR (Instrument Flight Rules) operations.

4.6.11.1 All-Weather Airstrip

The all-weather airstrip will be constructed by widening 914 m of the all weather road between the barge landing site and the mill to 23 m (Figure 1.2). This will ensure year round air access for small aircraft. This airstrip is not located in an optimum location with respect to the prevailing northwest winds. MHBL has accepted the operational limitations and risk associated with this airstrip location and alignment. While not operationally ideal, this location helps to minimize the overall footprint of the proposed project.

A 40 m x 17 m apron for vehicle parking and an emergency power generator, fuel storage and emergency shelter will be constructed at the southern end of the runway.

4.6.11.2 Winter Airstrip

Every year, once sufficient ice has developed on Doris Lake, a 1,524 m x 45 m airstrip will be constructed. The winter airstrip will also be instrumented and illuminated for IFR night operations, similar to lighting and instrumentation proposed for the permanent all-weather airstrip.

4.6.12 All Weather Roads

The all-weather roads will be constructed with a minimum fill thickness of the pad required to cover micro-relief and protect permafrost. Basic thermal modeling using site data suggest that pad thickness to ensure the integrity of the permafrost will be in the order of 2.0 to 2.5 m. For the purposes of this report a constant roadway thickness of 2.0 m has been assumed. Wherever possible, roadways will be constructed in the winter to ensure the integrity of the permafrost. All roadway fill will be from clean quarry material from three different locations (Figure 1.2). No underground waste rock will be used to construct the all weather roads, airstrip, building pads, laydown areas or other surface infrastructure components. Fill will be crushed to the required size fraction for construction on site.

The road surfaces will be 6 m and 5.1 m wide respectively for the main and secondary roads. Side slopes will be at angle of repose (40°, or 1.2H:1V). Roadway drainage will be via 0.5% surface grading in both directions from the centreline of the roadway for the main road, while secondary roads will be graded 0.5% in the down slope direction only. The pad will consist of a 0.2 m thick surfacing grade layer overlying a 0.3 m thick select grade layer. Both these will overlie a 1.5 m thick sub grade layer.

4.6.12.1 Main Road from Beach to Mill/Camp Site

The 4.8 km all weather road between Roberts Bay and the mill area will follow the natural topography, which is well suited towards road construction. There are no natural obstacles, and the grades are low, suggesting few construction difficulties. Between Roberts Bay and where the road will turn east towards the mill, the road will be constructed towards the windward side of the valley to avoid snowdrifts that occur in the lee side of the western outcrops. Between the turn in the road and the mill the road will follow along the northeastern edge of the valley before turning east into the mill location. There are a number of areas where culverts will have to be installed to allow seasonal runoff to continue flowing along its original routes, but there are no significant stream crossings along this stretch of road. The soil conditions consist of open tundra underlain by thick marine silts and clays with abundant ground ice overlying bedrock. Areas where the surface is marked by large ice-wedge polygons indicate that abundant ground ice encountered during drilling operations is widespread.

At two locations along the route the 6 m wide road will be widened to 10 m for a distance of 30 m to form passing turnouts (Figure 1.2). These turnouts provide space for passing and turnaround of vehicles traveling along the road.

4.6.12.2 Tailings Service Road

Tailings will be deposited into Tail Lake, necessitating a 5.9 km, 5.1 m wide all-weather service road. A 150 mm diameter insulated HDPE tailings feed line and a 100 mm diameter, insulated and heat traced return water pipeline will be placed on the shoulder of the road, taking up at least 1.5 m of the roadway space. The pipelines will be placed on the outside edge of the roadway, i.e. closest to the lake shorelines. This will minimize the number of pipe crossings required. Eight passing zones measuring 10 m wide and 30 m long will be constructed along this stretch of road to ensure safe passing of traffic. The locations of these passing zones are indicated on Figure 1.2.

The road will start at the mill and pass the portal on the south before following a north-easterly direction towards the northern end of Doris Lake. At this location a bridge will be constructed to cross the Doris Lake outlet. The road will then turn southeast and will approximately follow the east shore of Tail Lake, always above the projected full supply elevation in Tail Lake of 33.5 m. There will be a 10 m x 10 m turning platform adjacent to the South Dam where the road ends.

This roadway has been designed to have a minimum longitudinal grade of 1% at any point, as well as minimizing the number of low-points. Since the tailings and return water pipeline follow the roadway grade these aspects will enable the lines to be drained by gravity flow in the event of a stoppage of either pipeline. Contents of the tailings line will be collected at selected emergency dump catch basins.

4.6.12.3 Explosives Magazine Service Road

A permanent explosives storage and mixing facility will be constructed 800 m northwest of the camp, and accessed by the main all-weather road coming from the barge landing site (Figure 1.2). The detonator magazine will be 275 m off this road, which will ensure that it is tucked in behind a rock outcrop effectively shielding it from view to the mill and camp site. The powder magazine will be located on the same road 100 m beyond the detonator magazine, and both of these facilities will be joined to the bulk ammonium nitrate storage area and explosives mixing plant with approximately 110 m of additional roadway. These roadways will all be 5.1 m wide allowing only one-way traffic to and from the main road. Sufficient turn-around room will be provided in the magazine areas to allow for safe vehicle turn around.

4.6.12.4 Dock Service Road

The link between the boat and float plane dock will be a 300 m long, 6 m wide all-weather road. The road will join up with the airport access and tailings service road immediately south of the portal. This roadway will also provide the bedding platform for the two four inch diameter water pipelines from Doris Lake (fresh, and fire/mill water supply). These pipelines will be heat traced and insulated and will take up at least 1.5 m of the width of the road. At the road junction a series of culverts will be installed to allow crossing of the two fresh water pipelines, the return water pipeline and the tailings pipeline.

4.6.12.5 Non-Hazardous Landfill Access Road

The permanent non-hazardous solid waste disposal site will be located in the rock quarry immediately west of the camp site (Quarry 2). A 150 m long stretch of all-weather road will link the disposal facility with the main access road to the camp. This roadway will be 6 m wide to ensure access by large equipment.

4.6.12.6 Caribou Crossings

Miramar will install graded caribou crossings at appropriate locations along all of the proposed all-weather roads. These crossings will typically consist of a gently sloped section with fine grained crushed rock covering to allow caribou to cross the roads with low risk of injury. The caribou crossings will entail flattening of the roadway shoulder to 5H:1V for a 10 m wide section on either side of the road. This flattened section will be clad in transition zone and surfacing grade material to ensure a suitable surface for caribou to travel on. Roadway signposts will be installed to warn traffic of the locations of these crossings.

Miramar will work with the Kitikmeot Inuit Association (KIA), community elders and representatives of the local hunters and trappers associations as appropriate to determine the number and location of these caribou crossings prior to the start of construction. Miramar will work with the KIA to arrange appropriate consultation and site visits with elders from local communities and representatives of the local hunters and trappers associations well before the start of the 2008 construction season to look at the proposed road alignments and presence of any indications on the ground of caribou travel routes. In consultation with the KIA, Miramar will use information obtained from these site visits together with Inuit Qaujimajatuqangit obtained from these consultations to determine where and how many caribou crossings should be installed. The final design (width, grade, capping material, etc.) of the crossings will be determined in a similar manner.

4.6.12.7 Bridge Crossing over Doris Lake Outflow

The stream crossing at the Doris Lake outflow is substantial, requiring a bridge deck with a span of at least 25.6 m to minimize impact on the stream banks. Based on site specific surveys the stream bank-full width (i.e., the ordinary high water mark) of Doris Creek at this location is approximately 15 m. The bridge abutments are designed to lie outside of this bank-full width. The bridge will be a modular 7.32 m wide prefabricated steel deck bridge with a loading capacity of up to 75 tonnes. The bridge will provide 4.1 m of clearance above the ordinary high water mark.

There are suitable founding conditions just upstream of the small set of falls in the stream. The roadway will be widened to 10 m on either side of the stream crossing and raised to greater than 2.5 m thick for a bridge approach angle slope of less than 20H:1V (5%). The bridge will be supported at either side of the bridge by I-beam cross members founded on the road embankment.

4.6.13 Jetty & Barge Landing Site

The mine site is approximately 4.5 km inland from a navigable portion of the Arctic coastline. Supplies and equipment will be brought to site via annual sealift. The tidal variation in Roberts Bay is in the order of 0.3 m.

4.6.13.1 Proposed New Barge Landing Site

The proposed new permanent sealift-landing site is located on the south-eastern shore of Roberts Bay (Figure 1.2). The bay is relatively shallow at this location, necessitating the construction of a 103 m long jetty out into the bay to reach water deep enough for tugs and barges to safely operate.

The final jetty design is a 103 m long, 6 m wide rock fill structure jetty, with a 25 m long mooring face. The final height of the jetty will be 1.4 m higher than the highest high tide elevation, to accommodate a 0.5 m freeboard above the maximum wave heights experienced. The maximum rock fill depth for the jetty will be approximately 6.8 m, with an average depth of less than 3 m thick.

Construction of the jetty will be completed through the placement of run-of-quarry rock from the shoreline, progressively moving out. Prior to placement of the rock fill on the marine sediments layers of geogrid will be placed to increase the bearing capacity of the foundation. In deeper water, rock will be placed with an extended boom excavator to allow better control over the placement of the fill on the geogrid layers. During construction silt curtains will be deployed around the construction zone, to prevent migration of suspended solids that may be mobilized as the rock fill is placed on the soft marine sediments. It is anticipated that the jetty will undergo settlement and that it would require annual maintenance to ensure trafficability.

The jetty footprint will cover approximately 1,800 m^2 of ocean bottom. The bulk of the jetty will be constructed from run-of-mine quarry material (1,000 mm maximum size). The final surfacing grade above the water line will consist of 0.2 m of a surfacing grade layer (38 mm maximum size fraction) and 0.3 m of a select grade material (200 mm maximum size fraction) which would act as intermediary between the sub base and the surfacing layer. The side slopes of the jetty will be at the angle of repose for the quarry rock (approximately 40^0.

The overall jetty width will be 6 m, which would allow easy and safe off loading of the 20 ft (6.1 m) long seacan containers with forklifts and trucks; NTCL provides a Komatsu 500 loader for such purposes. The jetty will end in a widened working area, with a 25 m long mooring face. Bollards and mooring chains will be anchored into the jetty to allow securing of barges to the jetty structure. Barges will be moored end-on to the jetty due to depth limitations at the south end of Roberts Bay, and off-loading will take place via the end of the barges. In rough weather conditions, the barges may be kept in place by the tugs, or off-loading may be suspended until the weather conditions improve.

4.6.14 Permanent Beach Lay-down Area

The land mass immediately inshore from the jetty site is relatively flat tundra, with rock outcrops on either side. Drilling has indicated that these soils are sandy to silty clays of low plasticity

containing minor ground ice. This land is well suited for construction of a pad to be used as a lay-down area for annual temporary storage of ammonium nitrate, equipment and supplies off-loaded from the sealift vessels. This lay-down area will be a minimum of 100 m from the high-tide level, and will be connected to the jetty via an all-weather road.

The lay-down area will have a surface area of 6,000 m^2 (100 m x 60 m), and the pad will be at least 2.5 m thick to preserve the permafrost. The pad has been sized based on the volume of annual freight that is expected to be delivered. The pad will be constructed from clean quarry material placed immediately on undisturbed tundra. A 2 m thick base of sub-grade material (<1,000 mm) will be capped by 0.3 m of select grade (<200 mm) and finished with 0.2 m of surfacing grade (<38 mm) crush. The pad will have an overall surface grade of 0.5% to allow drainage of surface water off the pad. This surface water will be considered uncontaminated and will be allowed to drain freely onto the tundra. The side-slopes of the pad will be at angle of repose for the quarry rock, approximately 40°.

The proposed location of the laydown occurs near the upper catchment boundary. Little to no surface drainage currently occurs within the laydown area footprint, and no design allowances have been made for such drainage.

Following development of the rock quarry northeast of the proposed laydown area, this area will be considered for use as a laydown. If exposed rock is suitable and competent, and sufficient space is available, consideration will be given to using the quarry instead of, or in addition to, the currently proposed laydown area.

4.7 Tailings Containment Area

4.7.1 Deposition in Tail Lake

Tailings produced during the milling process will be deposited in Tail Lake (Figure 1.2) about 5 kilometres from the proposed mill location. Tail Lake is 76.6 ha in size within a catchment area of 4.4 km^2. The normal water level in Tail Lake is 28.3 m above sea level. Detailed bathymetry for Tail Lake confirms that it is a shallow lake, with a maximum depth of 6 m in the widest section of the lake. The southern section of the lake is however between 1 and 3 m deep only. Tail Lake has a discontinuous outflow into Doris Lake immediately upstream of the Doris outflow creek. Ogama Lake (158 ha in size) is situated immediately south of Tail Lake and its normal water level is at 24.3 m above sea level. The height of land between the lakes is at 32 m above sea level. The normal volume of Tail Lake is approximately 2,196,040 m^3.

The tailings impoundment is sized to operate as a zero discharge facility during the two years of operation, if necessary; however, the proposed water management strategy is based on the annual release of supernatant from the impoundment. In addition, under the most conservative water balance assumptions, Tail Lake would take just over five years to reach the design Full Supply Level (FSL) of 33.5 m with no discharge. A permanent spillway will be constructed at this elevation, to prevent the possibility of dam overtopping.

The tailings will be pumped as a slurry with a solids content of 36.1% and discharged sub-aqueously into Tail Lake. The discharge location will not be fixed, but will be moved around such that the tailings impoundment can be sequentially filled from its deepest location. This

deposition methodology will enable the final closure water level to be as low as possible. Tailings will be pumped from the mill to Tail Lake via a 150 mm insulated HDPE pipeline. The pipeline route will be southwest from the mill site towards the northwest shore of Doris Lake. From there the pipeline will continue along the Doris Lake shore towards a crossing at the Doris outflow before continuing south-west towards the Tail Lake shoreline. The maximum piping distance from the mill to the southern tip of Tail Lake will be 5.5 km.

Operationally the piping freezing risks will be managed by constructing emergency dump ponds strategically along the pipeline to allow drainage of the pipeline in the event of a pump stopping for whatever reason. This would ensure controlled containment of the tailings, and minimize the risk of freezing pipelines.

Return water will be pumped from Tail Lake to the plant through a heat traced and insulated 100 mm diameter HDPE line. Both tailings and return water pipelines will follow the alignment of the tailings service road. The pipelines will follow the all-weather road, which has been designed to have a longitudinal grade of at least 1% at any location. There are four internal low points in the pipeline, where emergency tailings dump catch basins have been designed. These dump catch basins will store the contents of the tailings pipeline in an event of a pump stoppage. A valve located immediately above the catch basin will be automatically opened to allow gravity drainage of the tailings line to prevent freezing in the line. The dump catch basin located outside the Tail Lake watershed will be sized to hold the contents of both the tailings and reclaim water pipelines. Within the Tail Lake watershed the reclaim water line will drain by gravity onto the tundra and into Tail Lake consequently the catch basins within the Tail Lake watershed have been sized to hold only the contents of the tailings pipeline.

The dump catch basins have been sized to allow two sequential fillings plus an additional 0.5 m of freeboard. Each basin will be lined with HDPE placed on a geotextile fabric. The underlying basins will be constructed of a minimum of 2 m thickness of quarry rock, or an equivalent combination of insulation and rock fill to preserve the underlying permafrost.

4.7.2 Tail Lake Containment Area

In order to adequately isolate Tail Lake two containment dams will have to be constructed. The two proposed dams will be constructed as a rock fill structures with a geosynthetic clay liner (GCL), filter and transition zones and a frozen key trench founded on non-organic permafrost soils and/or bedrock. The upstream side of the dams will have a slope of 6H:1V (horizontal: vertical), and the downstream side at 4H;1V. These flat slopes are to compensate for the uncertainties associated with the potential deformation induced by the talik along the toe of the dams. Further analysis at the final design stage may lead to some optimization of these slopes. The North Dam will reach a height of about 11 m and will be about 200 m long. The South Dam will be 7 m high and almost 300 m long. The width at the crest will be about 10 m for both dams.

Passive looped thermosyphons are incorporated in the preliminary design as necessary components at this stage. The purpose of the looped thermosyphons is to lower the ground temperature of the foundations to overcome the uncertainties associated with salinity and the unfrozen water content of the marine deposit. The thermosyphons will consist of passive horizontal loop evaporators that would be installed at the base of the key trench during the construction of the dams. Four thermosyphons are currently considered for each dam, with two thermosyphons on both sides of the dam. The thermosyphons will each have a single loop evaporator that will cover half of the dam along the longitudinal axis. The looped evaporator will

be offset by 1.5 m apart and will cover the entire length of the dam. It is expected that each thermosyphon will consist of a 39 m^2 radiator connected to evaporator looped pipes that could be up to 220 m long. The 220 m length includes a 20 m offset between the dam alignment and the location of the radiator, plus two times 90 m for the looped evaporator pipe to reach the mid-point of the dam and return.

The vegetation cover will be removed below the entire footprint of the dams. The dam sections will also require the excavation of a key trench that will be at least 4 m deep. The final depth and width of the key trench will be confirmed during construction excavation.

The dam abutments will extend to bedrock, which appears competent at shallow depth but have some open and contiguous discontinuities. The slope of the rock will be limited to a 1H:1V slope, thus resulting in some rock excavation. The three dimensional aspect associated with the active layer at the abutments will be considered to provide an adequate seal against water leakage along the core-bedrock interface or in the near-surface fractured bedrock. Slush grouting or similar surface treatments may be required to fill voids in fractures and prepare the key trench. The condition of the abutments will be assessed during construction excavation.

4.7.2.1 Tailings Water Management Strategy

The tailings water management strategy for the Doris North Project has been revised based on new baseline water quality data, as well as an updated new rigorous water quality model (Supporting Document A2). The water balance for Tail Lake is presented in detail in Section 3.7.6.3 under the Water Management section of this chapter.

This revised water management strategy for the project entails an active managed discharge from Tail Lake beginning in Year 1 of operations and continuing through Year 9 (i.e. seven years after mining ceases). At that time water quality in Tail Lake is predicted to be within the CCME Guidelines allowing for a complete "walk-away" closure scenario.

During the mine's operating life (two years) and for an additional three years after mining and milling ceases the volume of water to be released from Tail Lake will exceed the natural inflow into Tail Lake. By the third year following the cessation of mining and milling the amount of water that needs to be released from Tail Lake is predicted to be equal to the natural inflow; however this water will continue to be pumped to the discharge point in Doris Outflow Creek upstream of the waterfall for an additional four years or until water quality in Tail Lake naturally returns to levels within the CCME Guidelines for protection of freshwater aquatic life. At that time the North Dam will be breached and the outflow from Tail Lake will be restored to the pre-mine outflow channel into Doris Lake. Under this scenario no further management of water releases from Tail Lake will be required however monitoring would continue for a minimum of one more year to verify that water quality continues to meet CCME Guidelines.

Under this water management strategy, the maximum water level in Tail Lake will be 29.4 m, with a flooded footprint of 94 ha.

Various water management strategies were assessed all of which would result in minimal changes of water quality in the receiving environment (Supporting Document A2). For example, all water could be contained in Tail Lake until the full supply level is reached. While this strategy would provide ample time to monitor the development of water quality in Tail Lake to verify the predictive modelling results, it would necessitate an extended period of site management. The

strategy selected by MHBL involves maximizing the annual discharge volume from Tail Lake as early as possible in the mine life while meeting the constraint of resulting in minimal change of water quality in the receiving environment. Other benefits for this strategy include the fact that the full supply level of Tail Lake will not be reached, and, as a result the effects of permafrost thaw and associated silt release will be minimised.

Starting in Year 1, key elements for the implementation of the selected water management strategy are as follows:

- Water quality in Tail Lake will be monitored on a regular basis and compared to the predictive modelling. If necessary, the predictive modelling will be updated to reflect actual conditions;
- In Year 1 of the 2 year mine operating life, discharge of supernatant from Tail Lake will commence;
- Discharge will occur only if MMER criteria are met in Tail Lake;
- Tailings discharge to Tail Lake (for operational period) will be scheduled to occur at a location well away from the point where decant water would be drawn from;
- Discharge will commence only when sufficiently ice-free conditions are observed in Doris Creek to enable accurate flow measurements;
- Water quality will be monitored in Doris Creek and in Tail Lake at least one week in advance of commencing discharge. The Allowable Discharge Volume Ratio (ADVR) will be back calculated from the copper concentrations in Tail Lake and in Doris Creek, and, calculations will be completed to verify that at that ratio, no other parameters will cause an exceedance of CCME guidelines in Doris Creek. If necessary, the ADVR will be adjusted as necessary to meet CCME guidelines or site specific objectives for Doris Creek;
- The Target Discharge Volume Ratio (TDVR) would be set at 80 % of the ADVR;

The Tail Lake discharge volume will be regulated to meet the TDVR as follows;

  - A temporary stilling basin with a flow weir will be installed in Doris Creek upstream of the waterfall. A pressure transducer will be installed and calibrated to provide an instantaneous measure of the flow in Doris Creek. The flow measurement will be used as input to a programmable logic controller (PLC) that will be used to regulate a variable flow pump that will draw water from Tail Lake and discharge to a point upstream of the waterfall but downstream of the stilling basin in Doris Creek.

- Water sampling will be undertaken upstream of the stilling basin, at the end of pipe discharge from Tail Lake and downstream of the waterfall in Doris Creek. Initially, sampling will be undertaken on a daily basis to verify that the pumping system is performing accurately. In time, based on the observed variability of flow and copper in

Doris Creek, and the variability of copper in Tail Lake, it may be possible to reduce the sample frequency;

- Active discharge will continue until the water quality in Tail Lake returns to concentrations that meet the CCME Guidelines for protection of freshwater aquatic life, after which Tail Lake will be allowed to discharge naturally; and
- Once natural discharge commences, the stilling basin in Doris Creek will be removed, and water quality in Tail Lake and in Doris Creek upstream of the discharge location and downstream of the waterfall will be continue to be monitored to confirm that CCME guidelines are maintained in Tail Lake.

The timing of the annual release will be during the open water season and be controlled to ensure that water quality in the Doris Outflow stream below the 4.5 m high waterfall at the discharge point remained protective of freshwater aquatic life (i.e., water quality does not cause harm to fish, benthic invertebrates or other wildlife).

MHBL will have analytical equipment and expertise on site to monitor copper concentrations at CCME levels of detection within Tail Lake, Doris Outflow and downstream both prior to and during the spring freshet and summer open water period to facilitate quick response in managing the timing and volumes of supernatant released from Tail Lake.

MHBL will monitor actual performance (water quality and volume) in Tail Lake from the start of operations and will compare actual results with the modeled predictions. This will allow MHBL to adapt its water management strategy if needed from as early as possible in the mine life. Contingent measures to adapt the water management strategy will depend greatly on the variable(s) (volume or water quality parameter) that departs from that predicted. Contingent measures that can be utilized include:

- Modification of the water treatment process in the mill to improve metal or other contaminant removal at source;
- Raising of the dams to allow water to be held for a longer time period to allow for natural dilution to lower contaminant concentrations;

The minimum design life of both dams has been set at 25 years; however, to account for possible upset conditions, including unforeseen water balance, water quality or global warming issues, the design has been tested for a maximum life of 40 years (maximum life refers to an expected performance of full water retaining capacity). In reality, under the proposed water management strategy, the North dam will be breached by year 9, and the water in Tail Lake will return to its original elevation of 28.3 m. Under this scenario there will be no water ponding behind either dam.

The South dam will not be breached, since it is located at the catchment divide between Tail and Ogama Lakes, and will not affect the regional hydrology in any way. No other reclamation will be carried out on this structure.

Under the most conservative water balance assumptions, including upset conditions of extreme precipitation events, the fastest time that Tail Lake would take to reach the FSL is 5 years. Under average climatic conditions, with no discharge at any time (i.e. assuming no site presence), the FSL would be reached by year 8; however at that time the natural outflow water quality will be sufficiently good to still meet the discharge criteria in Doris Creek, and the water quality in Tail Lake would be at CCME guideline values by year 31. The design life criteria are therefore sufficiently robust, to mitigate against the absolute worst case scenario of total abandonment post mining.

MHBL had acknowledged that there is a potential for shoreline erosion around Tail Lake as the permafrost shoreline is thawed through raising and lowering of the water level, and proposed an adaptive management plan to put mitigation measures in place. MHBL stated that there are no known methods by which the possible extent of shoreline erosion can be assessed, which the NIRB acknowledged.

MHBL subsequently conducted an extensive literature search into the mechanics of shoreline erosion processes in permafrost environments, and subsequently developed a complete hypothesis for how shoreline erosion impacts can be estimated at Tail Lake. This hypothesis was subsequently used to redesign an appropriate mitigation plan for shoreline erosion, based on measurable environmental triggers. Baseline monitoring for these processes has already been put in place.

Five specific case studies used to develop the hypothesis were; (1) Southern Indian Lake reservoir in northern Manitoba, (2) the Discovery Mine borrow pit in the NWT, (2) the Garrow Lake tailings impoundment at Polaris Mine, (4) three natural permafrost degradation and shoreline erosion features in the Doris North Project area, and (5) shoreline erosion features in Alaska.

Based on the estimated maximum erosion loss from Tail Lake at the dam FSL of 33.5 m, over an estimated 49 ha of inundated shoreline, the total suspended sediment load concentration in Tail Lake is estimated to be less than the MMER criteria, and therefore discharge is not likely to be affected. However, under the proposed actual tailings water management plan, the actual inundated shoreline will only be 13 ha, or 29% of what was originally expected.

4.8 Water Source, Distribution and Management

4.8.1 Freshwater Supply

Potable water, fire suppression water and up to 50% of the mill water (recycle water will be maximized for up to six months of the year) will be supplied from Doris Lake. Two separate 100 mm diameter insulated and heat traced HDPE lines will pump water from the lake to storage tanks at the mill and camp sites.

The intent is to maximize the use of recycle water from the tailings impoundment, however, there is a possibility that the water may not be able to clarify sufficiently during the winter period when lake ice reduces the volume in Tail Lake. Taking up to 50% of the mill water from Doris Lake is thus a contingency measure.

During summer months (June through September), process water will be taken from Tail Lake by a pump to be located near the north end of the lake. Make up freshwater for use in the mill

will be drawn from the freshwater holding tank only in case of a shortage from Tail Lake. It is projected that water will be released from Tail Lake in a controlled annual discharge during open water periods.

Mill process water requirements are projected to be 1,183 m^3/ day. During summer months the source of most of this make-up water will be recycled water recovered from Tail Lake returned to the mill by way of an insulated and heat-traced return line from a pump house.

Water use underground is expected to be minimal. A brine solution will be mixed in the mill and piped underground for use in drilling and dust suppression. This brine solution will be recirculated through an underground sump. Development and production drilling will use this brine solution to stop drills from freezing in the permafrost. Total requirements are estimated at approximately 0.1 m^3/h. As mining is expected to be within the permafrost zones, groundwater is anticipated to be minimal. Any water encountered will be pumped from underground and discharged into the tailings line to Tail Lake.

Potable water will be treated in a packaged plant installed in a 12.2 m x 2.4 m container and will consist of sand filtration followed by ultra violet light and/or chlorination treatment.

4.8.2 Mill/Camp Storm Water Management

The mill/camp pads will be graded nominally to ensure that water will drain from the pads. Surface run-off from process and work areas will be directed towards and collected in a sump (Figure 3.15). The sump will be designed to contain a 1:100 year recurrence interval, 24-hr duration storm subject to a 6-hour pumping cycle. If time permits, water quality testing will be used to determine whether the water is uncontaminated and be discharged to the tundra. If testing cannot be carried out in time, or if the water is considered contaminated it will pumped to the mill for circulation to Tail Lake.

Similarly, stormwater from the temporary PAG waste rock stockpile will be directed towards and collected in a sump and handled in the same manner.

4.9 Solid Waste Management

4.9.1 Domestic & Industrial Solid Waste Landfill Site

All solid non-combustible, non-hazardous waste will be disposed of in a portion of one of the rock quarries (quarry No.2 – Figure 1.2). An area approximately 100 m x 100 m will be dedicated to solid waste landfill operations. The final quarry configuration will consist of a flat surface, graded at approximately 1% in the down slope direction, adjoining a steeper angled rock surface that forms the transition to natural ground on the ridge above. Storm and melt water will be diverted away from the landfill by small 0.5 m berms on the upslope edges of the excavation.

Annual landfill operation will involve clearing of snow prior to spring melt, placement of waste rock over the summer period, and placement of a graded cover prior to the winter period of snow accumulation. Wastes produced during the winter months would be stored temporarily in the landfill area and relocated to its final location following snow removal.

All combustible material including kitchen waste will be incinerated in an industrial incinerator to be located near the camp.

4.9.2 Waste Oil & Hazardous Waste Management

Waste oil will be consumed on site in a dedicated waste oil burner specifically designed for that purpose. Other waste products such as used glycol, vehicle batteries, waste grease, etc. will be packaged in appropriate containers and stored in a secure fashion pending shipment off-site for disposal of in an appropriate manner. These materials will be placed into sea-can containers and held (pending shipment) on the plant site rockfill pad area where any spillage can be captured in the stormwater sumps and directed to the tailings containment area.

4.9.3 Sewage Treatment Facilities

Sewage treatment will be via a modular packaged biological treatment plant that will be brought to site fully assembled within two skid mounted 12.2 m x 2.4 m containers (61 m^2). The treatment plant will have a treatment capacity of 68.6 m^3/day, which is sufficient capacity for a fully manned 175-person camp.

The plant will be located downslope of the camp. The camp wastewater will be collected in a grinder pump lift station and discharged to the solids settling tank within the skid-mounted container. Clarified raw sewage overflows to the equalizing tanks that feed the extended aeration bioreactors.

Each bioreactor consists of an aerated primary side and a clarifier cone. Wastewater will enter the primary aerated side and will be mixed with the existing water by means of an extremely efficient fine bubble aeration system. The clarification cone separates developed solids from the treated wastewater, allowing solids to settle back into the aerated side of the tank. This action reduces the amount of total solids and improves treatment.

The ROTORDISK® sewage treatment plant is a high-efficiency packaged plant using the process of rotating biological contactors (RBCs) to remove pollutants from wastewater. ROTORDISK® employs disks made from 3/8" grid extruded medium density polyethylene material with U.V. light inhibitors. The grid pattern promotes oxygen transfer into the wastewater and particularly into the core of the media. The assembly is specially designed to prevent anaerobic conditions from developing.

ROTORDISK® is a multi-staged, fixed steel baffle RBC that has been proven to be more efficient for the removal of carbonaceous biological oxygen demand (BOD) and nitrification than a rotating baffle and plug flow media system. This process utilizes a fixed growth bacteria process whereby bacteria are grown on a media surface that is rotated into and out of the wastewater. The treated wastewater flows through four zones, each with a progressively higher standard of treatment. Unlike most suspended growth bioreactors, the ROTORDISK® is not prone to upsets and can be operated with very low flows during early years of project development (construction phase). The system can be operated from zero influent to above design capacity.

Treated effluent is collected in a discharge/recycle tank for delivery into the tailings line. Final discharge is into Tail Lake.

5.0 INTERIM RECLAMATION MEASURES

Interim reclamation planning has been developed for two scenarios: (1) temporary shutdown, and (2) indefinite shutdown. Both scenarios are based on the full intention of resuming operations once the source or reason for the shutdown has been rectified.

5.1 Temporary Shutdown

For the purposes of reclamation planning, a temporary shutdown is defined as a cessation of mining and processing operations for a finite period, generally three to twelve months, with the intention of resuming operations as soon as possible after the reason for the shutdown has been resolved. Possible causes for such a shutdown could be a major mechanical equipment failure, late delivery of critical equipment or supplies, or labour conflict.

5.1.1 Underground Mine

The extent to which the procedures listed below are implemented would depend on the anticipated length of the closure.

- All mobile equipment will be removed to surface and prepared for on-site storage. Some small service equipment will be maintained in full operating condition for use during underground inspection tours.

- Fuel, lubricants and hydraulic fluids will be removed from all underground locations, including storage areas and stored on surface;

- Explosives and accessories will be removed from the short-term underground storage magazines to the surface magazines.

- Airflow through the mine ventilation system will be reduced. The underground exhaust fans will be turned off;

- The underground electric power distribution system will be maintained. Low levels of heating will be provided to the mine power substations, secondary fan storage areas, maintenance shops, primary exhaust fan locations and main dewatering pump stations.

- The full dewatering pumping capability will be maintained.

- The operation of the primary fans, dewatering pumps and drainage sumps will be monitored.

- The underground facilities will be inspected daily as required to check for rock falls, and overall integrity.

5.1.2 Process Facilities

Any remaining ore stockpiled on surface will be processed before operations are halted. The plant will then be shut down in a planned and orderly sequence to prevent damage to equipment, piping and instrumentation. The following preparatory measures will be taken:

- The plant will be purged of all gold bearing materials;
- All gold doré will be removed from the site;
- All solids will be purged from the flotation circuit, the thickener, stock tanks and CIL tanks;
- All slurry lines will be flushed of solids and drained; and
- All reagent storage and mixing tanks will be run empty or drained.

Procedures during the shutdown will be as follows:

- Power supply to the building will be maintained;
- All major equipment will be run periodically to ensure lubrication and integrity of the rotating parts or the equipment decommissioned by lifting it off its bearings or packing moving components in grease. Minimal heating to the process building will be maintained to prevent equipment freezing.

5.1.3 Surface Infrastructure

During temporary shutdown, the site infrastructure will be placed into a care-and-maintenance mode to minimize operating costs and ensure environmental stability while maintaining conditions that will permit the safe mechanical resumption of operations at reasonable cost and schedule. Procedures during shutdown will be as follows:

- Minimal heating to the critical facilities will be maintained;
- All non-critical equipment requiring power and/or heating will be shut down;
- All necessary support facilities and services for care-and-maintenance personnel will remain in operation. This will include the freshwater intake, potable water treatment plant, sewage treatment plant, power plant, waste heat recovery system, diesel fuel storage and distribution, and some areas of the camp (one dormitory trailer section, kitchen, eating area) and the service shop. Some equipment within these facilities may be adjusted or modified to operate at lower capacity and consume less power. All major equipment will be run periodically to maintain operability;

- Where possible other sleeping quarters, common areas and offices in the camp and office area, except those required by care-and-maintenance personnel, will be closed off so that heating and ventilation can be reduced;

- Any hazardous materials stored within site facilities will be collected and stored in a controlled secure area;

- Most surface mobile equipment will be relocated to a secured, common parking area and inspected for any potential oil or other fluid leaks. Emergency response vehicles will be kept indoors and available for use as required;

- The power plant will be configured to operate at maximum efficiency under the reduced loading condition.

5.1.4 Ore and Waste Rock Piles

Procedures during temporary shutdown will be as follows:

- Ore stockpile will be run down and emptied prior to the shutdown if possible.

- Any stockpile of potentially acid generating waste rock will be placed underground prior to the shutdown if possible;

- If emptying the ore and potentially acid generating stockpile areas cannot be accomplished prior to the shutdown, then the material will be left in place and monitored for poor quality drainage;

- Runoff from the ore and stockpile areas will be monitored for water quality throughout the shutdown period. Unacceptable water quality, if encountered will be transferred to the tailings containment area.

5.1.5 Tailings Containment Area

Prior to a temporary shutdown the mill tailings discharge pipelines will be flushed and then drained to ensure that they remain available for resumption of operations. The reclaim pumping system in Tail Lake will be similarly drained.

The water level and water quality within Tail Lake will be monitored with continued operation of the annual pumped supernatant release assuming discharge criteria is being met. The dams and thermosyphons will be monitored and maintained throughout the temporary shutdown period.

5.1.6 Water Management

Procedures during temporary shutdown will be as follows:

Collection sumps and ditches around the site will be maintained to manage runoff.

5.2 Indefinite Shutdown

For the purposes of reclamation planning, an indefinite shutdown is defined as a cessation of mining and processing operations for an indefinite period with the intention of resuming operations in the future. In this scenario, the site must be placed into a mode of minimal operating expense while maintaining safety and environmental stability. Possible causes for such a shutdown could be depletion of developed mineable resources, prolonged adverse economic conditions or extended labour disputes.

5.2.1 Underground Mine

Procedures during indefinite shutdown will be as follows:

- Mobile and some semi-mobile and some fixed equipment will be removed from underground and stored on surface. This will include all mobile equipment; electric motors; secondary ventilation fans; portable dewatering pumps; and electrical substations. All other non-degradable and non-hazardous materials will be left underground;

- All fuel, lubricants, hydraulic fluids, hazardous materials and degradable material will be removed from the underground storage areas to surface, where they will be placed in appropriate containers and stored in a secure area;

- The adit portal and the surface collars of the three raises will be barricaded with secured steel structures, and warning signs will be posted.

5.2.2 Process Facilities

The same measures taken for temporary shutdown of the plant (Section 5.1.2) will be taken for indefinite closure, with the following additional activities:

- Equipment and gearboxes will be drained of lubricants, which will be stored in sealed drums in a secure area;

- All tanks will be drained;

- All water, glycol and slurry lines will be flushed and drained. Glycol will be stored in sealed drums in a secure area;

- Sensitive electronic devices such as instrumentation control cards, PLCs and control system computers will be removed from the site or stored in a heated, access-controlled location on site;

- Heavy rotating equipment such as the SAG and ball mills will be lifted off bearings and safely supported;

- The entire process plant will be locked and all heating and power supply turned off. Minimal site staff will be required during this period.

5.2.3 Surface Infrastructure

As in the case of a temporary shutdown, the site infrastructure will be placed into a care-and-maintenance mode of operation. The same measures taken for temporary shutdown (Section 5.1.3) will be taken for indefinite closure.

5.2.4 Waste Rock Piles

In the event of an indefinite shutdown the following actions will be taken to secure the chemical stability of any ore or potentially acid generating rock stored on surface and to minimize the requirement for a continued site presence:

- Ore stockpile will be run down and emptied prior to the shutdown; and
- Any stockpile of potentially acid generating waste rock will be placed underground prior to the shutdown.

5.2.5 Tailings Containment Area

Prior to an indefinite shutdown the mill tailings discharge pipelines will be flushed and then drained to ensure that they remain available for resumption of operations. The reclaim pumping system in Tail Lake will be similarly drained.

The water level and water quality within Tail Lake will be monitored with continued operation of the annual release assuming discharge criteria is being met. The dams and thermosyphons will be monitored and maintained throughout the shutdown period.

5.2.6 Water Management

Prior to an indefinite shutdown the emergency tailings sumps will be pumped out and the remaining solids moved to the tailings containment area. The mill sumps will be washed out and pumped dry with the washings going to the tailings containment area.

Collection sumps and ditches around the site will be maintained to manage runoff from the general site.

6.0 FINAL RECLAMATION MEASURES

With the completion of mining and ore processing (projected to be at the end of 2010), the mill and all processing circuits will be washed to recover the remaining gold and to remove any material containing cyanide and other milling reagents. All wash down water will be directed through the cyanide detoxification circuit prior to being discharged to Tail Lake.

The site will then be secured and held on a "care and maintenance" basis lasting for approximately five months (January to June) to await outdoor working temperatures more suitable for site disassembly. Over the following two summers (2011 and 2012), all buildings will be dismantled and the roads, building pads and other infrastructure remediated. Salvageable equipment and building material will be transported to the lay down area at Roberts Bay and shipped from site the year following closure (2011). Non-salvageable equipment and material will be cleaned of potentially hazardous material and then disposed of in the on-site landfill disposal area in Quarry 2. Given the remote location of the Doris North Project, it has been assumed that most equipment, buildings and materials will have no economic salvage value and will thus be demolished and disposed of on-site. Estimates of reclamation liability were made on this basis.

Part of the camp and other support facilities such as the sewage and potable water treatment plants and the shop will remain in place during most of the Closure Phase; a short period of approximately two years to provide support to the crews conducting the physical reclamation of the Doris North site. These facilities will be decommissioned and removed during the second year of reclamation (2012). The annual release of supernatant from Tail Lake will have to be actively managed for a period of seven years following the cessation of milling (through 2017. In the fall of 2007, the North Dam will be breached so that water can naturally flow from Tail Lake through the former Tail Lake discharge channel beginning with the spring freshet in 2008. At that time water quality in Tail Lake is predicted to be suitable for uncontrolled release.

In the five year period (2013 through 2017) a two person team will be mobilized to site each summer to manage the pumped release of water from Tail Lake during the open water season. This crew will be housed in a two man exploration camp mobilized each year for this purpose.

The reclamation plan assumes the worst case scenario specifically that at the end of the Doris North reserve there is no ongoing exploration or mining activity on the remainder of the Hope Bay belt. In the more optimistic scenario, MHBL will continue to develop additional reserves on the Belt which would continue the life of the Doris North site. MHBL has indicated that where possible from a practical and economic standpoint, the Doris North mill and camp would continue to be used as the centre for processing other reserves found on the belt. In this case the reclamation plan will be adjusted as needed to accommodate the extended facility life. MHBL will remove all of the Doris North buildings and facilities once all further activity on the Hope Bay Belt was completed.

The following sections provide a summary of reclamation activity proposed for each of the project components. A detailed schedule of reclamation activities along with a cost estimate is presented in Section 9.

6.1 General

6.1.1 Inert Solid Materials

Prior to closure and reclamation activities, it will be necessary to obtain appropriate authorization for a non-hazardous demolition waste disposal site (a demolition landfill) through the regulatory agencies dealing with land leases and water use (KIA, NWB, DIAND). This site will be used for the disposal of all non-hazardous debris generated by the demolition of all non-salvageable equipment, buildings and other materials from the Doris North Project site. MHBL anticipates that this demolition landfill will be located with Quarry 2 as an extension of the operational phase landfill site. The demolition debris will be placed in compacted layers and then buried under a minimum final waste rock cover of 1 m to ensure that large voids within the demolition debris are filled and that buried material will not protrude from the closed out landfill cap as a result of future frost heaving.

Materials destined for burial in the demolition landfill will be dismantled as safely and efficiently as possible and stacked in a stockpile within the plant site area. The materials will then be cut by flame, hydraulic shears or saw, into manageable sizes for safe transport and placement in the demolition landfill.

6.1.2 Hazardous and Salvageable Materials

All potentially hazardous materials will be removed from equipment prior to disposal. This will typically involve draining and removal of all remaining fuels, hydraulic fluid, engine oil, antifreeze, batteries and other lubricating fluids (transmission fluid, grease, etc.). Hazardous materials will be transferred into and stored in sealed containers and drums, and loaded into shipping containers pending removal from site on the next sealift. These materials will be packaged and shipped off site for disposal at an appropriate licensed disposal site. The only potential exception to off-site disposal will be the use of recovered fuel in other mobile equipment used in carrying out reclamation related activities and the use of waste oil in one of the existing waste oil burner units to generate heat during the post-closure care and maintenance and reclamation periods.
Given the remote location of the Doris North project, the salvage value of most pieces of equipment and buildings materials is likely to be insufficient to cover the cost of removal and transport. Consequently for the purposes of this Plan it has been assumed that no salvage credits will be obtained and that all equipment and building material will be disposed of on site in an appropriate solid waste disposal facility.

Some of the larger pieces of milling and mining equipment may have economic salvage value. This Plan includes an allowance for one shipment south during the post-closure period to facilitate the removal of hazardous materials for off-site disposal. Removal of the higher value pieces of mining and milling equipment from site will be done at the same time, dependent on longer term plans for mineral activities on the Hope Bay Belt.

6.1.3 Underground Mine

Once mining has ceased all potentially hazardous materials will be removed from the underground mine and brought to surface for disposal. These will include all hydrocarbon products such as fuel, hydraulic fluid and other lubricants; explosives; vehicle batteries, glycol, transformer fluids, antifreeze, other chemicals, etc.

Underground mobile equipment will be brought to surface and cleaned of any potentially hazardous materials such as fuel, hydraulic fluids, glycol, batteries, etc. These materials will be stored in appropriate containers and prepared for off-site shipment or on-site destruction (e.g., burning of waste oil). The projected fleet of underground equipment consists of 7 scooptrams, 2 haul trucks, 5 jumbo drill units, 1 blasthole drill unit, 1 scissors lift truck, 1 service/fuel truck, 2 portable air compressors and 4 pickup trucks. Some of this equipment will be used in completing the reclamation activity. Once the equipment is no longer required, the units will be decommissioned as indicated above and then disposed of in the surface solid waste disposal facility site.

All explosives supplies and accessories will be moved off-site or destroyed on-site (typically by controlled burning or detonation) in an appropriate manner. Regulatory agencies will be consulted on the appropriate disposal methods as the mine enters the closure phase.

Any remaining waste rock that is potentially acid generating will be reclaimed by front end loader and transported by haul truck back into the underground mine where it will be placed as backfill. It should be noted that under the current mine plan all potentially acid generating rock is likely to have been placed back underground as backfill well before the end of the mine life.

Items that will be left underground will typically be non-degradable, constructed of steel or concrete, or associated with utility lines, as follows:

- Floors and walls of material storage areas and refuge stations
- Concrete foundations
- Power and communication cables
- Water (brine) and air pipelines and associated supports
- Ventilation ducting and supports
- Ore pass and dump grizzlies, chute work and associated support steel
- Rock support structures such as rockbolts, screening, etc.
- Bulkheads
- Vent and egress raise ladders

The three 2.4 m by 2.4 m ventilation raises will be either capped with a reinforced concrete cap or backfilled. The Plan assumes that these vertical mine openings will be closed off and permanently sealed by the placement of a concrete cap. The fans, fan housings and associated ducting will be removed from the surface over top of these three ventilation raises and disposed

of in the on-site solid waste disposal facility. The collars for the raises will be capped with a reinforced concrete cap founded on solid rock. The concrete caps will be designed and constructed for a uniformly distributed load of 12 kPa and a concentrated load ranging from 24 to 54 kN as suggested in the Draft Mine Reclamation Guidelines for the NWT (June 2005). Provision for the venting of gas accumulation under the concrete cap will be provided as part of the cap design.

Following installation of the concrete caps, low-profile warning signs will be installed at each location.

The concrete raise caps will be designed and constructed in accordance with the regulations established in Ontario for that purpose (with the exception that the uniform and point load specifications contained in the Draft Mine Reclamation Guidelines for the NWT (June 2005) will be substituted). Schedule 1, Part 1 of Ontario Regulation 240/00 under the Ontario Mining Act provides a standard for the installation of a reinforced concrete cap to seal mine openings, specifically:

Concrete Caps:

1) *Before installation of a concrete cap to stop shafts, raises and stopes,*
   a) *A qualified professional engineer shall examine the competency of the rock at the supports and no construction shall be undertaken unless the engineer approves the rock as competent;*
   b) *All loose rock shall be removed from the rock anchorages leaving only competent rock;*
   c) *All concrete work shall meet or exceed the minimum standards set out in the CAN/CSA-A23.1-M90 or latest revision;*
   d) *The formwork for the concrete, shoring and temporary support shall be designed by a qualified professional engineer.*

2) *The concrete cap may be left exposed to the elements or may be buried.*

3) *Where the cap is to be left exposed, consideration shall be given to providing a slope to the surface of the cap to prevent the collection of water on the surface.*

4) *All reinforced concrete caps shall meet or exceed the following specifications:*
   The reinforced concrete cap shall be designed for the following minimum design live loads:

   - *1.4 metres cover of saturated soil uniformly distributed with a unit weight of 19 kN/cubic metre, and*

the greater effect of either,

   - *an 18 kPa uniformly distributed load, or*
   - *an 81 kN concentrated load applied over an area 300 mm by 300 mm anywhere on the cap, and*
- *the weight of the cap as the dead load.*

5) *The 28-day concrete strength shall be a minimum of 30 Mpa.*

6) *The reinforcing bars yield strength shall be a minimum of 400 Mpa.*

7) *The concrete cap minimum thickness shall be,*
   - *450 mm as per MNDM Drawing No. 94103-M1: "Monolithic Concrete Cap Typical Plan and Section" and Drawing No. 94103-M2: "Typical Monolithic Concrete Cap Reinforcement Schedule", or*
   - *300 mm if an alternate design with all calculations is provided.*

8) *All supports shall be founded on sound rock having a minimum bearing capacity of 600 Kpa.*

9) *All concrete design shall be as per CAN3-A23.3-M84 or it most recent revision.*

10) *The reinforced concrete cap shall be vented with a stainless steel pipe that is at least 75 mm in diameter and extends above the cap or soil cover to permit airflow.*

11) *The reinforced concrete cap shall be securely attached to the bedrock or to the concrete collar if one exists.*

12) *Appropriate reinforcing steel bars and concrete shall be used in areas where corrosive conditions may exist.*

Reinforced Concrete

1) *The concrete design shall meet the following specifications:*
   - *The minimum 28-day concrete strength shall not be less than 30 MPa.*
   - *The maximum slump shall not be greater than 75 mm +/- 25 mm.*
   - *The maximum aggregate size shall not be greater than 20 mm.*
   - *The air entrainment content shall be 6 percent +/- 1 percent.*
   - *The maximum water/cement ratio by weight shall not be greater than 0.50.*
   - *The aggregates used in the concrete mix shall be non-alkali-silica reactive type.*

2) The concrete cover shall be as follows:
   - *75 mm thick on the top of reinforcing bars.*
   - *50 mm thick on the bottom of reinforcing bars.*
   - *40 mm thick on the stirrups.*

3) *The concrete shall be cured as per CSA-A23.1-M90 or its latest revision. Curing compounds shall be clear liquid conforming to Canadian General Standards Board (CGSB) Standard 90-GP-1a, Type 1 or latest revision and applied as directed by the manufacturer.*

Inspection and Testing

1. *Before the placement of concrete, a qualified professional engineer shall inspect and approve any reinforcing steel bars that have been installed.*
2. *The concrete shall be tested for air content and slump in the field.*
3. *A minimum of one set of four cylinders shall be cast and tested for compressive strength.*
4. *The cylinders shall be cured under the same field conditions as the shaft cap and seat support (if applicable).*
5. *The testing shall be done in accordance with CAN/CSA-A23.2-M90 or its latest revision.*

A qualified professional engineer shall certify all test results obtained and the certified results submitted to the Director no later than 30 days after testing.

The portal access to the underground will be permanently closed by the placement of a 15 m thick rockfill plug and then sealed with a welded steel cover to make the underground workings inaccessible to people or wildlife in compliance with mine safety requirements. The Plan assumes that 300 m^3 of broken rock will be placed by scooptram inside the adit to form the plug followed by the construction of a welded steel barricade.

The ground in the mine will remain in a frozen condition thus there will be no anticipated movement of groundwater into or out of the mine, thus no water treatment of minewater will be required. The frozen ground combined with the lack of groundwater movement will retard any sulphide mineral oxidation and prevent the transport of any contaminants away from the mine workings.

The mine will not be force flooded during any project phase. If future global warming results in a loss of permafrost in this region, then it is expected that the underground workings will ultimately flood to a level most likely equalizing with the lake level in Doris Lake.

6.1.4 Process Facilities

At the cessation of underground mining all remaining ore-grade material on surface will be processed through the crushing plant and mill to extract the contained gold. The ore stockpile laydown area will be scraped clean using a front-end loader with the material being processed through the mill.

Once all the ore has been processed through the crushing plant and mill, the various circuits will be cleaned using high-pressure water hoses starting at the front of the process and working through the various unit processes thereby maximizing the recovery of any residual gold left in the circuit. The final washings will be passed through the circuit ultimately ending up in the tailings containment area. Once the milling circuit has been cleaned out the building structures themselves will be washed thoroughly on the inside using high-pressure water hoses.

All potentially hazardous materials such as hydrocarbons, chemicals and reagents will be removed from the plant. Reagent tanks will be drained and cleaned awaiting demolition. The milling equipment will be drained of any potentially hazardous materials such as lubricating oil, glycol, etc.

For the purposes of this closure plan it has been assumed that at the end of the economic life of the Doris North Project all of the crushing and milling equipment will have no off-site salvage value. Consequently the equipment will be dismantled and disposed of through burial in the proposed on-site solid demolition landfill.

Similarly the steel clad, steel frame mill building used to house the crushing plant and the milling equipment is assumed to have no-off site salvage value. The building will be dismantled and/or demolished with the debris being disposed of through burial in the proposed on-site demolition landfill.

Concrete foundations, pedestals and floor slabs within the mill building will be broken up and the rubble transported to the demolition landfill.

6.1.5 Surface Infrastructure

6.1.5.1 General

Specific materials will be dealt with as follows:

- Where they exist concrete foundations will be broken down to nominal ground level and the concrete rubble buried in the on-site demolition landfill.
- Any buried piping will be removed to just below grade and ends will be capped. Any buried fuel and glycol lines will be flushed with water, removed and buried in the on-site demolition landfill facility (it should be noted that the current Doris North Project development plan does not include planned use of any buried piping for any purpose and consequently this condition is included in case any pipelines are buried during the mine life).
- Buried electrical cables will be cut approximately 1 m below grade at surface terminations and left intact. (it should be noted that the current Doris North Project development plan does not include planned use of any buried cabling for any purpose and consequently this condition is included in case any cables are buried during the mine life). All above ground cable will be removed and buried in the on-site solid waste disposal facility.

The potential for soil/rockfill contamination at facility sites will be assessed. This will include fuel storage pads, fuel tank areas, process plant, power plant, accommodations complex, service shop, waste management facilities and storage facilities. Soils in these areas will be sampled during decommissioning and analyzed for contaminants such as hydrocarbons and metals. A soil remediation plan will be developed to address such contamination assuming that some contamination is discovered. Best available practice and research studies for contaminant remediation in arctic soil will be assessed and used in the design and development of the soil remediation plan. Typically remediation plans will involve either:

- The in-situ treatment of some soils, such as lightly hydrocarbon contaminated soils;
- The excavation and treatment of some soils using conventional land farming techniques using biologically enhanced treatment techniques, such as more heavily hydrocarbon contaminated soils;

- The excavation and placement of some soils into the underground mine, such as those soils identified as being contaminated with metals to levels above accepted remediation criteria; and

- The excavation and placement of some soils in drums and sent offsite to a licenced disposal facility.

Risk Assessment techniques will be applied in determining which soils are to be remediated and to what degree. Regulatory agencies and representatives of the land owner will be involved in this process. Government guidelines such as the CCME's Canada-wide Standards for Petroleum Hydrocarbons in Soil, and soil quality guidelines for the protection of environmental and human health; as well as Nunavut standards for industrial soils in place during Closure time will be consulted on an individual chemical basis.

It should be noted that remediation of hydrocarbon contaminated soils by landfarming techniques has been successfully achieved in Arctic regions with similar climate conditions to those experienced at Doris North. The performance of remediation tends to be slower in the Arctic than in more temperate climates but the procedure still works. Landfarming is not successful for all forms of hydrocarbon contamination. It typically is more successful for the lighter hydrocarbons than for heavier oils. Several references addressing use of landfarming techniques to remediate hydrocarbon contamination in soils are included in Appendix B.

6.1.5.2 Buildings and Equipment

All surface mobile equipment is assumed to have no off-site salvage value. Consequently the equipment will be cleaned, decontaminated to remove all potentially hazardous materials such as batteries, hydrocarbons, glycol, fuel, etc. and then be disposed of through burial in the proposed on-site demolition landfill site. The projected surface fleet will consist of the following equipment: 4 haul trucks, 3 front end loaders, 2 dozers, 1 excavator, 1 road grader, 4 fuel trucks, 1 Plow truck, 5 pickup trucks, 1 mini-bus, 1 vacuum truck and 3 portable lighting plants.

All stationary equipment (generators, etc) is assumed to have no off-site salvage value. Consequently the equipment will be cleaned, decontaminated to remove all potentially hazardous materials such as process residues, chemicals, hydrocarbons, glycol, etc. and then be dismantled and disposed of through burial in the proposed on-site demolition landfill.

All buildings are assumed to have no-off site salvage value. Consequently all of the buildings will be checked to identify and create a listing of all potentially hazardous materials that need to be removed. The buildings will then be cleaned to remove all potentially hazardous materials such as chemicals, reagents, hydrocarbons and then dismantled and/or demolished with the debris being disposed of through burial in the proposed on-site demolition landfill. The following buildings are to be removed and disposed of:

a. Mill and Crushing Plant – steel frame, steel clad building, 2,500 m^2 footprint (6,000 m^2 equivalent on multi floors used to cost demolition);
b. Service Workshop – steel frame, steel clad building 1,500 m^2;
c. Camp – 53 skid mounted trailer units, 61 m^2/unit;
d. Office/Dry – 6 skid mounted trailer units, 61 m^2/unit;

e. Sewage treatment plant – 2 skid mounted trailer units, 61 m^2/unit;
f. Power Plant – steel frame, steel clad building, 384 m^2;
g. Arctic Corridors – 1,500 m^2;
h. Mill reagent storage – 20 shipping containers, 30.5 m^2/unit;
i. Explosives magazines and mixing plant - 20 shipping containers, 30.5 m^2/unit;
j. Tail Lake pump house – 100 m^2.

These buildings will all be single story buildings with the exception of the mill and crusher building which have elevated workings throughout most of the plant. An allowance has been included for clean up and removal of miscellaneous bone yard materials from around the buildings for disposal in the demolition landfill.

Where concrete slabs are present, the slabs will be broken and removed with the concrete rubble placed in the demolition landfill.

6.1.5.3 Roads and Airstrip

All site roads not required for post-closure maintenance and monitoring will be decommissioned and reclaimed at the end of the closure and reclamation period. The rest will be reclaimed at the conclusion of the post-closure monitoring program. Most access in the post-closure period will be by aircraft, with minimal travel across the site roads.

The airstrip will be reclaimed near the end of the reclamation program. Lighting, navigation equipment and culverts will be removed to eliminate potential hazards to wildlife. Reclamation will involve scarifying and loosening the top surface to facilitate natural revegetation. Where erosion or sedimentation is a concern, the surface will be recontoured. Culverts and other stream-crossing structures will be removed to permit natural drainage to become re-established.

All site roads will be reclaimed using the following typical process:

- All road side safety berms will be removed by dozing them off the road;
- All road signs will be removed;
- The road surfaces will be graded to provide positive drainage of precipitation and snowmelt away from the road surface onto the surrounding countryside and to prevent water ponding on the road surfaces;
- The road surfaces will be scarified to a depth of 4 to 6 inches using a grader mounted scarifying unit or other similar device to loosen up the surface to promote natural re-vegetation over the long-term. There will be a total of 7.68 ha of road and airstrip surface to be graded and scarified;
- The Doris Outflow bridge crossing will be removed and the bridge disposed of in the on-site solid waste disposal site. The bridge footings will be removed and the fill on the stream

banks graded and armoured at the road crossing to prevent precipitation runoff eroding away the exposed bank; and

- All culverts will be removed. The culverts will be disposed of in the on-site solid waste disposal site. The excavation sides will then be pulled back and armoured if necessary with coarse rock to allow free passage of precipitation and snowmelt runoff and to prevent erosion of the former road materials into these drainage paths. It has been assumed that there will be 15 culvert crossings to be removed and regraded by this technique.

Following demolition of the buildings and final debris removal, the plant site and camp area, the beach laydown, the mill tank farm area and the explosives magazine storage area will be given a final grading and scarification to loosen up the top layer of the rockfill to enhance the natural in-growth of vegetation over time and to ensure the drainage of precipitation and snowmelt from these pads onto the surrounding countryside.

6.1.5.4 Jetty

The jetty will remain in operation for two years of active decommissioning after mining ceases. At that time all mooring hardware will be dismantled and removed from the jetty. The jetty will then be partially removed. Partial removal will entail lowering the jetty surface to 30 cm below the LLWL (lower low water level); 50 cm below the mean water level. This will be achieved by grading the rockfill surface of the jetty into the surrounding water using an excavator to create a submerged rock coarse platform beneath the water where the jetty used to be. Complete removal of the jetty is not possible without removal of a substantial volume of natural marine sediments. After reclamation there will be no above water evidence of the jetty.

6.1.5.5 Boat and Plane Dock

The rock fill boat and plane dock on Doris Lake will be similarly partially removed in a similar manner to the Roberts Bay jetty. Prior to final grading all anchor points, attached cables, wood cribbing, *etc.* will be removed.

6.1.5.6 Quarries

Reclamation of the four proposed rock quarries will involve the removal of all mobile and stationary equipment followed by slope stabilization and contouring as required. On-site stockpiles of rock will be depleted during the last years of operation. Remaining material will be spread and contoured to blend with the surrounding landscape.

Quarries Q1 and Q3 (Roberts Bay and Tail Lake areas respectively) will only be active during the construction period. Quarry 4 is the levelling of a rock outcrop to allow for construction of the mill building on bedrock.

Quarry Q2 is proposed to become the on-site solid waste disposal site and will end up receiving demolition debris from the removal of the mine's buildings at final reclamation. This quarry will be closed out near the end of the reclamation period.

The landfill in quarry2 will be closed out by placing a minimum 1 m thick layer of quarried rockfill over the compressed demolition debris to create a mounded cover. An allowance of 10,000 m^3 of rock fill has been allowed for this activity. The unit rate used for the loading, hauling and placement of the rock fill cover assumes that the rock fill material will be non-acid generating waste rock from one of the surface quarries stockpiled in Quarry 2 through the mine's operating life. The estimate assumes an average cover thickness of 1 m in depth over a surface area of 10,000 m^2. The final cover will then be graded to shed precipitation and snowmelt from the solid waste disposal site.

6.1.5.7 Mill Site Fuel Storage Tanks

There will be five 1.5 million-litre capacity diesel fuel storage tanks at the mill site fuel storage tank farm area to be cleaned, decontaminated and dismantled. In addition, an allowance has been included for the decommissioning, cleaning and dismantling of 5 smaller fuel tanks (skid mounted Envirotanks). It is assumed that the tanks will be essentially drained of useable fuel by the end of the mine life. An allowance for the disposal of 20,000 litres of residual fuel has been incorporated into the "chemicals" component of the reclamation cost estimate.

During the reclamation period, fuel requirements will initially be met from the remaining inventory in the main tank farm storage tanks; these tanks will then be drained, cleaned out and dismantled. The storage tanks will be steam cleaned and the residual oil recovered through an oil-water separator unit either brought to site for that purpose or constructed out of one of the Envirotank units already on-site. The wash water will be recycled until all the tanks are cleaned. The tanks will then be dismantled with the non-salvageable material to be buried within the on-site demolition landfill. The containment berm and liner materials will be removed and the area regraded. Liner materials will be cut into smaller strips and buried in the demolition landfill. The containment area will then be dozed level and regraded to ensure that precipitation and snowmelt runoff do not pond in this area and that the area drains effectively onto the surrounding landscape with minimal to no erosion.

Fuel will be then drawn from the Envirotanks for the balance of the reclamation program. The Envirotanks will then be cleaned out in a similar manner, the tanks cut up and the debris disposed of in the demolition landfill.

6.1.5.8 Power Plant

The main power plant will remain in use during the reclamation period as long as the power demand is great enough for efficient operation of one or more of the main generators. This period of extended use will end when the power plant must be decommissioned to maintain the overall reclamation program schedule. At this time, the power plant will be shut down, decommissioned and dismantled using the general measures described earlier in Section 6.1.4.2. Surface power distribution lines and poles will be removed and disposed of.

6.1.5.9 Site Support Facilities

Potable water treatment, sewage treatment and communications systems will be maintained to support construction personnel throughout the reclamation program. These systems will then be decommissioned, dismantled and disposed of.

6.1.5.10 Solid Waste Management Facilities

Once no longer required for ongoing use during the reclamation period, the incinerators, waste-handling equipment and associated structures will be dismantled and all debris buried within the demolition landfill.

The potential for contamination of the ground in the immediate area of the incinerator and waste handling facilities will be assessed. Any required remediation will be carried out, and a cover of clean non-potentially acid generating (non-PAG) rock will then be placed over the site. The area will be regraded to blend with the surrounding topography.

The non-hazardous solid waste landfill facility used for the disposal of the demolition debris will be closed out by placing rock fill over the compressed debris to create a mounded rock fill cover. An allowance of 10,000 m^3 of rock fill has been allowed for this activity. The estimate assumes an average cover thickness of 1 m in depth over a surface area of 10,000 m^2. The final cover will then be graded to shed precipitation and snowmelt from the solid waste disposal site.

6.1.6 Mine Waste Rock Piles

The Doris North Mine will not leave any underground waste rock piles on surface once mining has ceased. Most development waste rock will be used underground as backfill in the mechanized cut and fill stopes.

The material within the potentially acid generating stockpile will be relocated underground for placement as backfill. It should be noted that ARD characterization suggests that little PAG rock will be encountered during development of the access ramp. Most of the waste rock extracted during ramp development will be non-PAG rock suitable for use in construction. There is indication that a small zone of mafic volcanic rock with a pyrite content greater than 1% will be encountered during development of the Doris North access ramp (~400 m^3). This is expected to be the only potentially acid generating rock encountered until development gets into the mineralized halo around the ore zones.

The same procedure will be used for all development waste rock brought to surface from the underground mine. All PAG waste rock temporarily stored on surface will be returned underground as backfill.

6.1.7 Tailings Containment Area

Once mining and ore processing has ceased the tailings discharge pipeline will be flushed with process water to remove all process slurry material from the pipeline, drained and then decommissioned. The pipeline will be removed and the debris placed in the demolition landfill.

The water remaining in the tailings containment area will be monitored. The final closure for the Tail Lake tailings impoundment is a permanent water cover of 4.0 m above the highest tailings elevation in the impoundment. Research has shown that a minimum stagnant water cover of 0.3 m is sufficient to prevent oxidization of tailings. Tailings, however, can be resuspended due to wave action induced by environmental factors, and therefore the rule of thumb is to design a

water cover of at least 1.0 m thick. Based on the orientation of Tail Lake, the predominant wind direction, maximum wind speeds, and the particle size of the tailings, using the most conservative calculation method, and the worst case input variables, the maximum water cover would have to be 3.6 m (SRK 2005 – Supporting Document A1 – Appendix C). A 4.0 m thick water cover was subsequently selected as the design criteria to add an additional factor of safety against unforeseen events.

For the full design tailings volume over two years, the tailings surface is expected to be below 24.3 m, which implies that the minimum final water elevation in Tail Lake must be at 28.3 m. In actual fact, the existing (*i.e.* pre-mining elevation of Tail Lake is 28.3 m, which implies that once the water quality in Tail Lake returns to background concentrations, the North Dam can be breached to allow Tail Lake to return to its pre-mining elevation. Under this condition, there will be a 4.0 m water cover over the tailings.

The tailings containment area closure plan will entail continued annual controlled discharge of water thru 2017 (i.e. 7 years after mining ceases). During the mine's operating life (two years) and for an additional three years after mining and milling ceases the volume of water to be released from Tail Lake will exceed the natural inflow into Tail Lake. By the third year following the cessation of mining and milling the amount of water that needs to be released from Tail Lake is predicted to be equal to the natural inflow; however this water will continue to be pumped to the discharge point in Doris Outflow Creek upstream of the waterfall for an additional four years or until water quality in Tail Lake naturally returns to levels within the CCME Guidelines for protection of freshwater aquatic life. At that time the North Dam will be breached and the outflow from Tail Lake will be restored to the pre-mine outflow channel into Doris Lake. Under this scenario no further management of water releases from Tail Lake will be required however monitoring would continue for an additional year to verify that water quality continues to meet CCME Guidelines.

During this post-closure period MHBL will continue to monitor water quality both within the tailings containment area and in the downstream receiving water and to operate the annual release through the discharge pumping system in the same manner as that used during the mine's operating life. This practise will continue until it can be demonstrated that the excess water within the tailings containment area has and will continue to meet acceptable water quality for release into the downstream receiving water on an unrestricted flow basis (expected at the end of Year 2017 (7 years post closure).

Predictive water quality modeling conducted in support of the Doris North environmental impact assessment process suggests that no further water treatment of the tailings containment area supernatant will be required in the post closure time period. The modeling suggests that natural processes (volatilization and dilution with snow melt and precipitation runoff) will within a short time period (three years) following the cessation of mining, allow for the unrestricted volume release of supernatant from the tailings containment area while still meeting water quality objectives in the Doris outflow watershed below Tail Lake.

These predictions will be refined during the mine's operating life through additional monitoring, testing and modeling intended to verify the findings of the current predictive modeling work. MHBL acknowledges that additional contingency measures may have to be implemented prior to final decommissioning of the tailings containment area if these model predictions are not verified in practise. At this time the sensitivity runs using the water quality model suggest that

under a "worse" trending water quality condition in Tail Lake an acceptable contingency measure will involve extending forward the time over which active management of the volume of supernatant released needs to be implemented beyond the current planned three year post closure period. By continuing to manage the release of supernatant of water from Tail Lake over additional years, the modeling demonstrates that over time water quality in Tail Lake would improve allowing for unrestricted release of supernatant. In other words the contingency measure would involve extending the time period over which the annual volume of supernatant pumped from Tail Lake needs to be actively managed thus extending the post-closure care and maintenance requirement. The impoundment has the capacity to accommodate such a contingency. This is a significant improvement over the previous discharge strategy where additional water treatment was thought to be the needed contingent measure. Under the revised strategy it is unlikely that any additional water treatment would be needed to reclaim Tail Lake even under worse than predicted water quality trends.

Closure and reclamation of the tailings containment area will consist of the following steps;

1. Tail Lake will continue to be monitored and actively managed for seven years after the cessation of milling until it can be demonstrated that water quality is adequate for unrestricted release during the following spring freshet. During this interim period water will be released from Tail Lake using the existing supernatant pumping system using the discharge criteria and release rates established in the mine's water license;

2. During the first year the tailings and reclaim water pumping systems and pipelines will be removed and the materials disposed of in the solid waste disposal facility. The tailings pipelines are projected to be 6" diameter with a 4" diameter reclaim water pipeline, both insulated HDPE. The emergency tailings pipeline catch basins will be cleaned out with tailings material hauled to Tail Lake. The catch basins (each 25.2 m by 25.2 m with a 1 m high berm) will then be breached and either graded or backfilled to prevent further ponding of water and to encourage natural re-vegetation to become re-established. The HDPE liners will be removed and disposed of in the solid waste disposal facility site;

3. By the end of the seventh year (in 2017) following the cessation of mining it is expected that water quality will have improved within Tail Lake to the point where the discharge from Tail Lake can continue in an unrestricted manner while meeting water quality protective of aquatic life downstream. At this point the North Dam can be breached allowing the lake outflow to equilibrate with inflow.

4. By the end of the seventh year following the cessation of mining it is expected that water quality within Tail Lake will have returned close to pre-development background quality and will be within CCME Guidelines for protection of aquatic life.

6.1.8 Tail Lake Shoreline Erosion

Under the proposed mine development plan, the water level in Tail Lake is expected to rise from the pre-development elevation of 28.3 m to a flooded level of 29.4 m over the mine's operating life. There is concern that this rise in water level will result in the thawing of frozen marine sediments in the newly flooded shoreline and that this thawing will result in sloughing and erosion of the thawed sediments into the lake. As part of the development plan, MHBL has

proposed to install rock armouring over geotextile over the area it has identified as being most susceptible to such sloughing. This rock armour would be installed at the time of dam construction prior to the start of tailings deposition.

The total area of shoreline that will be inundated as the water level rises from 28.3 to 29.4 m is 12.9 ha. Through field investigations, MHBL has identified 40% of this 12.9 ha (30,600 square metres) as being most susceptible to such sloughing based on observed ground conditions (slope angle, etc). During dam construction, MHBL will place 25,800 square metres of geotextile and 7,600 cubic metres (15,800 dry tonnes) of quarried rock over half of this area (20% of the 12.9 ha), a 15,300 square metre area, to create a 0.5 m thick rock armour layer to prevent potential sloughing. MHBL will then monitor the area and has assumed that during the mine life a further 15,300 square meters will be armoured in a similar manner to cover the full 3.6 ha.

MHBL has included within the closure plan cost estimate a contingency allowance for the placement of additional quarried rock and geotextile to stabilize potential shoreline erosion that may occur along the edges of Tail Lake once the North Dam has been breached. This is a contingent measure in the event that receding water levels in Tail Lake following the breaching of the North Dam result in melting of frozen marine sediments and result in sloughing and erosion of the thawed shoreline into the lake after closure. The following allowance has been included for the placement of both geotextile and quarried waste rock onto the shoreline slopes to prevent such erosion:

Shoreline Erosion (Contingency)

> An allowance to armour the remaining 60% of the 12.9 ha surface area between the predevelopment lake level of 28.3 up to the planned flooded elevation of 29.4 m; 0.5 m thickness of placed quarried rock over 47,500 square metres of shoreline – 22,800 cubic metres (47,500 dry tonnes) of rock and 77,400 square meters of geotextile.

Consequently the closure cost estimate includes an allowance of $1.2 million to cover this contingency measure, i.e., placement of an additional 22,800 cubic metres of armouring rock and 77,400 square meters of geotextile.

6.1.9 Water Management

The fresh water intake pump house and piping will be removed.

No post closure water treatment from either the tailings containment area of from the mine site itself is expected to be required once reclamation has been completed.

Surface runoff drainage patterns will be restored through removal of water retaining berms such as road safety berms, containment berms from the fuel storage area and from the explosives storage area and through the removal of culverts.

7.0 ENVIRONMENTAL EFFECTS ASSESSMENT

7.1 Assumptions

This section provides an assessment of the predicted environmental conditions in the area surrounding the project in the post-closure time period. The assessment assumes that the following physical reclamation activities have been completed:

- All major equipment and structures, and hazardous materials have been removed from the underground mine; the openings into the mine have been physically sealed;
- All hazardous materials have been removed from the surface ore processing facilities; the plant has been cleaned out; the equipment and structure have been demolished; non-salvageable material disposed of in solid waste disposal facility;
- The water in the Tail Lake tailings containment area meets suitable water quality requirements for discharge. The Tail Lake tailings containment area has been breached at the main dam site and a self-sustaining minimum 4 meter of water cover has been established; excess water can freely drain from the tailings containment area through a rock armoured spillway into the former Tail Lake outflow stream channel and thus into Doris Lake;
- There is no ongoing sloughing of shoreline in Tail Lake on the basis that all unstable shoreline has been suitably armoured;
- All remaining hazardous materials, chemicals, reagents, hydrocarbons, etc., have been removed or disposed of in a manner approved by the appropriate regulatory agencies; and the facilities used to store these materials have been decontaminated, demolished and disposed of in the site solid waste disposal facility;
- All hazardous materials have been removed from the remaining surface infrastructure (camp, power plant, maintenance shop, explosives magazine, sewage treatment plant, etc.); the facilities have been cleaned out, the equipment and structures demolished; non-salvageable material disposed of in the solid waste disposal facility;
- The site roads and the airstrip have been decommissioned; all associated buildings, light stands, signs and drainage culverts have been removed; natural drainage across the roads and airstrip has been restored, with adequate erosion protection provided; and the roads and airstrip have been graded to shed surface runoff and scarified to promote in-growth of natural vegetation;
- All other surface infrastructure including above-ground piping and power distribution lines has been demolished and disposed of; all building pads, parking areas, laydown areas, etc., have been regraded and scarified; and all contaminated soils have been removed and treated.

7.2 Underground Mine

It is expected that the underground mine workings will remain frozen due to the presence of permafrost throughout this region. In the event that global warming causes a loss of this permafrost, it is likely that water will infiltrate from the nearby Doris Lake causing the mine workings to naturally flood. The rate of flooding will be determined by the amount of water that can enter the mine through the natural fractures in the rock and the relative difference in hydraulic head between Doris Lake and the mine workings. Ultimately the water level within the mine would be expected to reach equilibrium with the water level in Doris Lake.

All sources of hazardous materials (hydrocarbons, chemical, reagents) will be removed from the underground mine workings as part of the planned reclamation activity. All underground openings will have been sealed. Potentially acid generating rock either placed underground or contained in the mine walls will remain frozen reducing the relative rates of future sulphide mineral oxidation. That will no groundwater flow that could mobilize or transport acidity and/or metal contaminants away from the underground mine workings.

In the unlikely event that at some future point permafrost is lost, then natural future flooding of the underground mine workings would significantly reduce any oxidation of sulphide minerals exposed in the wall rock by eliminating contact with the air (limiting the availability of oxygen to oxidize the sulphide mineralization).

7.3 Process Facilities

The land surface altered by construction of the ore processing facilities will be covered with rock and graded to enhance natural drainage and prevent water from ponding. The graded rockfill pads will be visually evident until indigenous vegetation becomes re-established (expected to take several decades). No other post-closure effects are anticipated with regard to the ore processing facilities.

7.4 Surface Infrastructure

The proposed removal and reclamation of the site infrastructure facilities will eliminate any requirement for long-term maintenance, and no substantive adverse effects are expected in the post-closure period. The infrastructure in this category includes the airstrip, site roads, quarries, waste management facilities and other site support facilities.

7.5 Mine Waste and the Tail Lake Tailings Containment Area

The Doris North Mine will not result in the creation of any surface overburden or waste rock piles that will remain at the end of the mine life. All potentially acid generating waste rock will be left underground or returned to the underground mine before the completion of the reclamation. No overburden will be stockpiled due to the permafrost conditions prevalent throughout the area. Rockfill pads will be constructed on top of the frozen ground to minimize degradation of the underlying permafrost.

The Tail Lake tailings containment area dams will be breached once the contained water has reached quality suitable for discharge. A spillway will be constructed through the North dam to ensure the maintenance of a self-sustaining 4-meter minimum depth water cover over the stored tailings in Tail Lake. Acid Base Accounting test work conducted on a sample of laboratory generated mill tailings indicates that the mill tailings generated by the Doris North Project are not expected to be net acid generating and thus the maintenance of the water cover is not crucial from a chemical stability but is put forward as a means of controlling dust emissions and for aesthetic value. The premise that the combined mill tailings will be non-acid generating will be verified during the mine life through additional testing conducted on actual tailings material.

Water level modeling has been conducted to verify that the water cover can be maintained even following successive dry years.

Maintenance of the physical stability of the Tail Lake tailings containment area in the post-closure period does not rely on the continued presence of permafrost nor a frozen core in the North dam or in the ground beneath the main dam. The dam will be breached once water quality has reached a suitable quality for discharge. It is assumed that pore water within the tailings will in time be similar to the overlying lake water due to the relatively shallow depth of stored tailings and water within the lake. A small volume of seepage may emanate from the Tail Lake tailings containment area, affecting shallow groundwater quality in the active layer in the immediate area. The effects will be localized to the Tail Lake outflow channel area and should in time be similar in quality to water draining through the spillway in the North dam.

The reclamation plan will encourage a natural succession of indigenous plant species within disturbed areas, but re-establishment of vegetation can be expected to take several decades. The resultant effect on terrestrial wildlife and bird habitat associated with the reclaimed Doris North site will be relatively minor in a regional context, given the vast surrounding area of land and water providing suitable alternatives for wildlife species.

7.6 Biophysical Environment

7.6.1 Air Quality

All stationary and vehicle exhaust emissions (sulphur dioxide, oxides of nitrogen, greenhouse gases) associated with the project will cease following the closure and reclamation of the site facilities. The only emissions in the post-closure period will be those associated with periodic trips into the site for the purpose of environmental monitoring and maintenance. These will be minimal and should have no adverse effect.

Dust emissions associated with the project will also decrease substantially after closure and reclamation. Cessation of road and air traffic, removal of all site buildings and facilities will eliminate or substantially reduce potential dust sources. Because it will take several decades for natural in-growth of indigenous vegetation after reclamation, some dusting could occur in areas of exposed rockfill on the laydown and building rockfill pads during periods of strong winds. The only other dust emissions in the post-closure period will be those associated with periodic trips into the site for environmental monitoring. These dust sources are expected to be minimal and have little to no adverse effect.

7.6.2 Noise and Light

Noise and light effects associated with the project will cease with the completion of closure and reclamation. No operating equipment or power sources will be left on site in the post-closure period. Some minor noise will be associated with post-closure environmental monitoring trips to the site, but this is expected to be minimal and have no adverse effect.

7.6.3 Terrain

During operations, any area used for project activities that becomes unnecessary will be recontoured to suit the natural terrain. Because of the extremely harsh growing conditions and lack of soil, re-establishment of natural vegetation will take many years, probably decades. At closure natural re-vegetation of surfaces used for project facilities at site will be encouraged through scouring of surfaces. Arctic environment re-vegetation research will be looked at through the life of the mine and at closure to ensure that best available mitigation and management re-vegetation practices are implemented during mine closure.

The rockfill pads and quarry sites will remain visible after closure. A conceptual rendering of how the site will appear once reclamation is complete is presented in Figures 1.3 thru 1.7 previously presented in Section 1 of this Preliminary Mine Closure and Reclamation Plan.

7.6.4 Wildlife

The potential for human-wildlife interactions will greatly diminish in the post-closure period, and the risks of contact with equipment, vehicles and aircraft will cease once closure and reclamation activities are complete. Areas used for project facilities will essentially be lost to wildlife for the duration of the mine life and for several decades after closure while natural vegetation becomes re-established. Little to no effect on wildlife abundance and use is expected in the post-closure period.

7.6.5 Water Quality and Aquatic Resources

Predictive water quality modeling was conducted to predict how the project would affect water quality in the downstream aquatic environment during the mine's operating life. Metal leaching from the tailings has been tested and the data suggests that the tailings left in Tail Lake will not significantly contribute additional metal loadings into the Doris outflow and Little Roberts Lake watersheds in the post-closure period.

It is projected that the reclaimed Doris North mine site will not significantly add any additional contaminant loadings into the surface water bodies of the project area (i.e., into Doris Lake, Doris Outflow, Little Roberts Lake or Roberts Bay).

Leaching of contaminants from the non-hazardous landfill is not expected to occur due to the substrates natural characteristics (bedrock floor in the quarry) and given that the landfill will not contain hazardous materials (all hazardous materials will be shipped off site for disposal). Although permafrost is expected to naturally develop in the landfill material it is not necessary for contaminant encapsulation purposes.

Sediment loading to Doris Lake from post-closure runoff is not expected to differ from existing natural concentrations. Water quality within Doris Lake will not be adversely affected by the Doris North Mine in the post-closure time period. Consequently no adverse effect to the overall aquatic community in the lake is anticipated.

In summary, the immediate area of the project will be physically altered due to project development, and changes will remain evident in the plant site, site roads and airstrip after closure. However, the reclamation work will help blend these sites into the surrounding landforms over the long term. The re-establishment of natural vegetation will be slow. The reclaimed project will have minimal effect on the biodiversity and sustainability of the natural renewable resources of the region and have no lasting effect on traditional and non-traditional land use activities in the area.

8.0 POST - CLOSURE MONITORING AND MAINTENANCE

MHBL is committed to minimizing the residual environmental effects associated with project development. The closure and reclamation plan has been developed in conjunction with the mine plan so that closure considerations can be incorporated into the mine design. Surface facilities have also been designed with closure in mind to facilitate, wherever practical, reclamation requirements and the enhancement of natural recovery of areas affected by the project.

The closure and reclamation phase of the project will commence once the economic ore reserves within the deposit have been exhausted and mining and processing operations have ceased. Based on current planning, it is anticipated that underground mining at the project will commence in late 2008 and continue through 2010. Mine closure and reclamation is expected to take place in 2011 and 2012. The post-closure period would commence in 2013 and continue through 2020 or until it can be demonstrated that reclamation objectives have been achieved and no further environmental degradation is occurring.

Monitoring and maintenance programs will be implemented during the closure and post-closure phases of the mine to prevent environmental degradation and measure the performance of the closure and reclamation procedures. The data collected through post-closure monitoring will allow the planned procedures and activities to be adjusted and/or modified as necessary to ensure optimal environmental protection. The monitoring and maintenance programs discussed in this section are inherently generic at this stage of planning and will be developed in more detail in consultation with communities and regulators, and as project permitting advances.

8.1 Environmental Management and Aquatic Effects Monitoring

MHBL is developing an environmental management system (EMS) for the Doris North Project. An EMS is a defined system or process of measuring and documenting compliance with environmental standards and for seeking continuous improvement at a facility such as the project. An EMS utilizes training, environmental monitoring, audits, inspections and other tools to measure and manage actual environmental performance against established objectives.

The EMS sets out how the project will be managed to minimize its impact on the biophysical and socio-economic environment, and to continually improve its environmental performance. It sets out the management plans and the emergency plans for all key areas of the environment during construction, operations and closure.

This monitoring program will consist of a number of features, including:

- Monitoring for regulatory compliance (i.e., compliance with the Metal Mining Effluent Regulation of the Fisheries Act, with the Project's Water License and Land Use Permits and Leases, and with the applicable Nunavut legislation, regulations and guidelines for the protection of aquatic life, and environmental and human health);

- Monitoring for project-related regional environmental effects; and

- Identifying circumstances under which additional mitigation should be undertaken if impact predictions were incorrect or impacts were underestimated.

MHBL is committed to monitoring water quality in the project area during construction, operations and closure. The Aquatic Effects Monitoring Program (AEMP) includes both biological and water chemistry sampling. A detailed AEMP has been developed for the Doris North project area and is included as a supporting document to the Final EIS. This program will change over time to adapt and respond to conditions identified through sampling over the previous years. MHBL will continue this effects monitoring program into the post-closure period.

Allowance has been included in the reclamation cost estimate to continue this aquatic effects monitoring program on an annual basis from 2011 through 2016 and then every second year through 2020. Environmental monitoring and maintenance requirements are expected to decline once the project facilities have been fully decommissioned and the mine development area has been restored to the endpoints agreed upon in the water licence.

8.1.1 Current Water Quality Monitoring

In the pre-development phase water quality monitoring has been focussed on environmental baseline sampling in the local watersheds designed to establish current water quality prior to any mine construction activity.

8.1.2 Environmental Monitoring During Operational Period

It is anticipated that a Surveillance Network Program (SNP) will be established as part of the water license for the project. MHBL will continue monitoring under this SNP into the post closure period. Allowance has been included in the reclamation cost estimate for continuing SNP monitoring at a frequency of 4 times per year from 2011 through 2016, with the frequency decreasing to twice per year through 2018 and then once per year through 2020.

8.1.3 Environmental Monitoring during Closure and Reclamation Period

Compliance Monitoring during Closure and Reclamation Period: This section describes the monitoring program anticipated by MHBL to demonstrate compliance with all regulatory requirements and standards during the closure and reclamation period.

Biophysical Monitoring during Closure and Reclamation Period: monitoring will be conducted during the decommissioning and post closure periods to ensure that the project is not resulting in adverse impacts to water, air, and environmental health (fish, wildlife, humans).

Socio-economic Monitoring during Closure and Reclamation Period: Socio-economic data relating to mine expenditures, worker health and recruitment will be made available to the appropriate agencies with appropriate proprietary considerations. MHBL will assist KIA and government agencies by providing mine-related information. If socio-economic variables related to the IIBA are required, this information will be provided to the appropriate parties, as agreed. Information sharing with possible future projects and activities in Nunavut will also be conducted with appropriate proprietary considerations.

Compliance with MHBL Policies and Standards: Hiring, training and termination will be undertaken with consideration for Inuit peoples, residents in adjacent communities, and gender equity.

MHBL will initiate programs at closure to help Inuit and other local people in obtaining new jobs and filling vacancies that may be created through other mining developments in Nunavut or elsewhere.

8.1.4 Post – Closure Monitoring

Physical reclamation of the project facilities is expected to be complete within two years of plant shutdown. Management of the annual release of supernatant from Tail Lake would continue for an additional five years during the open water season (i.e., with a crew of two people camping on site during the annual release window each summer). Other on site activity will be minimal during this time. Environmental monitoring would continue.

The level of monitoring required will be a function of environmental performance at the site. For the purpose of this Mine Closure and Reclamation Plan, it has been assumed that post-closure environmental monitoring will continue for 10 years (2011 through 2020), with lesser degrees of effort required as it can be demonstrated that reclamation actions have achieved the stated objectives of preventing any ongoing degradation of the surrounding environment.

Initially it is expected that water quality monitoring of the same operational SNP stations will continue at the same frequency during the reclamation period (2011 and 2012). It was assumed that SNP monitoring would continue at a frequency of 4 times per year from 2011 through 2016, with the frequency decreasing to twice per year through 2018 and then once per year through 2020.

The types of environmental monitoring anticipated includes:

- Monitoring of water quality in Doris Lake, Tail Lake, Tail Lake outflow and in Doris outflow below Tail Lake;
- Monitoring of surface runoff from the reclaimed plant area, fuel tank farm, closed out landfill and from the reclaimed fuel transfer areas;
- Program of aquatic effects monitoring, including sediment, benthos and fisheries studies to assess cumulative effects of the project on the aquatic environment; and
- Annual inspection by a qualified professional geotechnical engineer of the Tail Lake containment dam.

It is anticipated that water quality and other data will demonstrate that environmental conditions have essentially stabilized by the end of 2015 and that a reduction in frequency of environmental monitoring can be justified. The assumed changes for post closure

years 6 through 10 are summarized as follows:

- Sampling of remaining applicable SNP stations, with the sampling visits scheduled during open water periods;
- Monitoring of surface runoff from reclaimed site facilities, with the sampling visit scheduled during open water periods;
- Annual inspection by a qualified professional geotechnical engineer of the Tail Lake containment dams.

Stabilization of environmental conditions by the end of year 10 is assumed to be sufficient to justify the cessation of further monitoring requirements by the end of 2020. However, this assumption will revisited, assessed and modified as necessary based on measured environmental performance at that time.

8.2 Post – Closure Maintenance

8.2.1 General

The closure design for the surface facilities incorporates features to minimize requirements for future care and maintenance. For example, all sites will be graded to prevent surface ponding, and drainage channels will be designed and constructed with wide cross-sections and appropriate erosion protection to accommodate extreme precipitation events. No buildings will be left, eliminating maintenance requirements associated with structures. All pumping systems will be removed and natural drainage established wherever practical. Other than the environmental monitoring and inspection activities covered in the previous sections, the Mine Closure and Reclamation Plan includes no planned or scheduled post-closure maintenance activities.

MHBL recognizes, however, that some unexpected post-closure issues could arise, such as the need to construct new drainage channel(s) or sediment control pond(s). Any such works would be small in size, able to be constructed in a cost-effective manner using resources brought to site by aircraft. An allowance has been included in the post-closure maintenance cost estimate for this type of unspecified maintenance activity.

The closure cost estimate for the Doris North Project includes allowance for two projected post closure types of maintenance activity:

a. An allowance for operation during open water months of the Tail Lake supernatant discharge system for a period of seven years following the cessation of mining. It is expected that unrestricted discharge of supernatant from the tailings containment area will be acceptable by the end of the seventh year following the cessation of mining. This will require a two person crew on site for five years after all other physical reclamation work has been completed during the open water discharge time period along with the cost associated with supporting this crew while at site.

b. An allowance for unspecified erosion and drainage repair work. It has been assumed that periodically it will be necessary for a small crew to be brought to site to repair minor erosion damage and to effect changes in the drainage works (ditches, etc.) to prevent further erosion damage. An allowance of 80 person-hours per year has been included for this type of activity along with money for travel and equipment. It is expected that this degree of effort will not be required every year, however at some point in time this type of maintenance will be required. It may occur once every five years at which time the allowance would be 400 person-hours, or every second year at which time the allowance would be 160 person-hours;

A period of 200 years has been used in costing the second type of projected post-closure maintenance activity. This in essence allows for long term care of the site.

8.2.2 Post-Closure Revegetation Considerations

The pre-development terrain is covered with characteristic sub-arctic tundra vegetation. Three ecosystem units dominate the area: the ocean shoreline association, lowland ecosystems, and the rock outcrop and upland ecosystems. The vegetation includes shrubs, herbs, grasses, sedges and rushes, mosses and various species and/or genera of lichen (MHBL, 2005).

It is unlikely that this type of vegetation can be restored in the short term using conventional revegetation techniques. There are no stockpiles or areas at the Project site where growth media can be obtained in sufficient quantity to realistically provide a suitable growth media to be placed over the building pads, roadways, etc. to allow for revegetation using conventional seeding techniques. There are no readily available sources for seed stock for the native plant species common to this area. It may be possible to plant commercially available grass mixes from southern Canadian climate areas but these will likely not survive over the long term. Consequently MHBL does not have the technology to assure successful revegetation of the site.

However MHBL will take action during reclamation designed to encourage a natural succession of indigenous plant species within disturbed site areas. Where appropriate, regrading, contouring and scarification of surfaces will be done to loosen up the crushed rockfill on building pads, roadways and the airstrip to provide for moisture retention and to promote natural revegetation. MHBL will continue to monitor revegetation work at other sites in the Northwest Territories and Nunavut with the intent of applying successful revegetation techniques as they may become available.

8.3 Estimated Post – Closure Monitoring and Maintenance Cost

For the purposes of this Closure and Reclamation Plan, an estimate of $1.1 million has been made for the total cost of environmental monitoring and continued operation of the annual release of supernatant from the tailings containment area during both closure and post-closure.

The estimate includes allowance of $0.48 million for ongoing operation of the Tail Lake discharge system in 2013 thru 2017. The operation of the system during 2011 and 2013 is covered under site management during the reclamation period. The average annual cost is $96,300 which includes a 15% contingency. Key assumptions and considerations used in the preparation of this estimate are as follows:

- A site-based person will be tasked during the two-year closure and reclamation period to continue operation of the Tail Lake supernatant release and environmental monitoring and reporting activity during the open water season;

- Environmental monitoring in the post-closure phase will be conducted by means of periodic site visits, scheduled to coincide with the summer flow period. Initially this would involve 4 trips per year through 2016, dropping to 2 thru 2018 and 1 thru 2020. Each sampling visit to site would involve preparation, travel, sampling and reporting activities and a round-trip cost for the charter of a small, fixed-wing aircraft for personnel transport to and from Cambridge Bay and commercial air carrier to Yellowknife;

- An allowance has been included for analytical costs, sampling supplies and equipment consumed in the ongoing monitoring activities. Biological effects monitoring would be undertaken during the same visit;

- An additional allowance has been included for the preparation and submission of annual reports covering the post closure monitoring program;

- The annual geotechnical inspection would be scheduled to take place at the same time to maximize efficiency of air charter costs. An allowance of $25,000 per year has been included for this inspection including reporting; and

- A contingency allowance of 15% has been included for unspecified monitoring or light maintenance activity that may be required.

Post-closure maintenance requirements were estimated at $26,000 per year, based on the following assumptions:

- Periodic erosion repair and drainage maintenance activities were based on an allowance of 80 person-hours per year at a fully loaded hourly rate of $75/hr. A further $20,000 per year was included in this allowance for travel to and from the site and for equipment and materials. This may vary between use of hand held shovels used to open up or repair a ditch to a small piece of excavating equipment flown into the site. The need will depend upon the amount of work required. It is expected that in some years no activity will be required allowing this allowance to build to cover larger pieces of work;

It has been assumed that post-closure maintenance activities will be required over an extended time period. For this cost estimate a period of 200 years was selected. A "sinking fund" would be created at the end of the two-year reclamation period to fund the ongoing expenditure of $26,000 per year on average over 200 years. A discount rate of 3% was used to calculate the size of the required fund and to reflect the real rate of growth of money over the long-term. A sinking fund of $864,000 would be set-aside at the end of 2012 to fund this ongoing expenditure for post closure maintenance. The chosen time period of 200 years essentially reflects long term care as increasing the time period in calculating the required sinking fund does not significantly alter the size of the fund once a time period of 200 years is chosen. This sinking fund is intended to be used to fund future care and maintenance of the Doris North site once reclamation has been completed.

9.0 IMPLEMENTATION SCHEDULE AND COST ESTIMATES

9.1 Introduction

In accordance with DIAND's *Mine Site Reclamation Policy for Nunavut* (Reclamation Policy), the reclamation implementation schedule and liability cost estimates described in this section were developed based on the worst case scenario of third-party management and execution of all closure and reclamation activities, for the purpose of establishing reclamation security. Reclamation liability estimates are presented both exclusive of progressive reclamation (financial assurance and security is discussed in Section 10).

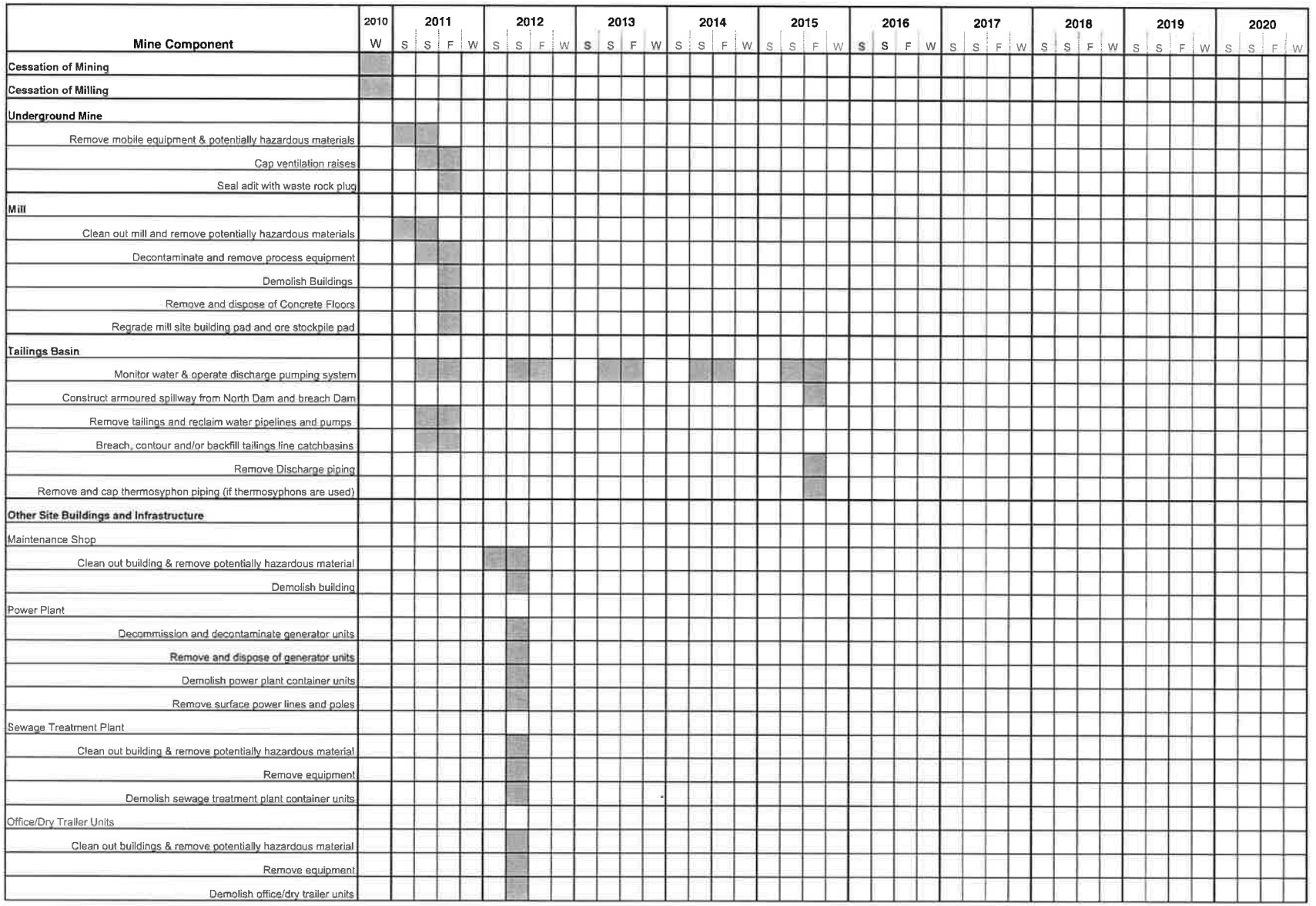
9.2 Implementation Schedule

9.2.1 Schedule Summary

A summary-level implementation schedule for final reclamation is provided in Figure 9.1. The schedule is based on final reclamation commencing at the end of the planned mine life. In summary:

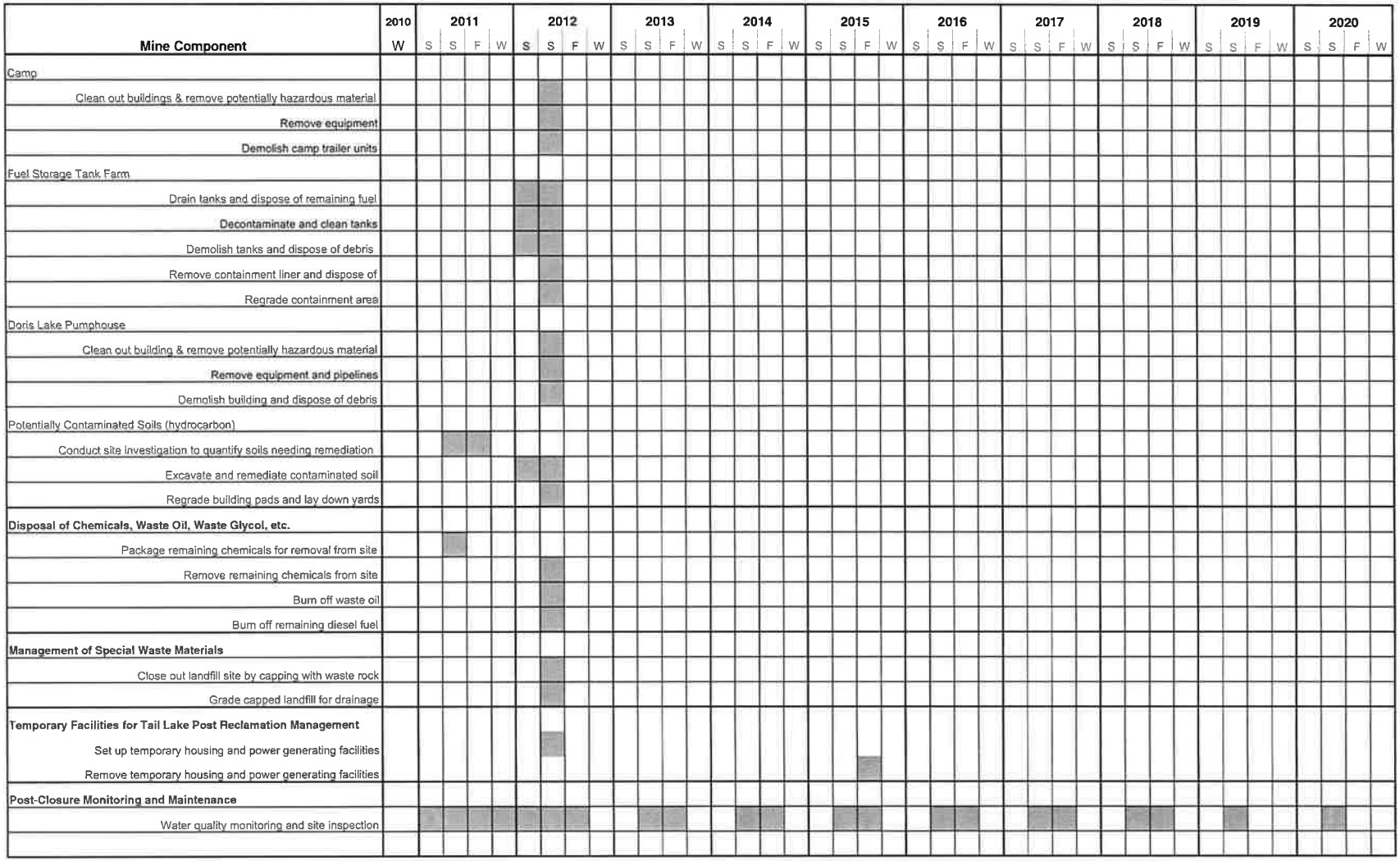
- Mining and milling would cease at the end of 2010 with the exhaustion of the currently known ore reserves;
- Due to weather constraints, reclamation activities will not commence until the spring of 2011 (June of 2011). In the intervening five-month period the site will be kept on a care and maintenance basis with a minimal sized crew (i.e., a 2 person care and maintenance crew on site at any given time);
- Reclamation activity will commence in June of 2011 and continue through September as shown in Figure 9.1 (decommissioning of the mine and processing plant facilities);
- The site will be placed back on a care and maintenance status from October 2011 thru May of 2012;
- Reclamation activity will re-commence in June and be completed by the end of September 2012 as shown in Figure 9.1;
- In the case of premature mine closure, the implementation schedule would essentially remain the same, with reclamation commencing in June of the year following the cessation of operations (assuming operations ceased after May). In the event that reclamation ceased before May, then reclamation could commence in the same year.

FIGURE 9.1: **SCHEDULE OF DECOMMISSIONING & RECLAMATION ACTIVITY**



S,S,F,W = Sr ner, Fall, Winter

FIGURE 9.1: SCHEDULE OF DECOMMISSIONING & RECLAMATION ACTIVITY



S,S,F,W = Spring, Summer, Fall, Winter

9.2.2 Schedule Basis

The implementation schedule for final closure and reclamation assumes the following:

- Upon shutdown of site operations, a contractor will be engaged and mobilized to site via aircraft to maintain site facilities on a care and maintenance basis until reclamation activities can commence. These facilities include the camp, power plant, tailings containment area and other site support facilities. For the purposes of this estimate, a period of five months has been assumed;

- A third-party manager and engineer will be engaged to prepare, tender and administer contracts for the site closure and reclamation activities. The engineer will also prepare detailed decommissioning, demolition and reclamation plans and specifications. This work is expected to take up to three months.

The reclamation contractor will mobilize his crews, materials and equipment to site by aircraft in the June of the year following the cessation of operations (June 2011). Most closure and reclamation activities will then be completed during 2011/2012.

9.3 Cost Estimates

9.3.1 Cost Summary

The overall cost of reclaiming the Doris North Project is estimated to be $11.5 million. The breakdown of this estimate is summarized by mine component in Table 9.1.

Table 9.1: Summary of Estimated Reclamation Cost for the Doris North Project

Capital Costs		
COMPONENT TYPE		**TOTAL COST**
UNDERGROUND MINE		$203,500
TAILINGS	Tail Lake	$2,989,220
BUILDINGS AND EQUIPMENT		$1,940,438
CHEMICALS AND SOIL MANAGEMENT		$354,000
MOBILIZATION/DEMOBILIZATION		$1,123,000
CARE AND MAINTENANCE DURING RECLAMATION		$302,000
SUBTOTAL		**$6,912,158**
PROJECT MANAGEMENT	15 % of subtotal	$1,036,824
ENGINEERING	10 % of subtotal	$691,216
CONTINGENCY	15 % of subtotal	$1,036,824
GRAND TOTAL - CAPITAL COSTS		**$9,677,021**
POST-CLOSURE MONITORING COST (NPV at 3%)		$838,370
POST-CLOSURE MONITORING CONTINGENCY 15%		$124,979
Years of post-closure monitoring	10	
POST CLOSURE MONITORING COST OVER 10 YEARS (NPV at 3%)		$963,350
POST CLOSURE MAINTENANCE ANNUAL AVERAGE COST		$26,000
Years of post-closure maintenance	200	
Discount Rate for Calc of NPV	3%	
POST CLOSURE MAINTENANCE SINKING FUND		$864,320
GRAND TOTAL CAPITAL AND POST-CLOSURE COSTS		**$11,504,691**

Detailed cost breakdowns for each of the mine component areas is included in Appendix A in the following Tables: Table A2 - the Underground Mine; Table A3 - the Tailings containment area; Table A4 – Buildings and Equipment; Table A5 – Chemicals and Soil Contamination; Table A6 – Mobilization; Table A7 – Care and Maintenance during Reclamation; Table A8 – Post Closure Monitoring; Table A9 – Post Closure Maintenance. These tables were generated using the RECLAIM model. The unit cost table included within the RECLAIM model is attached as Table A10. The assumptions that were used to generate these cost estimate details are documented in Appendix A.

This cost estimate includes the expenses anticipated from the time of mine shutdown in 2010 to completion of reclamation activities in 2012. This cost does not include any progressive reclamation credits.

The estimated costs are considered to be Class I or pre-feasibility level, with an expected accuracy of +15%. All costs are presented in 2005 Canadian dollars, with no allowance for escalation.

9.3.2 Cost Estimate Basis

9.3.2.1 General

For the purposes of developing the implementation schedule and cost estimates, it was assumed that the site is abandoned approximately mid-winter (end of the calendar year), following which the site would be maintained by a third-party contractor until equipment and materials needed for reclamation can be mobilized to site on the next available summer barge. Clearly, many other scenarios are possible. For example, in the event that the site is abandoned shortly after closure of the summer barging season (i.e. September), there would likely be sufficient diesel fuel in the main storage tanks (likely having been filled during the summer barge re-supply period) to supply most if not all of the closure and reclamation activity fuel requirements. However, this would also require the site to be maintained for a longer period (resulting in higher maintenance costs) before decommissioning equipment and supplies could be mobilized to site during the next available summer barge re-supply period. Conversely, if the site were abandoned late in the spring, the majority of stored diesel fuel would likely have been consumed in operations, and it would probably be necessary to purchase fuel for delivery on the next available barge re-supply, or the year after, to support the closure and reclamation program. In this scenario, however, the site maintenance period and costs would be reduced. It is expected that such variations in costs associated with alternative scenarios, such as those described above, will be accommodated within the range of accuracy of the cost estimates.

The reclamation cost estimates were based on the following general criteria, information and assumptions:

- A third-party contractor will be engaged to maintain the site on a care and maintenance basis from the date of mine shutdown by the owner to the completion of reclamation. All closure and reclamation activities, and operation of site support facilities during the care-and-maintenance and reclamation periods, will be performed by contracted labour and equipment;

- The site will be abandoned by the owner in a general state such that site facilities and mobile equipment are operational, but will require inspection, minor repairs, maintenance and an assessment of spare parts inventory needed for the care-and-maintenance period and the closure and reclamation program.

- Reclamation measures will be as described in Section 6; and

- The overall closure and reclamation schedule will be as described in Section 9.1.

9.3.2.2 Labour Costs

Labour costs were estimated by applying an inclusive unit labour rate to the estimated durations for closure and reclamation activities.

Labour rates were calculated using typical wages and benefits for open shop contractors. The all-inclusive labour costs were based on working 21 ten-hour days on-site followed by a 7-day rotation off-site, which equates to working 210 hours in a four-week period. The following are included in the wage rate:

- Base labour wage rate
- Overtime premiums
- Casual overtime allowance
- Benefits and burdens
- Workers' Compensation premiums
- Travel time
- Travel costs
- Appropriate crew mixes
- Small tools and consumables
- Contractor temporary facilities and services
- Contractors' overhead and profit.

An average unit labour rate of $75/h was used for cost estimating purposes.

9.3.2.3 Engineering, Procurement and Project and Construction Management

Costs were included for a third-party engineer and manager to carry out the following work:

- Project planning, including site visit, kickoff meetings and detailed planning and scheduling of decommissioning, demolition and disposal activities;

- Review of relevant drawings and information pertaining to equipment and structures to be demolished;

- Preparation of project and contract documents, including terms and conditions; drawings and specifications; safety, health and environmental management requirements; and schedules;

- Tendering, evaluation and administration of contracts;
- Procurement of equipment, materials and consumables required for the reclamation program not supplied by contractors; and
- Construction management functions, including manager, superintendents, safety supervision, accounting, contract administration, cost control, schedule management and general administration.

The above work will be initiated during the care-and-maintenance period, approximately three months prior to the first available barge re-supply period for contractor mobilization.

9.3.2.4 Temporary Construction Facilities and Services

All contractor-related temporary facilities and services were included in the hourly wage rate, with the exception of camp and catering, the costs of which have been estimated separately and are covered under the Mobilization/Demobilization line item.

9.3.2.5 Salvage

No salvage value has been assumed in the estimate.

9.3.2.6 Contingency

A contingency of 15% was applied to all project costs to cover unforeseeable costs within the scope of the estimate.

9.3.2.7 Exclusions

The following are not included in the estimate:

- Government overhead and administration expenses during the care-and-maintenance phase, closure and reclamation phase and post-closure phase;
- Taxes and duties;
- Cost of schedule delays such as those caused by:
  - Scope changes;
  - Unidentified ground conditions;
  - Labour disputes;
  - Environmental permitting activities;
- Sunk costs;
- Owner's costs; and
- Revegetation costs.

10.0 FINANCIAL SECURITY AND ASSURANCE

10.1 Introduction

DIAND's *Mine Site Reclamation Policy for Nunavut* (Reclamation Policy) sets the following guiding principles for financial security:

1. The total financial security for final reclamation required at any time during the life of the mine should be equal to the total outstanding reclamation liability for land and water combined (calculated at the beginning of the work year, to be sufficient to cover the highest liability over that time period);

2. Financial security for mine site reclamation for new mines must be readily convertible to cash. Security must meet the following basic criteria:

    - Subject to applicable legislation and due process, the form of security must provide the Crown with immediate, unconditional, unencumbered access to the full amount of the security;
    - The form of security must retain its full value throughout the life of the mine and, if applicable, beyond;
    - The form of security must remain beyond the control of the mining company, or its creditors in the event of insolvency.

3. The Minister of Indian and Northern Affairs may consider new or innovative forms of security, such as reclamation trusts, provided they meet the above criteria.

Regulatory authority to require financial assurance for mine site reclamation is not contained in a single statute. On Crown-owned lands in Nunavut, DIAND has jurisdiction with respect to land leases and related security issues. For water licenses, the Nunavut Water Board determines the amount of security, while the Minister for DIAND has the power to determine the form of security. The Doris North Project is on Inuit owned land and thus land leases fall under the jurisdiction of the Kitikmeot Inuit Association (KIA), who are the designated Inuit organization under the NLCA for this area, and thus land lease security will fall under the jurisdiction of the KIA. DIAND will have issued a foreshore lease for the jetty in Roberts Bay.

Accordingly under the policy it is intended that DIAND take the lead in facilitating discussions between the KIA and the various regulatory bodies to promote the co-ordination of financial security obligations. This role includes:

- Ensuring that, at any given time during the life of the mine, the total financial security for mine site reclamation is in place, subject to the timing of any application for credit for progressive reclamation, is equal to the total outstanding reclamation liability of the mine site, and the financial security for closure-related activities, imposed by land and water jurisdictions cumulatively, does not exceed the total reclamation cost estimates for both the land-related and water-related reclamation elements at each mine;

- Ensuring that the terms, conditions and notification processes in financial security are compatible for all regulatory instruments; and

- Co-ordinating the regulatory determinations required for each decision maker (e.g., KIA, NWB and the DIAND Minister).

10.2 Credit for Progressive Reclamation

Ongoing reclamation throughout the life of the mine is preferable from both the environmental and financial liability perspectives. DIAND's Reclamation Policy indicates its intent that the financial security of a mining project be adjusted to reflect progressive reclamation on the following basis:

- When ongoing reclamation work reduces the outstanding environmental liability, it will result in a reduction in the level of financial security required to be maintained;

- Credit for progressive reclamation work should be made in a timely fashion in accordance with authorities set out in the applicable legislation;

- The value of reclamation work will be based on generally accepted modeling and calculated as the difference between previous outstanding liability and estimates made of the remaining liability following the reclamation work (as opposed to actual costs, if actual costs do not fully reduce outstanding liability);

- The amount of financial security on deposit will normally increase proportionately as mining proceeds. Generally this implies that as the mine site grows, water usage increases and the work to restore a site expands. Accordingly, reclamation costs are usually estimated to rise over the life of the mine. However as reclamation is performed, the environmental liability is reduced and the financial security required may decrease proportionately;

- If, during a specific period, the value of any progressive reclamation exceeds the value of new reclamation liability created through additional mining operations, DIAND would reduce the amount of security required through the surface lease and would support an application by the mining company to the NWB to reduce the amount of the water license security accordingly.

Progressive reclamation may not reduce the financial assurance required to zero. Sometimes, a residual amount is required to meet other licensing obligations.

10.3 Post-Closure Reclamation and Final Decommissioning

DIAND's Reclamation Policy indicates that once the reclamation work required under the Mine Closure and Reclamation Plan is deemed completed, the site will be allowed to stabilize. During this time, monitoring will be conducted by the company and verified by KIA, DIAND and other agencies as appropriate, with respect to the effectiveness of the mitigative measures, the accuracy of the environmental assessment and any unforeseen environmental impacts. The

duration of the required monitoring phase will be reviewed and confirmed at the time of closure and will depend on the risks associated with the potential impacts on the environment.
During this period the mining company will continue to be responsible for the site, including remediation of any additional environmental complications that develop. If warranted by site conditions, the monitoring period may be extended to ensure remedial measures are met.

The land owner and the DIAND Minister may hold back an appropriate amount of financial assurance to cover future requirements for the site. In such cases, the mining company will be responsible for the care and maintenance of the site, but will also maintain a claim to any remaining financial assurance.

When the land owner and the DIAND Minister is satisfied that the operator has met the requirements for the decommissioning under the relevant legislation and that the objectives of the Mine Closure and Reclamation Plan have been fully met, the land owner and the DIAND Minister will provide the mining company with a written acknowledgement to that effect.

10.4 Financial Security and Assurance for the Project

MHBL is committed to providing suitable financial security and assurance to cover the cost of full reclamation of the Doris North project. MHBL expects that the estimates contained within this Mine Closure and Reclamation Plan will form the basis for future discussions between the NWB, DIAND and MHBL in establishing the appropriate level and form of financial security to be posted for the project. MHBL acknowledges the stated principles covering financial security enunciated in the *Mine Site Reclamation Policy for Nunavut*. It is MHBL's intent to enter into discussions with the responsible authorities to reach agreement on an appropriate form and amount of security to be posted for the project.

At this time MHBL has not developed or indicated any preference towards a specific format for the posting of security against reclamation liability. MHBL remains open to consideration of a wide range of options, including but not limited to the creation of a reclamation trust, cash, letter of credit, insurance bond or a combination of these mechanisms and others that may arise as a result of future discussions with the authorities.

MHBL is committed to a program of progressive reclamation at the Doris North Project site. Consequently, MHBL intends to manage its reclamation liability at Doris North by initiating reclamation work at an early point in the mine life where practical, thereby limiting the expansion of overall liability over time.

11.0 POST – CLOSURE ENVIRONMENT AND LAND USE

The key objectives of the reclamation plan are to:

- Protect public health and safety through the use of safe and responsible reclamation practices;
- Reduce or eliminate environmental effects once the mine ceases operations;
- Re-establish conditions, where practical, to pre-mining land use; and
- Reduce the need for long-term monitoring and maintenance by establishing physical and chemical stability of disturbed areas.

The following provides a brief description of the post-closure environment and land use potential.

11.1 Traditional Land Use

The project is located within a region that was used in the past by Inuit people for hunting and fishing and as a travel route. Once the project is reclaimed, there should be no effects on traditional land use patterns.

11.2 Non-Traditional Land Use

Potential non-traditional land uses within the area affected by the project include extraction of subsurface minerals, domestic hunting and trapping, recreational fishing and tourism. However the area immediately surrounding the project is currently not subject to these land uses. Few human activities are common at present because of the isolation of the area.

11.3 Aesthetic Quality

After closure, the only visible reminders of the mine's presence will be the rockfill jetty in Roberts Bay, the quarry sites, and the rockfill building pads. All other surface infrastructure will be removed. Site roads and the outlines of laydown areas will remain readily apparent for several decades until native vegetation becomes re-established.

11.4 Biophysical Environment

Emissions of gases from the combustion of fossil fuels, dust and noise from project facilities will cease after the reclamation period. The self-sustaining permanent water cover over the Tail Lake tailings containment area will prevent significant dusting. Noise from air and road traffic will be substantially eliminated; only a few aircraft visits per year are anticipated for post-closure monitoring.

At closure, the surface disturbed by project facilities will remain visible as rock-covered, gently sloping ground that will blend with the surrounding terrain but still be distinct for several decades until native revegetation becomes re-established.

The project area currently provides habitat for a variety of terrestrial wildlife and birds. None of these species, including caribou, is heavily dependent on resources within the project footprint and similar habitat is prevalent throughout a wide region surrounding the project site. The loss of habitat during project operations and after closure (while vegetation becomes re-established) is expected to have a relatively minor impact on wildlife in a regional context.

In summary, although the project will induce lasting physical changes to the local topography, the proposed reclamation plan will minimize these effects and assure the biodiversity and sustainability of the natural renewable resources of the region.

12.0 GLOSSARY

ARD	acid rock drainage
CCME	Canadian Council of Ministers of the Environment
°C	degrees Celsius
DIAND	Department of Indian and Northern Affairs Canada
EA	Environmental Assessment
EMS	Environmental Management System
Ha	Hectare
ISO	International Standards Organization
Kg	Kilogram
KIA	Kitikmeot Inuit Association
Km	Kilometre
Km^2	Square kilometres
L	Litre
LSA	local study area (project footprint, surrounded by 500 m buffer)
M	Metre
m/s	metres per second
m^2	square metre
m^3	cubic metre
Masl	metres above sea level
ML	million litres
Mt	million tonnes
MTVC	Metavolcanic
NIRB	Nunavut Impact Review Board
NLCA	Nunavut Land Claims Agreement
NWB	Nunavut Water Board
PAG	potentially acid generating
Ppm	parts per million
RSA	regional study area (31 km radius from project site)
SHE	safety, health and environmental
T	tonne (1,000 kg)
t/d	tonnes per day
TDS	total dissolved solids
t/m^3	tonnes per cubic metre
TSS	total suspended solids
TSP	total suspended particulates
$\mu g/m^3$	micrograms per cubic metre

REFERENCES

Bateman Minerals Limited, September 2003. Interim Report Doris North Gold Project: Investigation into the Use of Caro's Acid For Cyanide Destruction, prepared for Miramar Mining Corporation by Bateman Minerals Limited, September 26, 2003.

BGC Engineering Inc. 2003. Implication of Global Warming and the Precautionary Principle in Northern Mine Design and Closure. Report submitted to Indian and Northern Affairs Canada, Iqaluit, NU.

CCME (Canadian Council of Ministers of the Environment). 1999 (with updates to 2003). Canadian environmental quality guidelines. Winnipeg, MB.

CCME. 2003. Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. Winnipeg, MB. 73 p.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2004. Canadian Species at Risk, May 2004, 43 pages.

EBA Engineering Consultants Ltd. 1996. Boston Gold Project, Surficial Geology and Permafrost Features. Report submitted to Rescan Environmental Services Ltd.

Environment Canada. 2003. Proposed Federal Petroleum Products and Allied Petroleum Products Storage Tank System Regulations. Ottawa, ON. 48 p.

Golder Associates Ltd., 2001. Report on Thermistor Data Review – Hope Bay Project.

Geological Survey of Canada, 1989. Quaternary Geology of the Northwestern Canadian Shield by A. S. Dyke and L.A. Dredge in Chapter of Quaternary Geology of Canada and Greenland, R. J. Fulton (ed.); Geological Survey of Canada, Geology of Canada, No. 1.

Heginbottom, J.A., Dubreuil, M-A. and Harker, P.A. (compilers) 1995: Canada -- Permafrost; National Atlas of Canada, 5th edition, Plate 2.1, Ottawa: Geomatics Canada, National Atlas Information Service, and Geological Survey of Canada, scale 1:7,500,000 (MCR 4177).

Hope Bay Joint Venture, March 2002. Preliminary Project Description, Doris Hinge Project, Hope Bay Joint Venture

Hubert and Associates Ltd., September 2002, Terrestrial Wildlife of Hope Bay, Nunavut, An Integration of Data Collected from 1994-2001 (prepared for Miramar Hope Bay Limited).

Intergovernmental Panel on Climate Change (IPCC). 1995. Climate Change 1995: The Science of Climate Change. Technical Summary, Cambridge University Press, Cambridge, UK.

Knight Piésold Consulting, 2002. Integrated ARD Characterization Report, Volume I of 2.

Miramar Hope Bay Limited, December 2002. Doris North Project Mine Design Doris Lake, Nunavut, Canada, prepared by Miramar Hope Bay Limited, December 2002.

Natural Resources Canada (NRCan). 1995. Quantity-Distance Principles: User's Manual. Explosives Branch, Department of Natural Resources, Government of Canada. Ottawa, ON. 87 p.

Rescan. 1995. BHP World Minerals Boston Property Environmental data report. Prepared for BHP World Minerals by Rescan Environmental Services Ltd.

Rescan. 1996. BHP World Minerals Hope Bay Belt Project Environmental baseline Studies report 1996. Prepared for BHP World Minerals by Rescan Environmental Services Ltd.

Rescan, 1998. 1997 Environmental Data Report. Prepared for BHP World Minerals Hope Bay Belt Project; 2 volumes incl. appendices.

Rescan. 1999a. Hope Bay belt project 1998 environmental data report. Prepared for BHP World Minerals by Rescan Environmental Services Ltd.

Rescan. 1999b. BHP Hope Bay Belt wildlife studies 1999 field program. Prepared for BHP Diamonds Inc. by Rescan Environmental Services Ltd.

Rescan and Point West Heritage Consulting Ltd, 2001. Archaeological Investigations Hope Bay Joint Venture, Nunavut, 2000.

Rescan and Point West Heritage Consulting Ltd., 2002. Archaeological Investigations 1995-2000 Compiled Report.

RL&L Environmental Services Ltd. / Golder Associates Ltd. 2002. Aquatic baseline studies - Doris Hinge Project data compilation report, 1995□2000. Prepared for Miramar Hope Bay Ltd. RL&L/Golder Report No. 022-7009: 328 p. + 5 app.

Ryder, J.M. and Associates. 1992. Spyder Lake Area (Hope Bay Greenstone Belt): Terrain Analysis and Surficial Geology. Unpublished report prepared for University of British Columbia and B.H.P. Utah Mines, Ltd., Vancouver, B.C. 20 pp.

Smith, S. and Burgess, M. 2000. Ground temperature database for northern Canada; Geological Survey of Canada Open File Report #3954, p. 57.

Smith, S.L., Burgess, M.M., and Heginbottom, J.A. 2001. Permafrost in Canada, a challenge to northern development. in A Synthesis of Geological Hazards in Canada, G.R. Brooks (ed.). Geological Survey of Canada Bulletin #548, p. 241-264.

SRK (2003a). Hope Bay Doris North Project, Preliminary Engineering Designs for Surface Infrastructure Components. Report prepared for Miramar Hope Bay Limited, report No. 1CM0014.00, October 2003 (currently in production).

SRK (2003b), Hope Bay Doris North Project, Preliminary Engineering for the Tail Lake Tailings containment area. Report prepared for Miramar Hope Bay Limited, report No. 1CM0014.00, October 2003 (currently in production).

Steffen Robertson and Kirsten (Canada) Inc., February 2003. Hope Bay Doris North Project Technical Summary of Feasibility Study Nunavut Canada, prepared for Miramar Hope Bay Limited, dated February 2003.

Thurber Engineering Ltd. 2003. Hope Bay Doris North Project, Nunavut, Surficial Geologic Mapping, October 01, 2003.

Wolfe, S. A. (ed.), 1998. Living with frozen ground. A field guide to permafrost in Yellowknife, Northwest Territories; Geological Survey of Canada, Miscellaneous Report 64, p. 71.

APPENDIX A

Reclamation Cost Estimate

1.0 INTRODUCTION

A cost estimate was prepared for the reclamation of the proposed Doris North gold mine using the RECLAIM model Version 4.0 (March 2001). The RECLAIM model was developed to estimate the cost of mine reclamation by the federal Department of Indian and Northern Affairs Canada (DIAND) for use by government agencies, mining companies, and others.

The model includes the major components of a typical mine. An important feature of the model is a table of unit costs of common reclamation activities, which can be updated or customized to be site specific. The tabulated unit costs contained within the RECLAIM model are based on experience from reclamation work at northern mines.

For the Doris North Project reclamation cost estimate, unit costs have been obtained from the following sources:

- The RECLAIM model table of unit costs, although most of the unit cost items taken from this source were inflated to recognize inflation into 2005 dollars and to recognize the remote location of the Doris North Project and the inherent higher costs associated with doing work in such a remote location;

- Unit cost estimates were drawn from MHBL's past experience in doing business at the Doris North Project site (e.g.: air transport costs, barging costs) and from cost estimates provided to MHBL by prospective suppliers of goods and services to the Doris North Project;

- Unit cost estimates for some reclamation activities were drawn from AMEC Earth and Environmental Ltd.'s experience in estimating and implementing mine closure and reclamation plans at other northern Canadian mining sites; and

The base information relating to units of reclamation work and quantities used to estimate the cost of reclamation at the Doris North Project were drawn from the following sources:

- A report and the included drawings entitled "Preliminary Surface Infrastructure Design, Doris North Project", dated October 2005, prepared by SRK Consulting for MHBL;

- The Environmental Impact Statement for the Doris North Project dated October 2005, specifically from the Project Description Chapter (Chapter 4 from the EIS Technical Support document) and associated supporting documents;

- A report and the included drawings entitled "Preliminary Tailings Dam Design", prepared by SRK Consulting, dated October 2005;

- A report entitled "Tailings Alternatives Assessment", prepared by SRK Consulting, dated October 2005;

- Information drawn from Bateman Minerals Limited on their work on the design of the ore processing facilities (the mill); and

- Information drawn from MHBL on their work on the design of the underground mine and related facilities.

The overall cost of reclaiming the Doris North Project is estimated to be $11.5 million. The breakdown of this estimate is summarized by mine component in Table A1. Detailed cost breakdowns for each of the mine component areas is included in the following Tables: Table A2 - the Underground Mine; Table A3 - the Tailings Impoundment; Table A4 – Buildings and Equipment; Table A5 – Chemicals and Soil Contamination; Table A6 – Mobilization; Table A7 – Care and Maintenance during Reclamation; Table A8 – Post Closure Monitoring; and Table A9 – Post Closure Maintenance. These tables were generated using the RECLAIM model. The unit cost table included within the RECLAIM model is attached as Table A10. The assumptions that were used to generate these cost estimate details are documented in the following sections.

2.0 DISCUSSION OF COST ESTIMATE ASSUMPTIONS

2.1 General

The reclamation cost estimates were based on the following general criteria, information and assumptions:

- Mining and milling operations will cease at the end of 2010;

- Due to weather constraints, reclamation activities will not commence until the spring of 2011. In the intervening five-month period the site will be kept on a care and maintenance basis with a minimal sized crew (i.e., a 2 person care and maintenance crew on site at any given time). The proposed schedule of reclamation activities is presented in Figure A1;

- A third-party contractor will be engaged to maintain the site on a care and maintenance basis from the date of mine shutdown by the owner to the completion of reclamation. All closure and reclamation activities, and operation of site support facilities during the care-and-maintenance and reclamation periods, will be performed by contracted labour and equipment;

- The site will be left by the owner in a general state such that site facilities and mobile equipment are operational, but will require inspection, minor repairs, maintenance and an assessment of spare parts inventory needed for the care-and-maintenance period and the closure and reclamation program.

- Reclamation measures will be as described in Section 6 of the Mine Closure and Reclamation Plan;

- An average labour rate of $75 per hour was applied to all demolition activities. This rate is intended to reflect third party contractor rates and is inclusive of all contractor overheads including WCB, payroll burdens, administration, profit, etc. It is significantly

higher than labour rates that will be incurred by the mine operator should this work be completed with the mine workforce, which is what will likely happen;

- The overall closure and reclamation schedule will be as described in Section 9.1 of the Mine Closure and Reclamation Plan. Reclamation activity will commence in the spring of 2011 and continue through until the fall. The site will once again be placed on a care and maintenance basis through the winter of 2011/2012. Reclamation will recommence in the spring of 2012 and be completed (with the exception of Tail Lake) by the fall of 2012.

- A two person crew will remain on site during the open water seasons in Year 2013, 2014, 2015, 2016 and 2017 to release supernatant from Tail Lake. The North Dam will be breached in the late summer of 2017.

- Post-closure environmental monitoring and inspection of the Doris North site will continue for a period of ten years following the cessation of mining and milling (i.e., through year 2020). For the purposes of this closure cost estimate it has been assumed that a ten-year post closure monitoring period will be sufficient to verify that the reclamation objectives have been achieved and that no ongoing environmental degradation caused by the reclaimed mine site is occurring.

2.2 Underground Mine

For the purposes of this cost estimate the following assumptions related to the closure and reclamation of the Doris North underground mine facilities have been made:

1. Once mining has ceased all potentially hazardous materials will be removed from the underground mine and brought to surface for disposal. These will include all hydrocarbon products such as fuel, hydraulic fluid and other lubricants; explosives; vehicle batteries, glycol, transformer fluids, other chemicals, etc. An allowance for 4 people working 10-hour shifts for 5 days at a unit rate of $75 per hour was provided for this activity. An allowance of $5000 was included for support materials. Underground mobile equipment will be brought to surface and cleaned of any potentially hazardous materials such as fuel, hydraulic fluids, glycol, batteries, etc. and then disposed of in the surface landfill site. A cost allowance has been included in the cost estimate for both of these activities. An allowance for 2 people working 10-hour shifts for 10 days at a unit rate of $75 per hour has been provided for this activity. A further allowance of $5,000 has been included for support materials and equipment. The cost of disposal of these recovered chemicals is covered elsewhere in the cost estimate (under the "chemicals" component. The projected fleet of underground equipment consists of 7 scooptrams, 2 haul trucks, 5 jumbo drill units, 1 blasthole drill unit, 1 scissors lift truck, 1 service/fuel truck, 2 portable air compressors and 4 pickup trucks;

2. The three 2.4m by 2.4m ventilation raises will be either capped with a reinforced concrete cap or backfilled. The cost estimate was based on placement of a 1 m thick concrete cap over each raise. The cost estimate also includes an allowance for removal of the fan housings and ductwork from the surface over top of these three ventilation raises;

3. The adit access portal will be permanently closed by the placement of a 15 m thick rockfill plug and then sealed with a welded steel cover to make the underground workings inaccessible to people or wildlife in compliance with mine safety requirements. The cost estimate allows for the placement of 300 m^3 of broken rock at $50 per m^3 to form the plug and for the construction of 4m by 5m welded steel barricade (2 people working 10 hour shifts for 10 days at a unit rate of $75/hr plus $30,000 for materials).

4. The ground in the mine will remain in a frozen condition thus there will be no anticipated movement of groundwater into or out of the mine, thus no water treatment of minewater will be required. If future global warming results in a loss of permafrost in this region, then it is expected that the underground workings will ultimately flood preventing sulphide mineral oxidation.

2.3 Tailings Impoundment

For the purposes of this cost estimate the following assumptions related to the closure and reclamation of the Tail Lake tailings impoundment have been made:

1. No further chemical treatment of the water in Tail Lake will be required prior to initiating final reclamation of the Tail Lake tailings impoundment. It is assumed that water quality in Tail Lake meets discharge criteria for release as contained in the mine's water license;

2. Supernatant will be pumped from Tail Lake during open water season for seven years after the cessation of mining. At that time water inflow will have reached equilibrium with outflow and the North Dam will be deconstructed to allow unrestricted release through the former Tail Lake outflow creek. Tail Lake water quality will continue to be monitored for ten years after the cessation of milling to demonstrate that water quality is adequate for unrestricted release;

3. During the first year the tailings and reclaim water pumping systems and pipelines will be removed and the materials disposed of in the demolition debris landfill. A unit cost of $2/m has been applied for the removal and disposal of all pipelines. The tailings pipelines are projected to be 6" diameter with a 4" diameter reclaim water pipeline, both insulated HDPE. The emergency tailings pipeline catch basins will be cleaned out with tailings material hauled to Tail Lake. The catch basins (each 25.2m by 25.2m with a 1 m high berm) will then be breached and either graded or backfilled to prevent further ponding of water and to encourage natural re-vegetation to become re-established. The HDPE liners will be removed and disposed of in the landfill site. A unit cost of $7,500 per catch basin has been allowed for this activity;

4. The North dam will be breached by excavating out a section and installing rock armouring so that unrestricted release of supernatant can occur each subsequent year without impairing water quality downstream in Doris Outflow. Tail Lake will return to its pre-development water level that will ensure a minimum permanent water cover over the deposited tailings of at least 4 m.

5. A contingent measure has been included for the placement of a geotextile and an armour rock over the remaining 60% of the 12.9 ha shoreline that will be flooded during operation of the Tail Lake impoundment to mitigate potential erosion that may result from the thawing of the permafrost in these areas. This represents the remaining shoreline area not previously armoured during the mine life. This 12.9 ha area represents all of the potential shoreline that may be flooded between the pre-development lake level of 28.3 m to the expected operating level of 29.4 m. An allowance of $1.2 million has been included for this contingency.

3.0 BUILDINGS AND EQUIPMENT

The following assumptions were made in estimating the cost related to demolition and removal of the buildings and equipment from the Doris North site:

1. All surface mobile equipment is assumed to have no off-site salvage value. Consequently the equipment will be cleaned, decontaminated to remove all potentially hazardous materials such as batteries, hydrocarbons, glycol, fuel, etc. and then be disposed of through burial in the proposed on-site demolition debris landfill site. An allowance of 2 people working 10-hour shifts for 15 days at a unit rate of $75/hr has been applied for this activity. An allowance of $10,000 has been included for support materials and equipment. The projected surface fleet would consist of the following equipment: 4 haul trucks, 3 front end loaders, 2 dozers, 1 excavator, 1 road grader, 3 fuel trucks, 1 Plow truck, 5 pickup trucks, 1 mini-bus, and 3 portable lighting plants;

2. All stationary equipment (milling equipment, generators, etc) is assumed to have no off-site salvage value. Consequently the equipment will be cleaned, decontaminated to remove all potentially hazardous materials such as process residues, chemicals, hydrocarbons, glycol, etc and then be dismantled and disposed of through burial in the proposed on-site demolition debris landfill site. The mill is to be modular in design, prefabricated off-site and then re-assembled at site. Consequently removal of the plant equipment will be relatively straight forward involving disassembly and removal of the modules. The following time allowances have been included for cleaning, decontaminating and removal of this stationary equipment:

    a. Milling equipment – decontamination 560 person-hours
    b. Milling equipment – removal & disposal 3,600 person hours
    c. Other stationary equipment – decontamination & removal 600 person hours

    A unit rate of $75/hour was applied for these activities. An allowance of $70,000 has been included for support material and equipment such as cutting torches, cranes, forklifts, hydraulic shears and other materials, etc.

3. All buildings are assumed to have no-off site salvage value. Consequently all of the buildings will be checked, then decontaminated to remove all potentially hazardous materials such as chemicals, reagents, hydrocarbons and then be dismantled and/or demolished with the debris being disposed of through burial in the proposed on-site

demolition debris landfill site. The following buildings are to be removed and disposed of:

a. Mill and Crusher Building – Steel frame structure, 2,500 m^2 footprint (allowance of 6,000 m^2 at a unit rate of \$60/m^2 to allow for multiple floor levels within the mill and crusher building;
b. Service Workshop – steel frame, 2,000 m^2 at a unit rate of \$60/m^2;
c. Camp – 38 skid mounted trailer units, 61 m^2/unit at a unit rate of \$60/m^2;
d. Office/Dry – 6 skid mounted trailer units, 61 m^2/unit at a unit rate of \$60/m^2;
e. Sewage treatment plant – 2 skid mounted trailer units, 61 m^2/unit at a unit rate of \$60/m^2;
f. Power Plant – Steel frame structure, 400 m^2 at a unit rate of \$60/m^2;
g. Arctic Corridors – 1,500 m^2 at a unit rate of \$20/m^2;
h. Mill reagent storage – 20 shipping containers, 30.5 m^2/unit at a unit rate of \$30/m^2;
i. Explosives magazines - 20 shipping containers, 30.5 m^2/unit at a unit rate of \$30/m^2;
j. Tail Lake pump house – 100 m^2 at a unit rate of \$60/m^2.

With the exception of the mill these buildings will all be single story buildings. An allowance of \$15,000 has been included for clean up and removal of miscellaneous bone yard materials from around the buildings for disposal in the landfill site.

4. Concrete slabs will be broken up and the rubble transported to the solid waste disposal facility. There will be few concrete slabs to be broken within the buildings due to the use of skid-mounted trailers and modular buildings;

5. There will be five 1.5 million-litre capacity diesel fuel storage tanks at the Mill Site near the power house to be cleaned, decontaminated and dismantled. In addition there will be approximately 5 smaller fuel tanks across the site to be cleaned, decontaminated and dismantled. It is assumed that the tanks will be essentially drained of useable fuel by the end of the mine life. An allowance for the disposal of 20,000 litres of residual fuel has been incorporated into the "chemicals" component of the reclamation cost estimate. An allowance of \$18,000 per large tank (200 person-hours at a unit rate of \$75/hr plus \$3,000 per tank in services and supplies) and \$2,500 per small tank (20 person hours per tank at a unit rate of \$75/hr plus \$1,000 in services and materials) has been included for cleaning and decontamination. This would involve pumping out all remaining fuel, pressure washing down the insides of the tanks using an oil water separator unit constructed out of one of the Envirotanks to recycle the wash water. The tanks would then be cut up and disposed of in the on-site demolition landfill. An allowance of \$24,500 per large tank (300 person-hours per tank at a unit rate of \$75/hr plus \$2,000 in material per tank) and \$2,500 per small tank (20 person hours per tank at a unit rate of \$75/hr plus \$1,000 in materials and services) has been included for this activity. An allowance \$6,000 (80 person hours at a unit rate of \$75/hr) has been included for the removal and disposal of all fuel distribution piping and associated equipment at these fuel tank locations. An allowance of \$6,000 has been included for the decontamination and demolition of the fuel transfer facility at Roberts Bay. The

HDPE liner at the Mill Site fuel tank farm containment area will then be cut up, removed and disposed of in the on-site landfill. A lump sum of $6,000 (80 person-hours) has been included for this activity. The containment area will then be dozed level and regraded to ensure that precipitation and snowmelt runoff do not pond in this area and that the area drains effectively onto the surrounding landscape with minimal to no erosion. A lump sum allowance of $3,000 (40 person hours) has been included for this activity.

6. All site roads will reclaimed using the following process:

    - All road side safety berms will be removed by dozing them off the road;
    - All road signs will be removed;
    - The road surfaces will be graded to provide positive drainage of precipitation and snowmelt away from the road surface onto the surrounding countryside and to prevent water ponding on the road surfaces;
    - The road surfaces will be scarified to a depth of 4 to 6 inches using a grader mounted scarifying unit or other similar device to loosen up the surface to promote natural re-vegetation over the long-term. There will be a total of 7.68 ha of road and airstrip surface to be graded and scarified at a unit rate of $4,500 per ha (based on RECLAIM model unit rate table – high end);
    - The Doris Creek bridge crossing will be removed and the bridge disposed of in the on-site demolition debris landfill. The bridge footings will be removed and the stream banks graded and armoured at the road crossing to prevent precipitation runoff eroding away the exposed banks at the stream crossing. An allowance of $10,000 has been included to cover removal of the Doris Lake outflow bridge crossing; and
    - All culverts will be removed by excavating them out of the road. The culverts will be disposed of in the on-site demolition debris landfill. The excavation sides will then be pulled back and armoured if necessary with coarse rock to allow free passage of precipitation and snowmelt runoff and to prevent erosion of the former road materials into these drainage paths. An allowance of $1,200 per culvert has been included for this activity. It has been assumed that there will be 15 culvert crossings to be removed and regraded by this technique.

7. The landfill site used for the disposal of the demolition debris will be closed out by placing rockfill over the compressed debris to create a mounded rockfill cover. An allowance of 10,000 m^3 of rockfill has been allowed for this activity. The unit rate used for the loading, hauling and placement of the rockfill cover is $25/$m^3$ which assumes that the rockfill material will be non-acid generating waste rock from Quarry 2 previously stockpiled in the landfill quarry (quarry #2) through the mine's operating life. The estimate assumes an average cover thickness of 1 m in depth over a surface area of

10,000 m^2. The final cover will then be graded to shed precipitation and snowmelt from the landfill area. A grading cost of $3,600 was applied based on 16 hours of equipment time at a unit rate of $225/hr.

8. Following demolition of the buildings and final debris removal, the plant site and camp area, the beach laydown, the mill site tank farm area and the explosives magazine storage area will be given a final grading and scarification to loosen up the top layer of the rockfill to enhance the natural in-growth of vegetation over time and to ensure the drainage of precipitation and snowmelt from these pads onto the surrounding countryside. A unit cost of $4,500/ha has been applied for this light grading and scarification activity over a combined area of 4.08 ha of rockfill pad area. An additional $3,600 has been allowed for the bulldozing removal of the safety berms from the explosives magazine storage area based on 16 hours at a unit rate of $225 per hour.

9. Surface power distribution lines and poles will be removed and disposed of. A total of 5 km of power lines will be removed at a unit cost of $2,500/km.

4.0 CHEMICALS AND SOIL CONTAMINATION

The following assumptions were made in relation to the cost of removing, disposing and addressing the remaining chemicals, hydrocarbons and contaminated soil at the Doris North Project site:

1. All remaining inventory of laboratory chemicals will be packaged, palletized and then shipped from site for return to a supplier, for sale to an alternate user or for disposal at a licensed disposal facility. For this cost estimate it has been assumed that 2 pallets of such chemicals will have to be dealt with at mine closure. A unit rate of $2,500 per pallet was applied based on the RECLAIM model unit cost table (High end) of $2,100 plus an additional $400 due to the remoteness of this site;

2. Being a new mine it has been assumed that there will be no PCB fluids on site, no asbestos insulation materials nor lead based paints that have to be specially handled at closure;

3. Waste oil will be burned on site using a waste oil burner unit throughout the operating life of the mine. It has been assumed that 20,000 litres of waste oil will either be generated during reclamation work or remain at the time of closure. A cost allowance of $12,000 has been included for the destruction of this waste oil through burning on site. A unit rate of $0.60 per litre was applied based on the RECLAIM model unit cost table (high end) of $0.5 inflated to 2005 dollars;

4. Similarly an allowance of $12,000 has been included to burn off remaining diesel fuel. It has been assumed that diesel fuel stocks will be drawn down well before closure, however it has been assumed that 20,000 litres will need to be dealt with at closure by burning on site at a unit rate of $0.60 per litre;

5. An allowance of $150,000 has been included for the packaging and off-site disposal of any remaining reagents or chemicals left at the time of mine closure. These chemicals will be returned to the supplier, sold to another user or disposed of through a licensed disposal facility. The cost of sea-lift removal from the site is covered elsewhere under the "mobilization" cost component;

6. An allowance of $10,000 has been included for the on-site disposal of any remaining explosives. These will be destroyed through burning under controlled conditions following consultation with the appropriate regulatory agencies;

7. An allowance has been included for the land farming or underground disposal of 500 m^3 of Type 1 contaminated soil (light fuel) and 500 m^3 of Type 2 contaminated soil (heavy fuel and oil). The unit rates applied were $120/$m^3$ obtained from the RECLAIM model unit cost table at $110 inflated for 2005 dollars. It has been assumed that there will be no Type 3 contaminated soil (metal) on site at the time of closure. An allowance of $45,000 has been included for conducting a site investigation at closure to determine the extent and amount of any contaminated soil (rockfill) requiring remediation or alternate removal.

5.0 MOBILIZATION

The following assumptions have been made in estimating the cost of mobilization/demobilization associated with reclamation of the Doris North Project site:

1. It has been assumed that all equipment and buildings will have no economic salvage value and will be disposed of on-site through the demolition debris landfill site;

2. It has been assumed that the mine's fleet of surface and underground mobile equipment will be on-site and available for use (with maintenance) for carrying out the reclamation activity. In this regard it has been assumed that minimal heavy equipment will have to be mobilized to site to carry out the reclamation activity;

3. It has been assumed that the workforce required to complete reclamation will be transported to site by charter aircraft from either Yellowknife or Cambridge Bay. It has been assumed that over the two 4 month long (June, July, August, September) reclamation activity periods (one in 2011 and the other in 2012) that a total of 32 charter flights will be used to change out crews (16 per year, 4 per month) at a unit rate of $5,000 per flight;

4. It has been assumed over the 8 month long reclamation period (excluding care and maintenance), i.e. 4 months in 2011 and 2012 each, there will be on average 15 people on site requiring accommodation and food. This translates into 3,600 person-days at a camp cost of $55 per person-day. Consequently an allowance of $198,000 has been included for camp costs during this time period;

5. It has been assumed that over the reclamation period it may be necessary to move larger pieces of equipment to and from the site for specialty purposes. An allowance of $200,000 has been included for two charter flights using a large cargo aircraft such as a Hercules aircraft. A further allowance of $300,000 has been included for two sea-lift visits to the Doris North site to bring in equipment and to remove hazardous materials and other salvageable equipment;
6. An allowance of $200,000 has been included for maintenance of insurance on the site over the two year closure period;

7. An allowance of $65,000 has been included for incidental operating supplies (other than those included in specific activity estimates) during this 2-year period. Nominally these costs have been allocated as $50,000 for fuel and lubricants, $10,000 for minor tools and repair parts and $5,000 for tires.

6.0 CARE AND MAINTENANCE DURING RECLAMATION

It has been assumed that the site will be carried on a care and maintenance basis for 13 months over the two-year reclamation period, broken down as follows:

- January thru May of 2011 (5 months); and
- October of 2008 through May of 2012 (8 months).

During this time the Doris North Project site will be maintained by a two person crew (i.e., two people on site at all time) who will look after site security and to ensure that no environmental damage occurs as a result of the mine's facilities. For the purposes of this reclamation cost estimate, the following assumptions related to care and maintenance have been applied:

1. An allowance has been included for 26 person months of caretaker labour at a monthly rate of $4,500;

2. An allowance of $5,000 per month in food and supplies has been assumed over this 13 month period;

3. An allowance for 24 charter flights from Cambridge Bay has been included at a unit cost of $2,500 per flight over this 13-month period for crew rotation and re-supply.

7.0 PROJECT MANAGEMENT

An allowance of $1.9 million has been included for the management of the Doris North Project during the reclamation period. This allowance is to include project management, supervision and administration over a 21 month long period. However most of the site supervision and administrative costs will be incurred over the 8 month long period during which reclamation work is actually carried out. Project management during the remaining 13 months of care and maintenance would be limited to one person. This cost was based on a 15% allowance against

the estimated direct reclamation cost items as shown on Table A1. It is intended to cover labour, communications, and travel expenses incurred in managing reclamation of the Doris North Project site.

8.0 ENGINEERING

An allowance of $1.3 million has been included for engineering work required to implement the Doris North mine closure and reclamation plan. This allowance is to cover the detailed reclamation planning and design, preparation of contract tender documents, specifications and to oversee engineering aspects of the reclamation work. This cost was based on a 10% allowance against the estimated direct reclamation cost items as shown in Table A1.

9.0 CONTINGENCY ALLOWANCE

An allowance of $1.9 million has been included for contingencies. This allowance is based on 15% of the estimated direct reclamation cost items as shown in Table A1. It is intended to cover uncertainties and inaccuracies contained in the cost estimates completed for the specified reclamation components caused by the level of engineering design available at this point in the Project life.

10.0 POST-CLOSURE MONITORING AND MAINTENANCE

It will be necessary to monitor the environmental performance of the reclamation work for an extended period before it can be determined that the reclamation objectives have been achieved, specifically that the reclaimed site is not adversely affecting the surrounding environment nor contributing to ongoing environmental degradation. The following assumptions have been made in estimating the cost of this post closure environmental monitoring and maintenance activity:

1. Environmental monitoring will continue for a 10 year period following the cessation of mining (8 years after reclamation has been completed) to provide sufficient time and data collection to enable a conclusion to be made on the effectiveness of the reclamation activities;

2. Post Closure environmental monitoring will consist of four trips to site every year for the first five years for the purpose of collecting and having analyzed a set of water samples; to facilitate a physical inspection of the site to assess erosion, revegetation and to assess seepage from the landfill, drainage from Tail Lake and runoff from the roads and building pads; and to carry out minor maintenance activities such as repairing erosion, creating minor drainage pathways and cleaning of any debris from the Tail Lake outflow. The frequency would then drop to twice per year for the next 2 years and then to once per year for the next three years. It has been assumed for the purpose of this estimate that a total of 10 water samples per trip will be collected. An estimate of $10,400 per trip has been included to pay for the cost of the air charter from Cambridge Bay, sampling

labour, analytical costs, air transportation to and from Cambridge Bay by commercial carrier from Yellowknife to Cambridge Bay;

3. An allowance for one geotechnical inspection of the site every year thru 2016 to inspect and report on the performance and continued stability of the Tail Lake impoundment structures and other earthworks. The frequency would drop to every second year through 2020. An estimate of $25,000 per year has been included to pay for the services of a qualified geotechnical engineer, travel expenses and report preparation. It is assumed that this inspection will take place at the same time as the annual water sampling site visit;

4. An allowance of $50,000 per year has been included for an annual environmental effects monitoring program to be conducted at the site every year through 2016, then dropping to every second year through 2020;

5. A 15% contingency allowance has been applied to the annual post closure monitoring and maintenance cost estimate to cover uncertainties in these estimates;

6. It has been assumed that no significant environmental nor maintenance issues will arise in the post-closure period. This is based on the relative simplicity of the site following implementation of the closure plan and the low risk associated with the post closure facilities, i.e., no waste rock dumps, removal of all buildings and equipment, a breached tailings dam, etc.

Required post closure maintenance activities assumed are as follows:

1. Periodic erosion repair of removed culverts, stream crossings, breached emergency dump ponds, etc. For the purpose of closure cost estimating an allowance of 80 person-hours per year has been included for this type of activity along with money for travel and equipment. It is expected that this degree of effort will not be required every year, however at some point in time this type of maintenance will be required. It may occur once every five years at which time the allowance would be 400 person-hours, or every second year at which time the allowance would be 160 person-hours;

It has been assumed that post closure maintenance will be required over a 200 year period at an average annual cost of $26,000. A sinking fund approach was used to fund this long-term maintenance requirement. In other words a sinking fund of $0.86 million put aside at the time of completion of reclamation at a real rate of growth of money of 3% will generate an annual income of $26,000 every year to pay for this maintenance requirement. A period of 200 years was chosen as being representative of long-term care. The calculated value of the sinking fund required does not vary much once the period is set at 200 years. For example for a period of 500 years the sinking fund remains $0.86 million. In essence a 200-year period represents close to funding long term care.

TABLE A1: SUMMARY OF ESTIMATED RECLAMATION COST - DORIS NORTH PROJEC

Capital Costs		
COMPONENT TYPE		**TOTAL COST**
UNDERGROUND MINE		$203,500
TAILINGS	Tail Lake	$2,989,220
BUILDINGS AND EQUIPMENT		$1,940,438
CHEMICALS AND SOIL MANAGEMENT		$354,000
MOBILIZATION/DEMOBILIZATION		$1,123,000
CARE AND MAINTENANCE DURING RECLAMATION		$302,000
SUBTOTAL		**$6,912,158**
PROJECT MANAGEMENT	15 % of subtota	$1,036,824
ENGINEERING	10 % of subtota	$691,216
CONTINGENCY	15 % of subtota	$1,036,824
GRAND TOTAL - CAPITAL COSTS		**$9,677,021**
POST-CLOSURE MONITORING COST (NPV at 3%)		$838,370
POST-CLOSURE MONITORING CONTINGENCY 15%		$124,979
Years of post-closure monitoring	10	
POST CLOSURE MONITORING COST OVER 10 YEARS (NPV at 3%)		$963,350
POST CLOSURE MAINTENANCE ANNUAL AVERAGE COST		$26,000
Years of post-closure maintenance	200	
Discount Rate for Calc of NPV	3%	
POST CLOSURE MAINTENANCE SINKING FUND		$864,320
GRAND TOTAL CAPITAL AND POST-CLOSURE COSTS		**$11,504,691**

1 **Table A2: Underground Mine** **UG Mine # 1**

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
A	OBJECTIVE: CONTROL ACCESS					
	Fence	m		#N/A	0	$0
.	Signs	each		#N/A	0	$0
.	Ditch, mat'l A	m3		#N/A	0	$0
.	, mat'l B	m3		#N/A	0	$0
.	Berm	m3		#N/A	0	$0
.	Block Doris North adit - rockfill plug	m3	300		50	$15,000
	Block Doris North adit - Steel Barricade (200 hrs + $30,000)	each	1		45000	$45,000
.	Cap shaft	m3		#N/A	0	$0
.	Cap raise #1 - Ventilation Raise (Reinforced concrete cap)	m3	15	SR	2000	$30,000
.	Cap raise #2 - Ventilation Raise (Reinforced concrete cap)	m3	15	SR	2000	$30,000
.	Cap raise #3 - Ventilation Raise (Reinforced concrete cap)	m3	15	SR	2000	$30,000
.	Backfill shaft	m3		#N/A	0	$0
.	Backfill raise #1	m3		#N/A	0	$0
.	Backfill raise #2	m3		#N/A	0	$0
.	Backfill open stopes	m3		#N/A	0	$0
.	Other - Remove ventilation raise housings and fans (40 hrs ε	each	3	#N/A	4500	$13,500
B	OBJECTIVE: STABILIZE GROUND SURFACE					
.	Backfill mine	m3		#N/A	0	$0
.	Collapse crown pillar	m3		#N/A	0	$0
.	Contour, mat'l A	m3		#N/A	0	$0
.	, mat'l B	m3		#N/A	0	$0
.	Maintain dewatering (see "MONITORING/MAINTENANCE" costing component)			#N/A	0	
.	Other			#N/A	0	$0
C	OBJECTIVE: FLOOD MINE					
.	Plug adits	m3		#N/A	0	$0
.	Plug drillholes to surface	each		#N/A	0	$0
.	Grouting	m3		#N/A	0	$0
.	Llme addition, kg/m3 of water	tonne		#N/A	0	$0
.	Lime, purchase and shipping	tonne		#N/A	0	
D	OBJECTIVE: HAZARDOUS MATERIALS					
.	remove hazardous materials (200 person hours + $5,000)	each	1	LS	20000	$20,000
.	remove/decontam. Equipment (200 person hours + $5000)	each	1	LS	20000	$20,000
.	Other			#N/A	0	$0
E	SPECIALIZED ITEMS					$0
.				#N/A	0	
	Subtotal					$203,500

COMMENTS:

Labour Rate of $75.00 per hour used (includes all benefits)

1 **Table A3: Tailings Impoundment** **Impoundment # 1**

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
A	OBJECTIVE: CONTROL ACCESS					
.	No required activity					$0
B	OBJECTIVE: STABILIZE TAIL LAKE IMPOUNDMENT (From SRK)					
.	Breach North Dam					$810,000
.	Contractor Mobilization & Demobilization					$250,000
.	Engineering					$106,000
.	Construction Supervision					$96,720
	Contingency for Shoreline Stabilization					
	(allowance for armouring of remaining 60% of 12.9 ha shoreline to elec 29.4 m)					
	Stabilize Shoreline by placement of rock armouring (Contingency Measure)	cu m	22,800		25	$570,000
	Stabilize Shoreline by placement of geotextile (Contingency Measure)	sq m	77,400		8	$619,200
C	OBJECTIVE: FLOOD TAILINGS					
.	No required activity					
E	OBJECTIVE: MONITOR AND RELEASE SUPERNATANT					
.	Pump water during open water season for 7 years after closure					
.	Labour (2 people for 4 months for 5 years)	person-months	40		4500	$180,000
	(Reclamation site people will be used for the first two years)					
.	Operating Supplies Including Power	Allowance		20 LS/month	5000	$100,000
.	Camp Cost	Allowance		20 LS/month	5000	$100,000
	Air Charters	trips		40 each	2500	$100,000

1 **Table A3: Tailings Impoundment** **Impoundment # 1**

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
G	OBJECTIVE: REMOVE RECLAIM WATER SYSTEM					
.	Remove Reclaim barge and pumps	LS	1	LS	1500	$1,500
.	Pipe - remove 5,000 m of reclaim water pipeline	m	5000	PPL	2	$10,000
.	Other			#N/A	0	$0
H	OBJECTIVE: REMOVE TAILINGS DISCHARGE					
.	Pipe - Remove 2,500 m of Discharge pipeline	m	2500	PPL	2	$5,000
.	Pipe - remove 5,400 m of tailings	m	5400	PPL	2	$10,800
.	Clean out, breach and fill spill catchbasins	each	4	LS	7500	$30,000
	Subtotal					$2,989,220

COMMENTS:

Estimated $1.26 million closure cost for the Tail Lake facility is drawn from the SRK Report "Tailings Alternatives Assessment, Doris North Project, Hope Bay, Nunavut Canada" prepared for Miramar Hope Bay Limited dated October 2005. Costs for post closure water quality monitoring of Tail Lake are included under the "Post Closure Monitor" worksheet.

1 **Table A4: Building / Equipment** **Bldg / Equip #: 1**

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
A	OBJECTIVE: DISPOSE MOBILE EQUIPMENT					
	Decontaminate and ship off-site	each		#N/A	0	$0
.	Decontaminate, dispose on-site (300 person hours + $10000)	LS	1	LS	32500	$32,500
.	Other	each		#N/A	0	$0
B	OBJECTIVE: DISPOSE STATIONARY EQUIPMENT					
.	Decontaminate and ship off-site	person-hours		#N/A		$0
.	Decontaminate, dispose on-site	person-hours	600		75	$45,000
.	Support Equipment & Material	Allowance	1	LS	20000	$20,000
C	OBJECTIVE: DISPOSE MILLING EQUIPMENT					
.	Decontaminate Milling Equipment	person-hours	560		75	$42,000
.	Remove & Dispose of Milling Equipment	person-hours	3600		75	$270,000
.	Support Equipment & Material	Allowance	1	LS	50000	$50,000
D	OBJECTIVE: DISPOSE WATER TREATMENT EQUIPMENT					
.	Decontaminate tanks & plumb.	each		#N/A	0	$0
.	Remove tanks & plumbing	each		#N/A	0	$0
.	Other			#N/A	0	$0
E	OBJECTIVE: DECONTAMINATE BUILDINGS & TANKS					
.	Maintenance plant, chemicals	LS	1	LS	5000	$5,000
.	Camp	LS	1	LS	2000	$2,000
F	OBJECTIVE: MOTHBALL BUILDINGS					
.	Building 1	m2		#N/A	0	$0
.	Building 2	m2		#N/A	0	$0
.	Building 3	m2		#N/A	0	$0
.	Building 4	m2		#N/A	0	$0
.	Building 5	m2		#N/A	0	$0
.	Other	m2		#N/A	0	$0
G	OBJECTIVE: REMOVE BUILDINGS					
.	Mill Building - steel frame	m2	6000	BRS1	60	$360,000
.	Service Complex Workshop - Steel Frame	m2	2000	BRS1	60	$120,000
.	Camp - 38 Skid Mounted Trailer Units	m2	2318	BRS1	60	$139,080
.	Office/Dry - 6 Skid Mounted Trailer Units	m2	366	BRS1	60	$21,960
.	Sewage Treatment Plant - 2 Skid Mounted Units	m2	122	BRS1	60	$7,320
.	Power House	m2	400	BRS1	60	$24,000
	Arctic Corridors	m2	1500	BRW1	20	$30,000
	Mill Reagent - 20 Storage Containers	m2	610	BRW1	30	$18,300
	Explosive Magazine - 20 Storage Containers	m2	610	BRW1	30	$18,300
	Tail Lake Pumphouse	m2	100	BRS1	60	$6,000
	Incinerator Units	LS	2	LS	1000	$2,000
.	Remove boneyard waste	LS	1	LS	15000	$15,000

1 **Table A4: Building / Equipment** **Bldg / Equip #: 1**

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
H	OBJECTIVE: BREAK BASEMENT SLABS					
.	Mill Building - steel frame	m2	6000	BRC	6	$36,000
.	Powerhouse	m2	400	BRC	6	$2,400
.	Maintenance Shop	m2	2000	BRC	6	$12,000
.	Remove concrete equipment foundations in mill	Allowance	1	#N/A	50000	$50,000
I	OBJECTIVE: FUEL STORAGE TANKS					
.	Mill Site Fuel Tanks, decontaminate (5 tanks) (200 person hours/t	each	5	each	18000	$90,000
.	Mill Site Fuel Tanks , demolish & dispose (300 person hours/tank)	each	5	each	24500	$122,500
.	Other Small Fuel Tanks, decontaminate	each	5	each	2500	$12,500
.	Other Small Fuel Tanks, demolish & dispose	each	5	each	2500	$12,500
	Remove Fuel Piping	LS	1	LS	6000	$6,000
	Remove Fuel Transfer Station & Piping at Roberts Bay	LS	1	LS	6000	$6,000
	Remove containment liner at Mill Site Fuel Tank Farm	LS	1	LS	6000	$6,000
.	Breach & Level Containment at Mill Site Fuel Tank Farm	LS	1	LS	3000	$3,000
J	OBJECTIVE: LANDFILL FOR DEMOLITION WASTE					
.	Place rockfill cover (1 m thick)	m3	10000		25	$250,000
	Grade landfill cover	hours	16		225	$3,600
.	Vegetate	ha		#N/A	0	$0
.	Landfill disposal fee	tonne		#N/A	0	$0
K	OBJECTIVE: GRADE AND CONTOUR					
.	Grade plant site & camp area	ha	2.67	SCFYH	4500	$12,000
	Grade beach laydown area	ha	0.6	SCFYH	4500	$2,700
	Grade Mill Fuel Tank Farm Area	ha	0.36	SCFYH	4500	$1,620
	Grade explosives magazine area	ha	0.45	SCFYH	4500	$2,020
	Doze off Safety Berms at explosives magazine	hours	16	hours	225	$3,600
.	Place soil cover	m3		#N/A	0	$0
.	Rip rap on ditches	m3		#N/A	0	$0
.	Vegetate	ha		#N/A	0	$0
.	Other			#N/A	0	$0
L	OBJECTIVE: RECLAIM ROADS					
	Remove Doris Outflow Bridge & Armour Banks	LS	1	LS	10000	$10,000
	Remove culverts from roads & armour cuts	each	15		1200	$18,000
.	Scarify and install water breaks on roads & airstrip	ha	7.68	SCFYH	4500	$34,538
.	Vegetate	ha		#N/A	0	$0
K	SPECIALIZED ITEMS					
	Remove mooring attachments from jetty and regrade approaches	LS	1		2500	$2,500
.	Remove Power Lines	km	5	POWR	2500	$12,500
	Subtotal					$1,940,438

COMMENTS:

Labour Rate of $75 per hour inclusive of all benefits

1 TABLE A5: Chemicals and Soil Contamination: *1*

	ACTIVITY/MATERIAL	UNITS	QUANTITY	COST CODE	UNIT COST	COST
	Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.					
A	LABORATORY CHEMICALS					
.	Allowance for removal of lab chemicals	pallet	2	LCRH	2500	$5,000
B	PCB, hauling	litre		#N/A	0	$0
.	PCB, disposal	litre		#N/A	0	$0
C	FUEL					
.	Allowance for burning of remaining fuel on site	litre	20000	OBH	0.6	$12,000
.	Type 2	kg		#N/A	0	$0
.	Type 3	kg		#N/A	0	
D	WASTE OIL					
.	Oils/lubricants - burn on-site (allowance)	litre	20000	OBH	0.6	$12,000
.	Oils/lubricants - ship off-site	litre		#N/A	0	$0
.	Oils/lubricants - disposal fee	litre		#N/A	0	$0
E	PROCESS OR TREATMENT CHEMICALS					
.	Allowance for removal of remaining chemicals	LS	1	LS	150000	$150,000
.	Type 2	kg		#N/A	0	$0
.	Type 3	kg		#N/A	0	$0
.	Type 4	kg		#N/A	0	$0
F	EXPLOSIVES					
.	Allowance for removal of remaining explosives	kg	5000	ER	2	$10,000
G	CONTAMINATED SOILS					
.	Type 1, light fuel (allowance)	m3	500	CSR	120	$60,000
.	Type 2, heavy fuel and oil (allowance)	m3	500	CSR	120	$60,000
.	Type 3, metals	m3		#N/A	0	$0
H	Haz. Mat. testing & assessment					
.	Technician and analyses	each	1	#N/A	5000	$5,000
.	Drilling	each	1	#N/A	25000	$25,000
.	Audit	LS	1	#N/A	15000	$15,000
.	OTHER					
.				#N/A	0	$0
	Subtotal					$354,000

COMMENTS:

1 **TABLE A6: Mobilization** **Mob # *1***

	ACTIVITY/MATERIAL		UNITS	QUANTITY	COST CODE	UNIT COST	COST
A	MOBILIZE HEAVY EQUIPMENT						
	Allowance to mobilize equipment to and from		Lump Sum	2	LS	100000	$200,000
B	MOBILIZE CAMP				#N/A	0	$0
C	MOBILIZE WORKERS						
.	Allowance for air charters		trips	32	#N/A	5000	$160,000
D	MOBILIZE MISC. SUPPLIES						
.	Fuel & lubricants		allowance	1	#N/A	50000	$10,000
.	Minor tools and equipment		allowance	1	#N/A	10000	$50,000
.	Truck tires		allowance	1	#N/A	5000	$5,000
E	CAMP COST TO HOUSE WORKERS		person-day	3600	#N/A	55	$198,000
.	BARGING COSTS						
.	Sea-Lift Trips to site		each	2	#N/A	150000	$300,000
F	BONDING	lump sum			#N/A	0	$0
G	TAXES	lump sum			#N/A	0	$0
H	INSURANCE	lump sum	year	2	#N/A	100000	$200,000
	Subtotal						$1,123,000

COMMENTS:

1 TABLE A7: CARE AND MAINTENANCE DURING RECLAMATIOI Mon / Mtce # *1*

	ACTIVITY/MATERIAL	UNITS	QUANTITY in 2006/2007	QUANTITY in 2007/2008	COST CODE	UNIT COST	COST
A	CARE AND MAINTENANCE OF SITE						
	Care and Maintenance Crew (crew of 2) - labour	person-months	10	16		$4,500	$117,000
	Care and Maintenance Crew (crew of 2) - supplies	per month	5	8		$5,000	$65,000
	Charter Flights	trips	24	24		$2,500	$120,000
	Subtotal						$302,000

COMMENTS:

1 **TABLE A8: POST-CLOSURE MONITORING** **Mon / Mtce # *1***

Post Closure Monitoring & Maintenance	NPV at 3%	Reclamation Period		Post Closure								Sum
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
# of Site Visits		4	4	4	4	4	2	2	1	1	1	
Monitoring Labour	$66,321	$20,000	$20,000	$8,000	$8,000	$8,000	$2,400	$2,400	$1,200	$1,200	$1,200	$72,400
Monitoring Supplies & Equipment	$4,545	$760	$760	$760	$760	$760	$380	$380	$190	$190	$190	$5,130
Transportation to and from Site	$155,479	$26,000	$26,000	$26,000	$26,000	$26,000	$13,000	$13,000	$6,500	$6,500	$6,500	$175,500
Analytical Costs	$45,448	$7,600	$7,600	$7,600	$7,600	$7,600	$3,800	$3,800	$1,900	$1,900	$1,900	$51,300
Transportation of Samples to Lab	$5,980	$1,000	$1,000	$1,000	$1,000	$1,000	$500	$500	$250	$250	$250	$6,750
Aquatic Effects Monitoring Program	$350,985	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000		$50,000		$50,000	$400,000
Annual Geotechnical Inspection	$175,492	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000		$25,000		$25,000	$200,000
Annual Reporting	$34,121	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$40,000
Sub-Total	**$838,370**	**$134,360**	**$134,360**	**$122,360**	**$122,360**	**$122,360**	**$99,080**	**$24,080**	**$89,040**	**$14,040**	**$89,040**	**$951,080**
Contingency Allowance (15%)	$124,979	$20,154	$20,154	$18,354	$18,354	$18,354	$14,862	$3,612	$13,356	$2,106	$13,356	$142,662
Total	**$963,350**	**$154,514**	**$154,514**	**$140,714**	**$140,714**	**$140,714**	**$113,942**	**$27,692**	**$102,396**	**$16,146**	**$102,396**	**$1,093,742**

Analytical Costs	Cost per Sample*
Assay Set Ref #1	$25
Assay Set Ref #2	$158
Assay Set Ref #3	$169
Assay Set Ref #4	$190
Assay Set Ref #5	$113
Assay Set Ref #6	$82

1 **TABLE A9: POST-CLOSURE MAINTENANCE**

	ACTIVITY/MATERIAL	UNITS	QUANTITY per Year	COST CODE	UNIT COST	COST
A	POST CLOSURE MAINTENANCE					
	Erosion Repair - labour	person-hours/year	80	(allowance)	$75	$6,000
	Erosion Repair - Travel & Equipment	LS	1	LS	$20,000	$20,000
	Subtotal					$26,000
	Discount rate for calculation of net present value of long term mtce cost, %		3%			
	Number of years of post-closure activity		200	years		
	Present Value of payment stream				$864,320	

COMMENTS:
Allowance for Post-Closure Maintenance to take place over a 200 year period following the cessation of reclamation (i.e., post 2011).

TABLE A10: Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	
1	**excavate Rock, Bulk**						COMMENTS
	drill, blast, load short haul (<500m) Dump	RB1	m3	8.5	12.75	#N/A	quarry operations for bulk fill
	RB1 + long haul, up to 1500 m	RB2	m3	9	13.25	#N/A	
	RB1 + spread and compact	RB3	m3	9	13.25	#N/A	
	RB1 + long haul + spread and compact	RB4	m3	9.5	13.75	#N/A	
	RB1 + Specified activity	RBS	m3	#N/A	#N/A	#N/A	
2	**excavate Rock, Controlled**						
	drill, blast, load short haul (<500m) Dump	RC1	m3	20	30	#N/A	spillway excavation
	RC1 + long haul, up to 1500 m	RC2	m3	9.5	13.75	#N/A	
	RC1 + spread and compact	RC3	m3	9	13.25	#N/A	
	RC1 + long haul + spread and compact	RC4	m3	10.1	14.3	#N/A	
	RC1 + Specified activity	RCS	m3	#N/A	#N/A	132	$132/M3-drift excavation
3	**excavate Soil, Bulk**						
	excavate, load short haul (<500m) dump	SB1	m3	2.91	4.4	#N/A	LOW cost: excavation of loose soil, high volume
	SB1 + long haul, up to 1500 m	SB2	m3	3.61	5.43	#N/A	LOW cost: excavation of loose soil, 1.5 km haul, high volume
	SB1 + spread and compact	SB3	m3	3.34	4.83	#N/A	
	SB1 + long haul + spread and compact	SB4	m3	4.05	8.14	#N/A	LOW cost: excavation of loose soil, 1.5 km haul, high volume, const. of simple soil cover
	SB1 + Specified activity	SBS	m3	2.1	5.8	9.95	LOW cost: rehandle waste rock dump into pit, >500,000 m3, 2 km haul SPECIFIED cost: rehandle waste rock, haul 3 km, place & compact on dam
	Soil, tailings	SBT	m3	2.75	6.5		LOW cost: doze tailings, HIGH cost: excavate & short haul
4	**excavate Soil, Controlled**						
	excavate, load short haul (<500 m), dump	SC1	m3	5.1	6.95	#N/A	
	SC1 + long haul, up to 1500 m	SC2	m3	6.32	8.76	#N/A	
	SC1 + spread and compact	SC3	m3	5.1	10.6	#N/A	HIGH cost: for simple soil covers
	SC1 + long haul + spread and compact	SC4	m3	5.73	17.3	#N/A	HIGH cost: for complex covers & dam construction, spillway repair, LOW volume
	SC1 + Specified activity	SCS	m3	#N/A	#N/A	14.3	SPECIFIED cost: backfill adit with waste rock
	Geo-synthetics						
	geotextile, filter cloth	GST	M2	0.9	1.8	#N/A	FOB Edmonton, add shipping & installation
	geogrid	GSG	M2	4.3		#N/A	
	liner, HDPE	GSHDPE	M2	5.35		#N/A	
	liner, PVC	GSPVC	M2			#N/A	
	geosynthetic installation	GSI	m2	0.75	1	#N/A	
	bentonite soil ammendment	GSBA	tonne	230	260	#N/A	FOB Edmonton, add shipping & mixing

TABLE A10: Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	
	Shaft, Raise & Portal Closures						
	Shaft & Raises	SR	m2	480	1590	#N/A	LOW cost: pre-cast concrete slabs, little site prep. HIGH cost: for hand construction, remote site
	Portals	POR	m3		185	55	HIGH cost: for excavate & backfill collapsed portal SPECIFIED cost: concrete for pressure plug
5	**Concrete work**						
	Small pour, no forms	CS	m3	270	540	#N/A	
	Large pour, no forms	CL	m3	212	318	#N/A	
	Small pour, Formed	CSF	m3	318	1590	#N/A	
	Large pour, Formed	CLF	m3	265	370	#N/A	
6	**Vegetation**						
	Hydroseed, Flat	VHF	ha	1450	4500	#N/A	
	Hydroseed, Sloped	VHS	ha	1680	5050	#N/A	
	veg. Blanket/erosion mat	VB	ha	10000	12000	#N/A	
	Tree planting	VT	ha	10000	12000	#N/A	
	Wetland species	VW	ha	50000	75000	#N/A	
7	**Pumps**						
	Small, <	PS	each	3000	6000	#N/A	
	Large, >	PL	each	5000	9000	#N/A	
8	**PiPes**						
	Small, < 6 inch diameter	PPS	m	0.5	5	#N/A	LOW cost: pipe removal, HIGH cost: supply new pipe SPECIFIED: small, heat traced & insulated pipe
	Large, > 6 inch diameter	PPL	m	1	200	#N/A	LOW cost: pipe removal, HIGH cost: supply new 16in. Pipe add shipping & installation
9	**pump sand BackFill**	BF	m3	5	15	#N/A	
10	**Fence**	F	m	10	150	#N/A	
11	**Signs**	S	each	10	30	#N/A	
12	**rock, Drill and Blast only**	DB	m3	10	20	#N/A	
	(flatten slope, collapse drift)						

TABLE A10: Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	
13 **excavate Rip Rap**							
	drill, blast, load short haul (<500 m) dump and spread	RR1	m3	9.95	14.85	#N/A	
	RR1 + long haul	RR2	m3	10.1	15.4	#N/A	HIGH cost: quarry & place rip rap in channel
	excavate rock from waste dump, short haul, spread	RR3	m3	3.82	5.25	#N/A	LOW cost: removal of 18 in minus from dump, long haul and spread HIGH cost: removal of coarse rock from dump, long haul, armour spillway
	RR3 + long haul	RR4	m3	4.25	5.68	#N/A	
	specified rip rap source	RR5	m3	#N/A	#N/A	#N/A	
14 **Import LimeStone**		ILS	tonne	8	12	#N/A	
15 **Import LiMe**		ILM	tonne	150	450	#N/A	LOW cost: bulk shipping, high volume, FOB Vancouver/Edmonton HIGH cost: bags delivered to central Yukon, small volume
16 **Grouting**		G	m3	180	218	#N/A	HIGH cost: cement, FOB Yellowknife
17 **Dozing**							
	doze Rock piles	DR	m3	0.77	1.77	#N/A	LOW cost: doze crest off dump
	doze overburden/Soil piles	DS	m3	0.71	2.83	#N/A	HIGH cost: push up to 300 m
18							
						#N/A	
						#N/A	
19							
						#N/A	
						#N/A	
20							
			each	0	0	#N/A	
			each			#N/A	
21 **Buildings - Decontaminate**							
	Chemicals	BDC	m3	#N/A	#N/A	#N/A	
	Asbestos	BDA	m2	19	38	#N/A	LOW cost: removal of asbestos siding & flooring HIGH cost: removal of insulated pipes, friable asbestos
22 **Buildings - Remove**							
	areas are per floor on 3 m average height						LOW cost: removal and on-site disposal - small wooden structures
	Wood - teardown	BRW1	m2	19.5	30	#N/A	
	Wood - burn	BRW2	m2	5	10	#N/A	
	Masonry	BRM	m2	21.5	30	#N/A	
	Concrete	BRC	m	30	45	6	LOW cost: removal of building perimeter walls, HIGH cost: per m3 for bulk concrete SPECIFIED cost: $/m2 to break floor slab
	Steel - teardown	BRS1	m2	32	48	240	SPECIFIED cost: demolition shear $/hour operating
	Steel - salvage	BRS2	m2	50	75	#N/A	

TABLE A10: Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	
23	**Power & Pipe Lines**						
	Power lines, remove	POWR	each	1900	4200	#N/A	
						#N/A	
24	**Laboratory Chemicals**						
	Remove from site	LCR	pallet	1590	2100	#N/A	
	Dispose on site	LCD	each	#N/A	#N/A	#N/A	
25	**PCB - Remove from site**	PCBR	litre	30	35	#N/A	LOW cost: shipping, handling & disposal from Yellowknife
26	**Fuel**						
	Remove from site	FR	kg	0	0.93	#N/A	
	Burn on site	FB	kg	#N/A	#N/A	#N/A	
27	**Oil**						
	Remove from site	OR	litre	0.3	0.93	#N/A	
	Burn on site	OB	litre	0.3	0.5	#N/A	
28	**Process Chemicals**						
	Remove from site	PCR	kg	0.3	1.87	#N/A	
	Dispose on site	PCD	kg	#N/A	#N/A	#N/A	
29	**Explosives**						
	Remove from site	ER	kg	0	2	#N/A	
	Dispose on site	ED	kg	#N/A	#N/A	#N/A	
30	**Contaminated Soils**						
	Remediate on site	CSR	m3	35	110	#N/A	LOW cost: bio-remediate on-site. HIGH cost: ship off-site to landfil as haz. waste
	consolidate & cover	Use cost code items 1 - 4					
	cover in place	Use cost code items 1 - 4					
31	**Mobilize Heavy Equipment**						
	Road access	MHER	$/km	2.55	7.65	1.86	SPECIFIED cost: $/tonne/km in cargo plane
	Air access	MHEA	each	#N/A	#N/A	1250	SPECIFIED cost: helicopter cost, $/hr of operation
32	**Mobilize Camp**						
	<20 persons Road access	MC<R	each	#N/A	#N/A	#N/A	
	<20 persons Air access	MC<A	each	#N/A	#N/A	#N/A	
33	**Mobilize Workers**						
	mobilize	MM<	person	175	900	#N/A	LOW cost: road access. HIGH cost: transport by Twin Otter aircraft
	>20 persons	MM>	person	900	1200	#N/A	
34	**ACCoModation**	ACCM	month	1200	1800	#N/A	LOW cost, accom in existing camp, per man, HIGH cost: - supply new camp
35	**Mobilize Misc. Supplies**	MMS	each	#N/A	#N/A	#N/A	LOW cost: winter road - limited use, LOW snowfall
36	**Winter Road**	WR	km	1200	2400	#N/A	
37	**Visual site Inspection**	VI	each	3200	6400	10000	

TABLE A10: Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $
38	**Survey site Inspection**	SI	each	#N/A	#N/A	#N/A
39	**Water Sampling**	WS	each	4775	8000	#N/A
40	**site inspection RePorT**	RPT	each	#N/A	10000	#N/A
41	**Security Guard**	SG	pers/mon	5000	7000	#N/A
42	**Maintain Pumping**	MP	month	3000	#N/A	#N/A
43	**Clear SpillWay**	CSW	each	1700	4800	#N/A
44	**Build Treatment Plant**					
	Small (< 1000 m3/d)	BTPS	lump sun	1E+06	2E+06	#N/A
	Large (> 1000 m3/d)	BTPL	lump sun	2E+06	3.5E+6	#N/A
45	**Operate Treatment Plant**	OTP	m3	0.25	1.5	#N/A
46	**SCariFY road and install water breaks**	SCFY	km	3215	4500	#N/A

water treatment chemicals			
ferric sulphate	ferric	kg	0.61
ferrous sulphate	ferrous	kg	0.4
lime	lime	kg	0.27
hydrogen peroxide, 50%	hperox	kg	1.3
Sodium Metabisulfate	Nametab	kg	0.9
Caustic soda, 50%	caustic	kg	0.56
Sulfuric acid, 93%	sulfuric	kg	0.24
flocculant	flocc	kg	4.9
copper sulphate	copper	kg	
typical shipping, to Whitehorse or Yellowknife		kg	0.065

Appendix B
Updated Water Quality Model

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Memo

To:	Chris Hanks	**Date:**	November 30, 2011
Company:	Newmont	**From:**	Leslie Gomm and Tom Sharp
Copy to:	File, Maritz Rykaart, Bill Patterson, Michael McGurk, Kevin Mather, Angela Holzapfel	**Project #:**	1CH008.047
Subject:	Summary of Assessment of Pollution Pond Discharge to TIA		

1 Introduction

The Doris Water Balance and Water Quality Goldsim Model was run to provide an assessment of the potential discharge of water from the Pollution Pond to the TIA for a period of 5 years starting in 2012. Specifically the model was run to determine the following:

1. What is the predicted water quality in the TIA as a result of the discharge of the Pollution Pond water and specifically does it meet the discharge limits set out in Clause 26 of the current licence?
2. What is the predicted water quality in Doris Creek during discharge of water from the TIA and specifically does it meet the receiving environment standards set out in Clause 28 of the licence.

The model was run for a period of 5 years from October 2011 to November 2016 assuming the following:

- Water level elevation in the TIA on October 1, 2011 was 29.3 masl.
- The mine is on ongoing care and maintenance mode with no milling and discharge of tailings to the TIA.
- The only inflows to the TIA are that from the Pollution Pond and the TIA catchment area.
- There is discharge from the TIA during the open water season (June to October) as per the requirements of the current licence. Specifically the discharge rate from the TIA can't exceed 10% of the background flow in Doris Creek.
- The target water level in the TIA is 28.3 masl.
- The model was run assuming that all parameters behave conservatively (no degradation of nitrogen species).

As part of this assessment the model run was run assuming average precipitation and evaporation conditions: 229.3 mm annual rainfall and 220 mm annual evaporation.

2 Assumptions

The following highlight the key assumptions that have been incorporated into the model for these scenarios.

a) Initial Water Level and Lake Volume

The model run starts on October 1, 2011 at which time the lake elevation is 29.3 masl and the corresponding volume is 3,400,603 m^3. In subsequent years the discharge from the TIA is designed to lower the water level in the TIA to its natural elevation of 28.3 masl. The TIA is predicted to reach, and stabilize, at this elevation after the first two years of discharge.

b) Precipitation and Runoff

The annual precipitation used in the model run was 229.3 mm. For runoff from land area in Tail Lake catchment area, a runoff coefficient of 0.6 was applied to the annual precipitation value used in each scenario. This land runoff coefficient is based on that used by Golder in their GoldSim water balance model of the major waterbodies in the project area (Golder 2009).

c) Evaporation

A mean annual evaporation of 220 mm was used for the scenarios. This is based on the value used in the original model.

d) Pollution Pond Discharge Volume

The Pollution Pond is assumed to discharge to the TIA during the open water season (June to October) with a total annual discharge volume of 39,364 m^3 based on the information provided by SRK as part of the post-mortem assessment of the recent performance of the Pollution Pond. This assessment assumed a 1:20 precipitation year along with a 1:25 year 24-hour storm event. Furthermore it is assumed that 80% of the annual snowfall is removed from the Doris North Mine Area pads and 95% of the runoff from the undeveloped portion of the watershed north of the Doris North Mine Area is diverted. The corresponding monthly inflows to the TIA are provided in Table 1.

Table 1 Summary of Monthly Pollution Pond Inflows

Month	Discharge (m^3)
June	7,955
July	9,424
August	16,819
September	4,474
October	592

e) Pollution Pond Discharge Water Quality

The Pollution Pond discharge water quality is assumed to be characterized by the water quality sample collected from the pond on May 24, 2011 for all parameters except nitrate and nitrite (Table 2). Nitrate and Nitrite concentrations assumed in the model were from a water quality sample collected from the pond on May 29, 2011. The model was then used to predict the water quality in the TIA and Doris Creek during discharge for those parameters which had pollution pond concentrations provided.

Table 2 Pollution Pond Water Quality (mg/L) – May 24, 2011

Parameter	Concentration
Total Suspended Solids	**27**
Chloride	795
Total Cyanide	0.056
Ammonia-N	15.400
Nitrate-N	45.0
Nitrite-N	1.5
Total Aluminum	0.64
Total Antimony	0.00
Total Arsenic	0.0004
Total Barium	0.0618
Total Beryllium	0.001
Total Boron	0.194
Total Cadmium	0.00005
Total Calcium	334
Total Chromium (VI)	0.0172
Total Cobalt	0.0033
Total Copper	0.006
Total Iron	1.45
Total Lithium	0.16
Total Magnesium	20.1
Total Manganese	0.80
Total Mercury	0.0001
Total Molybdenum	0.005
Total Nickel	0.011
Total Lead	0.00022
Total Selenium	0.002
Total Silver	0.0001
Total Sodium	83.2
Total Thallium	0.0001
Total Tin	0.05
Total Titanium	0.023
Total Uranium	0.0004
Total Vanadium	0.0066
Total Zinc	0.007

3 Results

For each scenario, the model was run on monthly time step from October 1, 2011 for a period of 5 years until November 2016. Starting with a water level elevation of 29.3 masl in October 2011, the predicted water level in the TIA is predicted to return to its natural elevation of 28.3 masl after the second season of discharge (Fall 2013).

The minimum and maximum predicted concentrations in the TIA discharge over the 5-year period are presented in Table 3 along with the corresponding licence discharge limits. During the 5-year model period, the water quality in the TIA is predicted to be well below the limits set out in Clause 26 of the current water licence.

The minimum and maximum predicted concentrations in Doris Creek over the 5-year period are presented in Table 4 along with the corresponding licence receiving water quality limits. Similarly, during the 5-year model period, the water quality in Doris Creek during periods of discharge is predicted to be well below the limits set out in Clause 28 of the current water licence.

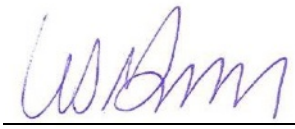
Table 3 Predicted Range of TIA Discharge Water Quality (mg/L) - 2012 to 2016

Parameter	Maximum Average Concentration in TIA Discharge (Clause 26 of Original Licence) (mg/L)	Average Precipitation Conditions	
		Minimum	Maximum
Total Suspended Solids	15	1	2
Total Cyanide	1.00	0.001	0.004
Ammonia-N	6.00	0.01	0.77
Total Arsenic	0.50	0.0002	0.0003
Total Copper	0.30	0.001	0.001
Total Nickel	0.50	0.001	0.001
Total Lead	0.20	0.00002	0.00004
Total Zinc	0.50	0.004	0.006

Table 4 Predicted Range of Doris Creek Water Quality (mg/L) during Discharge - 2012 to 2016

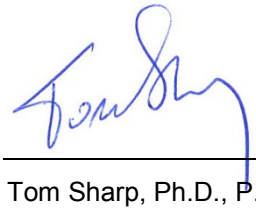
Parameter	Target Closure Concentration (Clause 28 of Original Licence) (mg/L)	Average Precipitation Conditions	
		Minimum	Maximum
Chloride	150	54	64
Free Cyanide	0.005	not predicted	
Total Cyanide	0.010	0.001	0.001
Ammonia-N	1.54 (pH 7.5 and T=20)	0.008	0.077
Nitrate-N	2.900	0.006	0.207
Nitrite-N	0.06	0.001	0.008
Total Aluminum	0.10	0.05	0.08
Total Arsenic	0.0050	0.0004	0.0005
Total Cadmium	0.000017	0.000002	0.000002
Total Chromium (VI)	0.0010	0.0002	0.0004
Total Copper	0.002	0.001	0.001
Total Iron	0.30	0.08	0.11
Total Mercury	0.000026	0.000001	0.000001
Total Molybdenum	0.073	0.0001	0.0002
Total Nickel	0.025	0.0004	0.0006
Total Lead	0.001	0.0000	0.0001
Total Selenium	0.001	0.001	0.001
Total Silver	0.0001	0.000001	0.000002
Total Thallium	0.0008	0.000003	0.000021
Total Zinc	0.03	0.0015	0.0031

Prepared by



Leslie Gomm, Ph.D., P.Eng.
Associate

Reviewed by



Tom Sharp, Ph.D., P.E.
Principal Consultant

Appendix C
Doris North Closure and Reclamation Cost Estimate

Table 1: Summary of Costs

Work task	WBS Code	Cost (rounded to the nearest thousand)	
		By task	By work Area
Direct Cost Items			
Roberts Bay			$ 214,000
Jetty	RB-001	$ 5,000	
Mechanical Shop Complex	RB-004	$ 46,000	
Waste Management Facility	RB-005	$ 21,000	
Laydown Area	RB-006	$ 65,000	
Overburden Dump	RB-007	$ 26,000	
Fuel Transfer Access Road	RB-008	$ 8,000	
Communications Tower	RB-009	$ 19,000	
Beach Laydown Area	RB-010	$ 2,500	
Orbit Drill Shop	RB-011	$ 22,000	
Airstrip			$ 31,000
Airstrip	AS-001	$ 3,000	
South Apron	AS-002	$ 13,000	
North Apron	AS-003	$ 6,000	
Explosives Mixing Facility	AS-004	$ 8,000	
Reagent Pads			$ 178,000
Equipment Laydown Area	PR-001	$ 55,000	
Material Laydown Area	PR-002	$ 85,000	
Ammonium Nitrate Storage Area	PR-003	$ 21,000	
Geotech Drill Shop	PR-004	$ 8,000	
Westarc Drill Shop	PR-005	$ 9,000	
Waste Management Area			$ 43,000
Land Farm	WM-001	$ 38,000	
Batch Plant Pad	WM-002	$ 2,000	
Burn Pan	WM-003	$ 2,000	
Quarry 2			$ 122,000
Crusher	Q2-001	$ 13,000	
Overburden Dump	Q2-002	$ 107,000	
Treated Sewage Discharge Areas	Q2-003	$ 1,000	
Doris Camp			$ 1,740,000
Accommodation Complex	DC-001	$ 148,000	
Permanent Power Generator	DC-003	$ 64,000	
Temporary Power Generator	DC-004	$ 19,000	
Sewage Treatment Plant	DC-005	$ 21,000	
Fire Water Storage Tank	DC-006	$ 41,000	
Muster Station	DC-007	$ 3,000	
Warehouse/Core Shack	DC-008	$ 42,000	
Offices & Mine Dry Complex	DC-009	$ 80,000	
Temporary Water Management Pond	DC-010	$ 46,000	
Portal and Underground Works	DC-011	$ 30,000	
Underground Wash Bay	DC-012	$ 8,000	
Swick Shop	DC-013	$ 9,000	
Water Intake Structure and Pumping Facility	DC-014	$ 6,000	
Sedimentation/Pollution Control Pond	DC-015	$ 17,000	
Underground Support Mechanical Shop	DC-016	$ 34,000	
Fresh Water Pipelines	DC-017	$ 11,000	
Helicopter Support Facilities	DC-018	$ 10,000	
Waste Rock Pile	DC-019	$ 576,000	
Ore Pile	DC-020	$ 144,000	
Run-off Diversion Berm	DC-021	$ 1,000	
Sewage Discharge Line	DC-022	$ 14,000	
Sedimentation Berm	DC-023	$ -	
Sumps	DC-024	$ 7,000	
Drainage channel	DC-000	$ 42,000	
Regrade pads to blend in with topography	DC-000	$ 362,000	
North Dam Area			$ 558,000
Frozen Core Dam	ND-001	$ 503,000	
Tail Lake Access Road	ND-002	$ 10,000	
Frozen Core Plant	ND-003	$ 45,000	
Vent Raise Area			$ 46,000
Vent Raise	VR-001	$ 22,000	
Ventilation and Heating Facilities	VR-002	$ 13,000	
Fuel Storage Area	VR-003	$ 10,000	
Doris Windy Road Area			$ 232,000
Stream crossings removal	SDW-001	$ 225,000	
Explosives Storage Facility	DW-005	$ 7,000	
Secondary Road Area	SR-001	$ 75,000	$ 75,000
Doris Mountain Communication Tower	DM-001	$ 53,000	$ 53,000
Off-site Shipping for Disposal		$ 2,338,000	$ 2,338,000
Off-Site Disposal Fees		$ 89,000	$ 89,000
TOTAL DIRECT COSTS		**$**	**5,718,000**
Indirect Cost Items			
Contingency		$ 657,000	
Mobilization & Demobilization		$ 428,000	
General and Administration costs		$ 213,000	
Field support		$ 108,000	
Hydrocarbon decontamination		$ 200,000	
Post-closure Monitoring		$ 200,000	
Subtotal Indirect Costs		**$**	**1,805,000**
CLOSURE COSTS - TOTAL		**$**	**7,523,000**

Table 2. Detailed Cost Estimate

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
DIRECT COSTS												
Roberts Bay											**$ 213,392**	
RB-001	1	1	1	Jetty	Remove rock fill to 0.3 m below LLWL	-	m^3	C.5.05	$ 2.38	$ -		
	1	1	2		Remove on-shore mooring points	-	LS		$ 1,200.00	$ -		
	1	1	3		Remove mooring buoy	-	LS		$ 2,500.00	$ -		
	1	1	4		Crown jetty for positive drainage	1,900.0	m^2	C.5.05	$ 2.38	$ 4,519		
RB-004	1	2	1	Mechanical Shop Complex	Decommission electrical, mechanical, heating (including connections to generator house & transformer)	7.0	each	C.1.05	$ 568.88	$ 3,982		
	1	2	2		Demolish (steel modular structure)	2,402.4	m^3	C.3.05	$ 10.61	$ 25,489		
	1	2	3		Demolish wood structures (warehouse roof, crew lounge)	283.2	m^3	C.3.05	$ 10.61	$ 3,005		
	1	2	4		Demolish tent structure (light vehicle shop)	460.3	m^3	C.3.05	$ 10.61	$ 4,884		
	1	2	5		Collect debris	685.8	m^2	C.3.10	$ 0.13	$ 88		
	1	2	6		Load waste into containers for shipping off-site	867.1	m^3	C.4.01	$ 8.16	$ 7,071		
	1	2	7		Haul debris to Roberts Bay laydown	867.1	m^3	C.4.11	$ 1.60	$ 1,391		
RB-005	1	3	1	Waste Management Facility	Collect ashes and place in containers	0.5	m^3	C.2.07	$ 535.08	$ 268		
	1	3	2		Dismantle (welding crew)	2.0	each	C.3.08	$ 1,916.56	$ 3,833		
	1	3	3		Demolish wood structures (roof, entryway, etc.)	321.6	m^3	C.3.05	$ 10.61	$ 3,413		
	1	3	4		Disconnect containers and prep for shipping off-site	11.0	each	C.1.08	$ 1,045.76	$ 11,503		
	1	3	5		Collect all debris	128.7	m^2	C.3.10	$ 0.13	$ 17		
	1	3	6		Load waste into containers for shipping off-site	152.5	m^3	C.4.01	$ 8.16	$ 1,244		
	1	3	7		Haul debris to Roberts Bay laydown	152.5	m^3	C.4.04	$ 2.31	$ 352		
RB-006	1	4	1	Laydown Area	Decommission vehicle plug system	1.0	each	C.1.05	$ 568.88	$ 569		
	1	4	2		Remove cables and posts	8.0	each	C.3.14	$ 370.24	$ 2,962		Estimated # of posts
	1	4	3		Collect all debris	24,491.6	m^2	C.3.10	$ 0.13	$ 3,143		
	1	4	4		Load waste into containers for shipping off-site	5.0	m^3	C.4.01	$ 8.16	$ 41		
	1	4	5		Haul debris to Roberts Bay laydown	5.0	m^3	C.4.11	$ 1.60	$ 8		
	1	4	6		Regrade area for positive drainage	24,491.6	m^2	C.5.05	$ 2.38	$ 58,246		
RB-007	1	5	1	Overburden Dump	Collect all debris	10,448.0	m^2	C.3.10	$ 0.13	$ 1,341		
	1	5	2		Load waste into containers for shipping off-site	10.0	m^3	C.4.01	$ 8.16	$ 82		
	1	5	3		Grade for positive drainage	10,448.0	m^2	C.5.05	$ 2.38	$ 24,847		
RB-008	1	6	1	Fuel Transfer Access Road	Crown road for positive drainage	3,378.0	m^2	C.5.05	$ 2.38	$ 8,034		
RB-009	1	7	1	Communications Tower	Decommission tower	1.0	Each	C.1.05	$ 568.88	$ 569		
	1	7	2		Remove communication equipment	4.0	each	C.1.07	$ 313.10	$ 1,252		
	1	7	3		Dismantle towers	1.0	each	C.3.11	$ 14,052.00	$ 14,052		
	1	7	4		Prep tower sections for shipping off-site	8.0	m	C.3.12	$ 421.16	$ 3,369		
	1	7	5		Collect all debris	1.4	m^2	C.3.10	$ 0.13	$ 0		
	1	7	6		Load waste into containers for shipping off-site	5.0	m^3	C.4.01	$ 8.16	$ 41		
	1	7	7		Haul containers to Roberts Bay laydown	10.5	m^3	C.4.11	$ 1.60	$ 17		
RB-010	1	8	1	Beach Laydown Area	Relocate all magazines and containers to Roberts Bay laydown (to be done in the winter)	5.0	each	C.4.06	$ 198.18	$ 991		Change the destination to Roberts Bay Laydown
	1	8	2		Scarify surface to encourage vegetation	273.8	m^2	C.5.05	$ 2.38	$ 651		
	1	8	3		Collect all debris	273.8	m^2	C.3.10	$ 0.13	$ 35		
	1	8	4		Load waste into containers for shipping off-site	1.0	m^3	C.4.01	$ 8.16	$ 8		
	1	8	5		Haul containers to Roberts Bay laydown	1.0	m^3	C.4.11	$ 1.60	$ 2		
RB-011	1	9	1	Orbit Drill Shop	Decommission electrical, mechanical, heating	3.0	each	C.1.05	$ 568.88	$ 1,707		
	1	9	2		Disconnect containers and prep for shipping off-site	12.0	each	C.1.08	$ 1,045.76	$ 12,549		
	1	9	3		Demolish tent structure	705.1	m^3	C.3.05	$ 10.61	$ 7,481		
	1	9	3		Collect all debris	141.0	m^2	C.3.10	$ 0.13	$ 18		
	1	9	4		Load waste into containers for shipping off-site	30.7	m^3	C.4.01	$ 8.16	$ 250		
	1	9	5		Haul containers to Roberts Bay laydown	30.7	m^3	C.4.04	$ 2.31	$ 71		
Airstrip											**$ 30,797**	
AS-001	2	1	1	Airstrip	Decommission airstrip	2.0	Each	C.1.09	$ 277.84	$ 556		
	2	1	2		Remove lighting fixtures (airstrip lighting, approach lights)	70.0	each	C.1.10	$ 35.56	$ 2,489		
	2	1	3		Collect all debris	2,850.0	m^2	C.3.10	$ 0.13	$ 366		1.5 m width
	2	1	4		Load waste into containers for shipping off-site	1.2	m^3	C.4.01	$ 8.16	$ 10		
	2	1	5		Haul containers to Roberts Bay laydown	1.2	m^3	C.4.10	$ 1.82	$ 2		
AS-002	2	2	1	South Apron	Crown for positive drainage	5,517.2	m^2	C.5.05	$ 2.38	$ 13,121		
AS-003	2	3	1	North Apron	Decommission electrical, and heating from traffic control tower	1.0	each	C.1.07	$ 313.10	$ 313		
	2	3	2		Demolish control tower structure (wood shack)	30.5	m^3	C.3.05	$ 10.61	$ 324		
	2	3	3		Disconnect containers and prep for shipping off-site	5.0	each	C.1.08	$ 1,045.76	$ 5,229		
	2	3	4		Collect all debris	12.2	m^2	C.3.10	$ 0.13	$ 2		
	2	3	5		Load waste into containers for shipping off-site	17.6	m^3	C.4.01	$ 8.16	$ 143		
	2	3	6		Haul containers to Roberts Bay laydown	17.6	m^3	C.4.10	$ 1.82	$ 32		
AS-004	2	4	1	Explosives Mixing Facility	Decommission electrical, and heating from traffic control tower	2.0	each	C.1.05	$ 568.88	$ 1,138		
	2	4	2		Demolish building (tent structure)	429.6	m^3	C.3.05	$ 10.61	$ 4,558		Plus the shed and wash bay
	2	4	3		Disconnect containers and prep for shipping off-site	2.0	each	C.1.08	$ 1,045.76	$ 2,092		
	2	4	4		Collect all debris	85.9	m^2	C.3.10	$ 0.13	$ 11		
	2	4	5		Load waste into containers for shipping off-site	41.5	m^3	C.4.01	$ 8.16	$ 338		
	2	4	6		Haul containers to Roberts Bay laydown	41.5	m^3	C.4.10	$ 1.82	$ 76		
Reagent Pads											**$ 178,068**	
RP-001	3	1	1	Equipment Laydown Area	Collect all debris	21,870.0	m^2	C.3.10	$ 0.13	$ 2,806		
	3	1	2		Load waste into containers for shipping off-site	20.0	m^3	C.4.01	$ 8.16	$ 163		
	3	1	3		Regrade area for positive drainage	21,870.0	m^2	C.5.05	$ 2.38	$ 52,011		
	3	1	4		Haul waste to Roberts Bay	20.0	m^3	C.4.09	$ 2.06	$ 41		
RP-002	3	2	1	Materials Laydown Area	Collect all debris	33,839.8	m^2	C.3.10	$ 0.13	$ 4,342		
	3	2	2		Load waste into containers for shipping off-site	20.0	m^3	C.4.01	$ 8.16	$ 163		
	3	2	3		Regrade area for positive drainage	33,839.8	m^2	C.5.05	$ 2.38	$ 80,478		
	3	2	4		Haul waste to Roberts Bay	20.0	m^3	C.4.09	$ 2.06	$ 41		
RP-003	3	3	1	Ammonium Nitrate Storage Area	Remove and stockpile liner protection cover	1,504.6	m^3	C.5.04	$ 2.56	$ 3,857		
	3	3	2		Clean liner	2,800.0	m^2	C.2.10	$ 0.36	$ 1,003		
	3	3	3		Remove and cut liner into manageable pieces	2,800.0	m^2	C.3.02	$ 0.14	$ 399		
	3	3	4		Load waste into containers for shipping off-site	25.2	m^3	C.4.01	$ 8.16	$ 206		
	3	3	5		Haul containers to Roberts Bay laydown	25.2	m^3	C.4.09	$ 2.06	$ 52		
	3	3	6		Level containment berms	2,800.0	m^2	C.5.05	$ 2.38	$ 6,659		
	3	3	7		Regrade area for positive drainage	3,858.0	m^2	C.5.05	$ 2.38	$ 9,175		
RP-004	3	4	1	Geotech Drill Shop	Decommission electrical, mechanical, heating	2.0	each	C.1.05	$ 568.88	$ 1,138		
	3	4	2		Demolish building (tent structure)	598.5	m^3	C.3.05	$ 10.61	$ 6,350		
	3	4	3		Collect all debris	335.2	m^2	C.3.10	$ 0.13	$ 43		
	3	4	4		Load waste into containers for shipping off-site	12.4	m^3	C.4.01	$ 8.16	$ 101		
	3	4	5		Haul containers to Roberts Bay laydown	12.4	m^3	C.4.09	$ 2.06	$ 26		
RP-005	3	5	1	Westarc Drill Shop	Decommission electrical, mechanical, heating	2.0	each	C.1.05	$ 568.88	$ 1,138		
	3	5	2		Demolish building (tent structure)	721.0	m^3	C.3.05	$ 10.61	$ 7,650		
	3	5	3		Collect all debris	363.3	m^2	C.3.10	$ 0.13	$ 47		
	3	5	4		Load waste into containers for shipping off-site	17.8	m^3	C.4.01	$ 8.16	$ 146		
	3	5	5		Haul containers to Roberts Bay laydown	17.8	m^3	C.4.09	$ 2.06	$ 37		
Waste Management Area											**$ 41,434**	
WM-001	4	1	1	Land Farm	Load contained contaminated soils into megabags for shipping off-site	100.0	m^3	C.4.12	$ 65.75	$ 6,575		
	4	1	2		Haul megabags to Roberts Bay laydown	100.0	m^3	C.4.04	$ 2.31	$ 231		
	4	1	3		Treat contained water and discharge	1.0	LS	-	$ 5,000.00	$ 5,000		According to estimate by IM
	4	1	4		Remove and stockpile liner protection cover	1,366.0	m^3	C.5.04	$ 2.56	$ 3,501		
	4	1	5		Clean liner	4,384.0	m^2	C.2.10	$ 0.36	$ 1,570		
	4	1	6		Remove and cut liner into manageable pieces	13,152.0	m^2	C.3.02	$ 0.14	$ 1,873		liner and geotextile
	4	1	7		Load waste into containers for shipping off-site	118.4	m^3	C.4.01	$ 8.16	$ 965		Does not include the liner protection cover
	4	1	8		Haul containers to Roberts Bay laydown	118.4	m^3	C.4.04	$ 2.31	$ 273		
	4	1	9		Level containment berms	3,011.2	m^2	C.5.05	$ 2.38	$ 7,161		
	4	1	10		Regrade area for positive drainage	4,384.0	m^2	C.5.05	$ 2.38	$ 10,426		
WM-002	4	2	1	Batch Plant Pad	Collect all debris	740.3	m^2	C.3.10	$ 0.13	$ 95		
	4	2	2		Load waste into containers for shipping off-site	3.0	m^3	C.4.01	$ 8.16	$ 24		
	4	2	3		Haul containers to Roberts Bay laydown	3.0	m^3	C.4.04	$ 2.31	$ 7		
	4	2	4		Regrade area for positive drainage	740.3	m^2	C.5.05	$ 2.38	$ 1,761		
WM-003	4	3	1	Burn Pan	Collect ashes and place in containers	0.1	m^3	C.2.07	$ 535.08	$ 54		
	4	3	2		Dismantle (welding crew)	1.0		C.3.08	$ 1,916.56	$ 1,917		
	4	3	3		Load waste into containers for shipping off-site	0.2	m^3	C.4.01	$ 8.16	$ 2		
	4	3	4		Haul containers to Roberts Bay laydown	0.2	m^3	C.4.04	$ 2.31	$ 1		
Quarry #2											**$ 121,408**	
Q2-001	5	1	1	Crusher	Dismantle hopper/crusher parts for transport	2.0	each	C.1.11	$ 2,844.40	$ 5,689		
	5	1	2		Load equipment into containers for transport (to Roberts Bay)	99.6	m^3	C.4.04	$ 2.31	$ 230		assuming they fit in 3 containers
	5	1	3		Collect all debris	2,668.0	m^2	C.3.10	$ 0.13	$ 342		
	5	1	4		Load waste into containers for shipping off-site	2.7	m^3	C.4.01	$ 8.16	$ 22		
	5	1	5		Haul containers to Roberts Bay laydown	2.7	m^3	C.4.04	$ 2.31	$ 6		
	5	1	6		Regrade area for positive drainage	2,668.0	m^2	C.5.05	$ 2.38	$ 6,345		
Q2-002	5	2	1	Overburden Dump	Reslope to 3h:1v	8,781.3	m^3	C.5.06	$ 3.17	$ 27,845		assumed 30% of entire footprint
	5	2	2		Grade top for positive drainage	18,440.8	m^2	C.5.05	$ 2.38	$ 43,856		assumed 60% of entire footprint
	5	2	3		Install erosion protection measures (coconut matting)	2,634.4	m^2	C.5.08	$ 2.94	$ 7,755		assumed 10% of entire surface area
	5	2	4		Re-vegetate	26,344.0	m^2	C.5.13	$ 1.06	$ 27,898		entire footprint area
Q2-003	5	3	1	Treated Sewage Discharge Areas	Fill in low-lying areas (assumed sourced within 0.5km)	69.1	m^3	C.5.02	$ 17.47	$ 1,207		
	5	3	2		Revegetate: supply and place cocoa matting	53.2	m^2	C.5.08	$ 2.94	$ 157		
	5	3	3		Revegetate: seed/fertilize, by hand, high application rate	53.2	m^2	C.5.13	$ 1.06	$ 56		

Table 2. Detailed Cost Estimate (Continued)

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
Doris Camp											**$ 1,735,886**	
DC-001	6	1	1	Accommodation Complex	Decommission (electrical, mechanical, plumbing)	18.0	each	C.1.05	$ 568.88	$ 10,240		
	6	1	2		Disconnect trailers and prep for moving (remove boards/piping, etc.; wrap in plastic)	65.0	each	C.1.08	$ 1,045.76	$ 67,974		
	6	1	3		Haul trailers to Roberts Bay for shipping off-site	2,755.6	m^3	C.4.04	$ 2.31	$ 6,354		
	6	1	4		Demolish cabins	319.1	m^3	C.3.05	$ 10.61	$ 3,385		
	6	1	5		Demolish cribbing, stairs, entryways, etc.	250.3	m^3	C.3.05	$ 10.61	$ 2,656		smoke tent, hallway, and storage room
	6	1	6		Demolish arctic corridor	132.5	m^3	C.3.05	$ 10.61	$ 1,406		
	6	1	7		Collect all debris	380.9	m^2	C.3.10	$ 0.13	$ 49		
	6	1	8		Load waste into containers for shipping off-site	562.4	m^3	C.4.01	$ 8.16	$ 4,586		
	6	1	9		Haul containers to Roberts Bay laydown	562.4	m^3	C.4.04	$ 2.31	$ 1,297		
	6	1	10		Regrade area for positive drainage	21,050.0	m^2	C.5.05	$ 2.38	$ 50,061		
DC-003	6	2	1	Permanent Power Generator	Decommission (electrical)	8.0	each	C.1.06	$ 599.98	$ 4,800		
	6	2	2		Disconnect containers and prep for shipping off-site	8.0	each	C.1.08	$ 1,045.76	$ 8,366		
	6	2	3		Haul containers to Roberts Bay laydown	265.6	m^3	C.4.04	$ 2.31	$ 612		
	6	2	4		Dismantle colling equipment	4.0	each	C.3.08	$ 1,916.56	$ 7,666		
	6	2	5		Dismantle stacks	40.0	m	C.3.13	$ 630.68	$ 25,227		2x 20m stacks: two in each container 2m high = 5 containers
	6	2	6		Prep stacks for shipping off-site	40.0	m	C.3.12	$ 421.16	$ 16,846		
	6	2	7		Haul stack sections to Roberts Bay laydown	166.0	m^3	C.4.04	$ 2.31	$ 383		
	6	2	8		Collect all debris	2,103.0	m^2	C.3.10	$ 0.13	$ 270		
	6	2	9		Load waste into containers for shipping off-site	2.0	m^3	C.4.01	$ 8.16	$ 16		
	6	2	10		Haul containers to Roberts Bay laydown	2.0	m^3	C.4.04	$ 2.31	$ 5		
DC-0047	6	3	1	Backup Power generator	Decommission (electrical)	4.0	each	C.1.05	$ 568.88	$ 2,276		
	6	3	2		Disconnect generator units and prep for shipping off-site	2.0	each	C.1.06	$ 599.98	$ 1,200		
	6	3	3		Haul units to Roberts Bay laydown	67.6	m^3	C.4.04	$ 2.31	$ 156		
	6	3	4		Demolish tent housing structure	1,296.6	m^3	C.3.05	$ 10.61	$ 13,757		
	6	3	5		Collect all debris	259.3	m^2	C.3.10	$ 0.13	$ 33		
	6	3	6		Load waste into containers for shipping off-site	122.4	m^3	C.4.01	$ 8.16	$ 998		
	6	3	7		Haul containers to Roberts Bay laydown	122.4	m^3	C.4.04	$ 2.31	$ 282		
DC-005	6	4	1	Sewage Treatment Plant	Flush and remove sewage plumbing, collect sewage sludge/waste water in 55 gallon drums	9.0	each	C.2.06	$ 514.30	$ 4,629		
	6	4	2		Decommission (electrical)	9.0	each	C.1.05	$ 568.88	$ 5,120		
	6	4	3		Disconnect containers and prep for shipping off-site	9.0	each	C.1.08	$ 1,045.76	$ 9,412		40 ' containers
	6	4	4		Haul containers to Roberts Bay laydown	597.6	m^3	C.4.04	$ 2.31	$ 1,378		
	6	4	5		Collect debris	29.8	m^2	C.3.10	$ 0.13	$ 4		
	6	4	6		Load debris into containers for transport (to Roberts Bay)	23.8	m^3	C.4.01	$ 8.16	$ 194		
	6	4	7		Haul debris to Roberts Bay	23.8	m^3	C.4.04	$ 2.31	$ 55		
DC-006	7	5	1	Fire Water Storage Tank	Decommission and disconnect electrical and plumbing	3.0	each	C.1.03	$ 1,166.24	$ 3,499		
	8	5	2		Disconnect and remove container housing the pumps and controls, and prep for shipping	1.0	each	C.1.08	$ 1,045.76	$ 1,046		
	6	5	3		Haul container to Roberts Bay laydown	66.4	m^3	C.4.04	$ 2.31	$ 153		
	6	5	4		Remove tank insulation	53.0	m^3	C.3.15	$ 646.73	$ 34,263		
	6	5	5		Dismantle tanks and cut into manageable pieces (includes water tank for Boston)	2.9	m^3	C.3.07	$ 242.92	$ 714		
	6	5	6		Prepare pieces for transportation (includes water tank for Boston)	8.8	m^3	C.4.01	$ 8.16	$ 72		
	6	5	7		Haul cut metal to Roberts Bay laydown (includes water tank for Boston)	8.8	m^3	C.4.04	$ 2.31	$ 20		
	6	5	8		Collect debris	73.2	m^2	C.3.10	$ 0.13	$ 9		
	6	5	9		Load debris into containers for transport (to Roberts Bay)	78.3	m^3	C.4.01	$ 8.16	$ 638		
	6	5	10		Haul debris to Roberts Bay	78.3	m^3	C.4.04	$ 2.31	$ 180		
DC-007	6	6	1	Muster Station	Demolish tent structure	227.3	m^3	C.3.05	$ 10.61	$ 2,412		
	6	6	2		Dismantle wood flooring	27.3	m^3	C.3.05	$ 10.61	$ 289		
	6	6	3		Collect debris	90.9	m^2	C.3.10	$ 0.13	$ 12		
	6	6	4		Load debris into containers for transport (to Roberts Bay)	42.7	m^3	C.4.01	$ 8.16	$ 348		
	6	6	5		Haul debris to Roberts Bay	42.7	m^3	C.4.04	$ 2.31	$ 99		
DC-008	6	7	1	Warehouse / Core Shack	Demolish tent structure	3,281.6	m^3	C.3.05	$ 10.61	$ 34,817		
	6	7	2		Dismantle wood flooring, shelving, and lofts	186.2	m^3	C.3.05	$ 10.61	$ 1,976		
	6	7	3		Collect debris	720.1	m^2	C.3.10	$ 0.13	$ 92		
	6	7	4		Load debris into containers for transport (to Roberts Bay)	350.3	m^3	C.4.01	$ 8.16	$ 2,857		
	6	7	5		Haul debris to Roberts Bay	350.3	m^3	C.4.04	$ 2.31	$ 808		
	6	7	6		Haul all warehouse containers to Roberts Bay	796.8	m^3	C.4.04	$ 2.31	$ 1,837		
DC-009	6	8	1	Offices & Mine Dry Complex	Decommission (electrical, mechanical, plumbing)	3.0	each	C.1.05	$ 568.88	$ 1,707		
	6	8	2		Disconnect trailers and prep for moving (remove boards, cladding, etc.; wrap in plastic)	17.0	each	C.1.08	$ 1,045.76	$ 17,778		
	6	8	3		Haul trailers to Roberts Bay for shipping off-site	564.4	m^3	C.4.04	$ 2.31	$ 1,301		
	6	8	4		Demolish arctic corridor	724.5	m^3	C.3.05	$ 10.61	$ 7,686		
	6	8	5		Demolish cribbing, stairs, entryways, etc.	998.2	m^3	C.3.05	$ 10.61	$ 10,591		Demolish Office Building, Minedry, and Admin Building
	6	8	6		Collect all debris	1,981.2	m^2	C.3.10	$ 0.13	$ 254		
	6	8	7		Load waste into containers for shipping off-site	2,325.6	m^3	C.4.01	$ 8.16	$ 18,965		
	6	8	8		Haul containers to Roberts Bay laydown	2,325.6	m^3	C.4.04	$ 2.31	$ 5,363		
	6	8	9		Regrade area for positive drainage	6,910.0	m^2	C.5.05	$ 2.38	$ 16,433		
DC-010	6	9	1	Temporary Water Management Pond	Discharge contained water to tail lake	1.0	LS		$ 5,000.00	$ 5,000		
	6	9	2		Remove and cut liner into manageable pieces	3,307.0	m^2	C.3.02	$ 0.14	$ 471		
	6	9	3		Load waste into containers for shipping off-site	50.6	m^3	C.4.01	$ 8.16	$ 412		
	6	9	4		Haul containers to Roberts Bay laydown	50.6	m^3	C.4.04	$ 2.31	$ 117		
	6	9	5		Consolidate waste rock within waste rock pile on pad I	2,221.3	m^2	C.5.12	$ 12.04	$ 26,749		
	6	9	6		Regrade area for positive drainage	5,617.0	m^2	C.5.05	$ 2.38	$ 13,358		
DC-011	6	10	1	Portal and Underground Works	Remove ducts, pipes, electrical cables	100.0	lm	C.3.16	$ 99.59	$ 9,959		assuming 100m length?
	6	10	2		Construct portal plug	706.8	m^3	C.5.03	$ 23.29	$ 16,460		
	6	10	3		Regrade area for positive drainage	1,446.0	m^2	C.5.05	$ 2.38	$ 3,439		
DC-012	6	11	1	Underground Wash Bay	Demolish tent structure	776.9	m^3	C.3.05	$ 10.61	$ 8,243		
	6	11	2		Collect debris	155.4	m^2	C.3.10	$ 0.13	$ 20		
	6	11	3		Load debris into containers for transport (to Roberts Bay)	15.5	m^3	C.4.01	$ 8.16	$ 126		
	6	11	4		Haul debris to Roberts Bay	15.5	m^3	C.4.04	$ 2.31	$ 36		
DC-013	6	12	1	Swick Shop	Demolish tent structure	859.2	m^3	C.3.05	$ 10.61	$ 9,116		
	6	12	2		Collect debris	229.1	m^2	C.3.10	$ 0.13	$ 29		
	6	12	3		Load debris into containers for transport (to Roberts Bay)	17.7	m^3	C.4.01	$ 8.16	$ 144		
	6	12	4		Haul debris to Roberts Bay	17.7	m^3	C.4.04	$ 2.31	$ 41		
DC-014	6	13	1	Water Intake Structure and Pumping Facility	Remove water intake line from Doris lake	25.0	lm	C.3.03	$ 9.78	$ 245		
	6	13	2		Decommission pumping facility (remove electrical)	2.0	each	C.1.03	$ 1,166.24	$ 2,332		
	6	13	3		Prep containers for shipping off-site	2.0	each	C.1.08	$ 1,045.76	$ 2,092		
	6	13	4		Disconnect and remove generator fuel tank (place in Doris tank farm for cleaning)	1.0	each	C.1.01	$ 66.89	$ 67		
	6	13	5		Clean TidyTank and prep for shipping off-site	1.0	each	C.2.02	$ 21.49	$ 21		Assumed there is only one tank
	6	13	6		Run oil-water separator	1.0	each	C.2.08	$ 28.16	$ 28		
	6	13	7		Prep generator container for shipping off-site	1.0	each	C.1.08	$ 1,045.76	$ 1,046		
	6	13	8		Haul containers to Roberts Bay laydown	66.4	m3	C.4.04	$ 2.31	$ 153		
	6	13	9		Collect debris	2,226.2	m^2	C.3.10	$ 0.13	$ 286		
	6	13	10		Load debris into containers for transport (to Roberts Bay)	20.0	m^3	C.4.01	$ 8.16	$ 163		
	6	13	11		Haul debris to Roberts Bay	20.0	m^3	C.4.04	$ 2.31	$ 46		
DC-015	6	14	1	Sedimentation/Pollution Control Pond	Disconnect piping and electrical wiring, remove sump pumps	2.0	each	C.1.05	$ 568.88	$ 1,138		
	6	14	2		Remove and cut liner into manageable pieces (sedimentation pond only)	10,200.0	m^2	C.3.02	$ 0.14	$ 1,452		Liner + Geotextile
	6	14	3		Load waste into containers for shipping off-site	30.6	m^3	C.4.01	$ 8.16	$ 250		Liner + Geotextile
	6	14	4		Haul containers to Roberts Bay laydown	30.6	m^3	C.4.04	$ 2.31	$ 71		
	6	14	5		Breach pollution control pond and sedimentation pond containment berms	2,608.2	m^2	C.5.05	$ 2.38	$ 6,203		
	6	14	6		Rip-rap breach for erosion protection	27.6	m^3	C.5.03	$ 23.29	$ 643		
	6	14	7		Decommission RO plant	4.0	each	C.1.05	$ 568.88	$ 2,276		
	6	14	8		Disconnect RO plant containers and prep for shipping off-site	4.0	each	C.1.08	$ 1,045.76	$ 4,183		
	6	14	9		Haul RO plant containers to Roberts Bay laydown	132.8	m^3	C.4.04	$ 2.31	$ 306		
DC-016	6	15	1	Underground Support Mechanical Shop	Decommission electrical, mechanical (including connections to generator house & transformer)	3.0	each	C.1.05	$ 568.88	$ 1,707		
	6	15	2		Demolish building	2,281.6	m3	C.3.05	$ 10.61	$ 24,207		
	8	15	3		Collect debris	456.3	m^2	C.3.10	$ 0.13	$ 59		
	6	15	4		Load waste into containers for shipping off-site	756.8	m^3	C.4.01	$ 8.16	$ 6,172		
	6	15	5		Haul debris to Roberts Bay laydown	756.8	m^3	C.4.04	$ 2.31	$ 1,745		
DC-017	6	16	1	Fresh Water Pipelines	Cut pipelines into manageable pieces	830.0	lm	C.3.03	$ 9.78	$ 8,118		
	6	16	2		Decommission electrical (heat tracing)	4.0	each	C.1.05	$ 568.88	$ 2,276		
	6	16	3		Collect electrical cables and controllers and prep for shipping off-site	1,600.0	m^2	C.3.10	$ 0.13	$ 205		
	6	16	4		Load debris into containers for transport (to Roberts Bay)	63.4	m^3	C.4.01	$ 8.16	$ 517		
	6	16	5		Haul debris to Roberts Bay	63.4	m^3	C.4.04	$ 2.31	$ 146		
DC-018	6	17	1	Helicopter Support Facilities	Dismantle helicopter pads and walkway	15.0	m^3	C.3.06	$ 2.81	$ 42		
	6	17	2		Demolish Helishack	84.6	m^3	C.3.05	$ 10.61	$ 897		Heli Office
	6	17	3		Decommission washcar and other facilities	225.9	m^3	C.3.05	$ 10.61	$ 2,397		
	6	17	4		Collect debris	154.2	m^2	C.3.10	$ 0.13	$ 20		
	6	17	5		Load debris into containers for transport (to Roberts Bay)	635.9	m^3	C.4.01	$ 8.16	$ 5,186		
	6	17	6		Haul debris to Roberts Bay	635.9	m^3	C.4.04	$ 2.31	$ 1,466		
DC-019	6	18	1	Waste Rock Pile	Regrade top surface for positive drainage	13,396.9	m^2	C.5.05	$ 2.38	$ 31,860		
	6	18	2		Cover entire dump with hope liner,	13,396.9	m^2	C.5.01	$ 31.70	$ 424,636		
	6	18	3		Place 0.3 m thick liner protection layer of crushed rock	5,138.3	m^3	C.5.03	$ 23.29	$ 119,662		
DC-020	6	19	1	Ore Pile	Regrade top surface for positive drainage	3,516.4	m^2	C.5.05	$ 2.38	$ 8,363		
	6	19	2		Cover entire dump with hope liner,	3,516.4	m^2	C.5.01	$ 31.70	$ 111,458		
	6	19	3		Place 0.3 m thick liner protection layer of crushed rock	1,054.9	m^3	C.5.03	$ 23.29	$ 24,567		
DC-021	6	20	1	Run-off Diversion Berm	Remove culvert	12.0	lm	C.5.15	$ 87.05	$ 1,045		
	6	20	2		Haul containers to Roberts Bay	2.0	m^3	C.4.04	$ 2.31	$ 5		
DC-022	6	21	1	Sewage Discharge Line	Flush pipeline prior to decommissioning	1.0	Each	C.2.06	$ 514.30	$ 514		
	6	21	2		Cut pipelines into manageable pieces and place in containers for shipping off-site	1,190.0	m	C.3.03	$ 9.78	$ 11,640		
	6	21	3		Remove electrical cables and controllers	1.0	each	C.1.05	$ 568.88	$ 569		
	6	21	4		Load debris into containers for shipping off-site	90.8	m^3	C.4.01	$ 8.16	$ 741		
	6	21	5		Haul containers to Roberts Bay	90.8	m^3	C.4.04	$ 2.31	$ 209		
DC-023	6	22	1	Sedimentation Berm	Breach the berm to restore a free drainage path	24.0	m^2	C.5.05	$ 2.38	$ 57		
	6	22	2		Rip-rap breach for erosion protection	3.6	m^3	C.5.03	$ 23.29	$ 84		
DC-024	6	23	1	Sumps	Decommission sumps	2.0	each	C.1.05	$ 568.88	$ 1,138		
	6	23	2		Remove pumps, pipes, cables, culverts	2.0	LS		$ 2,500.00	$ 5,000		
	6	23	3		Backfill sump excavation	28.3	m^3	C.5.02	$ 17.47	$ 494		
DC-000	6	24	1	Drainage channel	Excavate channel	881.8	m^3	C.5.04	$ 2.56	$ 2,260		
	6	24	2		Drill and blast	881.8	m^3	C.5.09	$ 30.01	$ 26,462		
	6	24	3		Rip-rap for erosion protection	590.0	m^2	C.5.03	$ 23.29	$ 13,740		
DC-000	6	25	1	Camp Pads	Regrade pads to blend in with topography	152044	m^2	C.5.05	$ 2.38	$ 361,591		

Table 2. Detailed Cost Estimate (Continued)

Work Area Code	Item	Task	Sub-task	Activity	Task	Quantity	Unit	Cost Code	Unit Cost	Activity Total	Subtotals	Source / Comments
North Dam											**$ 557,664**	
ND-001	7	1	1	Frozen Core Dam	Breach the dam by cutting a 20 m slot down to original ground (drill and blast)	7,028.0	m^3	C.5.09	$ 30.01	$ 210,900		
	7	1	2		Load and haul material	31,021.1	m^3	C.5.16	$ 8.32	$ 257,995		
	7	1	3		Remove thermosyphon radiators and superstructure	12.0	each	C.3.08	$ 1,916.56	$ 22,999		
	7	1	4		Clad the cut core faces for thermal protection	614.2	m^3	C.5.02	$ 17.47	$ 10,728		
ND-002	7	2	1	Tail Lake Access Road	Crown road for positive drainage	3,429.0	m	C.5.05	$ 2.38	$ 8,155		
	7	2	2		Remove floating dock and bridge	132.0	m^3	C.3.06	$ 2.81	$ 371		
	7	2	3		Load all debris and waste into containers and haul containers to Roberts Bay	132.0	m^3	C.4.01	$ 8.16	$ 1,076		
ND-003	7	3	1	Frozen Core Plant	Decommission asphalt plant	5.0	each	C.1.05	$ 568.88	$ 2,844		
	7	3	2		Haul plant parts to Roberts Bay	111.6	m^3	C.4.08	$ 2.66	$ 297		
	7	3	3		Decommission wash car	1.0	each	C.1.05	$ 568.88	$ 569		
	7	3	4		Demolish buildings	1,857.8	m^3	C.3.05	$ 10.61	$ 19,710		
	7	3	5		Load all debris and waste in containers for shipping off-site, and haul containers to Roberts Bay	121.2	m^3	C.4.01	$ 8.16	$ 988		
	7	3	6		Regrade pad for positive drainage	7,510.0	m^2	C.5.05	$ 2.38	$ 17,860		
	7	3	7		Regrade any aggregate stockpiles on frozen core pad to ensure long-term physical stability	1,000.0	m^2	C.5.06	$ 3.17	$ 3,171		assumed area
Vent Raise											**$ 45,756**	
VR-001	8	1	1	Vent raise	Remove ducks, pipes, and cables	100.0	lm	C.3.16	$ 99.59	$ 9,959		
	8	1	2		Construct a concrete cap (0.5 m thick reinforced concrete) to seal the top	1.0	each	C.6.03	$ 12,064.56	$ 12,065		
VR-002	8	2	1	Ventilation and Heating Facilities	Decommission and dismantle all ventilation and heating facilities	4.0	each	C.1.05	$ 568.88	$ 2,276		
	8	2	2		Prepare units for shipping off-site	1.0	each	C.1.08	$ 1,045.76	$ 1,046		
	8	2	3		Haul units to Roberts Bay	33.2	each	C.4.04	$ 2.31	$ 77		
	8	2	4		Regrade pads for positive drainage	4,150.0	m^2	C.5.05	$ 2.38	$ 9,870		
VR-003	8	3	1	Fuel Storage Area	Drain and decommission environ tank	1.0	each	C.2.03	$ 227.84	$ 228		
	8	3	2		Haul environ tank to Roberts Bay	33.2	m^3	C.4.04	$ 2.31	$ 77		
	8	3	3		Remove liner and cut into manageable pieces	1,230.0	m^2	C.3.02	$ 0.14	$ 175		
	8	3	4		Load all debris and waste into containers and	11.1	m^3	C.4.01	$ 8.16	$ 90		
	8	3	5		Haul containers to Roberts Bay	11.1	m^3	C.4.04	$ 2.31	$ 26		
	8	3	6		Backfill area to prevent permanent ponding	4,150.0	m^2	C.5.05	$ 2.38	$ 9,870		
Doris Windy Road											**$ 232,129**	
DW-001	9	1	1	AWR	Remove arched culvert	1.0	LS	-	$ 75,000.00	$ 75,000		
	9	1	1		Remove bridges	3.0	LS	-	$ 50,000.00	$ 150,000		
DW-002	9	2	1	Quarry A	No closure activities are required							
DW-003	9	3	1	Quarry B	No closure activities are required							
DW-004	9	4	1	Quarry D	No closure activities are required							
DW-005	9	5	1	Explosives Storage Facility	Remove all explosive magazines	66.4	m^3	C.4.08	$ 2.66	$ 177		
	9	5	2		Demolish entry gates	0.5	m^3	C.3.05	$ 10.61	$ 5		
	9	5	3		Load all debris and waste into containers	25.4	m^3	C.4.01	$ 8.16	$ 207		
	9	5	4		Haul containers to Roberts Bay	25.4	m^3	C.4.08	$ 2.66	$ 68		
	9	5	5		Regrade area for positive drainage	2,805.8	m^2	C.5.05	$ 2.38	$ 6,673		Including the AWR
Secondary Road											**$ 74,862**	
SR-001	10	1	1	Tail Lake Road	Remove Doris creek bridge	1.0	LS		$ 50,000.00	$ 50,000		Remove
	10	1	2		Cut tailings line running alongside the road into manageable pieces	1,569.0	m	C.3.03	$ 9.78	$ 15,347		
	10	1	3		Strap together or load pipe sections in containers for shipping off-site	753.1	m^3	C.4.01	$ 8.16	$ 6,142		Assuming the diameter is 0.4 m and the pipeline runs on the side of the road (have the same length)
	10	1	4		Haul pipe sections to Roberts Bay	753.1	m^3	C.4.04	$ 2.31	$ 1,737		
	10	1	5		Remove pipe culvert east of the bridge	18.8	lm	C.5.15	$ 87.05	$ 1,637		
Doris Mountain											**$ 52,973**	
DM-001	11	1	1	Communications Towers	Remove communications equipment	12.0	each	C.1.07	$ 313.10	$ 3,757		
	11	1	2		Dismantle the communications towers and prepare for shipping off-site	2.0	each	C.3.11	$ 14,052.00	$ 28,104		
	11	1	3		Demolish equipment housing shack	12.0	m^3	C.3.05	$ 10.61	$ 127		
	11	1	4		Remove electrical and fiber optics cables	12.0	each	C.1.05	$ 568.88	$ 6,827		
	11	1	5		Remove all equipment, material, and waste from Doris Mountain	6.0	m^2	C.3.17	$ 2,343.92	$ 14,064		
	11	1	6		Place all waste in containers for shipping off-site	9.0	m^3	C.4.01	$ 8.16	$ 73		
	11	1	7		Ship containers to Roberts Bay	9.0	m^3	C.4.04	$ 2.31	$ 21		
Off-site Shipping for Disposal											**$ 2,338,443**	
WC	12	1	1	Ship off-site for disposal by barge	Hazardous waste	118.4	m^3	S.02	$ 200.00	$ 23,674		
WC	12	1	2		Non-Hazardous waste and demolition debris	11573.8	m^3	S.03	$ 200.00	$ 2,314,769		
WC	12	1	3		Hydrocarbon contaminated soils	0.0	m^3	S.01	$ 989.00	$ -		
Off-Site Disposal Fees											**$ 88,752**	
WC	13	1	1	Disposal fees in licensed facility	Hazardous waste	1.0	LS		$ 25,000.00	$ 25,000		
WC	13	1	2		Non-hazardous waste and demolition debris	11573.8	m^3	M.10	$ 5.51	$ 63,752		
WC	13	1	3		Hydrocarbon contaminated soils	0.0	t	H.01	$ 100.00	$ -		
TOTAL DIRECT COSTS											**$ 5,711,564**	
INDIRECT CLOSURE COSTS												
Contingency											**$ 656,874**	
-	1	1	-	Contingency	20% of direct costs	20%	%	x	$ 3,284,368.85	$ 656,874		
Mobilization & Demobilization											**$ 427,515**	
-	2	1	1	Closure and Reclamation activities	Mobilization	1.0	ls	x	$ 208,543.82	$ 208,544		Equipment mobilised from Edmonton
					Demobilization	1.0	ls	x	$ 218,971.01	$ 218,971		Equipment demobilised to Edmonton
General and Administration costs											**$ 212,682**	
-	3	1	-	Travel allowance		42	ls	x	$ 1,500.00	$ 63,309		
-	3	2	-	Communications		2.1	months	x	$ 5,000.00	$ 10,302		
-	3	3	-	Misc. Supplies		2.1	months	x	$ 1,500.00	$ 3,090		
-	3	4	-	Camp Cost		20.6	Man-months	x	$ 6,600.00	$ 135,980		
Field support											**$ 107,896**	
-	4	1	-	Supervision		61.8	days	x	$ 1,172.40	$ 72,465		
-	4	2	-	Equipment maintenance support - Mechanic	15% of project duration	10	days	x	$ 1,023.12	$ 10,231		
-	4	3		Helicopter Support		3.0	days	x	$ 8,400.00	$ 25,200		minimum of 4 hr. per day (Doris Mountain towers)
Hydrocarbon decontamination											**$ 200,000**	
-	5	1	-	Engineering Design		1.0	LS	x	$ 100,000.00	$ 100,000		
-	5	2	-	Confirmatory Sampling and Analysis		1.0	LS	x	$ 100,000.00	$ 100,000		
Post-closure Monitoring											**$ 200,000**	
	6	1	1	Yearly Monitoring Cost	For 5 years	5.0	LS	x	$ 40,000.00	$ 200,000		Includes 1 week monitoring site work, sample testing, monitoring report; geotechnical inspection and report; vegetation specialist inspection and report
-	9	1	-	Contractor profit	% Of direct and other indirect costs (excluding contingency)	-	%	of	$ 6,659,657.29	$ -		included in equipment unit rates and POH (i.e. Production Overhead) labor cost
-	9	2	-	Contractor Bonding	% Of direct cost	-	%	of	$ 5,711,564.26	$ -		
Subtotal Indirect Costs				Subtotal Indirect Costs							**$ 1,804,967**	
CLOSURE COSTS - TOTAL											**$ 7,516,531**	

Table 3. Indirect Cost Calculations

Indirect Unit Rates

Cost Code	Item	Unit rate	Unit	Source/comment
I.01	Communications	$ 5,000	month	SRK-Estimate
I.02	Contractor Bonding	0.0%	% of direct costs	Included in Nuna POH rates
I.03	Miscellaneous Supplies	$ 1,500.00	month	SRK-Estimate
I.04	Camp Cost	$ 6,600.00	person-month	Newmont
I.05	Travel Allowance	$ 1,500.00	LS per person	SRK estimate
I.06	Contractor Profit	0%	%	Included in Nuna POH rates

Mob/Demob Costs

Crew mobilization costs included in loaded labour rates.
The barging fee for equipment is calculated on a square foot basis.

No. of units	Description	Units	Quantity	Unit cost	2012 Task cost	Notes
	Construction equipment	Footprint				
1	Bobcat	m^3	11.0	$ 332.96	$ 3,657.90	From Hay River to Roberts Bay
1	Loader	m^2	10.2	$ 332.96	$ 3,400.45	From Hay River to Roberts Bay
1	Dozer	m^2	20.3	$ 332.96	$ 6,750.26	From Hay River to Roberts Bay
1	Excavator	m^2	38.1	$ 332.96	$ 12,687.55	From Hay River to Roberts Bay
1	small equipment	m^3	24.1	$ 332.96	$ 8,025.01	From Hay River to Roberts Bay
1	Trucks (CAT 735)	m^2	41.6	$ 332.96	$ 13,860.35	From Hay River to Roberts Bay
1	Tractor trailer	m^3	86.8	$ 332.96	$ 28,907.95	From Hay River to Roberts Bay
1	Crewcab pickup (Ford F350)	m^3	33.8	$ 332.96	$ 11,254.35	From Hay River to Roberts Bay
	Haul equipment to Shipping point (Hay River)	each	8	$ 15,000.00	$ 120,000.00	hauling 8 trailers from Edmonton to Hay River / source: Doris cost estimate
Subtotal Mobilisation					**$ 208,544**	
Subtotal Demobilisation					**$ 218,971**	Assumes same cost as mobilisation, updated by 5%
Total					***$ 427,515***	

Camp costs

Work Period - Description	Project Duration (weeks)	Crew Size	Person-Months	Camp Cost ($/month/person)	Cost	Notes
Site Remediation	82.41239907	10	20.60309977	$ 6,600	$ 135,980.46	
Total	**82.41239907**		**20.60309977**		**$ 135,980**	

Table 4. Unit Rates

Cost Code	Item	Unit rate	Unit	Comment	Source
Equipment					
E.01	Dozer (CAT D7)	$ 166.50	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.02	Dozer (CAT D4)	$ 86.60	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.03	Dozer (CAT D4) w/ Tiller	$ 99.59	hr.	15% added for tiller attachment	Nuna 2012 equipment rates
E.04	Truck (CAT 730)	$ 138.70	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.05	Excavator (CAT 330 CL)	$ 185.00	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.06	Loader (CAT IT38/930)	$ 82.30	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.07	Skidder (CAT Bobcat)	$ 80.10	hr.	hourly equipment rate (less operator)	Nuna 2012 equipment rates
E.08	Helicopter	$ 2,100.00	hr.	fuel surcharge applies	IMiskolczi (from Angela Holtzapfel@HBML ESR)
E.09	Welding Equipment	$ 52.58	day	300 Amps, gas/diesel driven	2009 BC Blue Book + 10% Northern Allowance, 10% fuel factor
E.10	Power washer	$ 149.92	day	3,500 PSI, 800 Gal capacity	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012 +10% fuel factor
E.11	Drum crusher	$ 1.17	hr.	30 tones, mobile	+10% Northern allowance; Personal communication with "The Compactor Guy" SAmiralaei 03Jul2012
E.12	Oil-water separator	$ 27.50	hr.	25 GPM, trailer mounted	+10% Northern allowance; Personal communication with Enviro-Equipment SAmiralaei 03Jul2012
E.13	Air Track Drill	$ 296.34	hr.	self-propelled crawler drill; 4" Piston Bore Diameter	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012 +10% fuel factor
E.14	Tractor Trailer (6 axle low bed + booster)	$ 71.78	hr.	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
E.15	Flatbed truck (6x4, 5 tonne)	$ 24.83	hr.	hourly equipment rate (less operator)	2011 BC Blue Book + 10% Northern Allowance + 5% rate increase to 2012
E.13	Clemro Crusher	$ 787.40	hr.	200 tons/hr. (cost less operator)	Nuna 2012 Equipment Rates
Materials					
M.01	Liner - HDPE	$ 28.93	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.02	Liner - geotextile	$ 26.62	m^2	supply and install	from JDS (Surface Water Management Options Analysis)
M.03	Fuel (Diesel)	$ 1.17	L	2008 Landed fuel cost at Hope Bay	Maritz (from Jeff Reinson @ Newmont)
M.04	Explosives	$ 21.38	m^3	15% freight cost added	RSMeans, 2005; adjusted to 2009 dollars based on CPI + 15% rate increase to 2012
M.05	Silt Fencing	$ 2.06	m	15% freight cost added	Layfield 2012 - personal communication
M.06	Coco-matting	$ 0.68	m^2	15% freight cost added	Layfield 2012 - personal communication
M.07	Seed/Fertilizer	$ 35.00	kg	freight included	SRK estimate
M.08	Winter road	$ 16,675.00	km	open and maintain for 2 months	NUNA Logistics (from Court Smith) + 15% cost increase to 2012
M.09	Hazardous Waste Disposal fee	$ 10,000.00	m^3	Disposal + handling and cleaning fee	SRK estimate
M.10	Demolition Debris Disposal Fee (@Hay River)	$ 5.51	m^3	Disposal + handling fee	Personal communication with Rob Jamieson@Hay River Disposals Ltd.
M.12	Bentonite chips	$ 570.96	m^3	In 50 pound bags, 15% freight cost added	Holly North Production Supplies Limited
M.13	Plastic wrapping	$ 1.00	m^2	in 14 ft. wide rolls	web search;shrinkit-inc.com accessed June15, 2012
Labour					
L.01	Labour general	$ 56.96	hr.		Nuna Blended 2012 rate, POH included
L.02	Labour - Trades	$ 85.26	hr.	Electrician, Welder, plumber etc.	Nuna Blended 2012 rate, POH included
L.05	Supervision	$ 97.70	hr.		Nuna Blended 2012 rate, POH included
L.06	Truck Drivers	$ 65.81	hr.	Heavy Equipment	Nuna Blended 2012 rate, POH included
L.07	Heavy Equipment Operator	$ 71.32	hr.	Light equipment	Nuna Blended 2012 rate, POH included
L.08	Technician (Consultant)	$ 130.00	hr.	Staff Consultant	SRK-Estimate (all inclusive)
L.09	Note: Loading Rate includes allowances for (EI, CPP, MSP/Benefits/Travel/OT)				
Shipping					
S.01	Outbound Shipping - Soils	$ 989.00	m^3	1.7 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs. limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.02	Outbound Shipping - Haz Waste	$ 200.00	m^3	1.0 t/m^3 bulk density	(7.75 m^3/seacan based on 29,000 lbs. limit per seacan, seacan is 38.5 m^3) - from NTCL 17APR 12
S.03	Outbound Shipping - Demolition	$ 200.00	m^3	0.733 t/m^3 bulk density	$7661/seacan (seacan is 38.5 m^3) - from NTCL 17APR 12
Hydrocarbon Soils and Haz Waste					
H.01	Tipping Fee for HC Soils at Hay River	$ 100.00	tonne		Communication with Hay River Landfill Tsharp 18APR12

Table 5. Task Unit Rate Calculations

Cost Code	Item	Unit	Productivity (Unit/hr.)	Unit Rates				Labour					Equipment														Note / Source
								$ 56.96	$ 85.26	$ 85.26	$ 85.26	$ 130.00	$ 65.81	$ 71.32	$ 166.50	$ 185.00	$ 82.30	$ 80.10	$ 138.70	$ 71.78	$ 24.83	$ 2,100.00	$ 296.34	1.166	14.9919	52.58	787.4	
				Total Unit Cost	Material Unit Rate	Labour Unit Rate	Equipment Unit Rate	General Labour	Trades - Electrical	Trades - Mechanic	Trades - Plumbing	Engineer/ Technician	Light Equipment Operator	Heavy Equipment Operator	Dozer - CAT D7	Excavator - Cat 330	Loader - CAT 966	Skidder CAT 242	Truck - CAT 730	Tractor Trailer	Flatbed truck (6 tonne)	Helicopter	Drill	Drum crusher	Power washer	Welding Equipment	Crusher	
Decommissioning																											
C.1.01	Decommission and remove all heating fuel tanks and place into lined facility	each	4.00	$ 66.89	$ -	$ 46.31	$ 20.58	2						1			1											Disconnect and remove all fuel drums and disconnect all Tidy Tanks from all structures
C.1.02	Decommission above ground storage tanks	each	0.5	$ 398.36	$ -	$ 398.36	$ -	2	1																			Disconnect all fuel lines and electrical parts
C.1.03	Decommission potable water supply	each	0.25	$ 1,166.24	$ -	$ 981.24	$ 185.00	1	1		1			0.25		0.25												Disconnect all electrical and plumbing (intake and distribution)
C.1.04	Decommission waste incinerator	each	0.17	$ 1,083.75	$ -	$ 960.30	$ 123.45	1		1				0.25			0.25											Disconnect and remove fuel storage
C.1.05	Decommission Main Camp Facility electricity	each	0.25	$ 568.88	$ -	$ 568.88	$ -	1	1																			De-energise main electrical board, disconnect auxiliary power (if exists)
C.1.06	Decommission electrical generators	each	0.46	$ 599.98	$ -	$ 510.52	$ 89.46	2	1					0.5			0.5											De-energise main breaker board, disconnect external fuel tanks (if needed) / loader used for lifting; source - RSMeans (26050525210)
C.1.07	Dismantle Satellite/Communication Equipment	each	0.5	$ 313.10	$ -	$ 313.10	$ -	2	0.5																			source - SRK estimate
C.1.08	Prep portable trailers for moving (remove cladding, apply shrink wrap etc.)	each	0.25	$ 1,045.76	$ 55.00	$ 826.16	$ 164.60	3						0.5			0.5											
C.1.09	Decommission Airstrip - Place large X's at each end of strip	each	0.5	$ 277.84	$ 50.00	$ 227.84	$ -	2																				Assumed material cost for a high density plastic, nails and sandbags.
C.1.10	Dismantle airstrip approach lights	each	4	$ 35.56		$ 35.56	$ -	1	1																			
C.1.11	Dismantle Hoper, Crusher	each	0.05	$ 2,844.40		$ 2,844.40	$ -	1	1																			
Decontamination																											
C.2.01	Collect hazardous chemical waste and place in suitable containers	m^3	0.17	$ 1,947.00	$ -	$ 1,453.20	$ 493.80	3						1			1											Includes all chemicals on site / jm_Estimate
C.2.02	Drain and power-wash heating fuel tanks (Tidy Tanks)	each	6.00	$ 21.49	$ -	$ 18.99	$ 2.50	2																1				Drain fuel from tanks and wash exterior with hot water (collect water for treatment)
C.2.03	Drain above ground fuel storage tank	each	0.5	$ 227.84	$ -	$ 227.84	$ -	2																				Drain fuel /source - SRK estimate
C.2.04	Pressure wash above ground fuel tank	each	0.16	$ 805.70	$ -	$ 712.00	$ 93.70	2																1				
C.2.05	Drain and power-wash empty fuel drums	each	12	$ 16.69	$ -	$ 15.44	$ 1.25	2						1										1				Drain fuel and triple-rinse drum (collect water for treatment)
C.2.06	Flush sewage treatment unit and collect sewage sludge	each	0.4	$ 514.30	$ -	$ 373.95	$ 140.35	2						0.5			0.5							1				Flush treatment unit with water (collect water for treatment)/source - SRK estimate
C.2.07	Empty incinerator and collect ashes	m^3	0.25	$ 535.08	$ -	$ 370.48	$ 164.60	1						0.5			0.5											Place ashes and unburned contents into containers / see C.6.04
C.2.08	Operate oil/water separator	m^3	6.60	$ 28.16	$ -	$ 25.89	$ 2.27	3																1				Collect skimmed oil from separator and place in suitable container - 15 minutes per 55 gal. drum
C.2.09	Empty soil from 45 gallon drums	each	4	$ 92.56	$ -	$ 46.31	$ 46.25	2						1		1												
C.2.10	Liner pressure wash cleaning	m^2	360	$ 0.36	$ -	$ 0.32	$ 0.04	2																1				
Demolition																											
C.3.01	Crush empty fuel drums	each	20.00	$ 13.44	$ -	$ 9.26	$ 4.17	2						1			1							1				
C.3.02	Cut Tank Farm geomembrane to manageable size	sq. m	1200.00	$ 0.14	$ -	$ 0.14	$ -	3																				source - SRK estimate
C.3.03	Remove intake hoses and cut to manageable size	Lm	100	$ 9.78	$ -	$ 1.50	$ 8.29	2						0.5			0.5										1	source - SRK estimate
C.3.04	Dismantle pollution control berm	each	0.50	$ 227.84	$ -	$ 227.84	$ -	2																				
C.3.05	Demolish office buildings/ shop structures/ living quarters	m^3	53.00	$ 10.61	$ -	$ 5.92	$ 4.69	3						2	1		1											Demolish empty wood structures (offices, shacks, etc.)/ source - ECHOS
C.3.06	Demolish helipads/ float plane dock	m^3	75	$ 2.81	$ -	$ 1.71	$ 1.10	1						1			1											Demolish wood structure / source - SRK estimate
C.3.07	Demolish Above ground storage tanks	m^3	5	$ 242.92	$ -	$ 48.44	$ 194.48	3						1		1											1	
C.3.08	Dismantle Old Equipment (torch)	each	0.5	$ 1,916.56	$ -	$ 341.76	$ 1,574.80	3																			1	
C.3.08	Cut off top of drill casings	each	2.00	$ 54.77	$ -	$ 28.48	$ 26.29	1																		1		
C.3.10	Clean up debris from site	m^2	2529	$ 0.13	$ -	$ 0.10	$ 0.03	3						1			1											source - SRK estimate
C.3.11	Dismantle radio tower	each	0.04	$ 14,052.00	$ -	$ 9,612.00	$ 4,440.00	2	1			1		1		1												source - SRK estimate
C.3.12	Prep stacks for shipping	m	0.50	$ 421.16	$ -	$ 256.56	$ 164.60	1						1			1											Estimate
C.3.13	Dismantle Power Generator Stacks	m	0.50	$ 630.68	$ -	$ 466.08	$ 164.60	1	1			0.15		1			1											
C.3.14	Removing Cables and Posts	each	1.00	$ 370.24	$ -	$ 185.24	$ 185.00	2						1		1												
C.3.15	Remove Tank Insulation	each	0.30	$ 646.73	$ -	$ 379.73	$ 267.00	2										1										
C.3.16	Remove pipes, ducts, and electrical cables	m	2.00	$ 99.59	$ -	$ 99.59	$ -	2	1																			
C.3.17	Remove waste from Doris Mountain (helicopter support)	m^3	1.00	$ 2,343.92		$ 243.92	$ 2,100.00	2				1										1						
Material Relocations																											
C.4.01	Load demolition debris/solid waste in containers	m^3	48.00	$ 8.16	$ -	$ 2.97	$ 5.18							2	1		1											source - SRK calculated from first principles
C.4.02	Empty Seacan of debris at the landfill	each	5.7	$ 86.55	$ -	$ 24.98	$ 61.57							2	1	1												
C.4.04	Haul waste to Roberts Bay jetty in 20 ft. container (33.2 m3/container)	m^3	59.67	$ 2.31	$ -	$ 1.10	$ 1.20						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.06	Haul Containers on skids from beach laydown to Roberts Bay Jetty	each	1.20	$ 198.18	$ -	$ 59.43	$ 138.75							1	1													
C.4.07	Haul Material From Doris Windy Road to Roberts Bay	m^3	36.31	$ 3.79	$ -	$ 1.81	$ 1.98						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.08	Haul Material From North Dam To Roberts Bay	m^3	51.64	$ 2.66	$ -	$ 1.27	$ 1.39						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.09	Haul Material From Reagent Pad To Roberts Bay	m^3	66.90	$ 2.06	$ -	$ 0.98	$ 1.07						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.10	Haul Material From Airstrip to Roberts Bay	m^3	75.48	$ 1.82	$ -	$ 0.87	$ 0.95						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.11	Haul Material to Jetty (Roberts Bay)	m^3	85.74	$ 1.60	$ -	$ 0.77	$ 0.84						1							1								Productivity calculation shown on 'Relocation Unit Cost' Worksheet
C.4.12	Load soils into megabags	m^3	4.00	$ 65.75	$ -	$ 44.93	$ 20.81	2					1			0.45												
Earth works																											
C.5.01	Install HDPE Liner	m^2	175	$ 31.70	$ 28.93	$ 1.71	$ 1.06	4						1		1												
C.5.02	Load, haul, dump, place: 1 truck with <0.5 km haul distance	m^3	40	$ 17.47	$ -	$ 5.21	$ 12.26						1	2	1	1			1									
C.5.03	Load, haul, dump, place: 1 truck with <1.0 km haul distance	m^3	30	$ 23.29	$ -	$ 6.95	$ 16.34						1	2	1	1			1									
C.5.04	Excavate: Spoil locally, no trucks	m^3	100	$ 2.56	$ -	$ 0.71	$ 1.85							1		1												
C.5.05	Regrade surface - rough grading, D7	m^2	100	$ 2.38	$ -	$ 0.71	$ 1.67							1	1													
C.5.06	Reslope Stockpiles - D7	m^3	75	$ 3.17	$ -	$ 0.95	$ 2.22							1	1													
C.5.07	Relocate core box pallet (<0.5 km)	ea.	6	$ 35.10	$ -	$ 21.38	$ 13.72	1						1			1											
C.5.08	Install soil stabilization measures (straw/coconut matting)	m^2	269	$ 2.94	$ 0.68	$ 1.27	$ 0.99	3.5						2		1	1											
C.5.09	Drill, blast Quarry	m^3	66	$ 30.01	$ 21.38	$ 4.14	$ 4.49	1		0.1		0.5		2									1					
C.5.10	Trackpack using loaded rock truck	m^2	100	$ 2.05		$ 0.66	$ 1.39						1						1									
C.5.11	Scaling (loose rock)	hr.	1	$ 256.32	$ -	$ 71.32	$ 185.00							1		1												
C.5.12	Load, haul, dump place: 2 trucks with <1.0km haul distance	m^3	75	$ 12.04	$ -	$ 3.66	$ 8.39						2	2	1	1			2									
C.5.13	Seeding/Fertilizing: By hand, high application rate	m^2	320	$ 1.06	$ 0.53	$ 0.53	$ -	3					0															
C.5.14	Summer identification of low-lying areas	day	0.08	$ 6,627.52	$ 100.00	$ 2,243.52	$ 4,284.00	1				1										0.17						
C.5.15	Remove culvert and create swale	lm	5	$ 87.05	$ -	$ 50.05	$ 37.00	2				0.5		1		1												
C.5.16	Load, haul, dump, 2 trucks<0.5 km haul distance	m^3	80	$ 8.32	$ -	$ 2.54	$ 5.78						2	1		1			2									
C.5.17	Crown road	km	0.25	$ 985.38		$ 319.38	$ 666.00			0.1				1	1													
Other																											
C.6.01	Sample HC contaminated soils / confirmatory samples	each	2	$ 93.48	$ -	$ 93.48	$ -	1				1																
C.6.02	Band together core pallets	each	12	$ 9.49	$ -	$ 9.49	$ -	2			0		0		0													
C.6.03	Construction of Vent Raise Seal	each	0.042	$ 12,064.56	$ 3,000.00	$ 8,076.96	$ 987.60	3				1		0.5			0.5											

Table 6. Relocation Unit Cost Calculations

Hauling Distance to Roberts Bay		
Doris Camp	5.3 km	One Way
Windy Camp	14.82 km	One Way
North Dam	7.6 km	One Way
Reagent Pads	3.7 km	One-Way
Airstrip	2.2 km	One-Way

C.4.03 - Productivity of hauling bulk materials on skids at Roberts Bay			
By Skid - SnowCAT (equivalent to D7)			Note: Cost of winter road not included
Equipment Cost	$ 166.50	per hr.	Includes fuel
Labour Cost	$ 71.32	per hr.	
Average speed	9	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	skids	One container per skid
Load	1	container	
Distance:	1.5	km	
Time Required 1 round trip:	**0.83**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**1.20**	**skid/hr.**	

C.4.04 - Productivity of hauling bulk materials from Doris North to Roberts Bay			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	5.3	m^3	
Time Required 1 round trip:	**0.78**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**59.67**	**m^3/ hr.**	

C.4.07 - Productivity of hauling bulk materials from Doris Windy Road to Roberts Bay			
Tractor trailer with Lowboy, 2x20 ft. seacans per trip			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	14.82	m^3	
Time Required 1 round trip:	**1.28**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**36.31**	**m^3/ hr.**	

C.4.08 - Productivity of hauling bulk materials from North Dam to Roberts Bay			
Tractor trailer with Lowboy, 2x20 ft. seacans per trip			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x #of Containers x Space Utilization Ratio
Distance:	7.6	m^3	
Time Required 1 round trip:	**0.90**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**51.64**	**m^3/ hr.**	

C.4.9 - Productivity of hauling bulk materials from Reagent Pad to Roberts Bay			
Tractor trailer with Lowboy, 2x20 ft. seacans per trip			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	3.7	m^3	
Time Required 1 round trip:	**0.69**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**66.90**	**m^3/ hr.**	

C.4.10 - Productivity of hauling bulk materials Airstrip to Roberts Bay			
Tractor trailer with Lowboy, 2x20 ft. seacans per trip			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	2.2	m^3	
Time Required 1 round trip:	**0.62**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**75.48**	**m^3/ hr.**	

C.4.11 - Productivity of hauling bulk materials in Roberts Bay			
Tractor trailer with Lowboy, 2x20 ft. seacans per trip			
Equipment Cost	$ 71.78	per hr.	Includes fuel
Labour Cost	$ 85.26	per hr.	
Average speed	38	km/hr.	Sleds assumed as being available on site
Hauling capacity	2	Containers	One container per skid
Cargo capacity	33.2	m^3	Standard 20 ft. container
Space utilization ratio	0.7		
Load	46.48	m^3	Cargo Capacity x # of Containers x Space Utilization Ratio
Distance:	0.8	m^3	
Time Required 1 round trip:	**0.54**	**hrs.**	**Includes 0.5hr unloading time**
Productivity:	**85.74**	**m^3/ hr.**	

Table 7. Structure Quantities

Demolition Bulking Factors	
Tents - Empty	1.3
Wood Structures - Empty	1.5
Wood Structures - w/ Interior Wall Allowance	2
Steel Structures - Empty	1.5
Steel Structures - w/ Interior Wall Allowance	2
Mechanical Equipment	1.1
Liners	3
Pipelines	3

Structure Volumes

Area	Structure	Quantity	Length (m)	Width/ Dia. (m)	Footprint Area (m^2)	Avg Height (m)	Wall Volume (m^3)	Floor Volume (m^3)	Roof Volume (m^3)	Total Collapse Volume (m^3)	Loose Volume (m^3)	Standing Volume (m^3)	Surface area (m^2)	Source
Accommodation Complex	Portable Trailers	64	17.6	3.1	54.6	2.5	15.525	16.4	8.7	2600		136.4		As built ACAD, height/wall/roof thickness est. from design doc
	Building A to B Corridor	2	71.4	3.1	221.3	2.5	0	66.4	35.4	204	305.45	553.4		As built ACAD, height/wall/roof thickness est. from design doc
	Arctic Corridor	1	26.5	2	53.0	2.5	21.4	15.9	8.5	46	68.63	132.5		As built ACAD, height/wall/roof thickness est. from photo
	Cabins	7	4.27	4.27	18.2	2.5	6.4	5.5	5.5	121	182.12	45.6		As built ACAD, height/wall/roof thickness est. from photo
	Smoke Shack Tent	1	7.42	3.78	28.0	2.5	0.6	2.8	1.4	5	6.20	70.1		As built ACAD, height/wall/roof thickness est. from photo
	Sea-can 20'	1	6.1	2.44	14.9	2.5	0.9	0.3	0.3	1		37.2		As built ACAD, height/wall/roof thickness est. from photo
	Storage Sea-can	1	12.3	4.9	60.3	2.75	14.2	18.1	9.6	42		165.7		As built ACAD, height/wall/roof thickness est. from photo
Tank Farm	Fuel Tanks	5	-	14.6	167.4	9.9	1.4	0.8	0.8	15	22.77	1657.4	1903.5	As built ACAD, thickness est. from design doc
	Geotextile	1			11000.0		0.0	33.0	0.0	33	99.00	0.0		Fuel Tank Farm design doc
	Liner	1			5500.0		0.0	16.5	0.0	17	49.50	0.0		Fuel Tank Farm design doc
	Pipes (Tanks to Fuel Station)	1	265	0.15	0.018					5	14.05	0.0		Rough Length Estimate based on Judgement (3" pipes)
	Pipes (Fire Suspension to Tanks)	1	265	0.15	0.018					5	14.05	0.0		Rough Length Estimate based on Judgement (3" pipes)
	Containment Berm	1	278	5	962.000							0.0		As built ACAD
Permanent Power Generator	Extent of the Area	1	35.54	59.19	2103.0		0.0	0.0	0.0	0		0.0		As built ACAD, height thickness est. from photo
Temporary Power Generator	Tent	1	21.61	12	259.3	5	3.4	77.8	13.0	94	122.36	1296.6		As built ACAD, thickness est. from photo
Sewage Treatment Plant	Sewage Sea-cans 40'	9	12.23	2.44	29.8	2.5	11.0	9.0	4.8	223		74.6		As built ACAD, est. from photo
	Sewage Pipes	1	200	0.1	0.01					2	4.71	0.0		Length est. from Piping As Built Doc, Diameter from Pipe Design Spec
	Fresh Water Pipes	1	360	0.15	0.02					6	19.09	0.0		Length est. from Piping As Built Doc, Diameter from Pipe Design Spec
Fire Water Storage Tank	Fire Water Tank	1	-	9.65	73.1	7.32	0.7	0.4	0.4	1	4.41	535.4	176.6	As built AutoCAD, height thickness est. from design doc
	Fire Water Pipes	1	260	0.2032	0.03					8	25.29	0.0		Length est. from Piping As Built Doc, Diameter from Pipe Design Spec
	Pump House Sea-can	1	12.2	2.44	29.8	2.5	11.0	8.9	4.8	25		74.4		As built ACAD, height/thickness est. from photo
Muster Station	Tent	1	14.76	6.16	90.9	2.5	1.0	0.0	4.5	6	7.27	227.3		As built ACAD, height/thickness est. from photo
	Wood flooring	1	14.76	6.16	90.9		0.0	27.3	0.0	27	35.46			
	Sea-Can 20'	2	6.1	2.44	14.9	2.5	0.9	0.3	0.3	3		37.2		As built ACAD, height/thickness est. from photo
Warehouse/Core Shack	Tent	1	36.15	17.17	620.7	5	5.3	186.2	31.0	223	289.35	3103.5		As built ACAD, height/thickness est. from photo
	Bent. Shack Tent	1	7.21	4.94	35.6	2.5	0.6	10.7	1.8	13	17.00	89.0		As built ACAD, height/thickness est. from photo
	Core Log Tent	1	7.21	4.94	35.6	2.5	0.6	10.7	1.8	13	17.00	89.0		As built ACAD, height/thickness est. from photo
	wood flooring, shelving, and lofts	1			310.3	0.3				93	186.21	93.1		Estimated
	Orbit Trailer	1	12.26	3.7	45.4	2.5	12.0	13.6	7.3	33		113.4		As built ACAD, height/thickness est. from photo
	Sea-can 20'	12	6.1	2.44	14.9	2.5	0.9	0.3	0.3	17		37.2		As built ACAD, height/thickness est. from photo
	Sea-can 40"	5	12.23	2.44	29.8	2.5	1.5	0.6	0.6	13		74.6		As built ACAD, height/thickness est. from photo
	Geotech Trailer	1	12.26	3.7	45.4	2.5	12.0	13.6	7.3	33		113.4		As built ACAD, height/thickness est. from photo
	Contractor Tents	2	5.18	5.43	28.1	2.5	0.5	8.4	1.4	21	26.98	70.3		As built ACAD, height/thickness est. from photo
Offices/Mine Dry Complex	Arctic Corridor	1	112.32	2.58	289.8	2.5	86.2	86.9	46.4	219	329.21	724.5		As built ACAD, height/thickness est. from photo
	Mine Dry	1	40	23.92	956.8	5	95.9	287.0	153.1	536	1072.02	4784.0		As built ACAD, height/thickness est. from photo
	Admin	1	40.44	12.72	514.4	5	79.7	154.3	82.3	316	632.73	2572.0		As built ACAD, height/thickness est. from photo
	Office	1	14.96	14.72	220.2	5	44.5	66.1	35.2	146	291.63	1101.1		As built ACAD, height/thickness est. from photo
	Sea-can 20"	11	6.1	2.44	14.9	2.5	0.9	0.3	0.3	16		37.2		As built ACAD, height/thickness est. from photo
	Sea-can 40"	3	12.23	2.44	29.8	2.5	1.5	0.6	0.6	8		74.6		As built ACAD, height/thickness est. from photo
Temporary Water Management Pond	Fluid	1			3307.0	2	0.0	0.0	0.0	6614		6614.0		
	Liner	1			5617.0			16.9		17	50.55	0.0		
	Containment Berm Volume	1	294	3.65	1073.1	2.07						2221.3		
Portal & UG Works	Extent	1			1446.0							0.0		
	Plug	1	15	7.6	114.0	6.2				707	918.84	706.8		Estimated
Underground Wash Bay	Tent	1	15.6	9.96	155.4	5	2.6	0.0	9.4	12	15.49	776.9		est. from photo
	Sea-cans 20"	24	6.1	2.44	14.9	2.5	0.9	0.3	0.3	35		37.2		est. from photo
	Sea-can 40"	3	12.23	2.44	29.8	2.5	1.5	0.6	0.6	8		74.6		est. from photo
Swick Shop	Tent	1	24.53	9.34	229.1	3.75	2.5	0.0	11.0	14	17.65	859.2		est. from photo
Water Intake Structure and Pumping Facility					0.0		0.0	0.0	0.0	0	3.00	0.0		Estimate
Sedimentation Pollution Control Pond	Geotextile	1			8200.0					25	0.00	0.0		
	Liner	1			2000.0					6	0.00	0.0		Design Documents
	RO plant Sea-can 40"	4	12.23	2.44	29.8	2.5	1.5	0.6	0.6	11		74.6		As built ACAD, height/thickness est. from photo
	Sedimentation Pond Backfill				1293.0	1						1293.0		1 m thick thermal cover
	Breach Volume .(Sedimentation)	1	23	18	414.0	3.4						1407.6	13.8	
	Breach Volume (Pollution)	1	23	18	414.0	2.9						1200.6	13.8	
UG Mechanical Shop	Shop building	1	24.84	18.37	456.3	5	64.8	136.9	50.6	252	756.79	2281.6		est. from photo
	Sea-can 20"	10	6.1	2.44	14.9	2.5	0.9	0.3	0.3	14		37.2		est. from photo
	Sea-can 40"	6	12.23	2.44	29.8	2.5	1.5	0.6	0.6	16		74.6		est. from photo
Helipads	Helipads	6	7.27	4.13	30.0	0.5	0.0	0.0	0.0	15	15.01	15.0		Foot Print AutoCAD, height thickness est. from photo
	Heli Building 1	1	8	5.11	40.9	2.5	9.8	16.4	6.5	102	204.40	102.2		As built ACAD, height/thickness est. from photo
	Heli Building 2	1	5.05	2.95	14.9	2.5	6.0	6.0	2.4	37	74.49	37.2		As built ACAD, height/thickness est. from photo
	Office	1	7.45	4.54	33.8	2.5	9.0	13.5	5.4	85	169.12	84.6		As built ACAD, height/thickness est. from photo
	Lift Station	1	5.89	2.45	14.4	2.5	6.3	5.8	4.3	36	72.15	36.1		As built ACAD, height/thickness est. from photo
	Washcar	1	3.23	6.24	20.2	2.5	7.1	8.1	3.2	50	100.78	50.4		As built ACAD, height/thickness est. from photo
	Sea-cans 20"	10	6.1	2.44	14.9	2.5	0.9	0.3	0.3	37		37.2		
Fresh Water Pipelines	Piping	1	830	0.18	0.03					21	63.36	0.0		As built ACAD
Waste Rock Pile	Pile	1			13396.88							0.0		
	Liner Cover	1	278	13.42	17127.64	0.3				5138		5138.3		As built ACAD
Ore Pile	Extent	1	74.5	47.2	3516.40							0.0		As built ACAD
	Liner Cover	1	236	8.9	5616.80									
Sewage Discharge Pipelines	Piping	1	1190	0.18	0.03					30	90.85	0.0		As built ACAD
Sedimentation Berm	Berm	1	77	8	617.00	1						24.0	3.6	As built ACAD
Run-off Diversion Berm	Breach (Berm)	4	10	6.3	63.00	1.5						378.0		
	Cut-off Sections	4	2	4.2	33.60							0.0		Estimate
	Liner	4	2	4.2	33.60					0.10	0.30	0.0		Estimate
Sumps	Sump 1 & 2	2		3	7.07	2						28.3		
Drainage channel		1	295	2								881.8	590.0	from Global Mapper Cut/Fill volumes
Camp Pads		1			152044.00								152044.0	from Interim Water Management Plan
Roberts Bay												0.0		
Jetty	Rock fill removal	1	39	26.8	1045.2	0.97						1013.8		Jetty As-built estimate
RB Tank Farm	Fuel Tanks	3	-	25.76	521.2	9.75	2.4	2.6	2.6	23	34.10	5081.4	3369.8	Fuel Tank Farm design doc/ photos
	Geotextile	1			20600.0					62	185.40			
	Liner	1			10300.0					31	92.70	0.0		Nuna As built ACAD est.
	Pipes (Tanks to Fuel Station)	1	110	0.15	0.018					2	5.94	0.0		Nuna As built ACAD est.
	Containment Berm (breach)	1	11.8	19.8	231.280	2.9						670.7		As Built drawing
Q1 Tank Farm (old)	Fuel tank	1	-	25.76	521.2	9.75	2.4	2.6	2.6	8	11.37	5081.4	1123.3	As built ACAD, height/thickness est. from photo
	Geotextile	1			13042.0					39	117.38			
	Liner	1			6521.0					20	58.69	0.0		estimated from As built ACAD
	Pipes (Tank to Fuel Station)	1	75	0.15	0.018					1	4.05	0.0		As built ACAD, est. from photo
	Empty fuel drums	150		0.6	0.283	0.15				0.04	0.06			
	Sea-cans 20"	40	6.1	2.44	14.9	2.5	0.9	0.3	0.3	58		37.2		As built ACAD, est. from photo
	Fuel Transfer Facility Trailers	2	12.24	3.4	41.6	2.5	11.7	12.5	6.7	62		104.0		As built ACAD, est. from photo
	Containment Berm (breach)	1	25.86	10.8	279.3	1.8						502.7		
Mechanical Shop Complex	Nuna Shop	1	15.58	30.84	480.5	5	69.6	144.1	77.3	291	582.11	2402.4		Nuna As built ACAD est., height/thickness Photo Est.
	Tent	1	11.58	7.95	92.1	5	29.3	27.6	57.4	114	148.66	460.3		Nuna As built ACAD est., height/thickness Photo Est.
	Trailers	3	12.09	2.4	29.0	2.5	10.9	8.7	4.6	73		72.5		Nuna As built ACAD est., height/thickness Photo Est.
	Site Service Shack	1	11.8	9.6	113.3	2.5	16.1	34.0	18.1	68	136.32	283.2		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 20"	28	6.1	2.44	14.9	2.5	0.9	0.3	0.3	41		37.2		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 40"	12	12.23	2.44	29.8	2.5	1.5	0.6	0.6	32		74.6		Nuna As built ACAD est., height/thickness Photo Est.
Waste Management Facility	Facility	1	12.23	10.52	128.7	2.5	17.1	38.6	20.6	76	152.49	321.6		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 20"	11	6.1	2.44	14.9	2.5	0.9	0.3	0.3	16		37.2		Nuna As built ACAD est., height/thickness Photo Est.
Laydown Area	Pad				24491.6							0.0		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 20"	11	6.1	2.44	14.9	2.5	0.9	0.3	0.3	16		37.2		Nuna As built ACAD est., height/thickness Photo Est.
Overburden Dump		1			10448.0							0.0		
Fuel Transfer Road	Road	1			3378.0							0.0		
Communication Tower	Tower	1	1.7	1.7	1.4	10	3.4	0.1	0.1	4	5.53	14.5		Nuna As built ACAD est., height/thickness Photo Est.
	Shack													
Beach Laydown Area	Magazines	5	12.17	4.5	54.8		0.0	0.0	0.0	0		0.0		Nuna As built ACAD est., Photo Est.
Orbit Drill Shop	Shop Tent	1	9.26	15.23	141.0	5	2.4	14.1	7.1	24	30.68	705.1		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 20"	12	6.1	2.44	14.9	2.5	0.9	0.3	0.3	17		37.2		Nuna As built ACAD est., height/thickness Photo Est.
	Sea-can 40"	2	12.23	2.44	29.8	2.5	1.5	0.6	0.6	5		74.6		Nuna As built ACAD est., height/thickness Photo Est.
Airstrip		1										0.0		
Airstrip					68475.0							0.0		Nuna As built ACAD, photo est.
	Ground Lighting fixtures	1	1900	0.025	47.5	0.025						1.2		Nuna As built ACAD, photo est.
South Apron		1			5517.2							0.0		
North Apron	Wood Shack	1	5	2.44	12.2	2.5	5.6	3.7	2.5	12	17.58	30.5		Nuna As built ACAD, photo est.
	Portable Trailers	1	8	3.1	24.8	2.5	8.3	7.4	4.0	20		62.0		Nuna As built ACAD, photo est.
	Sea-can 20"	1	6.1	2.44	14.9	2.5	0.9	0.3	0.3	1		37.2		Nuna As built ACAD, photo est.
Explosives Mixing Facility	Prill Tent	1	9.41	9.13	85.9	5	1.9	25.8	4.3	32	41.50	429.6		Nuna As built ACAD, photo est.
	Washbay	1	9.31	5.05	47.0	5	23.0	14.1	7.5	45	66.90	235.1		Nuna As built ACAD, photo est.
	Shed	1	1.78	2.54	4.5	2.5	3.2	1.4	0.7	5	7.98	11.3		Nuna As built ACAD, photo est.
	Sea-can 20"	6	6.1	2.44	14.9	2.5	0.9	0.3	0.3	9		37.2		Nuna As built ACAD, photo est.
Reagent Pads												0.0		
Equipment Laydown					21870.0							0.0		Nuna As built ACAD, photo est.
Material Laydown					33839.8							0.0		Nuna As built ACAD, photo est.
Ammonium Nitrate Storage Area	Extent				3858.0					1157	1504.62	0.0		Nuna As built ACAD, photo est.
	Liner	1			2800.0					8	25.20	0.0		Nuna As built ACAD, photo est.
	Containment Berm	1	63.4	0.5	2800.0	0.3						840.0		length=19.5x12.2 (8x2 22' seacans)
Geotech Drill Shop	Drill Shop	1	15.24	9.3	141.7	5	2.5	0.0	7.1	10	12.40	598.5		Nuna As built ACAD, photo est.
	Sea-can 20"	13	6.1	2.44	14.9	2.5	0.9	0.3	0.3	19		37.2		Nuna As built ACAD, photo est.
Westarc Drill Shop	Tent	1	18.36	11.68	214.4	5	3.0	0.0	10.7	14	17.84	721.0		Nuna As built ACAD, photo est.
	Sea-can 20"	10	6.1	2.44	14.9	2.5	0.9	0.3	0.3	14		37.2		Nuna As built ACAD, photo est.
Waste Management Area												0.0		
Land Farm	Liner	1			4384.0					13	39.46	0.0		Nuna As built ACAD, design document est.
	Non-woven Geotextile	1			8768.0					26	78.91	0.0		Nuna As built ACAD, design document est.
	Containment Berm	1	89.3	33.72	3011.2							0.0		
Batch Plant Pad	Tent	1	36.65	20.2	740.3	5	5.7	222.1	21.4	249	323.94	3701.7		Nuna As built ACAD, photo est.
Burn Pan	Burn Pan	1	3.29	2.71	8.9	2	0.1	0.0		0	0.25	17.8		
Quarry #2												0.0		
Crusher	Regrade area	1	82.4	32.4	2668							0.0		Nuna as built ACAD estimated
Overburden Dump	Regrade area	1			26344							0.0		Nuna as built ACAD estimated
Treated Sewage Discharge Areas	Extent	2	6.63	4.01	27	1				53	69.12	0.0		
North Dam												0.0		
Tail Lake Access	Bridge	1	30	2	60.0			18.0		18	27.00	0.0		Nuna As built ACAD, photo est.
	Dock	1	10	7	70.0			70.0		70	105.00	0.0		Nuna As built ACAD, photo est.
	Breach Volume (Core Material)	1	17.8	53.6	943.4	7.45						7028.0	614.2	
Dam	Breach Volume	1	65.5	62	3844.0	8.07						31,021	2367.2	
Cover Surface Area	East Side	1	23.8	8	190.4									
	West Side	1	23.9	8	191.2									
	Base	1	30.6	20	612.0									
	Total				**993.6**									
Frozen Core Plant	Plant	1	30.48	12.19	371.6	5	21.3	0.0	59.4	81	121.17	1857.8		Nuna As built ACAD, photo est.
	Asphalt mixing equipment	3	6.1	2.44	14.9	2.5	42.7	14.9	0.0	173	259.13	37.2		
	Sea-can 20"	2	6.1	2.44	14.9	2.5	0.9	0.3	0.3	3		37.2		Nuna As built ACAD, photo est.
	Sea-can 40"	2	12.23	2.44	29.8	2.5	1.5	0.6	0.6	5		74.6		Nuna As built ACAD, photo est.
Vent Raise												0.0		
Ventilation and Heating Facilities	Air Heaters											0.0		
Fuel Storage Area	Enviro Tank	1										0.0		
	Liner	1			410.0					1	3.69	0.0		Vent Raise Design document est.
	Geotextiles	1			820.0					2	7.38	0.0		Vent Raise Design document est.
Doris Windy Road												0.0		
AWR					101334.9							0.0		
Quarry A					5130.3							0.0		
Quarry B					5178.9							0.0		
Quarry D					12661.9							0.0		
Explosives Storage Facility	magazines	2	13.4	3.6	2805.8							0.0		Nuna As built ACAD, photo est.
	Gate	1	12	0.2	0.3	1.5				4	5.40	0.5		Estimate
Secondary Road												0.0		
Secondary Road	Road	1	1569		16674.5							0.0		Nuna As built ACAD, photo est.
Tail Lake Road	bridge deck	1	32	4.79	153.3		0.0	46.0	0.0	46	91.97	0.0		Nuna As built ACAD, photo est.
	Girders	4	30	0.3	9.0	1.5				14	13.50			
	Tailings Pipes	1	1569	0.4	0.1	0.4				251	753.12	0.1		
	Culvert	1	18.8									0.0		Estimate -From as built drawings
Doris Mountain												0.0		
Communication Tower	Tower	2	1.7	1.7	1.4	10	3.4	0.1	0.1	7	11.07	14.5		Nuna As built ACAD est.
	Equipment Shack	1	3.17	3.03	4.8	2.5	3.1	1.9	1.0	6	8.97	12.0		Nuna As built ACAD est.
TOTAL:						**83.845**					11573.85			

Demolition Preparation

Area	Structure	# of Units	Decommission				Special Item Description	Source
			Electrical	Heating System	Plumbing System	Total		
Doris Camp								
Accommodation Complex	Trailer Camp	1	1	1	1	3		Accommodation Design Doc, as built ACAD
	Cabins	5	1	1	1	15		As built ACAD
Fuel Tank Farm	Fuel Transfer Facility	1	1			1		Accommodation Design Doc, as built ACAD
	Piping and Controls	1				0		As built ACAD
	Above Ground Tanks	5				0	Residual Fuel (in each)	As built ACAD
Permanent Power Generator	Debris						Debris	
Temporary Power Generator	Power House	1	1	1		2		Estimated from ACAD
	Mobile Generator	1				0		Estimated from ACAD
	Fuel Unit	2				0		As built ACAD
Sewage Treatment Plant	Sewage Treatment Facility	1	1	1	1	3		Estimated from ACAD
	Sludge Storage Tank	1				0	Sludge/Solid Waste	Estimate from Sewage Treatment Plant Specs
	Chemical Tank	1				0	Chemical	Estimate from Sewage Treatment Plant Specs
Fire Water Storage Tank	Pump House	1	1		1	2		Estimated from ACAD
Muster Station	Fuel Unit	1				0		Estimated from ACAD
	Muster Tent	1	1	1		2		Estimated from ACAD
Warehouse/Core Shack	Fuel Unit	1				0		Estimated from ACAD
	CoreShack/Warehouse	1	1			1		
	Contractor Tents	2	1	1		4		Estimated from ACAD
UG Mechanical Shop	Maintenance Shop	1	1	1	1	3	Chemicals/Grease/ Waste	Estimated from ACAD
Office/Mine Dry	Office/Admin/Mine Dry	3	1	1	1	9		Estimated from ACAD
Portal and Underground Works Water Treatment	Underground Works	1	1			1		Estimated from ACAD
Underground washbay	generators	4				0		Estimated from ACAD
	Washbay	1	1	1	1	3		Estimated from ACAD
Swick Shop	Shop Tent	1	1	1		2		Estimated from ACAD
Water Intake/Pumping Facility	pumping facility sea-can	1	1		1	2	Debris	Estimated from ACAD
	Generator Fuel Tank	1				0		Estimated from ACAD
Sedimentation Pollution Control Pond	Piping & Wiring	1	1			1		Estimated from aerial photo
	RO plant	1	1	1		2	Sludge	Estimated from ACAD
Fresh Water Pipelines	Pipelines	1	1			1		Estimated from ACAD
Heli Pad	Offices/Buildings	3	1	1	1	9	Grease	Estimated from ACAD
Sewage Discharge Pipelines	Pipelines	1	1			1		Estimated from ACAD
Robert's Bay						0		
New Tank Farm	Fuel Transfer Facility	1	1			1		As built ACAD
	Above Ground Tanks	4				0	Residual Fuel (in each)	As built ACAD
Old Tank Farm	Fuel Transfer Facility	1	1			1		As built ACAD
	Above Ground Tanks	1				0	Residual Fuel (in each)	As built ACAD
Mechanical Shop Complex	Nuna Shop	1	1	1	1	3	Grease/Waste	Nuna as built ACAD
	Tent	1	1	1		2		Nuna as built ACAD
	Site Service Shack	1	1	1		2		Nuna as built ACAD
Waste Management Facility	Facility	1	1	1	1	3	Waste (ash)	Nuna as built ACAD, waste est.
Laydown Area	Electric System	1	1			1	Debris	Nuna as built ACAD, Photo Est.
Overburden Area	Pad						Debris	
Communication Tower	Tower	1	1			1	Debris	Nuna as built ACAD, Photo Est.
Beach Laydown	Laydown Area	0	0	0	0	0	Debris	
Orbit Drill Shop	Shop	1	1	1	1	3	Grease	Nuna as built ACAD, Photo Est.
Air Strip						0		
North Apron	Traffic Control Tower	1	1			1		Nuna as built ACAD, Photo Est.
Explosive Mixing Facility	Facilities	1	1	1		2	Dye	Nuna as built ACAD, Photo Est.
Reagent Pads						0		
Equipment Laydown Area							Debris	
Material Laydown Area							Debris	
Geotech Drill Shop	Drill Shop	1	1	1		2	Grease	Nuna as built ACAD, Photo Est.
Westarc Drill Shop	Drill Shop	1	1	1		2	Grease	Nuna as built ACAD, Photo Est.
Waste Management Area						0		
Landfarm	Soil Pond	1				0	Contaminated Soil	Nuna as built ACAD,
Burn Pan	Ashe	1				0	Ashe	Nuna as built ACAD, Photo Est.
Quarry 2	Debris						Debris	Estimate
North Dam						0		
Frozen Core Plant	Plant	1	1	1		2		Nuna as built ACAD, Photo Est.
Vent Raise	Vent Rise Facility	1		1	1.0	2		Estimate
	Enviro Tank	1						Estimate
Secondary Road	Debris						Debris	
Doris Mountain						0		
communication tower	equipment	1				0		Nuna as built ACAD, Photo Est.

Table 8. Earthwork Quantities

Earthwork Volumes/Quantities

Bulking Factors	
Soil/Rock Pad	1.2
Cover shrinkage factor	1.1

Reclamation Areas

Work Area	Location	Total Area (m^2)	Area Scarified (m^2)	Area Regraded (m^2)	Area Requiring Fill (m^2)	Coconut-matting Area (m^2)	Seeding Area (m^2)	Source/Comment
Roberts Bay	Beach Laydown Area		11,830					Nuna ACAD, Photo Est.
Quarry #2	Overburden Dump					7,600	7,600	Nuna ACAD, Photo Est.
	Sewage Discharge Area				20	400	400	Estimated 2x(10mx20m)

Earthwork Areas

Work Area	Item	Qnty	Length (m)	Width (m)	Height (m)	Side Slope (percent)	Area (m^2)	In-situ Volume (m^3)	Loose Volume (m^3)	Source / Comments
Doris Camp										
Accommodation Area (Pad X)	Regrade area					1	21050			as built ACAD estimated
Tank Farm (Pad R)	Excavate crush material							2800	3360	Fuel Tank Farm Design Docs
	Regrade area		80.65	61.1		1	4928			Fuel Tank Farm Design Docs
Warehouse (Pad Y)	Regrade area					1	8440			as built ACAD estimated
(Pad B)	Regrade area					1	6910			as built ACAD estimated
Mine Dry (Pad C)	Regrade area					1	13030			as built ACAD estimated
Pad D	Regrade area					1	5943			est. from Nuna As built ACAD
Pad E/P (UG Maintenance)	Regrade area					1	11000			as built ACAD estimated
Portal Area	Regrade area					1	1800			as built ACAD estimated
Pad I - Waste Rock	Regrade area					1	11500			as built ACAD estimated
Pad G	Regrade area					1	5340			Nuna as built ACAD estimated
Pad F (washbay area)	Regrade area					1	8750			Nuna as built ACAD estimated
Pad Q/ J/H (ore pile)	Regrade area					1	9870			as built ACAD estimated
Water Intake/Pumping Facility	Regrade area					1	2226			as built ACAD estimated
Roberts Bay										
Jetty	Excavate rock fill				1.3		1900	2470		as built ACAD estimated
	Regrade area					1	1900			as built ACAD estimated
New Tank Farm	Regrade area					1	11530			as built ACAD estimated
	Excavate crush material				0.6			9400		Tank Farm Design Documents
Old Tank Farm	Regrade area					1	3650			as built ACAD estimated
	Excavate crush material				0.6			2190		as built ACAD estimated
Mechanical Shop Complex	Regrade area					1	4780			Nuna as built ACAD estimated
Waste Management Facility	Regrade area					1	3050			Nuna as built ACAD estimated
Laydown Area	Regrade area					1	15530			Nuna as built ACAD estimated
Overburden Dump	Regrade area/side slope					18	11530			Nuna as built ACAD estimated
Fuel Transfer Access Road	Crown road					1	3375			Nuna as built ACAD estimated
Airstrip										
Airstrip/Aprons	Regrade area					1	81945			existing + expand (up to explosive facility) ACAD Estimated
Reagent Pads										
Upper and Lower Pads	Regrade area					1	75550			as built ACAD estimated
Waste Management Area										
Land Farm	Excavate crush/surfacing material							1366		Landfarm Design Documents estimated.
	Contaminated Soil							100	Contaminated soil	Estimated
	Regrade area					1	26750			Nuna as built ACAD estimated
Batch Plant Pad	Regrade area					1	12130			Nuna as built ACAD estimated
Quarry #2										
Crusher	Regrade area					1	25630			Nuna as built ACAD estimated
Overburden Dump	Regrade area					1	28420			Nuna as built ACAD estimated
North Dam										
Tail Lake Access Road	Crown Road					1	3429			Nuna as built ACAD estimated
Frozen Core Plant	Regrade area					1	7510			Nuna as built ACAD estimated
Vent Raise										
Fuel Storage Area	Excavate crush material							123		Design Document estimated
	Regrade area					1	4150			Nuna as built ACAD estimated
Doris Windy Road										
Explosives Storage Facility	Regrade area					1	2050			Nuna as built ACAD estimated
Secondary Road										
Tail Lake Road	Regrade area					1	17500			Nuna as built ACAD estimated