MONITORING AND FOLLOW-UP PLAN
FOR THE DORIS NORTH GOLD MINE PROJECT

Submitted to:

Miramar Hope Bay Limited
899 Harbourside Drive, Suite 300
North Vancouver, British Columbia
V7P 3S1

Prepared by:

Golder Associates Ltd.
#300, 10525 – 170 St.
Edmonton, AB
T5P 4W2

In Association with

SRK Consulting Engineers and Scientists

Vancouver, BC

and

Miramar Hope Bay Ltd.

North Vancouver, BC

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Executive Summary

Miramar Hope Bay Limited (MHBL) proposes to construct and operate an underground gold mine called the Doris North Project (the Project) in the West Kitikmeot Region of Nunavut. Several monitoring and follow-up programs have been developed for the Doris North Project as part of corporate commitments, regulatory approval conditions (e.g., Project Certificate from the Nunavut Impact Review Board) and as a result of stakeholder consultation. This report summarizes the environmental monitoring programs that will be implemented for the Doris North Project.

A follow-up monitoring program is used to verify the accuracy of the environmental assessment and/or to determine the effectiveness of mitigation. Typically, follow-up programs are focused on issues associated with potentially significant adverse environmental effects or negotiated mitigations, such as fisheries compensation to replace productive capacity of lost fisheries habitat due to the project. Monitoring data will be analyzed to help determine if there are any undesirable environmental effects as a result of project activities.

The following monitoring programs are summarized in this document:

- Air Quality and Climate Monitoring;
- Noise Monitoring;
- Hydrology Monitoring;
- Site Water Quality Monitoring;
- Tailings Geotechnical Monitoring;
- Waste Rock Characterization;
- Aquatic Effects Monitoring;
- Fish Monitoring;
- Vegetation and Soil Quality Monitoring; and
- Wildlife Monitoring.

In general, adaptive management is triggered when effects to the receptor exceed predictions determined in the Environmental Impact Statement (EIS).

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1.0 INTRODUCTION

1.1 BACKGROUND

Miramar Hope Bay Limited (MHBL) proposes to construct and operate an underground gold mine called the Doris North Project (the Project) in the West Kitikmeot Region of Nunavut. The project is located 685 km northeast of Yellowknife and 160 km southwest of Cambridge Bay (Figure 1). The mine is on Inuit owned land, approximately 5 km south of the Arctic Ocean. The nearest communities are Umingmaktok, located 65 km to the west, and Bathurst Inlet, located 110 km to the southwest. The Project is one of several existing (e.g., Lupin mine, Jericho Diamond Project) and potential mining developments (e.g., Boston, Meadowbank, Ulu, Izok Lake, High Lake, George Lake and Goose Lake) in Nunavut.

The Project will consist of an underground gold mine, associated mill site, roads, buildings, camp and other necessary infrastructure (Figure 2). The mine will process about 668 tonnes of ore per day producing approximately 8,700 kg (306,830 ounces) of gold. The terrestrial disturbance from the project will be 57 ha. The mine will have a 24 month operating life employing approximately 165 persons.

Several monitoring and follow-up programs have been developed for the Doris North Project as part of corporate commitments, regulatory approval conditions (e.g., Project Certificate from the Nunavut Impact Review Board) and as a result of stakeholder consultation. This report summarizes the environmental monitoring programs that will be implemented for the Doris North Project.

1.2 PURPOSE OF FOLLOW-UP MONITORING

A follow-up monitoring program is used to verify the accuracy of the environmental assessment and/or to determine the effectiveness of mitigation. Typically, follow-up programs are focused on issues associated with potentially significant adverse environmental effects or negotiated mitigations, such as fisheries compensation to replace productive capacity of lost fisheries habitat due to the project. Monitoring data will be analyzed to help determine if there are any undesirable environmental effects as a result of project activities.

All environmental monitoring programs are designed by qualified scientists using widely-accepted scientific standards. The monitoring and follow-up programs will be conducted by qualified and experienced professionals or technicians, with assistance, where practical, of Inuit hired from the region.

The following monitoring programs are summarized in this document:

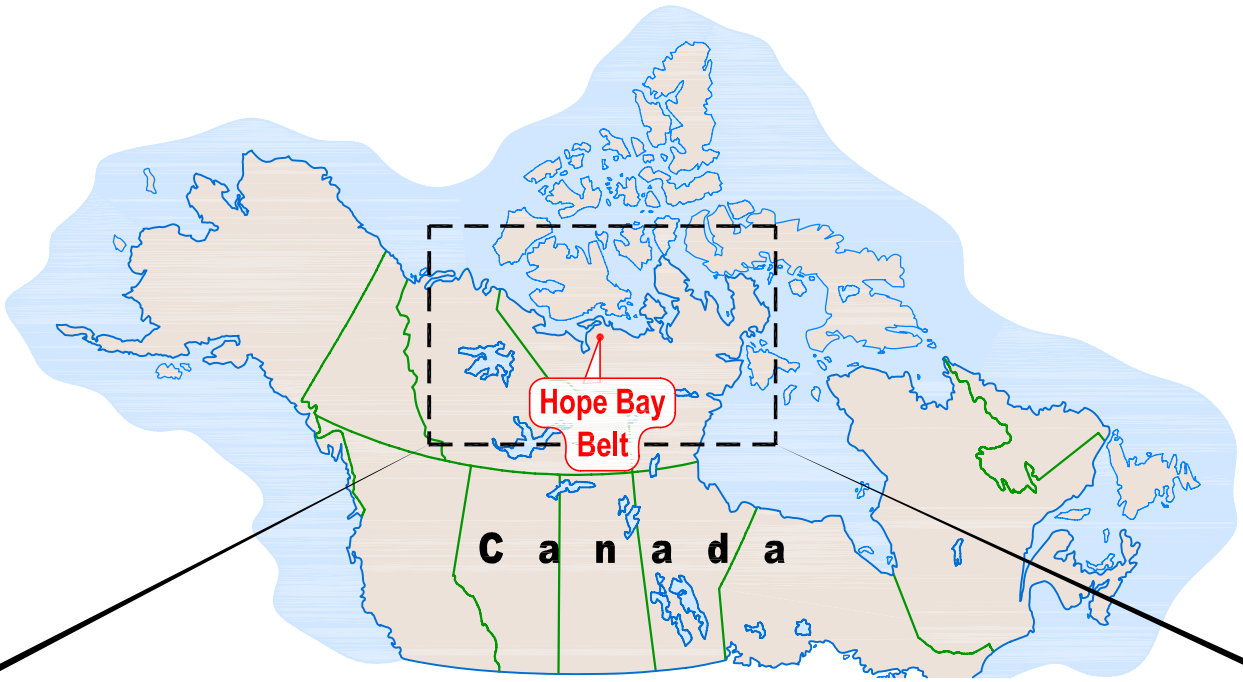
- Air Quality and Climate Monitoring;
- Noise Monitoring;
- Hydrology Monitoring;
- Site Water Quality Monitoring;
- Tailings Geotechnical Monitoring;
- Waste Rock Characterization;
- Aquatic Effects Monitoring;
- Fish Monitoring;
- Vegetation and Soil Quality Monitoring; and
- Wildlife Monitoring.

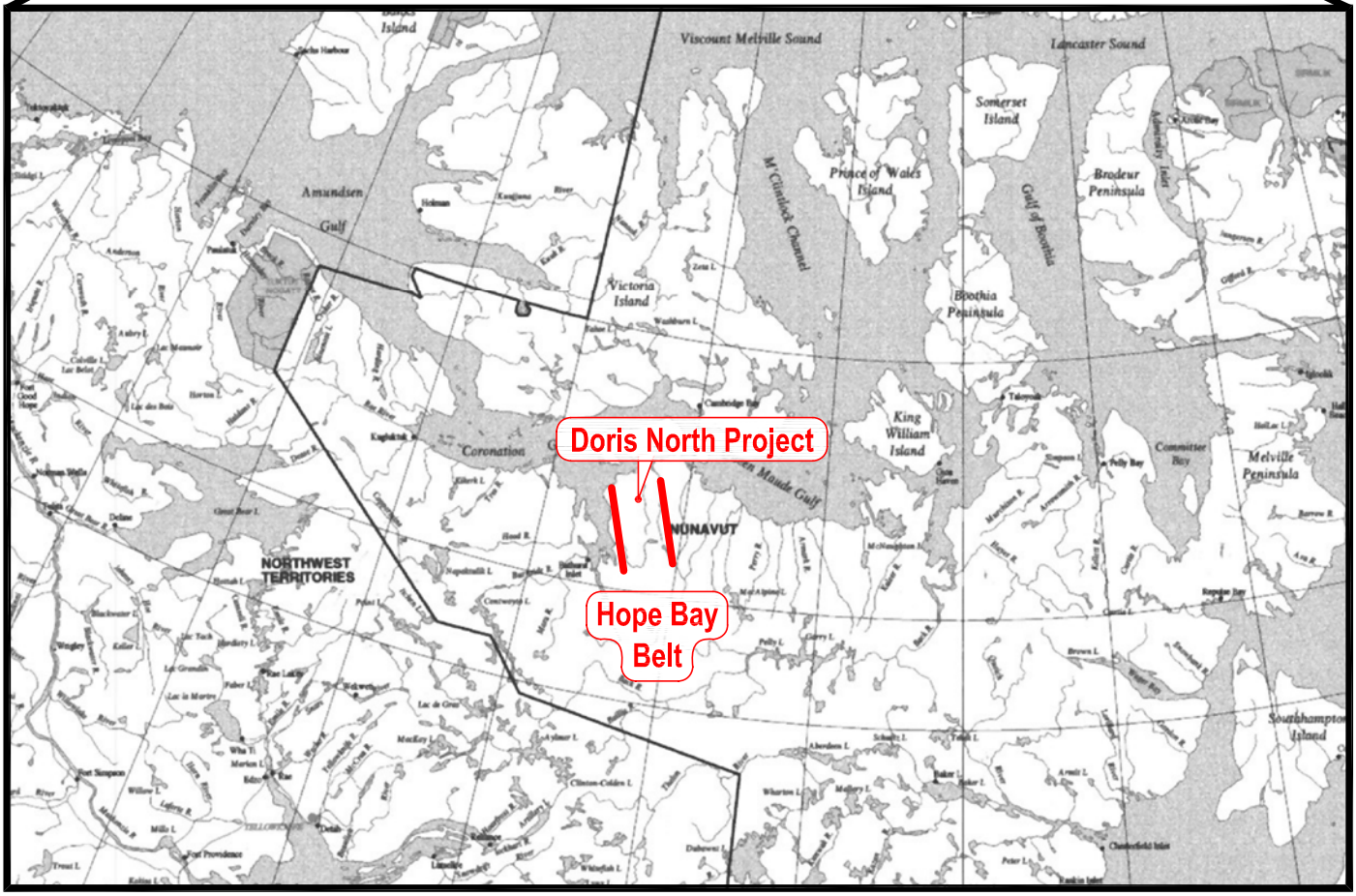
Table 1 outlines the monitoring parameters, sampling location, and sampling frequency for each monitoring program

1.3 CROSS REFERENCE TO DETAILED MONITORING PLAN

The following documents contain detailed information regarding the monitoring programs summarized in this document:

- Hydrology and Meteorology Report (S5);
- Water Quality Model (S6);
- Geochemical Characterization of Quarry Materials (S7);
- Geochemical Characterization of Portal Development Rock (S8);
- Noise Abatement Plan (S10c);
- Aquatic Effects Monitoring Program (S12-Golder 2003);
- Doris North Project No Net Loss Plan – Revision 5 (Golder 2005a and Supporting Document F4 in the Doris North Gold Mine Project FEIS); and
- Wildlife Mitigation and Monitoring Program (WMMP) (Golder 2005b and Supporting Document F1 in the Doris North Gold Mine Project FEIS).





Schematic Only, Not To Scale

PROJECT

Miramar Hope Bay Limited

TITLE

Location of the Proposed Doris North Gold Mine Project

Golder Associates
Edmonton, Alberta

PROJECT No.		06-1373-026	FILE No.		1730907
DESIGN			SCALE	As shown	REV. 0
CADD	RW	18/10/06			
CHECK					
REVIEW					

Figure: 1

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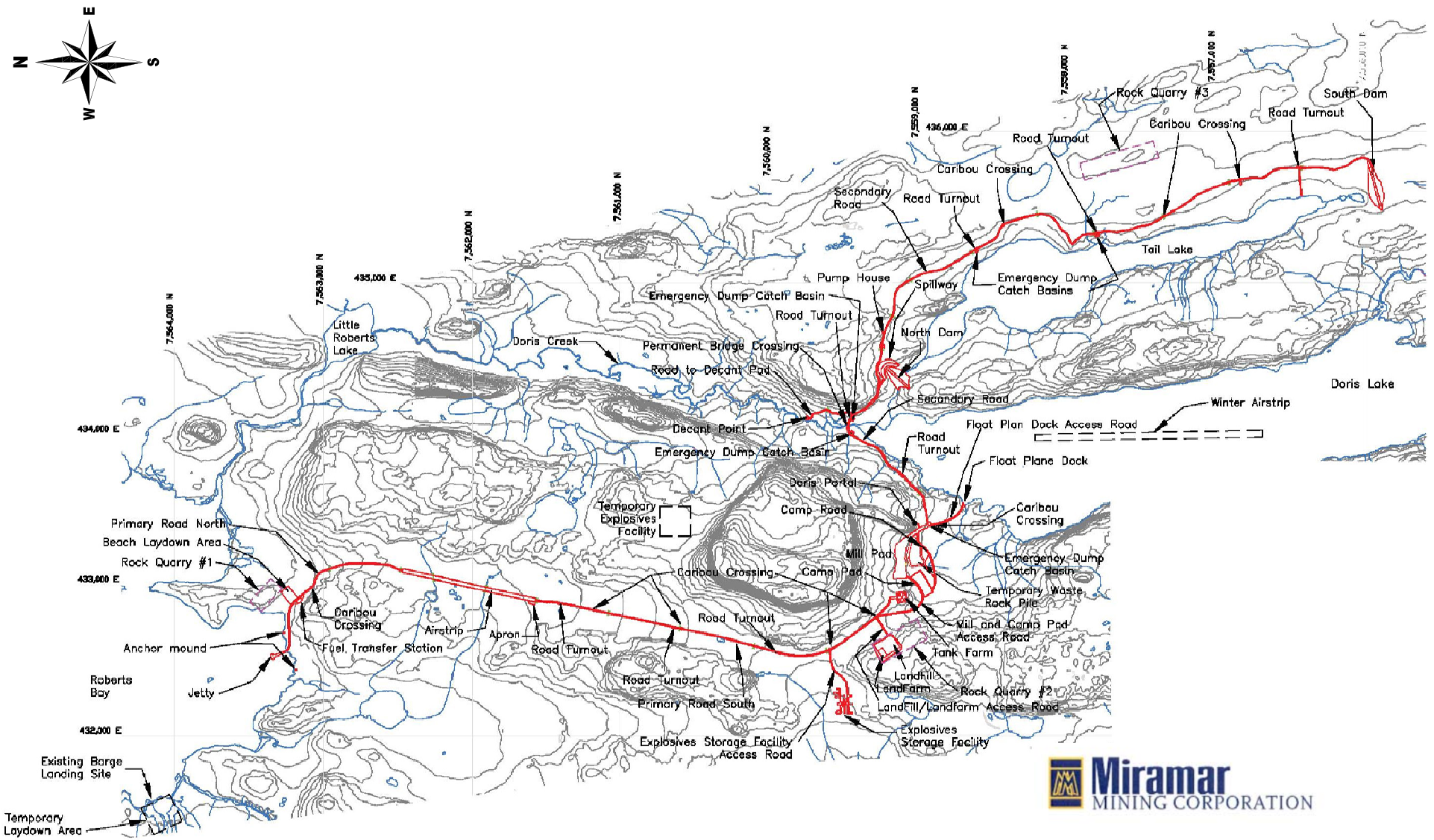


Miramar MINING CORPORATION

TITLE

Site Infrastructure Layout of the Doris North Gold Mine Project

Golder Associates
Edmonton, Alberta

PROJECT No.		06-1373-026	FILE No.		1730926
DESIGN			SCALE	As shown	REV. 0
CADD	RW	23/10/06	**Figure: 2**		
CHECK					
REVIEW					

Table 1 Monitoring Program Summary

Category	Parameter	Location	Frequency	Mining Phase
Air Quality and Climate				
Doris North	Wind speed @ 3 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Wind direction @ 3 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Temperature @ 2 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Relative humidity @ 2 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Solar radiation @ 2.5 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Precipitation (tipping bucket; summer)	Mill Site	Summer continuous	Construction, Operation, Closure, Post-closure
	Passive monitoring for SO_2, NO_2 and O_3	Mill Site	Monthly	Construction, Operation, Closure
	Particulate matter (TSP, PM_{10}, $PM_{2.5}$) PLANNED	Mill Site	Every 6^{th} day	Construction, Operation, Closure
Boston	Wind speed @ 10 m	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Wind direction @ 10 m	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Temperature @ 2 m	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Relative humidity @ 2 m	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Solar radiation @ 2.5 m	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Snow Depth	Above the Portal	Continuous	Construction, Operation, Closure, Post-closure
	Precipitation (tipping bucket; summer)	Above the Portal	Summer continuous	Construction, Operation, Closure
	Passive monitoring for SO_2, NO_2 and O_3	Above the Portal	Monthly	Construction, Operation, Closure

Table 1 Monitoring Program Summary (continued)

Category	Parameter	Location	Frequency	Mining Phase
Soil and Vegetation Sampling	Metal concentrations in lichens[1]	Project site locations and reference locations throughout the Hope Bay Region	Once during Construction, annually during Operation and once during Closure	Construction, Operation, Closure
	Metal concentrations in plants and berries[1]	Project site locations and reference locations throughout the Hope Bay Region	Once during Construction, annually during Operation and once during Closure	Construction, Operation, Closure
	Metal concentrations in soils[1]	Project site locations and reference locations throughout the Hope Bay Region	Once during Construction, annually during Operation and once during Closure	Construction, Operation, Closure
Noise				
	L_{eq}, L_{min}, L_{max}, LFN, and any other that regulators require.	To be discussed with regulators.	To be discussed with regulators.	Construction, Operation, Closure
Hydrology				
	Water quantity (water level and/or discharge)	Tail Lake	Continuous	Construction, Operation, Closure, and Post-closure to end of treated tailings effluent discharge
		Doris Lake	Continuous	
		Tail Lake Outflow (upper)	Continuous during open water season including during discharge of treated tailings effluent	
		Doris Lake Outflow (upper)		
		Doris Lake Outflow (lower)		
		Roberts Lake Outflow	Continuous during open water season	Construction, Operation through verification of fisheries No Net Loss mitigation measures
		Little Roberts Lake Outflow		
	Snowcourse surveys	Doris Lake watershed	Annual in late winter	Construction, Operation, Closure and Post-closure to end of treated tailings effluent discharge
	Lake Evaporation	Doris Lake Watershed (calculated)	Continuous	Construction, Operation, Closure and Post-Closure to end of treated tailings effluent discharge

Table 1 Monitoring Program Summary (continued)

Category	Parameter	Location	Frequency	Mining Phase
Site Water Quality				
Site Compliance Monitoring	Total suspended sediment/Turbidity	Roberts Bay jetty Doris Lake boat launch Doris Lake water intake	Hourly to daily during in-water construction activity	Construction, Closure
Site Compliance Monitoring	Water quality and quantity	Tail Lake end of discharge pipe to Doris Outflow Creek Doris Creek Outflow both upstream and downstream of discharge point	Every second day during annual discharge period	Operation, Closure, Post Closure (for up to nine years after cessation of mining)
Site Compliance Monitoring	Water quality and quantity	Water Quality within Tail Lake – Reclaim water	Every second day during annual discharge period Monthly at all other times during operational phase Monthly during closure phase only during open water period	Operation, Closure, Post Closure (for up to nine years after cessation of mining)
Site Compliance Monitoring	Water quality and quantity	Combined Tailings discharged to Tail Lake– water component	Daily initially, composited weekly thereafter	Operation
Site Compliance Monitoring	Water quality and quantity	Plant site storm water management pond	Weekly (during open water season) and prior to any planned discharge to the tundra	Operation, Closure
Site Compliance Monitoring	Water quality	Fuel tank farm collection sump	Monthly (during open water season) and prior to any planned discharge to the tundra	Operation, Closure
Site Compliance Monitoring	Water quality	Roberts Bay Fuel tank transfer facility collection sump	Monthly (during open water season) and prior to any planned discharge to the tundra	Operation, Closure
Site Compliance Monitoring	Water quality	Landfarm collection sump	Monthly (during open water season) and prior to any planned discharge to the tundra	Operation, Closure

Table 1 Monitoring Program Summary (continued)

Category	Parameter	Location	Frequency	Mining Phase
Site Water Quality				
Site Compliance Monitoring	Water quality	Landfill collection sump	Monthly (during open water season) and prior to any planned discharge to the tundra	Operation, Closure
Site Environmental Management	Water quality	Doris Lake at freshwater pump intake	Monthly	Operation, Closure
Site Environmental Management	Water quality	Potable Water – taken at different spots each month	Monthly	Operation, Closure
Site Environmental Management	Water quality	Sewage Treatment Plant Effluent to Mill pump box	Monthly	Operation, Closure
Effluent Treatment Process Control	Water quality and quantity	Barren bleed solution	Every two hours	Operation
Tailings Geotechnical				
Thermal Monitoring	Ground Temperature	Thermistor strings at tailings dams, around Tail Lake shoreline	Monthly	Operation, Closure
Visual Inspections	Tailings containment system performance	Tailings and reclaim pipelines, dump catch basins, tailings discharge point, reclaim water pump, north and south dams and discharge system	Daily	Operation, Closure
Geotechnical Inspections	Tailings containment system performance and dam stability	Inspection by a qualified geotechnical engineer of all structures including the dams and Tail Lake shoreline	Annually during early summer	Operation, Closure, Post- Closure
Tail Lake Bathymetry	Tail Lake bathymetry to facilitate tailings deposition management	Survey of Tail Lake bathymetry	Annually during early summer	Operation

Table 1 Monitoring Program Summary (continued)

Category	Parameter	Location	Frequency	Mining Phase
Waste Rock Characterization				
Quarried Rock Material	ABA Characterization	Check sampling of rock quarried for use in infrastructure (jetty, roads, airstrip, building pads, dams, etc.) to verify characterization ABA characterization work completed on quarry rock sources in 2006	Approximately 100 samples spread over construction quarrying	Construction
Underground Waste Rock	ABA Characterization	ABA characterization of any non-acid generating waste rock to be permanently left on surface to verify that such rock is non-acid generating	As required – contingent measure	Construction, Operations
Aquatic Effects				
Regional Water Quality	Water Quality	Doris Outflow Creek at confluence with Little Roberts Lake	Monthly during annual discharge period	Operations, Closure. Post-closure
Regional Water Quality	Water Quality	Little Roberts Lake Outflow	Monthly during annual discharge period	Operations, Closure, Post-closure
MMER Effluent Monitoring	pH, MMER deleterious substances	Tail Lake end of Discharge pipe to Doris Outflow Creek	Weekly during annual discharge period	Operations, Closure, Post-closure
	Acute Lethality Testing on rainbow trout and *Daphnia magna*	Tail Lake end of Discharge pipe to Doris Outflow Creek	Monthly during annual discharge period	Operations, Closure, Post-closure
EEM Effluent Characterization	pH, MMER deleterious substances	Tail Lake end of Discharge pipe to Doris Outflow Creek	Four times per year during EEM cycle	Operations, Closure, Post-closure
EEM Receiving Water Chemistry	pH, dissolved oxygen, temperature, MMER deleterious substances	Doris Creek Outflow both upstream and downstream of discharge point	Four times per year during EEM cycle	Operations, Closure, Post-closure

Table 1 Monitoring Program Summary (continued)

Category	Parameter	Location	Frequency	Mining Phase
Aquatic Effects				
EEM Fish Population Survey	Fish survival, growth, condition and reproduction	Two control streams, two control lakes, one exposure lake and two exposure streams (near-field and far-field)	Monitoring frequency is dependent on results of previous cycle (minimum of two cycles)	Operations, Closure, Post-closure
EEM Fish Tissue Survey	Tissue mercury concentration			
EEM Benthic Invertebrate Community survey	Invertebrate density, taxa richness, diversity and similarity of community structure			
Fish				
Rearing habitat in Doris L.	Periphyton, benthos, and fish	Doris Lake sites and two reference sites	Annually during operation; plus Year-1 and Year-5 from decom-missioning.	Operation, Closure and Post-closure.
Jetty fish habitat structures	Periphyton, benthos, and fish	Jetty structure sites and two reference sites	Summer following jetty construction, plus Year-2 of operation and Year-2 of active post-closure (year prior to jetty lowering to below water)	Construction, Operation and Post-closure.
Rearing habitat in tributary to Roberts Lake	Use of habitat by fish (Arctic char, lake trout)	Tributary to Roberts Lake	Annually during operation; plus Year1 and Year-5 from decommissioning.	Operation, Closure and Post-closure.
Enhancement of stream channel in Roberts Creed	Success of upstream Arctic Char movement into Roberts Lake	Roberts Creek above and below enhancement area	Once in a low to moderate flow year during early years of operations or closure and again in Year-9 or Year-10 (depending on flow conditions) after decommissioning	Operation/Closure and Post-closure
	Arctic char smolt out-migration	Roberts Creek below Little Roberts Lake	Annually beginning in 2006 for 10 year period	Pre-construction, Construction, Operation, Closure, and Post-closure
	Arctic char and lake trout abundance (catch-per-unit-effort)	Roberts Lake and selected tributaries	Annually beginning in 2006 for 10 year period	Pre-construction, Construction, Closure, and Post-closure

Table 1 Monitoring Program Summary (concluded)

Category	Parameter	Location	Frequency	Mining Phase
Willow Habitat along Doris Lake at entrance of Tail Creek	Distribution of shoreline willow habitat	Doris Lake at entrance of Tail Creek	Once in summer of 2007 (pre-construction), once during operation and once during closure	Pre-construction, Construction, Closure
Tail Lake Fish Tissue Analyses	Metal contaminant levels in lake trout	Tail Lake	Once prior to conducting fish-out of Tail Lake	Construction
Wildlife				
VECS include: ➢ wildlife habitat; ➢ caribou; ➢ muskoxen; ➢ grizzly bears; ➢ wolverines; ➢ upland breeding birds; ➢ waterfowl; and ➢ raptors.	Habitat loss from Project footprint	Project footprint	Once during each mining phase	Construction, Operation, Closure
	Survey observations (individuals, density, species richness and sign) for all VECs	Wildlife Study Area	Annually according to species survey protocol	Construction, Operation, Closure and Post-closure
	Sightings log and encounters	Hope Bay Region	Annual summary of observations	Construction, Operation, Closure

[1] Metal concentrations in soils, lichens, plants and berries include analyses for the following metals: Arsenic, Silver, Aluminum, Barium, Beryllium, Cadmium, Cobalt, Chromium, Copper, Molybdenum, Nickel, Lead, Antimony, Tin, Strontium, Thallium, Vanadium, Zinc, Calcium, Potassium, Magnesium, Sodium, Iron, Manganese, Phosphorus, Selenium, Titanium and Mercury.

2.0 AIR QUALITY AND CLIMATE MONITORING

2.1 BACKGROUND AND RATIONALE

An air quality and meteorological monitoring program has been operating at the Doris North Project site to measure pre-operational air quality conditions, and is the basis for the Air Quality Management Plan (AQMP). Meteorological monitoring is a continuing program that is used to support other monitoring programs including hydrology, air quality and wildlife.

2.2 STUDY DESIGN

The air quality monitoring program currently includes monitoring of total suspended particulates (TSP), dustfall, sulphur dioxide (SO2), nitrogen dioxide (NO2) and ozone (O3). A Hi-Vol sampler has been configured to measure airborne particulate with a nominal aerodynamic diameter of 30 microns or less; however, it is not currently operational. Once operational, 24-hour measurements will be taken every six days as per the National Air Pollution Surveillance (NAPS) schedule. Dustfall is measured quarterly, and SO2, NO2 and O3 are measured with passive samplers and results collected monthly.

An additional Dual PartisolTM sampler will be installed in summer 2007 to measure ambient concentrations of PM10 and PM2.5. The measurement schedule will be the same as the TSP sampling. Prior to construction, monitoring for TSP and PM10 and PM2.5 will be sampled when camps are open as the sampler requires full-time power. Once operational, monitoring of these parameters would likely be year round.

The Hi-Vol and Partisol samplers will be re-sited based on protocols established by Alberta Environment (AENV Air Monitoring Directive, 1989) and through consultation with Environment Canada and Health Canada air quality officials. The Alberta Monitoring Directive has developed a site selection tool that incorporates parameters, such as wind direction frequency, receptor sensitivity and site accessibility. The primary site selection tool is the geographic coverage factor (G), which is calculated as follows:

$$G = W \times D \times R \times A \times E$$

where:

- W = Frequency of winds blowing from the emission source towards the site.
- D = Dispersion weighting computed from one of the following:

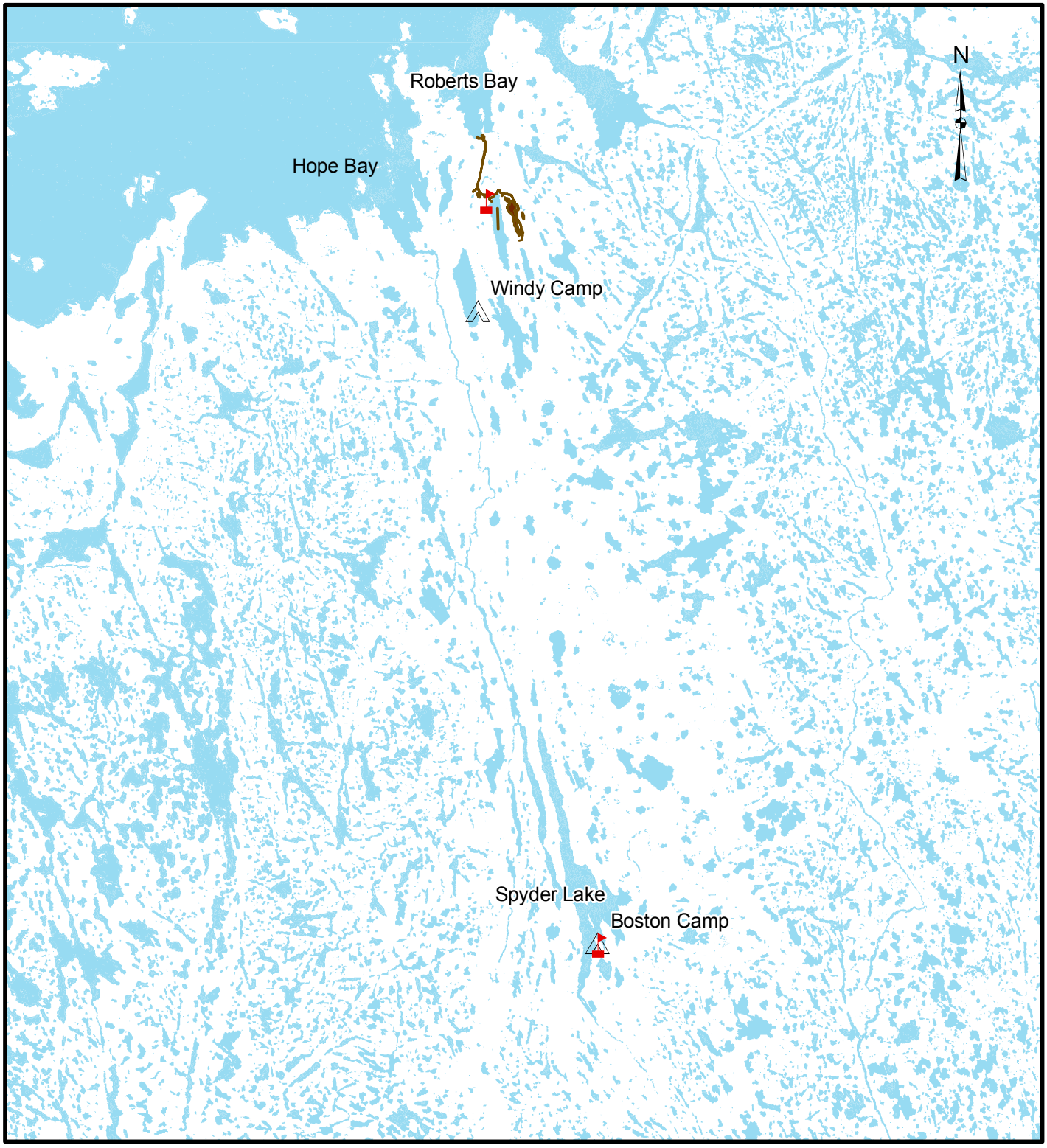
- Short-term concentration (i.e., 1-hour)
- long-term average concentration (i.e., annual)
- concentration occurring under the most frequent wind speed and stability class,
- probability of detecting concentrations above a specified concentration,
- probability that the measured concentration will be within a fixed fraction of its true value n times in N occurrences with specified percent confidence (method of Noll).

- R = Sensitivity of the receptor defined as low (1), medium (2), or high (3).
- A = Accessibility to the proposed location defined as poor (1), adequate (2), or good (3).
- E = Electric (AC) power availability for the proposed location defined as poor (1), good (2), or existing (3).

This siting method is a modified version of the one used in the Alberta Monitoring Directive, in that it incorporates the accessibility to the proposed site (A) and the availability of electric power (E). The "A" parameter was included because pre-existing access may serve to minimize the environmental impact of implementing a monitoring program. Also, additional delays in program start up are possible if road work and associated permits are required to access the site. The "E" factor is considered in the site selection weighting to consider if there is electricity currently available or if installing an electrical power source will be relatively easy or difficult. The dispersion weighting factor has the greatest influence on the G value.

2.3 METEOROLOGICAL MONITORING PROGRAM

The current meteorological monitoring program will continue as part of the AQMP; however, the location and design of the station will be discussed with Environment Canada officials. The Doris North climate (meteorological) station was installed on the northern shore of Doris Lake in May 2003 and the Boston climate (meteorological) station was installed in July 2006 (Figure 3). The station is a self contained, solar/battery-powered system, and includes instrumentation to measure hourly values of temperature, wind speed, wind direction, relative humidity, solar radiation and rainfall.



Climate Stations

Doris North Footprint

5 0 5 10 15 Kilometers

SCALE 1:400,000

PROJECT

Miramar Hope Bay Ltd.

Location of Climate Stations

REFERENCE

Landsat TM landcover classification courtesy of Environment and Natural Resources, GNWT.
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 13

Golder Associates
Yellowknife, Northwest Territories

PROJECT No. 06-1373-026			SCALE AS SHOWN	REV. 0
DESIGN	CDLM	18 Oct. 2006	FIGURE:3	
GIS	DP	18 Oct. 2006		
CHECK	CDLM	18 Oct. 2006		
REVIEW	CDLM	18 Oct. 2006		

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3.0 NOISE MONITORING

3.1 BACKGROUND AND RATIONALE

The noise monitoring program is part of the overall noise abatement plan (Supporting Document S10c), and is a requirement of the NIRB Project Certificate for the Doris North Project (Commitment #29). The overall objectives of the noise abatement plan are to protect people and wildlife from mine activity noise, including blasting, drilling, equipment, vehicles and aircraft.

3.2 STUDY DESIGN

The noise monitoring programs will be conducted 3-4 times in each project stage: pre-construction (baseline), construction, operation and closure. Construction is scheduled to start in the fall of 2007; therefore, baseline monitoring will commence as early as possible. Monitoring periods and dates are yet to be determined; however, the date selection will consider the potentially affected VECs. The following are factors that will be used to finalize the scheduling of baseline, construction, operations and closure monitoring:

- season;
- caribou migration;
- raptor nesting;
- the month before bear hibernation; and
- times when major wildlife events occur.

Locations will be selected based on the results of noise modelling for the EIA, location of project noise sources and infrastructure and VEC factors. Locations will also depend on the criteria to be met for the project. Further discussions with Health Canada (HC), Environment Canada (EC) and the Government of Nunavut Department of Environment (GNDoE) will help define locations. Up to four, long-term monitoring locations likely will be selected. In the interim, on-site short-term measurements are being conducted to aide with long-term baseline monitoring site selection.

Type I or Type II integrating noise level meters capable of logging Leq, Lmax and Lmin in both dBA and dBC units will be used for long term monitoring. In addition, sound recordings will be made in order to identify noise events and sources being measured. All data will be summarized and compared with agreed criteria.

3.3 ADAPTIVE MANAGEMENT

The abatement plan, which will be finalized within six months of issuance of the Doris North Project Certificate, will also identify criteria for environmental noise, mitigations or work procedures to be used by Miramar in controlling noise from the site, and action that will be taken if noise is not in compliance with criteria.

4.0 HYDROLOGY MONITORING

4.1 BACKGROUND AND RATIONALE

Existing hydrology data at Doris North were collected as part of the baseline study and during post-baseline (2003 to 2006) monitoring to support the EIS, water licence application and project design. The hydrology monitoring program during construction, operation, closure and post-closure will be similar to the existing post-baseline program, with modifications to meet regulatory and operational requirements.

4.2 STUDY DESIGN

Monitoring of snowfall, lake water levels and stream discharge will be included as part of the environmental monitoring program for the Doris North project (Figure 4). The purpose of this monitoring is to refine hydrological baseline estimates for water management planning, to provide data for assessment of EIS predictions, and to provide data for water management operations. Components of the hydrology monitoring program include:

- Annual snowcourse surveys: the existing snowcourse survey program will be continued through construction to post-closure of the Tail Lake facility to provide additional data to refine local hydrological parameters, and to provide a basis for operational water management. Snowcourse surveys will identify the volume of runoff into the Tail Lake facility and the Doris Lake system each spring.

- Doris and Tail lake water level monitoring: the existing lake water level monitoring program for Doris and Tail lakes will be continued through construction to post-closure of the project to provide additional data to refine local hydrological parameters, to provide a basis for operational water management, and to provide data for assessment of EIS predictions. Year-round monitoring is recommended, though it should not be necessary to implement real-time data acquisition. The Tail Lake water level station may need to be moved to a new location when the Tail Lake Outlet dam is constructed, to allow for land access during operations.

- Doris Lake outflow discharge monitoring: the existing discharge monitoring at Doris Lake outflow will be modified during the construction phase of the project to include stations above and below the water falls. This is necessary to confirm EIS predictions regarding increased flow below the falls due to discharge of treated tailings. Installation of the second station during construction is recommended to allow a reliable rating curve to be developed prior to operations. During

operations, the upper station must be capable of real-time monitoring to allow treated tailings discharge rates to be properly specified.

- Tail Lake outflow discharge monitoring: the existing discharge monitoring at Tail Lake outflow will be continued until the outlet is blocked by dam construction, to provide additional data to refine local hydrological parameters. Once the dam is constructed, the local drainage area will be small enough that flows at the existing station are likely to be too small for continuous monitoring. The treated tailings discharge pipe should be equipped with continuous, real-time monitoring during operation of the tailings facility.

- Roberts Lake and Little Roberts Lake outflows discharge monitoring: The existing discharge monitoring at Roberts Lake and Little Roberts Lake outflows will be continued through construction to provide additional data to refine local hydrological parameters, and more importantly to provide data to confirm EIS predictions with regards to the effectiveness of the fisheries "No Net Loss" plan. Monitoring at these stations could be discontinued once the effectiveness of modifications to the Roberts Lake outlet boulder garden is confirmed.

Additional data from the meteorological monitoring program will be used to characterize annual hydroclimatic conditions, and to provide input to watershed and facility water balances.

4.3 ADAPTIVE MANAGEMENT

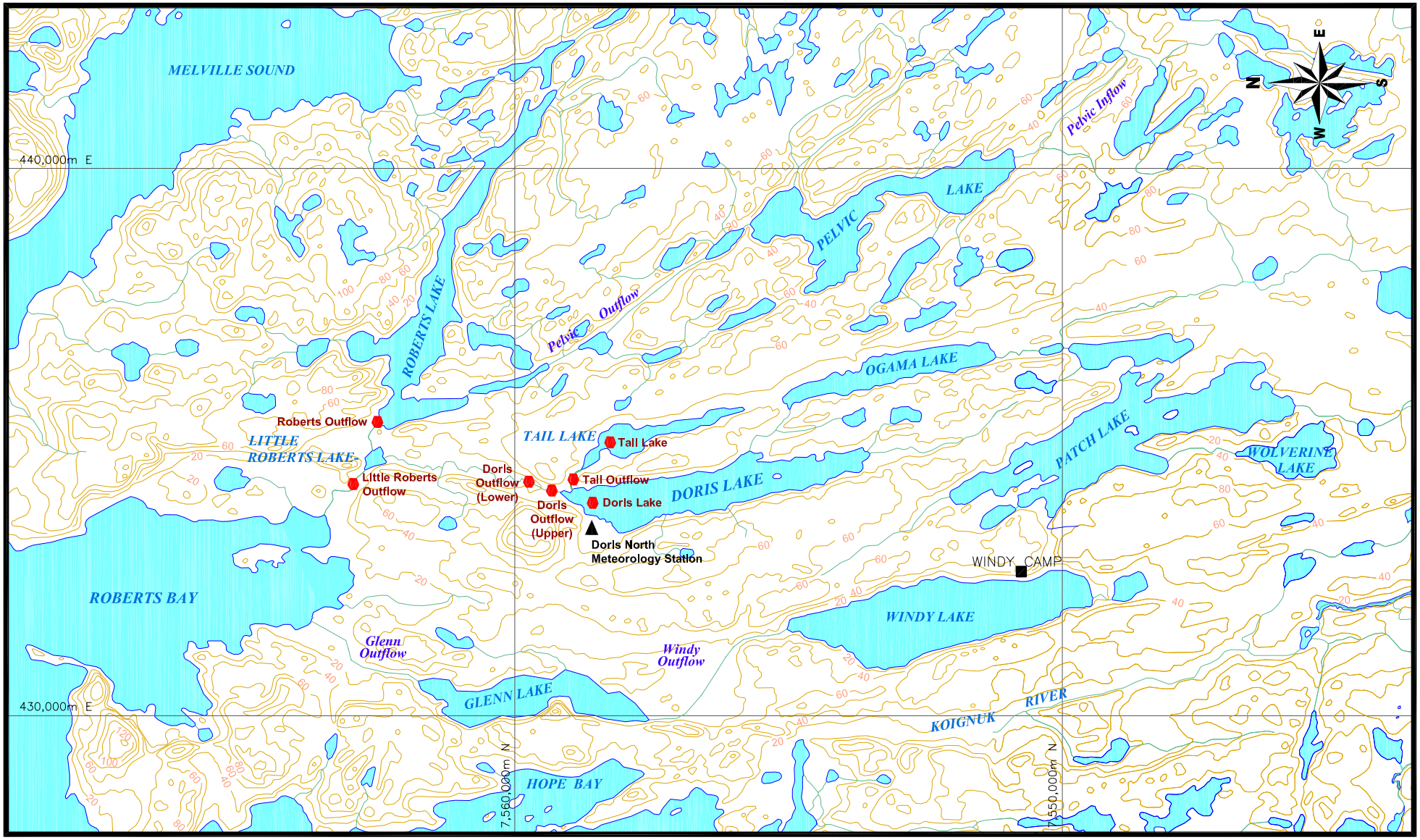
Additional data from the local hydrology monitoring program will be used to reduce uncertainty in local conditions and to provide input into operational water management planning.

The results of real-time monitoring at the Doris Lake and Tail Lake outflows will be used to define allowable discharge rates from the Tail Lake tailings facility. Additional data from the Doris Lake outflow will be used to confirm EIS predictions regarding potential geomorphological effects on the outflow. If adverse effects are indicated, mitigation will be initiated.

The results of water level monitoring at Doris and Tail lakes will be used to confirm EIS predictions regarding changes to water levels during construction and operations. If adverse effects are indicated, mitigation will be initiated.

The results of discharge monitoring at the Roberts Lake and Little Roberts Lake outflows will be used to confirm EIS prediction regarding the effectiveness of the fisheries No Net Loss plan. If the compensation measures are shown not to be effective, additional measures will be explored.

Images used: Miramar Mining Corp 00.jpg -
Drawing path and name: N:\CAD\2006\1373\0026 Roberts Lake\1000\1200\04 - 1730923 hydrogolyMonitoring.dwg Oct. 24, 2006 (3:23 pm)



LEGEND

- ▲ Meteorology Station Location
- ⬢ Hydrology Station Location

2 0 2
Scale KM

REFERENCE

BASE MAP PROVIDED BY RESCAN, 22 JANUARY 2001

NOTE : CONTOUR INTERVAL 20 m

Miramar MINING CORPORATION

TITLE

Proposed Hydrology Monitoring Locations at Doris North Project

Golder Associates
Edmonton, Alberta

PROJECT No.		06-1373-026	FILE No.	1730923
DESIGN	NS	17/10/06	SCALE As shown	REV. 0
CADD	RW	17/10/06		
CHECK				
REVIEW				

Figure: 4

5.0 SITE WATER QUALITY MONITORING

5.1 BACKGROUND

Miramar Hope Bay Limited has developed a water management plan for the Doris North Project. It is a component of the site's Environmental Protection Plan and is supporting document S10 to the October 2006 Water License application.

This plan outlines the management strategy and procedures to be used to manage:

- All storm water that comes in contact with the mine facilities and thus can become contaminated; and

- All water to be released from the Tail Lake tailings containment system.

This Plan is a "living document" and will be reviewed and updated periodically during the mine life to ensure that site experience with water management procedures is captured and shared amongst all operating staff (adaptive management).

Site water quality monitoring will be conducted for several purposes:

- Site Compliance Monitoring – sampling sites expected to be included within the Surveillance Network Program (SNP) that is expected to be included in the water license for the Doris North Project. These sites are to be sampled to allow MHBL mine site personnel to determine whether water from the mine facilities meets standards for discharge, how much water can be discharged and to verify compliance with the discharge standards set under the water license and by the MMER;

- Site Environmental Management Sampling – samples expected to be collected by MHBL to facilitate management of the site water management facilities and to provide data needed by mine operational staff to make operational decisions, such as if snow melt water collected within say the fuel tank containment berm meets all standards for discharge to the tundra or needs to be sent through a filter to separate hydrocarbons as one example;

- Effluent Treatment Process Control – samples taken within the mill to provide data to MHBL operating personnel that will tell them how the mill effluent treatment circuit is performing and to adjust operational controls accordingly to optimize treatment performance;

- Environmental Effects Monitoring of water quality in the downstream aquatic receiving environment to meet obligations under the MMER to monitor for potential mine related effects and to facilitate adaptive management programs to mitigate when adverse effects are found (covered in Section 8 of this Plan).

The primary objective of the Tail Lake water management strategy will be to meet CCME guidelines (Canadian Water Quality Guidelines) for parameters of concern to protect freshwater aquatic life in Doris Creek, downstream of the waterfall, with the possible exception of nitrite.

The following sections provide a summary description of these site water quality monitoring programs.

5.2 SITE COMPLIANCE WATER QUALITY MONITORING

The following section provides a summary description of the proposed water quality compliance sampling, Tail Lake discharge flow control, system, analytical requirements, data management requirements, calculation of allowable discharge flow rates, and, operational and post operational water management activities.

Approved water sampling protocols will be adopted. Water sampling and monitoring for the management of Tail Lake water during each annual open water discharge period are described in the following sections. Proposed site surface water monitoring stations are shown in Figure 5.

5.2.1 Tail Lake

Depth sampling within Tail Lake will be monitored only during periods of active discharge. The intake to the discharge pipeline will be located on a floating barge system within the northern part of Tail Lake, about 1.5 m below the water surface. Three water samples will be obtained from the barge at depths of 1.0 m, 1.5 m and at 2.0 m to represent the intake water quality. The monitoring will initially be undertaken every second day, but may be reduced to weekly or less should the data indicate that the rate of change in water quality is small. Similarly, if the samples taken at different depths are shown to vary little, then sampling may be reduced to duplicate samples at the pipe intake depth.

During winter months when now water is being discharged, samples of Tail Lake water will be taken from the mill reclaim water pipeline on a monthly basis whenever the reclaim water system is operational.

5.2.2 Tail Lake Discharge - End of Pipe Discharge

The Tail Lake discharge will be monitored only during periods of active discharge. The frequency of sampling and analysis is specified in the MMER to be weekly, at least initially, for regulated parameters. However, there is provision to reduce the frequency of analysis for some parameters based on the results obtained. These results will be correlated with the intake water quality results for further confirmation that the intake monitoring results reasonably reflect actual discharge water quality.

5.2.3 Doris Creek Upstream of Discharge Point

Doris Creek upstream of the discharge point will be monitored only during periods of active discharge. The upstream water quality samples for Doris Creek will be obtained upstream of the flow monitoring point, as dictated by site conditions. During open water periods, sampling will initially be undertaken every second day to coincide with the intake monitoring samples. As for the intake sampling, the frequency may be reduced to weekly should the data indicate that the rate of change in water quality is small.

5.2.4 Doris Creek Downstream of Waterfall

Doris Creek downstream of the waterfall will be monitored only during periods of active discharge. The sample location will be established approximately 30 to 50 m downstream of the waterfall, as dictated by site conditions, to ensure that complete mixing of Tail Lake discharge and Doris Creek had occurred. Sampling will initially be undertaken every second day. As the discharge control strategy is refined and proven to meet discharge objectives, the frequency of sampling may be reduced.

5.2.5 Dam Seepage

If evident, toe seepage at the North and South Dams will be sampled and monitored on a weekly basis. If flows become significant, the seepage will be collected and pumped back to Tail Lake.

5.2.6 Mill Effluent

Mill tailings discharge water will be monitored at a location after all of the effluent streams have been combined into a single flow. Initially the water quality will be sampled daily and composited over a two day period. Depending on the variability in the tailings effluent water quality, the composite period may be increased and the frequency of analysis reduced.

5.2.7 Total Suspended Sediment /Turbidity

A total suspended sediment (TSS) monitoring program will be conducted during the construction of the water intake structure in Doris Lake, the boat dock in Doris Lake, and the jetty in Roberts Bay. This will provide a review of the effectiveness of sediment control efforts and ensure compliance with regulatory requirements. The monitoring program will consist of periodic monitoring (e.g., hourly to daily, depending on the construction activity) of total suspended sediments, or its surrogate, turbidity, at reference and test stations in the vicinity of the construction activities (Figure 5). As total suspended sediment measurements require water samples to be sent offsite to a laboratory for analyses, turbidity measurements will be the primary monitoring tool. At the initiation of the construction work, both turbidity measurements and TSS samples will be collected concurrently, to allow derivation of a turbidity-TSS relationship for the construction site. The monitoring results will be compared to regulatory guidelines for protection of aquatic life (CCME), and if guidelines are being exceeded, appropriate mitigation measures will be implemented to reduce the input of suspended sediment into the water

5.3 SITE ENVIRONMENTAL MANAGEMENT SAMPLING

Water Quality samples will be periodically collected by MHBL to facilitate management of the site water management facilities and to provide data needed by mine operational staff to make operational decisions. The expected sampling locations are summarized as follows:

5.3.1 Plant Storm Water Management Pond

Water quality samples will be taken on a weekly basis during open water season from the plant site storm water management pond. The data from this sampling will be used by MHBL to determine whether accumulated snowmelt or precipitation runoff collected within the pond meets standards for direct discharge onto the tundra or whether this water needs to be transferred to the tailings containment system via the mill tailings pump box. No water will be discharged onto the tundra until water sampling has demonstrated that the water is of sufficient good quality to meet discharge standards as established within the water license.

5.3.2 Fuel Tank Farm Collection Sump

Water quality samples will be taken on a monthly basis and prior to any planned discharge during open water season from the fuel tank farm collection sump. The data from this sampling will be used by MHBL to determine whether accumulated snowmelt or precipitation runoff collected within the sump meets standards for direct discharge onto the tundra or whether this water needs to be

transferred to the tailings containment system via the mill tailings pump box. No water will be discharged onto the tundra until water sampling has demonstrated that the water is of sufficient good quality to meet discharge standards as established within the water license. All water discharged onto the tundra from this source will be passes through a hydrocarbon separator filter system.

5.3.3 Roberts Bay Fuel Tank Transfer Facility Collection Sump

Water quality samples will be taken on a monthly basis and prior to any planned discharge during open water season from the Roberts Bay fuel tank transfer facility collection sump. The data from this sampling will be used by MHBL to determine whether accumulated snowmelt or precipitation runoff collected within the sump meets standards for direct discharge onto the tundra or whether this water needs to be transferred to the tailings containment system. No water will be discharged onto the tundra until water sampling has demonstrated that the water is of sufficient good quality to meet discharge standards as established within the water license. All water discharged onto the tundra from this source will be passes through a hydrocarbon separator filter system.

5.3.4 Landfarm Collection Sump

Water quality samples will be taken on a monthly basis and prior to any planned discharge during open water season from the landfarm collection sump. The data from this sampling will be used by MHBL to determine whether accumulated snowmelt or precipitation runoff collected within the sump meets standards for direct discharge onto the tundra or whether this water needs to be transferred to the tailings containment system. No water will be discharged onto the tundra until water sampling has demonstrated that the water is of sufficient good quality to meet discharge standards as established within the water license. All water discharged onto the tundra from this source will be passes through a hydrocarbon separator filter system.

5.3.5 Landfill Collection Sump

Water quality samples will be taken on a monthly basis and prior to any planned discharge during open water season from the landfarm collection sump. The data from this sampling will be used by MHBL to determine whether accumulated snowmelt or precipitation runoff collected within the sump meets standards for direct discharge onto the tundra or whether this water needs to be transferred to the tailings containment system. No water will be discharged onto the tundra until water sampling has demonstrated that the water is of sufficient good quality to meet discharge standards as established within the water license.

5.3.6 Sewage Treatment Plant Effluent

Samples of the treated sewage effluent will be taken on a monthly basis. The data from this sampling will be used by MHBL to monitor the performance of the sewage treatment plant and to adjust operating conditions and procedures as needed to optimize treatment performance. The data will also be used to monitor the quality of this waste water stream in comparison to the predictions made in the Tail Lake water quality model (supporting document S6).

5.3.7 Potable Water Quality

Samples of freshwater drawn from Doris Lake will be collected on a monthly basis from the Doris Lake pump house. Samples of treated potable water will be collected on a monthly basis from various fresh water taps throughout the accommodation camp, dry facilities and offices. These samples will be analyzed for potable water quality parameters including harmful bacteria to monitor potable water quality used by all personnel at the Doris North mine site.

5.4 EFFLUENT TREATMENT PROCESS CONTROL SAMPLING

Samples of treated barren bleed solution within the mill will be take on a regular basis (every two hours) to provide data to MHBL operating personnel that will tell them how the mill effluent treatment circuit is performing and to adjust operational controls accordingly to optimize treatment performance.

5.5 WATER QUALITY ANALYSES

5.5.1 Onsite Laboratory

A low level detection environmental laboratory will be established on site. For convenience the laboratory will be sited near the camp complex, but sufficiently removed from the mill site to prevent contamination. The laboratory will be established prior to commencement of any discharges from Tail Lake.

Suitably qualified personnel familiar with the operation and maintenance of a low level environmental laboratory will be retained to operate the laboratory. Documented standard operating procedures (SOPs) will be used.

The laboratory will be equipped with a low level inductively coupled plasma (ICP) mass spectrophotometer (MS) to enable low level detection analyses of metals. Details of the operation of the laboratory setup and technical information for the ICP-MS are provided in Appendix J of the SRK Water Quality Model (supporting document S6).

MHBL will seek laboratory accreditation with the Canadian Association for Environmental Analytical Laboratories (CAEAL). The requirements include a well-documented quality assurance/quality control (QA/QC) program, as well as demonstrated proficiency in analysis of performance evaluation (PE) samples. The assessment and accreditation will be updated every two years.

A documented internal quality control program will be implemented which will include items such as calibration schedules, use of quality control samples, established control specifications with corrective actions if specifications are not met, data validation, equipment maintenance, and staff training and evaluation programs.

Quality control samples will include:

- blanks – analysis of de-ionized water to ensure that there is no contamination due to laboratory procedure;
- duplicates – a replicate analysis of a homogeneous sample to show method precision;
- spikes – a replicate sample spiked with a known amount of stock standard solution to show both method precision and accuracy and to check for any interferences; and
- reference materials – a National Institute of Standards and Technology (NIST) or other suitable certified reference material to show method accuracy.

All of the above laboratory QC samples will be run regularly. Results will be compared to Data Quality Objectives (DQOs) and be used to flag sample results where DQOs are not met. Control samples will be run at a minimum frequency of 10% of the samples for analysis. Quality records will be kept and will be available for inspection.

5.5.2 Water Quality Parameters

The parameters that will be monitored regularly, and intermittently, at the site are summarised in Table 2. Not all of the parameters will necessarily be measured on-site. Non-critical parameters such as dissolved and total organic carbon would be measured off-site on a less frequent basis.

5.5.3 Third Party Verification

Upon the commencement of operations, MHBL will ensure that an independent, third party laboratory carry out monitoring of Tail Lake and Doris Creek water

quality, above and below the waterfall, three times annually during active discharge to provide verification of MHBL's monitoring results. MHBL will provide the sampling and delivery of samples to the independent, third party laboratory, with copies of the results directly to the NWB and NIRB's Monitoring Officer.

5.6 DORIS CREEK FLOW MONITORING

A pressure transducer will be installed at a suitable location within Doris Creek to facilitate real time monitoring of flow. The pressure transducer will be connected to a programmable logic controller (PLC) that would record flows in Doris Creek and be used to control the discharge flow rate. If initial monitoring suggests that greater accuracy is required, a flow monitoring weir may be constructed in Doris Creek at a location approximately 50 to 100 m upstream of the waterfall, as dictated by site conditions.

Table 2 Parameters to be Measured for Effluent Characterization and Water Quality Monitoring

Deleterious substances and pH[1,2]	Required Effluent Characterization and Water Quality Monitoring Parameters[2,3]:	Required Additional Water Quality Monitoring Parameters	Site-Specific Parameters[6]
Arsenic	Aluminium	Dissolved oxygen[5]	Chromium
Copper	Cadmium	Temperature[5]	Manganese
Lead	Iron		Selenium
Nickel	Mercury[4]		Total phosphorus
Zinc	Molybdenum		Nitrite
Radium 226	Ammonia		Conductivity
Total cyanide	Nitrate		Calcium
Total suspended solids	Alkalinity		Chloride
pH	Total hardness		Magnesium
			Potassium
			Sodium
			Sulphate
			Dissolved organic carbon[5] Total organic carbon [5]

Notes:

1. List of parameters regulated (deleterious substances and pH) as per Schedule 3 of the MMER; concentration limits specified in the regulation (Schedule 4).
2. All concentrations are total values; dissolved concentrations may also be reported; effluent loading (Section 20 of MMER) will also be calculated and reported.
3. List of parameters required for effluent characterization and water quality monitoring as per Schedule 5 of the MMER Analysis of mercury may be discontinued if the concentration of total mercury in effluent is less than 0.10 µg/L in 12 consecutive samples of effluent.
4. In situ measured parameters only for water quality monitoring (in receiving waters).
5. These other parameters are potential contaminants or supporting parameters; analysis is optional and may be added based on site specific historical monitoring data or geochemistry data

During periods of active discharge, the flow level in Doris Creek will be monitored visually on a daily basis and checked against the real time monitoring results. For this purpose, a staff gauge will be installed at the location where the pressure transducer is located. The area will also be inspected on a daily basis for ice and any debris, and cleared as required to ensure accurate monitoring of flows.

5.6.1 Data Management

Monitoring information that will be collected will include:

- The name of the person(s) who performed the sampling or took measurements;
- Date, time, and place of sampling or measurement;
- Date of analysis;
- Name of the person who performed the analysis;
- Analytical methods or techniques used; and
- Results of any analysis.

The results and records of any monitoring, data, or analysis shall be kept for a minimum of the life of the project including closure and post closure monitoring. This time period will be extended if requested by NIRB, DFO, EC or the NWB.

MHBL will set up and maintain a Laboratory Information Management System (LIMS) to record and manage all the water quality monitoring results. MHBL will consult with NIRB's Monitoring Officer for guidance on presentation of monitoring results and records.

6.0 TAILINGS GEOTECHNICAL MONITORING

6.1 BACKGROUND

A geotechnical monitoring program has been included in the final tailings dam design report (SRK 2006a – Design of the Tailings Containment Area). The following is a summary of the proposed geotechnical monitoring and follow-up for the tailings containment area.

The proposed monitoring program includes monitoring of the thermal regime, deformation, and seepage. The level of monitoring will be intensive during the early stages of operations since it is during this period that the dam performance against the design assumptions will be confirmed.

6.2 METHODS

Given the importance of the frozen core for the performance of the dam, the ground temperature inside the dam will be monitored. The ground temperature measurements will determine the extent of the frozen region in the dam and should provide information on the rate of thawing or freezing fronts. Temperature sensors are located in sensitive areas, such as the upstream zone of the dam, the outer shell that will be subject to the fluctuations of the active zone, as well as the abutments. Temperature sensors will be installed both horizontally and vertically, and as much as possible, will be installed as the dams are being constructed.

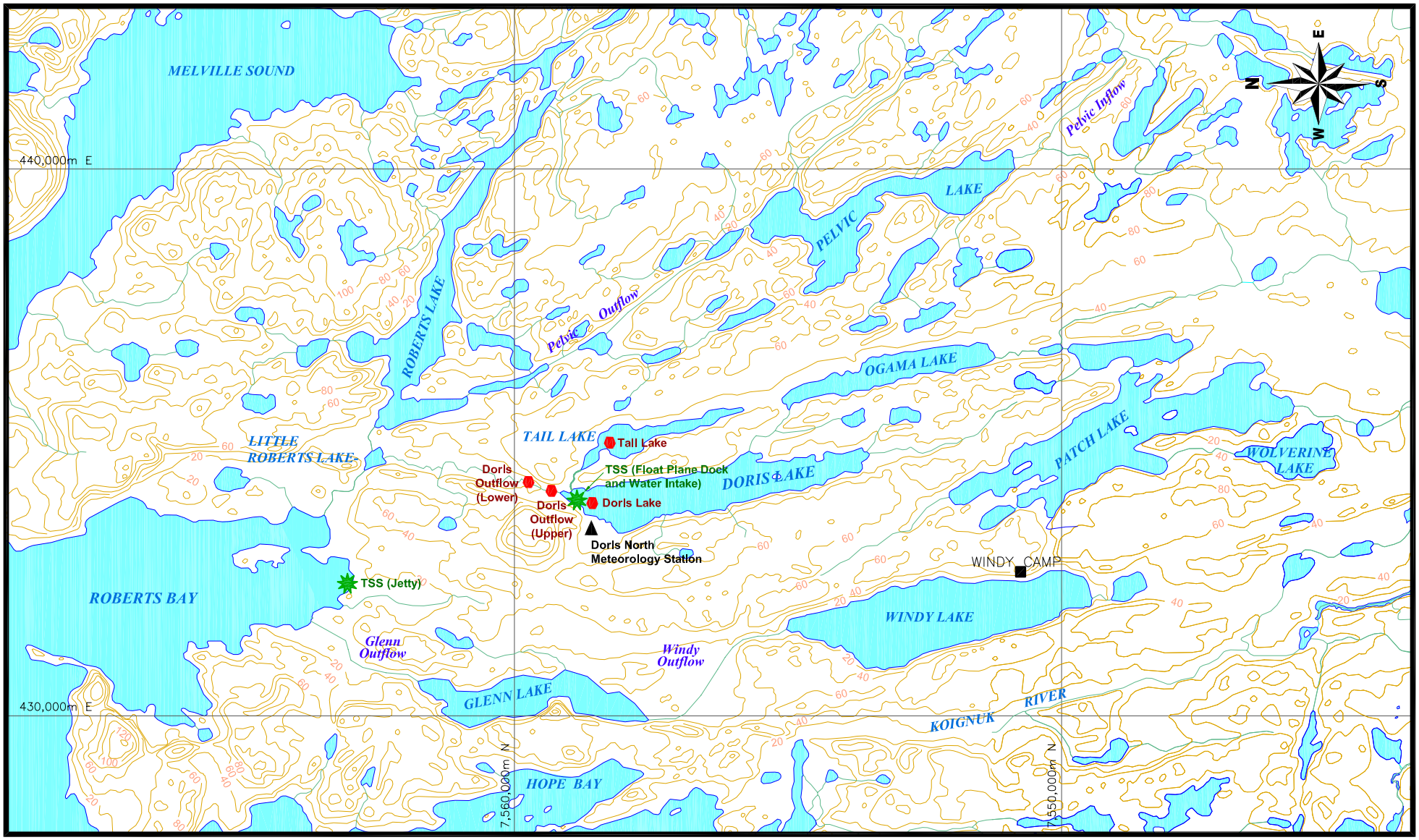
Monthly readings will be manually taken from these sensors to depict the thermal regime in the dams; however, data loggers will be installed to collect continuous data at key locations. This frequency will be maintained until the dam reaches pseudo-steady state conditions. The frequency will then be reduced thereafter but the frequency will have to coincide with the peaks of the annual climatic cycles (i.e., low and high temperatures).

Settlement will be monitored by installing monuments along the crest and sloped faces of the dam. The monuments will be installed during the construction of the dam and will be surveyed on a regular basis to monitor the movement of the dam, both horizontally and vertically. The deformation will be monitored using settlement plates (or similar devices) and, possibly, inclinometers. The frequency of measurements will be higher during the initial stage of the operations, and will be based on the rate at which the talik is developing along the upstream side of the dams. The frequency of the measurements may be decreased as the rate of deformation decreases.

Climatic data will be collected during the operation of the mine. The climatic data will include ambient air temperature, precipitation (rain and snow), wind speed and wind direction as a minimum (see Section 2.3 - climate monitoring). Surveys of snow cover would also be performed to complement the assessment of the thermal regime at the dams.

The dams will be inspected on a regular basis (weekly) to detect damage, deformation or any other anomalies. It is important that the inspections be frequent during the period the lake level is rising and the talik developing. The water level of Tail Lake will also be monitored as part of those regular inspections. Observations of potential seepage will be incorporated in the dam inspection requirements.

Images used: Miramar Mining Corp 00.jpg -
Drawing path and name: N:\CAD\2006\1373\0026 Roberts Lake\1000\1200\05 - 1730924 waterQualityMonitoring.dwg Oct. 24, 2006 (3:23 pm)



LEGEND

- Meteorology Station Location
- Surface water compliance monitoring site (operations)
- Total Suspended Sediment (TSS) monitoring site (construction)

Miramar MINING CORPORATION

2 0 2
Scale KM

REFERENCE

BASE MAP PROVIDED BY RESCAN, 22 JANUARY 2001

NOTE : CONTOUR INTERVAL 20 m

TITLE

Proposed Site Water Quality Monitoring Locations

Golder Associates
Edmonton, Alberta

PROJECT No.		06-1373-026	FILE No.		1730924
DESIGN	NS	17/10/06	SCALE	As shown	REV. 0
CADD	RW	17/10/06			
CHECK					
REVIEW					

Figure: 5

6.3 REPORTING

The data collected from the monitoring program will be compiled and assessed as part of the Annual Monitoring Program for the tailings containment area. The compiled data will be made available to the regulatory agencies as well as other parties that may have interest in such data. The frequency of reporting will be on an annual basis.

6.4 ANNUAL GEOTECHNICAL SITE INSPECTION

6.4.1 Background

In addition to the regular site inspections of the tailings containment area, a suitably qualified professional engineer registered in the Nunavut Territory will make an annual inspection of the tailings dams each summer. The subsequent inspection report will summarize the observations and the review of the available monitoring data (described above). The report will be filed in a timely manner so that, if required, mitigation measures to these structures can be implemented prior to the next freshet.

6.4.2 Maintenance

The dams may require maintenance as the talik develops on the upstream face of the dams. The talik will induce settlements along the upstream face of the dams. The central frozen core is expected to remain frozen and is unlikely to be subject to significant settlement. The final design includes provisions to reduce or minimize these potential settlements along the upstream faces. Regardless of the outcome of the final design, the maintenance program should include placement of additional fill on the upstream face of the dams as settlement develops. The frequency of the maintenance should decrease over time as the thermal regime gradually reaches equilibrium. Regular inspection of the dams will identify any other maintenance issues.

7.0 WASTE ROCK CHARACTERIZATION MONITORING

7.1 QUARRY ROCK MATERIAL

The proposed construction rock quarries have been characterized as having low acid generating and metal leaching potential. In the winter of 2006, a geotechnical drilling program was conducted at all four quarry sites to better define and characterize subsurface rock conditions. The data obtained from this program have been used in the design and operational planning for the four proposed quarry sites.

The quarry outcrops are 15 to 20 m in height and will not be mined below grade to prevent creating permanent ponds at closure. Given the nature of the bedrock geology in the area, it is unlikely that the rock types seen at surface will significantly change as the quarries are developed, given the relatively shallow depth of the proposed quarries (maximum of 20 m in depth). This was validated during the 2006 geotechnical drilling program.

A total of 157 samples was taken from this drill program and subjected to conventional acid base accounting analysis. The data verified that the construction rock from these four quarry sites will be non-acid generating rock. Additional information on this sampling program is attached in supporting document S7 (SRK 2006b – Geochemical Characterization of Quarry Materials).

However there is always a small chance that some unexpected change in rock type will be encountered as the quarries are developed. To ensure that any such change is detected, the quarry faces will be inspected by MHBL's field geologists as they are exposed; if sulphide mineralization is encountered, quarrying will stop until additional testing is completed and the implications assessed. The objective is to ensure that no potentially acid generating rock is used in site construction.

In addition, a program of check ABA (acid base accounting) testing will be conducted on the quarried rock used in site construction to verify that all rock used is non acid generating. A target of collecting 100 samples spread equally over the approximately one million tonnes of rock to be quarried has been established for this follow-up program.

7.2 UNDERGROUND WASTE ROCK

MHBL does not plan to use any of the underground waste rock for construction of the site roads, building pads, laydown areas, tailings dams or other site infrastructure, to ensure that only non-acid generating rock is used in such

construction. Under the mining plan, it is expected that all development waste rock will be used internally as backfill within the mine workings.

In the event that during the mine life, MHBL wishes to use some of the underground waste rock for use on surface for some unspecified purpose, such as cover material in the non-hazardous landfill area, then the following procedures will be used to demonstrate that such rock is suitable for such use:

- Only waste rock that has been demonstrated through confirmatory test work to be non-acid generating and non-metal leaching will be allowed for use on surface;
- Acid Base Accounting test work will be used to demonstrate that underground waste rock is suitable for use on surface. Typically one ABA test for every 25 tonnes of rock to be used will be required to meet this requirement assuming that the 25 tonnes are all from one rock lithology and location; and
- The NPR value derived from the ABA test must exceed 4.0 and the NNP must be greater than +20 Kg/tonne CaCO3 equivalent to meet the threshold of being classified as non-acid generating for this purpose.

8.0 AQUATIC EFFECTS MONITORING

8.1 BACKGROUND AND RATIONALE

As of 6 December 2002, all metal mining projects are required to follow the Metal Mining Effluent Regulations (MMER), which incorporates an Environmental Effects Monitoring (EEM) program. The objective of the metal mining EEM is to evaluate the effects of mine effluent on fish, fish habitat, and the use of fisheries resources. Biological monitoring studies must include a fish survey (fish population and fish tissue analysis) and a benthic invertebrate community survey, and effluent and water quality monitoring studies, which include effluent characterization, water quality monitoring, and sublethal toxicity testing. Aquatic EEM consists of a series of monitoring and interpretation cycles, with the requirements of each cycle dependent upon the findings of the previous cycle.

8.2 STUDY DESIGN

The MMER and, hence, the EEM requirements will apply to the Doris North Project once effluent is discharged at a rate exceeding 50 m3/day. Environmental effects monitoring requirements have been divided into two parts:

- Part 1: Effluent and Water Quality Monitoring Studies; and,
- Part 2: Biological Monitoring Studies.

The effluent and water quality monitoring studies (Part 1) will commence within six months of the Project becoming subject to the MMER (i.e., which will occur once effluent is discharged at a rate exceeding 50 m3/day). MHBL will submit annual reports, summarizing effluent and water quality, and sublethal toxicity results, by 31 March each year. Effluent samples will be collected a minimum of four times per year to determine pH and concentrations of deleterious substances. Water quality samples downstream of the waterfall on Doris Creek will also be collected a minimum of four times per year to measure pH, deleterious substances, dissolved oxygen and temperature. Sublethal toxicity testing will be conducted twice per year for the first three years of discharge, and once per year thereafter, to determine the effects of mine effluent on survival, growth and reproduction of a fish, an invertebrate, an algae and a plant species.

MHBL will submit the design for the initial biological monitoring study (Part 2) within 12 months of becoming subject to the MMER. The first interpretive report will be submitted within 36 months of the becoming subject to the MMER, and the submission date for subsequent monitoring cycles will be determined by the results of the previous cycle. The biological monitoring study includes a benthic invertebrate community survey (ICS), a fish population survey and a fish tissue

study. For each monitoring component, an effect is defined as a statistically significant difference, between reference and exposure areas, in one or more of the measured endpoints.

To facilitate the development of the EEM project for the Doris North Project, MHBL contracted Golder Associates to evaluate available baseline data and to design a monitoring program in accordance with EEM requirements. This preliminary study design, titled "Effluent And Aquatic Monitoring Study Design For Doris North Project, Nunavut, Canada" (Golder 2003; EIS Supporting Document F3), provides details of the proposed monitoring program. The study design document will be updated in consultation with Environment Canada, once the Doris North Project becomes subject to MMER.

The proposed ICS is a Multiple Control/Impact design consisting of five replicate stations in each of two stream reference areas, two reference lakes, two stream exposure areas and one exposure lake (Figure 6). The ICS will compare benthic invertebrate density, taxa richness, diversity and similarity of community structure between exposure and reference areas.

The fish population survey will include analysis of survival, growth, condition and reproduction for two sentinel fish species in the exposure and reference area. As in the ICS, the Multiple control/Impact design for the proposed fish survey will include two stream reference areas, two reference lakes, two stream exposure areas and one exposure lake (Figure 6). The stream survey will target ninespine stickleback, a small-bodied fish species with limited migration, and lake trout will be targeted in the lakes.

A fish tissue study, to determine mercury concentration in muscle tissues, is required if the effluent mercury concentration is greater than 0.10 µg/L. The proposed fish tissue study will consist of lake trout fillets from the exposure and reference areas that will be collected and compared to baseline fish tissue data.

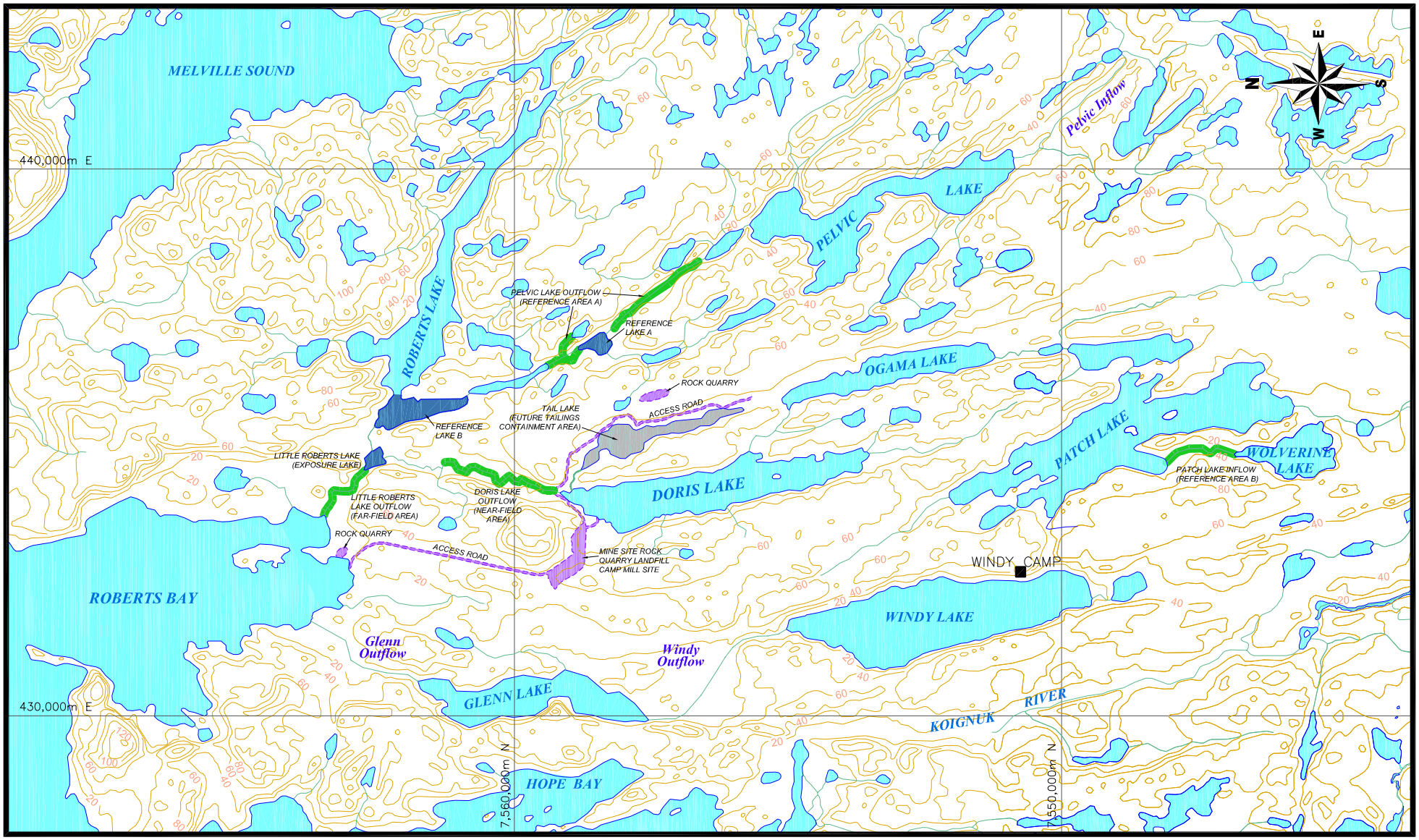
8.2.1 Adaptive Management

All mines regulated by the MMER are required to conduct a minimum of two consecutive biological monitoring cycles. MHBL will submit the second interpretive report within 36 months after the previous report submission if effects are found in two or fewer of the biological monitoring components. If effects are found in all three components, the second interpretive report will be submitted within 24 months.

If effects are not found in two consecutive biological monitoring cycles, MHBL may reduce the monitoring frequency, and will submit a subsequent interpretive report within 72 months of the previous report submission. However, if mine discharge operations or the receiving environment changes, MHBL will conduct a biological monitoring study within 24 months of the change.

If the same effects are found in two consecutive cycles, MHBL will design a monitoring study to determine the geographic extent and the magnitude of the effect, and submit an interpretive report within 24 months of the previous report submission. After the extent and magnitude have been determined, MHBL will design an Investigation of Cause study and submit the interpretive report within 24 months of the previous report submission. The Investigation of Cause study determines the follow-up actions required by MHBL, and the mine will return to conducting biological monitoring studies.

Images used: Miramar Mining Corp 00.jpg -
Drawing path and name: N:\CAD\2006\1373\0026 Roberts Lake\1000\1200\06 - 1730925 environmentalEffectsMonitoring.dwg Oct. 24, 2006 (3:47 pm)



LEGEND

- Sampling areas in lakes
- Sampling areas in streams
- Doris North Project planned access road and facilities

Miramar MINING CORPORATION

2 0 2
Scale KM

REFERENCE

BASE MAP PROVIDED BY RESCAN, 22 JANUARY 2001

NOTE : CONTOUR INTERVAL 20 m

TITLE

Location of Environmental Effects Monitoring (EEM) Sampling Locations

Golder Associates
Edmonton, Alberta

PROJECT No.		06-1373-026	FILE No.	1730925
DESIGN	NS	17/10/06	SCALE As shown	REV. 0
CADD	RW	17/10/06		
CHECK				
REVIEW				

Figure: 6

9.0 FISH MONITORING

9.1 FISHERIES COMPENSATION PLAN

MHBL submitted a Doris North Project "No Net Loss" Plan Revision 5 (Golder Associates Ltd. 2005; EIS Supporting Document F4), which outlines the proposed fisheries mitigation and compensation developed in discussion with the Department of Fisheries and Oceans (DFO) and KIA. The plan is currently being updated to include detailed design drawings for the proposed compensation program as part of permitting requirements under the Fisheries Act.

The fisheries compensation program for the Doris North Project has been designed to ensure that "No Net Loss" in fish habitat productive capacity is achieved as it relates to the DFO policy for the management of fish habitat. The compensation program consists of four main components; these are as follows:

- creation of rearing habitat in Doris Lake;
- creation of additional reef habitat in the vicinity of the Jetty in Roberts Bay;
- creation of rearing habitat in a tributary to Roberts Lake; and,
- enhancement of the stream channel to facilitate fish migration in Roberts Outflow.

Follow-up monitoring to assess the effectiveness of the compensation program will include the following components:

9.1.1 Creation of Rearing Habitat in Doris Lake

As part of the project's compensation for the Harmful Alteration, Disruption or Destruction (HADD) to fish habitat, six shallow near-shore rearing areas in Doris Lake will be created. The key measures of enhancement success for these proposed rearing areas are to demonstrate that these areas have established primary and secondary productivity similar to that in non-enhanced rearing areas of Doris Lake (i.e., reference areas). Following one complete open-water season post-construction, monitoring will be undertaken to assess the quantity and extent of periphyton growth and benthic macroinvertebrate use in these newly created rearing habitats (i.e., treatment areas). "Reference" areas will be sampled for comparison with "treatment" areas. There will be two types of reference areas sampled.

One type of reference area will consist of habitats that are similar to the existing habitat before treatment and the second type of control areas will consist of similar habitats to the treatment areas. Most proposed treatment areas will be placed in shallow areas with sandy substrate. After enhancement, the treatment areas will consist of primarily boulder/rock substrate in shallow waters.

This portion of the monitoring program will be similar to that of a control/impact (CI) design, in which an impacted area (i.e., treatment = "newly constructed rearing habitats") is compared to one or more reference (control) areas (i.e., reference = "existing shallow water rearing areas"). The use of at least three reference sites is similar to the requirements of a "before/after control/impact" design summarized by Minns et al. (1995).

This monitoring will continue annually during the operation of the mine (two years) and will be monitored again in Year-1 and Year-5 from decommissioning. Although the main benchmark of success is establishing suitable primary and secondary productivity, fish sampling would also be conducted to assess use of these areas by juvenile fish, in particular lake trout. Fish sampling methods would include snorkeling, underwater videography and backpack or electrofishing.

9.1.2 Jetty Fish Habitat Compensation Structures

Fisheries compensation for loss of fish habitat associated with the footprint of the jetty will include the provision of additional reef habitat through the construction of under-water rock spurs perpendicular to the jetty and rock spurs out from the shoreline at several locations along Roberts Bay. The key measures of enhancement success will be the establishment of primary and secondary productivity on the enhancement structures (i.e., which provide food source for fish), as well as the documentation of the use of the structures as rearing and feeding habitat for fish. The follow-up study design will be a Control/Impact design similar to that described above for monitoring enhancement structures in Doris Lake. Fish sampling methods will include snorkeling, minnow traps and other trapping methods, as well as underwater video and hydroacoustic gear to monitor fish presence along the enhanced and reference sites.

This monitoring will be conducted beginning the summer following the year of jetty construction and in Year-2 of operation and in Year-2 of active post-closure (i.e., year prior to jetty lowering to below water).

9.1.3 Creation of Rearing Habitat in a Tributary to Roberts Lake

As part of the project's compensation, rearing habitat will be created in a tributary to Roberts Lake. The key measure of enhancement success is to provide access to the newly created rearing habitat. To determine whether unrestricted access for Arctic char juveniles has been provided, backpack electrofishing surveys in the enhanced stream will be conducted annually during the operational period of the mine (two years). This monitoring will also be conducted again in Year-1 and Year-5 from decommissioning.

9.1.4 Enhancement in Roberts Outflow

The main premise behind the proposed enhancement of the boulder garden in Roberts Outflow is to increase accessibility to Roberts Lake for fish migrating upstream from the ocean, and to reduce the mortality of Arctic char that become stranded in the boulder zone. This boulder area restricts fish passage in low to moderate flow years. Available data show that in five out of eight years, there were extended periods of time when fish migration was hindered or blocked. Increasing access through the boulder garden would result in increased Arctic char access to rearing, feeding, and spawning habitat, as well as critical overwintering habitat. One of the key measures of success, therefore, will be the provision of nearly unrestricted passage of Arctic char into Roberts Lake.

Fish fences were used annually to monitor fish migration through the Roberts Outflow boulder garden from 2002 to 2005. This provided a baseline of Arctic char movements and related mortality during a range of flow conditions. After completion of the channel modification (i.e., during the first summer of construction), monitoring of the upstream migration of Arctic char will be undertaken during a moderate or low flow year during the early years of the development to assess fish passage success and mortality during passage through the enhanced section. This will be accomplished by installing fish fences and traps at both the upstream and downstream ends of the boulder garden to count and mark fish at the lower end of the section, and to determine the success of passage by recapturing the fish at the upper end of the section (i.e., at the entrance to the lake). This program will be repeated in Year-9 or Year-10 (depending on flow conditions) to ensure that the enhanced channel is still effective, and to assess the size of the Arctic char run at that time (i.e., reduced mortality and increased access to Roberts Lake should be reflected in increased run size).

It would be difficult to judge success of the enhancement program strictly on numbers of fish returning to Roberts Lake each year, because Arctic char often overwinter in freshwater lakes that are not part of their natal watershed, and the runs can fluctuate widely from year to year. A more direct measure of Arctic char

production in the Roberts Lake system could be obtained by monitoring the out-migration of smolts (i.e., first time migrants to the ocean). In the Canadian Arctic, Arctic char juveniles spend the first four to seven years rearing in the lake system where they were born (based on data from Nauyak Lake; Johnson 1980). The size of the smolt run downstream, which normally occurs in early July, would be an appropriate measure of Arctic char production in Roberts Lake resulting from the improved access and survival of fish passing through the enhanced channel into Roberts Lake.

Based on the advice of DFO, MHBL installed a fish fence in mid June to mid July of 2006 on Roberts Creek below Little Roberts Lake to assess the feasibility of conducting annual counts over a longer-term. Based on the success of the program (i.e., it was possible to keep the smolt fence and trap operational), it appears that monitoring smolt out-migration will provide data useful in assessing the effectiveness of the enhancement facilities in the boulder garden section of Roberts Outflow.

Based on the results of the 2006 smolt out-migration monitoring, the program will be repeated annually for a total of a 10 years to document variations in out-migration run size and composition both prior to, as well as for a long enough period after channel enhancement, to determine any changes in smolt production that could be attributable to the enhancement program. MHBL proposes that the measure of success of the enhancement program would be to increase smolt production in Roberts Lake by an average of 25% over the pre-enhancement average, as the increased number of smolts would rapidly increase in biomass during their periods in the marine environment. Mathieson and Berg (1968) found Arctic char in northern Norway increased in weight by an average of 60.05% per summer season in the marine environment over a five year period. Although growth rates may be lower in the Canadian Arctic, Arctic char put on considerable weight during their forays in the productive marine environment.

A fish sampling program would also be conducted in Roberts Lake during years when the fish fence is operational (i.e., little additional cost, since the sampling crews would be on site to monitor the fish fence); however, given the size of the lake, it would be very difficult to demonstrate that an increase in productivity for Arctic char has occurred. Catch-per-unit-effort (CPUE) will be compared to baseline data. Fish sampling methods would include gill nets for adult fish and modified Arctic fyke nets, beach seines and backpack electrofishers for juvenile fish. Tributaries to Roberts Lake would also be sampled using backpack electrofishers to capture young-of-the-year fish or small juvenile fish seeking forage areas and shelter from predators. During these programs, additional life history information (e.g., length and weight distribution, size at age for juveniles and smolts, etc.) will be collected for Arctic char in the system. It should be noted that mortalities will be kept to a minimum, as the objective of the

enhancement program is to increase the standing stock and production of Arctic char in the system.

9.2 DORIS LAKE WILLOW MONITORING PROGRAM

In addition to the follow-up programs associated with the fisheries compensation program, MHBL has agreed to conduct follow-up monitoring in response to a concern raised by the Department of Fisheries and Oceans relating to potential changes to shoreline habitats along Doris Lake due to dewatering of Tail Lake outflow, and the potential effects on ninespine stickleback rearing habitat. To confirm that the ninespine stickleback habitat along the shoreline where Tail Outflow enters Doris Lake is not adversely affected by the project, MHBL will undertake a detailed survey of the willow habitat along this section of shoreline during the summer of 2007 (i.e., prior to construction). The survey methods will include the establishment of a permanent transect along a portion of the outflow with permanent 1 m by 1 m plots placed along this transect. In addition, permanent photographic survey stations will also be established along this transect as a means of visually documenting any changes in plant community cover and composition. This will provide a basis for comparison with monitoring to be conducted during operation and closure phases of the project. The frequency of monitoring will be conducted once prior to construction, once during operations and once during closure. If unforeseen effects on the shoreline habitat of Doris Lake in this area are identified, additional mitigation or compensation measures will be identified and discussed with DFO, prior to implementation.

9.3 TAIL LAKE FISH TISSUE ANALYSES

Prior to the mine operation, the lake trout in Tail Lake will be removed following the DFO “General Fish-Out Protocol for Lakes to be Lost Due to Mining Developments”, and in a manner that accords with the Inuit Qaujimajatuqangit key tent of respect for fish. It is proposed that the fish would be removed through a netting program using local Inuit fish harvesters. Prior to removal of fish from the lake and possible distribution of the fish for use as human or animal food, lake trout will be collected from Tail Lake. Tissue samples a sample of the fish (i.e., 15 fish) will be analysed for metal contaminants as precautionary testing to confirm the fish are suitable by humans or animal consumption.

10.0 VEGETATION AND SOIL QUALITY MONITORING

10.1 BACKGROUND AND RATIONALE

Monitoring of vegetation quality (i.e., collection of vegetation samples for chemical analysis) will be included as part of the environmental monitoring program for the Doris North Project. The purpose of the sample collection is to determine whether dust from the site is depositing onto nearby plants, and whether the plants are taking up metals (i.e., components of dust) as a result. Information on plants concentrations can then be used to judge the quality of food for wildlife in the area.

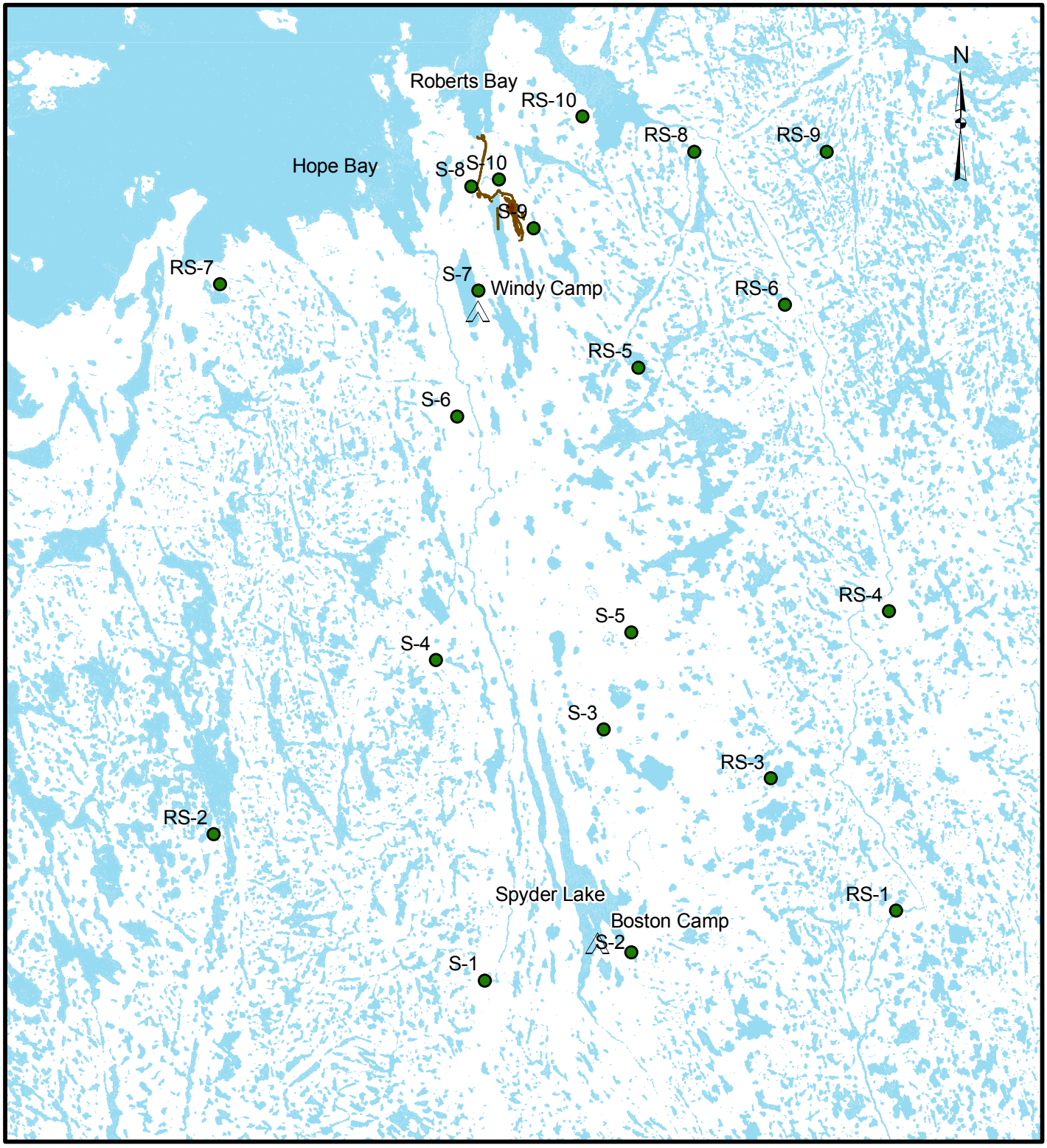
10.2 STUDY DESIGN

The data collection program will focus on the collection of plant tissue (both vascular plants and lichen) samples and soil samples for the analysis of trace metals. Lichen is known to be an indicator plant for air emissions because lichen obtains nutrients from the air. Vascular plants are also recommended for monitoring because they also uptake metals from deposition and from soil. Soil quality can also change due to deposition. Therefore, these three types of samples will be collected prior to operation (completed in 2006), annually during operation, and once during closure.

Sample locations will include areas immediately adjacent to the mine lease area and reference locations not expected to be impacted from the mine site (Figure 7). Concentrations of metals in each media type will be compared between years. Trends will also be examined in conjunction with dust monitoring results to determine whether a relationship between the dust fall and metals concentrations in plants exists.

10.3 ADAPTIVE MANAGEMENT

Triggers for adaptive management are as yet undetermined, however, MHBL will initiate discussions with the GNDoE and Environment Canada to determine appropriate trigger thresholds for adaptive management. Mitigation will be initiated if risks to ecological receptors are indicated. The ecological risk assessment completed for the EIA will be updated to include the vegetation data from the 2006 program. If the results of the operation and/or post-operation monitoring indicate that concentrations in vegetation or soil appear to be increasing, then potential risks to wildlife health will be determined. Mitigation will include source identification and dust reduction as applicable.



Soil and Vegetation Sampling Locations

Doris North Footprint

5 0 5 10 15 Kilometers

SCALE 1:400,000

PROJECT

Miramar Hope Bay Ltd.

Location of 2006 Soil and Vegetation Sampling

REFERENCE

Landsat TM landcover classification courtesy of Environment and Natural Resources, GNWT.
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 13

Golder Associates
Yellowknife, Northwest Territories

PROJECT No. 06-1373-026			SCALE AS SHOWN	REV. 0
DESIGN	CDLM	18 Oct. 2006	FIGURE:7	
GIS	DP	18 Oct. 2006		
CHECK	CDLM	18 Oct. 2006		
REVIEW	CDLM	18 Oct. 2006		

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11.0 WILDLIFE

11.1 BACKGROUND AND RATIONALE

The Wildlife Mitigation and Monitoring Program (WMMP) is designed to determine the direct and indirect effects of the Doris North Project on wildlife and wildlife habitat (Golder 2005b) . Direct effects include habitat loss from project infrastructure and direct mortality from encounters with on-site staff. Indirect effects include a reduction in habitat effectiveness through habitat avoidance near the project site as a result of human presence and sensory disturbance. Alternatively, some species (e.g. wolverine and grizzly bear) may be attracted to the project site due to human presence and camp smells. The area of avoidance or attraction is referred to as a Zone of Influence (ZOI).

11.2 STUDY DESIGN

All wildlife species occurring in the Hope Bay Region can not be studied, therefore the following wildlife Valued Ecosystem Components were selected for monitoring:

- wildlife habitat;
- caribou;
- muskoxen;
- grizzly bears;
- wolverines;
- upland breeding birds (songbirds, shorebirds and ptarmigan);
- waterfowl (including sea ducks); and
- raptors (e.g. falcons, eagles, hawks, ravens and owls).

The general study area for determining project-related effects to wildlife is shown in Figure 8. The study area was selected based on previous data collection surveys, potential zone of influence (e.g. caribou) and location of other ore deposits.

Each survey is setup to obtain reference or control data (i.e. outside the perceived influence of the Project) and treatment data (i.e. influenced by the Project). Monitoring program surveys are species-specific and will be conducted according to accepted protocols.

11.2.1 Wildlife Habitat and Ungulates

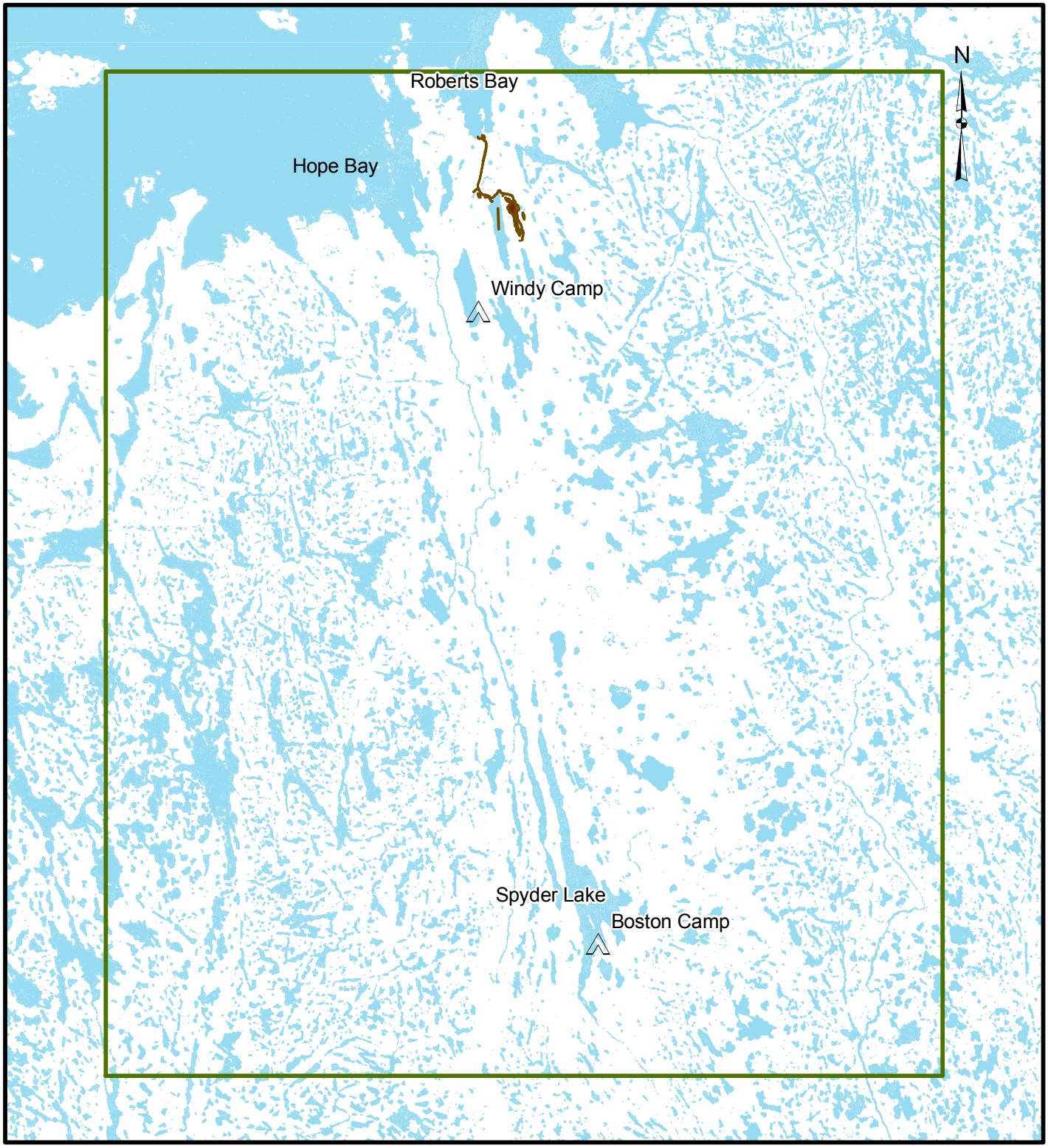
Wildlife habitat will be measured through the use of acquired imagery (Ikonos) to determine if predicted losses to vegetation communities in the EIS match what is actually observed on the landscape. Surveys for caribou and muskoxen include aerial surveys over the entire wildlife study area. Additional caribou surveys include snow tracking to determine interactions with roads and other project infrastructure and behavioural observations to determine activity budgets.

11.2.2 Carnivores

Surveys for grizzly bears include seasonal forage plots to determine grizzly bear habitat use during spring and late summer. MHBL is currently in discussions with the GNDoE and the Kitikmeot Inuit Association (KIA) about the use of hair-snagging and DNA analysis as a protocol for grizzly bear monitoring. Wolverine surveys currently consist of snow-track counts throughout the study area (Figure 8) and MHBL is currently in discussions with the GNDoE and KIA about the use of hair-snagging and DNA analysis as a protocol for wolverine monitoring as well.

11.2.3 Birds

Surveys for upland breeding birds include breeding bird point counts and PRISM plots throughout the study area. Aerial surveys for waterfowl will be conducted in blocks that represent treatment (i.e. Doris North Project) and control areas throughout the wildlife study area (Figure 8). Surveys for raptors consist of aerial surveys in June to determine species occupancy of historic nest sites followed by a second survey in August to determine reproductive success (i.e. presence of eggs and/or chicks).



Wildlife Study Area

Doris North Footprint

5 0 5 10 15 Kilometers

SCALE 1:400,000

PROJECT

Miramar Hope Bay Ltd.

Wildlife Study Area

REFERENCE

Landsat TM landcover classification courtesy of Environment and Natural Resources, GNWT.
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 13

Golder Associates
Yellowknife, Northwest Territories

PROJECT No. 06-1373-026			SCALE AS SHOWN	REV. 0
DESIGN	CDLM	18 Oct. 2006	FIGURE:8	
GIS	DP	18 Oct. 2006		
CHECK	CDLM	18 Oct. 2006		
REVIEW	CDLM	18 Oct. 2006		

Project: N:\2006\GIS\05-1373-008 Miramar\ - Plot: N:\2006\GIS\05-1373-008 Miramar\PDF\

11.3 WILDLIFE INCIDENTS AND MORTALITY

A wildlife sightings log will be maintained on-site through the use of sightings cards and a wildlife awareness poster that are posted in both the Windy Lake camp and Boston camp. Wildlife incidents and mortality will be monitored through various wildlife surveys of infrastructure including the tailings impoundment area, road and landfill.

11.4 ADAPTIVE MANAGEMENT

Adaptive management triggers are species-specific and are outlined in the WMMP (Golder 2005b). In general, the adaptive management measures are triggered if measured results contradict predictions to wildlife VECs as determined in the EIS.

12.0 REFERENCES

Golder Associates Ltd. (Golder). 2003. Effluent and aquatic monitoring study design for Doris North Project. Prepared for Miramar Hope Bay Ltd. Golder Report No. 03 1370-009: 51 p. (Miramar Doris North Project EIS Supporting Document F3)

Golder. 2005a. Doris North Project "No Net Loss" Plan – Revision 5 – October 2005. Prepared for Miramar Hope Bay Ltd. Golder Report No. 05-1373-008-8000: 72 p + 8 photographic plates + 5 app. (Miramar Doris North Project EIS Supporting Document F4).

Golder. 2005b. Wildlife Mitigation and Monitoring Program for the Doris North Gold Mine Project. Golder Report No. 05-1373-008-7700. 72 p + 1 app. (Miramar Doris North Project EIS Supporting Document F1).

Johnson, L. 1980. The Arctic charr, Salvelinus alpinus. Pages 15-98 In E.K. Balon (ed.). Charrs: Salmonid fishes of the genus Salvelinus. Dr. W. Junk Publishers, The Hague, Netherlands.

Mathison, O.A., and M. Berg. 1968. Growth rates of char, Salvelinus alpinus (L), in the Varnes River, Troms, Northern Norway. Institute of Freshwater Research, Drottn ingholm Report 48:177-186.

Minns, C.K., J.D. Meisner, J.E. Moore, L.A. Greig, and R.G. Randall. 1995. Defensible methods for pre- and post-development assessment of fish habitat in the Great Lakes. I. A prototype methodology for headlands and offshore structures. Canadian Manuscript Report of Fisheries Aquatic Sciences. 2328: xiii + 65 p.

SRK Consulting Engineers and Scientists (SRK). 2006a. Design of the Tailings Containment Area, Doris North Project, prepared by SRK Consultants Ltd, dated October 2006.

SRK. 2006b. Design of the Surface Infrastructure Components, Doris North Project, prepared by SRK Consultants Ltd, dated October 2006.