NEWMONT
NORTH AMERICA

DORIS NORTH GOLD MINE PROJECT

Monitoring and Follow-up Plan

May 2011

Prepared by:

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Prepared for:

Nunavut Impact Review Board
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DORIS NORTH GOLD MINE PROJECT
MONITORING AND FOLLOW-UP PLAN

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Glossary and Abbreviations

Glossary and Abbreviations

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

ABA	Acid Base Accounting
AEMP	Aquatic Effects Monitoring Program
ASTM	American Society for Testing and Materials
BC MOE	British Columbia Ministry of Environment
CCME	Canadian Council for Ministers of the Environment
CEPA	Canadian Environmental Protection Act
DFO	Department of Fisheries and Oceans
EC	Environment Canada
EEM	Environmental Effects Monitoring
ESR	Environment and Social Responsibility
GN	Government of Nunavut
GN DOE	Government of Nunavut, Department of Environment
HBGB	Hope Bay Greenstone Belt
HBML	Hope Bay Mining Limited
HC	Health Canada
ICS	Invertebrate Community Survey
INAC	Indian and Northern Affairs Canada
KIA	Kitikmeot Inuit Association
MHBL	Miramar Hope Bay Limited
MMER	Metal Mining Effluent Regulations
NAAQOs	National Ambient Air Quality Objectives
NAPEGG	Nunavut Association of Professional Engineers, Geologists, and Geophysicists
NAPS	National Air Pollution Surveillance Network
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
OMS	Operation, Maintenance and Surveillance
RSA	Regional Study Area
SFE	Shake Flask Extraction
TIA	Tailing Impoundment Area
TSP	total suspended particulates
US EPA	United States Environmental Protection Agency
VEC	Valued Ecosystem Component
WMMP	Wildlife Mitigation and Monitoring Program

1. Introduction

1. Introduction

The Doris North Gold Mine Project (the Project) is located approximately 125 km southwest of Cambridge Bay, Nunavut, on the south shore of Melville Sound (Figure 1-1). The nearest communities are Omingmaktok (75 km to the southwest of the property), Cambridge Bay, and Kingaok (Bathurst Inlet; 160 km to the southwest of the property).

The Project will consist of an underground gold mine, associated mill site, roads, buildings, camp and other necessary infrastructure. All necessary permits, licences, and authorizations for development have been received for the Project. The Project is currently under construction and is anticipated to move into operations in 2012. Figure 1-2 presents the existing and future infrastructure for the Doris North Project.

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 (NIRB) and Type A Water Licence from the Nunavut Water Board (NWB)) and as a result of stakeholder consultation. This report summarizes the environmental monitoring programs that are currently in place for the Doris North Project in fulfillment of Section 4.0, Item 32 of the Doris North Gold Mine Project Certificate, issued by the Nunavut Impact Review Board (NIRB) on September 15, 2006, which states:

1. Section 4.0. Item 32. Prior to the commencement of operation Hope Bay Mining Limited (HBML) shall have a complete Environment, Health and Safety Management System in place which includes the following: Wildlife Mitigation and Monitoring Plan; Environmental Protection Plan; Emergency Response and Spill Contingency Plan; Occupational Health and Safety Plan; Reclamation Plan; Education and Orientation Plan; Human Resources Plan; Inuit Involvement Plan; Community Relations Plan; Monitoring and Follow-up Plan; and Auditing and Continuous Improvement Plan. When complete, these Plans shall be forwarded to NIRB's Monitoring Officer.
2. Section 4.0. Item 32. Commentary. HBML is expected to contact federal and territorial Government Departments immediately regarding the preparation of these plans. The GN, in particular, is involved with the approval of many of the plans and is encouraged to designate an official to approve the plans as applicable. Please see Appendix E for a list of GN contacts. NIRB considers the Environmental, Health and Safety Management System to be complete once HBML has submitted all required plans. NIRB expects the Environmental Health and Safety Management System to be completed prior to the commencement of construction.

The Monitoring and Follow-up Plan is a component of the Environment, Health and Safety Management System for the Doris North Mine. The Environment and Social Responsibility (ESR) department of HBML has overall responsibility for the implementation of the programs outlined in this document, with support from Rescan Environmental Services Ltd. (Rescan) and SRK Consulting Inc. (SRK). This Monitoring and Follow-up Plan replaces the April 2007 Monitoring and Follow-Up Plan (MHBL 2007). This Plan will be updated as required.

Figure 1-1

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Regional Location of the Doris North Project

Figure 1-1

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PROJECT #**1009-002-01** GIS # **HB-15-042** March 3, 2011

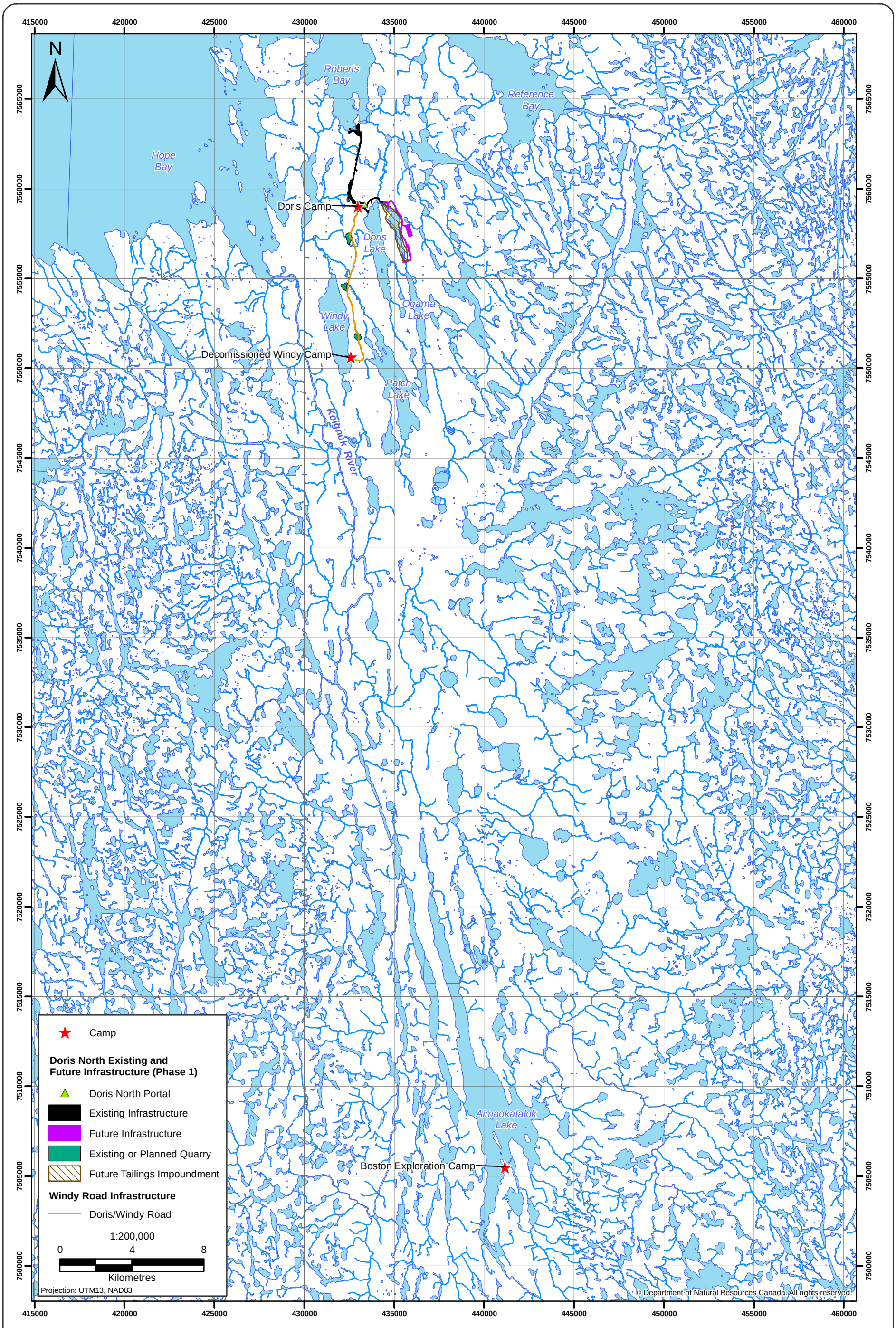

Figure 1-2

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Existing and Future Infrastructure, Doris North Project

Figure 1-2

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1.1 PURPOSE AND SCOPE OF THE FOLLOW-UP MONITORING PLAN

The purpose of the Monitoring and Follow-Up Plan is to provide a consolidated summary of the monitoring and follow-up programs currently in place for the Doris North Project, as outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006) and the Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007). Some monitoring programs are also designed to conform to additional regulatory requirements (e.g. fisheries authorizations), and this is noted where applicable.

The monitoring and follow-up programs are intended to collect high quality data to:

- Enable HBML to monitor and report on performance compliance with all environmental legislation, regulations, Licenses, Permits, Leases and/or Authorizations applicable to ongoing operation of the Doris North Project;
- Enable HBML to obtain good quality data on environmental conditions at and around the mine to facilitate appropriate management of HBML's activities and facilities at the Doris North Project;
- Allow HBML to check the validity of the assumptions that were made during the design phase of the project and provide the data needed to adaptively manage its activities if such assumptions are shown to be incorrect; and
- Allow HBML to check the validity of the environmental impact assessment predictions made during the environmental assessment process and modify its activities if measured impacts are worse than predicted.

These procedures are an integral component of the overall Environmental Protection Plan (EPP) for the Doris North Project and will be periodically reviewed and updated as Doris North moves into operations and final closure and reclamation. This Plan is a "living document" and will be reviewed and updated periodically during the mine life to ensure that site experience with monitoring and follow up activities are captured and shared amongst operating staff (adaptive management).

This Monitoring and Follow-Up Plan provides a summary of existing programs, and will be provided to regulatory agencies, the land owner (Kitikmeot Inuit Association (KIA)), and HBML operating staff.

The following monitoring programs are summarized in this document:

- Air Quality Monitoring;
- Meteorological Monitoring;
- Noise Monitoring;
- Hydrology Monitoring;
- Site Water Quality Monitoring;
- Tailings and Site Geotechnical Monitoring;
- Quarry and Underground Waste Rock Monitoring;
- Waste Management Monitoring;
- Construction and Reclamation Monitoring;
- Aquatic Effects Monitoring;

- Fish Monitoring;
- Vegetation Monitoring; and
- Wildlife Monitoring.

1.2 CROSS REFERENCE TO DETAILED MONITORING PLANS

This Plan is intended to be a compilation and summary of the individual monitoring plans developed for the Doris North Project. The reader is referred to the following supporting documents for more detailed information regarding the monitoring programs summarized in this document:

- SRK. 2006. Design of Surface Infrastructure Components, Doris North project Nunavut, Canada. Prepared for Miramar Hope Bay Ltd. by SRK Consulting Inc. October 2006.
- Golder. 2007. Doris North Project No Net Loss Plan, Revision 6, 2007. Prepared for Miramar Hope Bay Ltd. by Golder Associates Ltd. December 2007.
- SRK. 2007. Design of the Tailings Containment Area, Doris North Project, Hope Bay, Nunavut, Canada. Prepared for Miramar Hope Bay Ltd. by SRK Consulting Inc. March 2007.
- SRK. 2009. 2009 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. November 2009.
- SRK. 2009. Bay Project, Quarry Monitoring. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. November 2009.
- SRK. 2009. Hazardous Waste Management Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. Sept 2009.
- SRK. 2009. Doris North Infrastructure Project Sewage Management Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. March 2009.
- EBA. 2010. Quarry A Landfill Management Plan, Doris North Property, NU. Prepared for Hope Bay Mining Ltd. by EBA Engineering Consultants Ltd. June 2010.
- Rescan. 2010. Doris North Gold Mine Project: Aquatic Effects Monitoring Plan. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. February 2010.
- Rescan. 2010. Doris North Gold Mine Project: Noise Abatement Plan. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. December 2010.
- Rescan. 2010. Hope Bay Belt Project: Updates to the Doris North No Net Loss Plan for Tail Outflow. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. September 2010.
- Rescan. 2010. Hope Bay Belt Project: Updates to the Doris North No Net Loss Plan for Tail Lake. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. September 2010.
- SRK. 2010. Incinerator Management Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. July 2010
- SRK. 2010. Doris North Land Farm Management and Monitoring Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. May 2010.
- SRK. 2010. Doris North Project Interim Water Management Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. December 2010.
- SRK. 2010. Doris North Waste Rock and Ore Management Plan. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. December 2010.

- SRK. 2010. Quarry A, B and D Management and Monitoring Plan, Revision 01. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. October 2010.
- Rescan. 2011. Doris North Gold Mine Project: 2010 Air Quality Management Plan. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. March 2011.
- Rescan. 2011. Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Plan. Prepared for Hope Bay Hope Bay Mining Limited by Rescan Environmental Services Ltd. April 2011.

The following reports discuss the monitoring programs and provide additional details of the monitoring methods that were completed for 2010:

- Rescan. 2010. Doris North Gold Mine Project: Roberts Bay Jetty Fisheries Authorization Monitoring Report. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. December 2010.
- Rescan. 2010. Doris North Gold Mine Project: Air Quality Compliance Report, Q1 and Q2, 2010. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. November 2010.
- Rescan. 2010. Doris North Gold Mine Project: 2010 Meteorology Compliance Report. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. November 2010.
- Rescan. 2010. Doris North Gold Mine Project: Hydrology Compliance Report, 2010. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. November 2010.
- Rescan. 2010. Doris North Gold Mine Project: Incinerator Stack Testing Compliance Report for Section 4 Item 30 of the Project Certificate. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. February 2010.
- HBML. 2011. 2010 2AM-DOH0713 Type A Water Licence Annual Report. Hope Bay Mining Ltd. March 2011.
- HBML. 2011. 2010 2AM-DOH0713 Type A Water License Construction Monitoring Report Doris North Project Nunavut Water Board. Hope Bay Mining Ltd. March 2011.
- Rescan. 2011. 2010 Doris North Mine Site Fisheries Authorization Monitoring Report. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. January 2011.
- Rescan. 2011. Doris North Gold Mine Project: 2010 Aquatic Effects Monitoring Program Report. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. May 2011.
- Rescan. 2011. Doris North Gold Mine Project: Air Quality Compliance Report, Q3 and Q4, 2010. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. April 2011.
- Rescan. 2011d. Doris North Gold Mine Project: 2010 Noise Compliance Report. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. March 2011.
- Rescan. 2011. Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Program, 2010. Prepared for Hope Bay Hope Bay Mining Limited by Rescan Environmental Services Ltd. January 2011.
- SRK. 2011. 2010 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. March 2011.

2. Air Quality and Meteorology Monitoring

2. Air Quality and Meteorology Monitoring

2.1 BACKGROUND AND RATIONALE

HBML is committed to complying with the air quality monitoring requirements outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006; NIRB 2006):

1. Section 4.0. Item 30. HBML will install and fund an atmospheric monitoring station. This station and its location shall be developed in consultation with Environment Canada and Health Canada air quality officials and focus on particulates of concern generated at the mine site. The results of air-quality monitoring are to be reported every six months to NIRB through the Monitoring Officer, and from there to all of the parties.
2. Section 4.0. Item 30. Commentary: NIRB expects that Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury will apply and should be followed including stack testing of incinerators.
3. Appendix A. Air Quality. Item 1. Use of an aggressive fuel conservation effort;
4. Appendix A. Air Quality. Item 2. Use of a brine solution for dust suppression in the underground mine;
5. Appendix A. Air Quality. Item 3. Use of coarse rock in roads, airstrip, building pads and laydown areas to minimize dust during construction;
6. Appendix A. Air Quality. Item 4. Driving at designated speeds on site roads;
7. Appendix A. Air Quality. Item 5. Application of water to roadways to reduce dust from ore and waste rock haulage and grading to a minimum;
8. Appendix A. Air Quality. Item 6. Installation of dust covers, sonic sprays, etc. to suppress dust generation from equipment in the crushing facility;
9. Appendix A. Air Quality. Item 7. Installation of a dust scrubber on the smelting off-gas stream;
10. Appendix A. Air Quality. Item 8. Submerged release of tailings deposition to avoid tailings dust emissions;
11. Appendix A. Air Quality. Item 9. Installation of a waste oil burner unit equipped with a settling tank and filter system for particulate removal from the waste oil;
12. Appendix A. Air Quality. Item 10. Regular servicing of all mobile and stationary engines to maintain efficiency;
13. Appendix A. Air Quality. Item 11. Proper equipment maintenance; and
14. Appendix A. Air Quality. Item 12. Adherence to all permits, authorizations and approvals.
15. Appendix A. Vegetation. Item 3. Implement dust suppression methods (i.e., spraying with water) on the airstrip and roads during the snow/ice free period;
16. Appendix A. Vegetation. Item 4. Apply water to roadways to reduce dust from ore and waste rock haulage and minimizing grading;
17. Appendix A. Vegetation. Item 5. Install dust covers and sonic sprays to suppress dust generation from equipment in the crushing facility;

18. Appendix A. Vegetation. Item 6. Install a dust scrubber on the smelting off-gas stream;
19. Appendix A. Caribou. Item 5. All diesel powered equipment will meet emission guidelines;
20. Appendix A. Caribou. Item 8. Implement dust suppression methods (i.e., spraying with water) on the airstrip and roads during the snow/ice free period [permission has been received to use EK-35 as a dust suppressant];
21. Appendix A. Caribou. Item 9. Install dust covers and sonic sprays to suppress dust generation from equipment in the crushing facility;
22. Appendix A. Caribou. Item 10. Install a dust scrubber on the smelting off-gas stream;

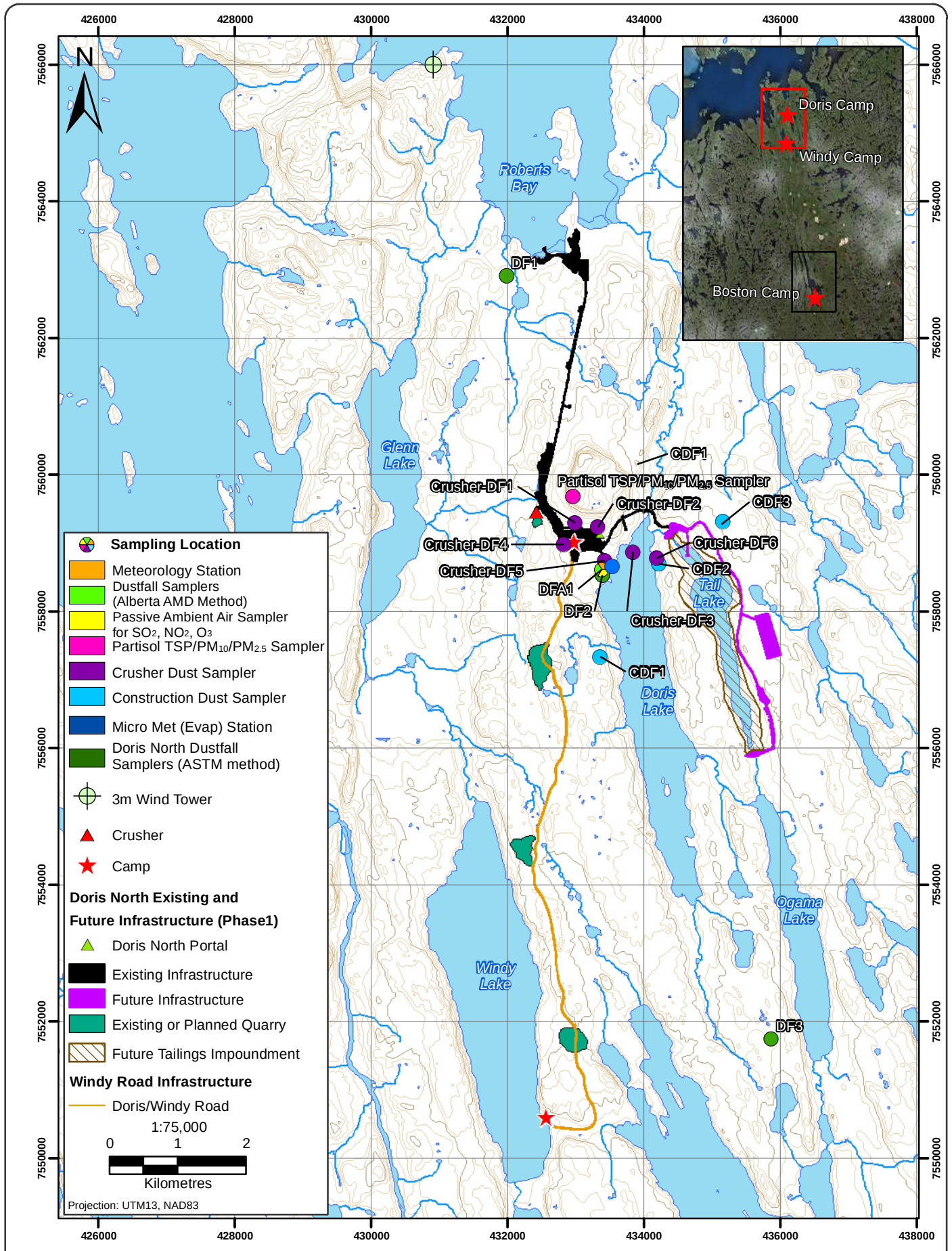
In addition, the Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007) outlines to following air quality monitoring requirements:

23. Part G. Item 6. The Licensee shall ensure that any on-site incinerator meets the requirements of the Canada-Wide Standards for Dioxins and Furans and Canada-Wide Standards for Mercury emissions.
24. Part G. Item 7. The Licensee shall submit to the Board for review by May 1, 2008 an Incineration Management Plan in conjunction with Part G, Item 9 [the Landfill Management Plan].
25. Schedule B. Item 12. [The Annual Report shall include] Annual Incineration stack testing results.
26. Part D. Item 8. The Licensee shall submit an annual Construction Monitoring Report no later than March 31 in the year following the calendar year being reported. The report shall be developed in accordance with Schedule D Item 1.
27. Schedule D. Item 1. The Construction Monitoring Report referred to in Part D, Item 8 shall include the following:
    i. Monitoring of dust generation and use of water by the contractor to manage dust emissions from crushing and construction activity.

2.2 STUDY DESIGN

In compliance with Project Certificate, the current ambient air quality program consists of suspended particulate matter, dustfall, sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3) monitoring and the results are reported every 6 months (Table 2.2-1, Figures 2.2-1 and 2.2-2). This monitoring program will continue during the remainder of construction, operations and closure. Samples will be analyzed at an accredited laboratory and will be compared with the Nunavut Environmental Guideline for Air Quality Sulphur Dioxide and Suspended Particulates, and the National Ambient Air Quality Objectives (NAAQOs) established under the Canadian Environmental Protection Act (CEPA).

A passive air sampling system is located beside the Doris meteorology station at the north end of Doris Lake (Figure 2.2-1). This sampler system monitors SO_2, NO_2 and O_3 in the air through the process of diffusion through a permeable membrane into a static air cartridge. The sampler cartridges are exposed for approximately 30 days prior to analysis. Two additional passive sampling systems (replicate samples) are located beside the Boston meteorology station as part of the wider Hope Bay Belt monitoring area.



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2011 Meteorology, Air Quality and Dustfall Monitoring Stations, North End of Belt, Doris North Project

Figure 2.2-1

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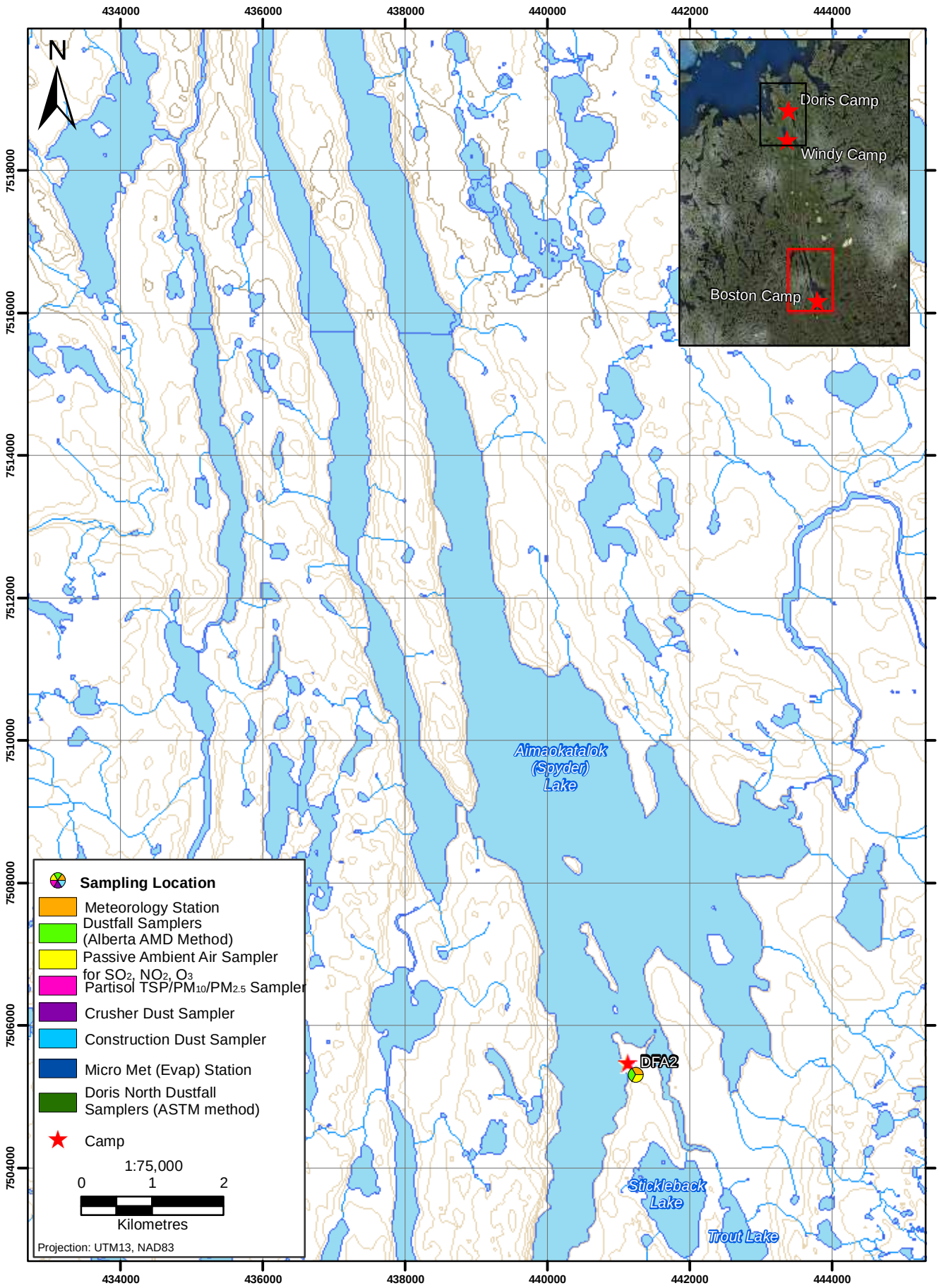

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2011 Meteorology, Air Quality and Dustfall Monitoring Stations, South End of Belt, Doris North Project

Figure 2.2-2

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Table 2.2-1. Summary of Air Quality and Meteorology Monitoring Program

Area	Parameter	Location	Frequency	Mining Phase
Doris North	Wind speed @ 10 m	Mill Site	Continuous	Construction, Operation, Closure, Post-closure
	Wind direction @ 10 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
	Rainfall (tipping bucket rain gauge)	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
	Evaporation	Doris Lake	Summer continuous	Construction, Operation, Closure
	Dustfall - local crusher, construction	Various around Doris Project	Monthly	Construction, Operation, Closure
	Particulate matter (TSP, PM_{10}, $PM_{2.5}$)	Mill Site	Intermittently (sampling every 6^{th} day)	Construction, Operation, Closure
	Incinerator Emissions - Dioxin, Furan, Mercury	Robert's Bay	Annual or periodic upon approval	Construction, Operation, Closure
Boston	Wind speed @ 10 m	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Wind direction @ 10 m	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Temperature @ 10 m	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Relative humidity @ 10 m	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Solar radiation @ 2.5 m	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Snow Depth	Above the Portal	Hourly, Daily	Construction, Operation, Closure, Post-closure
	Rainfall (tipping bucket rain gauge)	Above the Portal	Hourly and Daily during Summer	Construction, Operation, Closure
	Passive monitoring for SO_2, NO_2 and O_3,	Above the Portal	Monthly	Construction, Operation, Closure
	Dustfall	One station above the portal.	Monthly	Construction, Operation, Closure

The suspended particulate matter monitoring includes monitoring of total suspended particulates (TSP), PM_{10} (particles of 10 µm or less in aerodynamic diameter) and $PM_{2.5}$ (particles of 2.5 µm or less in aerodynamic diameter). The samplers are located on Doris Butte but access restrictions prevented regular equipment checks and timely repair; therefore, alternate locations are being assessed for relocation of the samplers. Samples are collected using a Partisol plus ambient air sampler that draw an airstream through a size-selective inlet through the filter for 24 hours. This program follows the

6-day sampling schedule determined by the National Air Pollution Surveillance Network (NAPS). Since Nunavut does not have established siting requirements for ambient air samplers, the siting criteria from the British Columbia Ministry of Environment (BC MOE) and the US Environmental Protection Agency (US EPA) methods were used for location and design of the station.

Seven dustfall monitoring stations monitor the settleable particulate matter in the vicinity of the Doris Project site. These stations will be monitored throughout the construction, operations and into closure and reclamation. Two dustfall monitoring stations located at the Doris and Boston meteorology stations are active all year long and siting, collection and measurement of dustfall at this station uses the Alberta Environment method (Alberta AMD 1989). The other 5 dustfall monitoring stations (3 in the Doris Project area, 1 west of Patch Lake and 1 north of Aimaokatalok Lake) are active during summer months (May to September) (Figure 2.2-1) and use the American Society for Testing and Materials (ASTM) standard methodology was used for the siting, collection, and measurement of dustfall. The dustfall samplers are exposed for 30 days.

Construction and crusher dustfall monitoring was implemented in 2011. Three stations were selected within the expected zone of deposition at progressively further distances from Quarry 2 and the main construction areas. These stations will remain active through the construction phase.

An incinerator stack emissions testing program was implemented in mid-October 2009 to collect samples for dioxin, furan and mercury. Prior to the beginning of the stack emissions testing program, the general methodology was reviewed with Mr. Dave Fox (Air Protection Management Analyst North, Environment Canada, Yellowknife). The samples were analyzed at an accredited laboratory. These parameters were compared with the Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury (CCME 2000, 2001). The Doris incinerator stack emissions did not exceed the mercury emissions standard; however, the dioxin and furan emissions exceeded the Canada Wide Standards. The emissions test was not conducted in 2010 because HBML decided to implement a number of actions in attempt to improve emissions quality. These actions included: enclosing the incinerator in a building, refurbishing the incinerator to factory specification, implementing a plastic recycling and reduction program to reduce plastics entering the incinerator waste stream, and certification of incinerator operators by the manufacturer to improve incineration efficiency. The next stack testing program is scheduled for September 2011.

The Doris North meteorological station has been in operation since May 2003 and will continue at the Doris North meteorological station during construction, operations, closure and post closure of the Project (Figure 2.2-1). The station consists of a standard 10 m tower with a radio system installed to allow for observation of instantaneous meteorological conditions and downloading the data remotely from Doris camp. The Doris North station has wind speed, wind direction, temperature, relative humidity, solar radiation, rainfall and barometric pressure sensors. Data is records hourly and daily averages of all parameters and is reported annually. Prior to closure and reclamation, HBML will consult with appropriate agencies including INAC and EC, to discuss the possibility of the continued operation of the stations, including transfer of ownership, for the collection of regional meteorological data.

For the full description of the air quality and meteorology monitoring program refer to the Doris North Gold Mine Project: Air Quality Management Plan (Rescan 2011b) and the Doris North Gold Mine Project: 2010 Meteorology Compliance Report (Rescan 2010b).

2.3 ADAPTIVE MANAGEMENT

HBML is committed to examining options for reducing emissions and improving emissions quality at the Hope Bay Project. In the event that substantial negative impacts to air quality are detected (SO_2, NO_2, O_3, suspended particulates, or dustfall), HBML will examine the emissions sources on-site to identify opportunities to improve emissions quality. Dust suppression will be used whenever possible.

Incinerator emissions were above the Canadian Standards for dioxins and furans in 2009, and various strategies were employed to improve emissions. The next test will be completed in September 2011 to assess the performance of the incinerator after improvements and recycling activities were implemented. Additional options are being investigated should the incinerator emissions still not comply with the Canadian Standards.

3. Noise Abatement and Monitoring

3. Noise Abatement and Monitoring

3.1 BACKGROUND AND RATIONALE

The noise monitoring program, as part of the Noise Abatement Plan (Rescan 2010e), is intended to comply with the requirements of the Doris North Gold Mine Project Certificate (NIRB No. 003; issued September 15, 2006) as follows.

1. Section 4.0 Item 29. HBML shall develop and implement a noise abatement plan to protect people and wildlife from mine activity noise, including blasting, drilling, equipment, vehicles and aircraft. The noise abatement plan will be developed in consultation with GN-DoE, EC, and HC, and include:
   - restrictions on blasting and drilling when migrating caribou, birds or local carnivores may be affected;
   - the establishment of strict standards for noise levels;
   - use of equipment and vehicles with the best noise attenuation devices;
   - when practical, the use of fences or berms around noisy machinery or sites;
   - flight corridor restrictions over sensitive areas with known concentrations of wildlife and birds whenever possible; and
   - and requiring with the exception of take-off and approach for landing, a minimum flight altitude 300 metres above ground level when flights to and from the mine site are passing near sensitive wildlife and bird areas.

   The noise abatement plan will also incorporate the use of sound meters to monitor sound levels at sites in and around the mine site and local study area. The location and design of the sound meters shall be selected in consultation with EC and set up immediately upon issuance of the Project Certificate for the purpose of obtaining baseline data, and during and after operations. The final noise abatement plan shall be filed with NIRB's Monitoring Officer within 6 months of the issuance of the Project Certificate.
2. Section 4.0 Item 29. Commentary: The Local Study Area refers to the combined spatial boundaries set by HBML in its [Doris North] FEIS for each sensitive Valued Ecosystem Components (VECs) including Arctic char, lake trout, lake whitefish, ninespine stickleback, caribou, grizzly bear, wolverine, upland breeding birds, waterfowl, and raptors. Also the noise abatement plan will consider potential blasting time restrictions with the DFO's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998) as modified by DFO for use in the North. HBML should also consult with HC, the GN-DoE, and the Workers Compensation Board in locating and designing the sound meters.

The Project Certificate also lists the following noise abatement measure in Appendix A, noise:

3. Appendix A. Noise. Item 1. Buildings, structures and material stockpiles will act as physical barriers to noise particularly for outdoor exposed equipment;
4. Appendix A. Noise. Item 2. Most powered equipment will be enclosed in insulated buildings;
5. Appendix A. Noise. Item 3. Proper equipment maintenance;
6. Appendix A. Noise. Item 4. There will be noise monitoring in the mill for occupational health and safety;

7. Appendix A. Noise. Item 5. The on-site Environmental Manager will also conduct routine inspections of the Project operations and look for possible mitigation opportunities; and
8. Appendix A. Noise. Item 6. Adherence to all permits, authorizations and approvals;
9. Appendix A. Caribou. Item 4. Reduce noise by use of muffled exhaust systems;
10. Appendix A. Caribou. Item 6. Minimum flying altitude of 300 m above ground level for cargo and passenger aircraft outside of the Project area;

To date, three Noise Abatement Plans have been submitted to the NIRB, the most recent of which in December of 2010 (Rescan 2010e). Noise monitoring was conducted in 2007, 2008 and 2010.

3.2 STUDY DESIGN

The Noise Abatement Plan is designed to monitor and protect both wildlife and people, and, as such, it is divided into "Environmental Noise Monitoring" and "Health and Safety Noise Monitoring" sections. A brief outline of these programs is presented here. Environmental Noise Monitoring

The environmental monitoring portion of the noise abatement plan focuses on environmental airborne noise levels that could affect VECs such as caribou and birds. Noise monitoring programs will be conducted as specified in the Project Certificate; during pre-construction (baseline), operations and post operations.

3.2.1.1 Timing

The timing of noise measurement collection will coincide with critical wildlife periods and over a scale which is biologically relevant to compare to wildlife surveys in the area. Timing is guided by studies in the Doris North area, while distances for monitoring are guided by research at functioning mines in the NWT and Nunavut. Measurements will be conducted to encompass two critical periods for wildlife:

- The northward migration of the Dolphin and Union Caribou herd from the mainland to Victoria Island; and
- The summer period where resident wildlife are breeding and rearing young.

These two periods also encompass a wide amount of environmental variation, the first being conducted during spring conditions, with cool air and snow cover on the ground while the second occurs at the peak temperatures for the season and with growing vegetation.

3.2.1.2 Location

Noise monitoring locations are selected based on relevant distances from the areas of Project activity and important wildlife areas. Figure 3.2-1 presents the noise monitor placement locations selected in 2010.

The specific distances where noise levels were monitored relative to project activities are as follows:

- To address potential effects on birds: <1 km, 1 km and >2 km; and
- To address potential effects on caribou: 5 km, 12 km, and 15 km.

These distances were selected based on findings from various research programs conducted in the Arctic. Wind direction and high use wildlife areas are also considered in the placement of noise monitors.

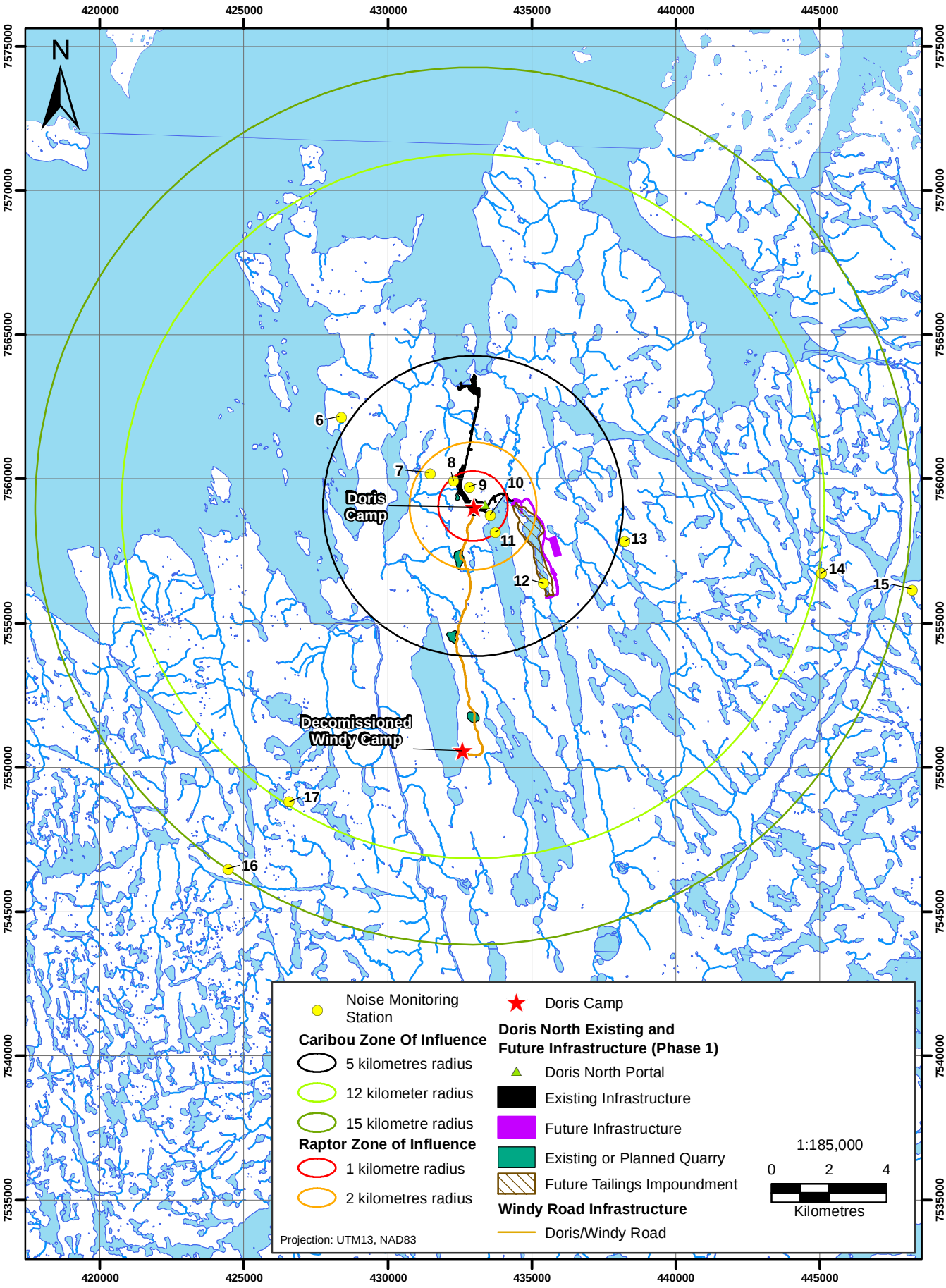

Figure 3.2-1

Noise Monitoring Station Locations, Doris North Project

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3.2.1.3 Methodology

The following overall noise levels are measured every minute over a 24-hour sample period:

- L_{Aeq} (equivalent continuous sound pressure level in dBA);
- L_{AFmax} (absolute maximum in dBA);
- L_{AFmin} (absolute minimum in dBA); and
- L_{Ceq} (the C weighted equivalent continuous sound pressure level in dBC).

Two, 24-hour logging periods are conducted at each location, at a 1-minute logging rate, unless a longer monitoring period is required. Simultaneous sound recordings are also collected during the measurement period to identify peak events and sources of sound.

Weather data from one of the two on-site weather stations are used to validate data collected. In addition, a variety of field notes relating to the placement and environment of each noise monitor are recorded.

The reports generally include a summary of the methods and equipment, summary tables for the weather and noise data along with graphs of the raw noise data, a map showing the location of monitoring sites and photos of each site. Any noise sources that are causing criteria to be exceeded will be identified. Short-term source measurements may be conducted where necessary to allow appropriate mitigation design.

The noise data reports will provide input to the ongoing Wildlife Monitoring and Mitigation Program on site.

3.2.2 Health and Safety Noise Monitoring

HBML will have a noise monitoring component to the Doris North Occupational Health and Safety Program. The details of the program have not been finalized as operations are not expected to begin before 2012, however, the general plan will include occupational noise monitoring for employees performing various tasks throughout operations (Table 3.2-1). HBML will have this program fully developed prior to the start of operations. The noise monitoring component of the Occupational Health and Safety Program will comply with the Consolidation of Mine Health and Safety Regulations under the territorial *Mine Health and Safety Act* (sections 9.19 through 9.26 and Schedule 5).

Table 3.2-1. Summary of Noise Monitoring Program

Category	Parameter	Location	Frequency	Mining Phase
Environmental Noise	L_{Aeq}, L_{AFmin}, L_{AFmax}, L_{Ceq}, and 1/3 band octave data	Various – between <1 and 15 km of the project area	2 times per year (1/3 band octave data will only be collected once per project stage)	Baseline, Operation, Closure
Occupational Noise Monitoring	Hearing Levels Workplace Noise Levels	Pre-employment medicals and annual audiometric testing for employees working in high exposure areas or occupations UG Mine, Mill, Mtce Shop, Heavy Equipment Operators, Employees working around aircraft, other areas where noise level is 80 dBA or greater	On commencing employment, annually on the anniversary of commencing employment and at any other time when required by the manager or the chief inspector After commencement of operations to set operating baseline Follow up monitoring at 4 intervals per year	Operations

HBML and its contractors will comply with all applicable regulations, including the implementation of a hearing conservation program that will include the following (where required):

- Education of employees;
- Noise surveys of worksites and equipment;
- Engineering and administrative controls;
- Hearing protection for employees;
- Audiometric testing; and
- Consultation with employees.

HBML and its contractors will also follow the Mine Health and Safety Regulation requirements specific for:

- Noise exposure limits (including steady state (i.e., constant) and impulse noise);
- Measurement of noise levels;
- Hearing protection; and
- Audiometric testing.

For the full description of the noise monitoring program, including methodology, see the Noise Abatement Plan (Rescan 2010e) and the 2010 Noise Compliance Report (Rescan 2011d).

3.3 ADAPTIVE MANAGEMENT

The following list outlines the noise abatement measures and policies that HMBL has already implemented on site, along with abatement measures that will continue to be implemented:

- Include mufflers and silencers on highway-legal mobile and motorized equipment that are so equipped by the manufacturer, and ensure that are in proper working order;
- Static noise from mobile mining and other heavy construction equipment and from generators is reduced as much as possible;
- Equipment is well maintained;
- Helicopters are operated above 300 m outside of the Project Area when caribou are present, as per the caribou protection measure guidelines. Landing and take-off are only conducted when herds of caribou are not present in the immediate area;
- Implement pilot education on the potential effects of helicopters on caribou and the importance of maintaining proper distances from animals;
- Cessation of above ground blasting when groups of caribou are within 500 m of the blast area, as determined by ground-based observations. Caribou presence will be identified through daily, ground-based surveys during the peak periods when caribou are present in the Project area – currently early May and early November, when the Dolphin and Union herd is migrating to and from Victoria Island.
- Whenever possible, blasting will be scheduled outside the peak periods of caribou presence in the Project area.
- Frequent surveys of Project infrastructure by environment staff and removal of any nestbuilding materials prior to egg-laying;

- If a nest is successfully built on Project infrastructure adjacent to an above-ground blasting site, the patterns of blasting will be altered to minimize disturbance to raptors;
- All blasting will be conducted following the federal blasting guidelines of Wright and Hopky (1998) as modified by DFO for use in the North. Where possible, effects of noise on fishes due to blasting activities will be reduced by restricting blasting activity to the time of least biological activity or biological sensitivity according to DFO's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998) as modified by DFO for use in the North; and
- Appropriate hearing protection will be worn by all employees that will be exposed to noise.

Additional mitigation measures may be implemented as required if noise monitoring results indicate that noise exceeds acceptable levels or wildlife effects are observed.

4. Hydrology Monitoring

4. Hydrology Monitoring

4.1 BACKGROUND AND RATIONALE

The surface water Hydrology Monitoring Program is designed to collect water level data in order to comply with the following regulatory requirements:

Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007):

1. Part F. Item 1a: [the Water Management Plan should include] A requirement to continuously monitor Doris Lake levels and outflow during the two (2) years of mining and beyond to confirm water balance model predictions.
2. Part G. Item 29. The Licensee shall ensure that water within the Tailings Impoundment Area is maintained at an elevation of least 28.3 metres above sea level such that a minimum of four (4) metres of water cover is maintained over the tailings at all times.
3. Part G. Item 30. The Licensee shall ensure that the flow from the Tailings Impoundment Area into Doris Creek at monitoring station TL-4 does not exceed 10% of the background flow in Doris Creek as measured at monitoring station TL-2 at the time of discharge.
4. Part G. Item 31. The Licensee shall on a monthly basis, input average monthly water quality, hydrology and climate monitoring data in to the water quality model and perform the following assessment:
   a. Compare the predicted water elevation in the Tailings Impoundment Area to the measured elevations. If the difference between predicted and measured elevations is greater than 0.1 m, then the Licensee shall re-calibrate the volume rating curve;
   c. Predict the future discharge schedule and compare this prediction to the previously predicted discharge schedule. If necessary identify adaptive management strategies.
5. Part J. Item 1. The Licensee shall install and maintain flow meters or other such devices, or implement suitable methods required for the measuring of water use and Effluent discharge volumes, to be operated and maintained to the satisfaction of an Inspector.
6. Part J. Item 2: The Licensee shall install appropriate instrumentation in Doris Creek at Monitoring Station TL-2, to monitor flow when ice conditions allow for such measurements to be taken, on a real time and continuous basis.
7. Part J. Item 3. The Licensee shall undertake the Water Monitoring Program detailed in the Tables of Schedule J [see Table 5.1-2 below; sites TL-2 and TL-3]
8. Part J. Item 5. The Licensee, in consultation with an Inspector, shall establish the locations and GPS coordinates for all monitoring stations referred to in Schedule J.
9. Part J. Item 6. The Licensee shall install and maintain, to the satisfaction of an Inspector, signs that identify monitoring stations. The signs shall be posted in English, Inuktitut and Inuinnaqtun.
10. Schedule B. Item 7. [The Annual Report will include] A comparison of the flows (m^3/day) at monitoring stations TL-1, TL-2, TL-3, and TL-4.

Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

11. Appendix C: Final Hearing Report Appendix B, Additional Comments, DFO, Item 2: HBML will monitor stage and discharge in Doris Outflow both upstream and downstream of the decant discharge point to provide information that can be used in assessing the accuracy of the impact predictions relating to fish habitat downstream.

4.2 STUDY DESIGN

In order to comply with the project certificate and water licence commitments, HBML has been conducting hydrometric monitoring in Doris Creek (Doris Outflow) and Doris Lake annually since 2003 and 2004, respectively. Signs will be posted at each monitoring station prior to beginning operations.

In addition to the hydrometric monitoring required under the Project Certificate and the Type A Water Licence, monitoring is being conducted to support fisheries authorization work (hydrometric monitoring of Roberts Lake Outflow, Windy Lake Outflow, and a tidal gauge in Roberts Bay). The current Hydrology Monitoring Program includes 7 stations (Figure 4.2-1, Table 4.2-1).

Table 4.2-1. Summary of Hydrology Monitoring Program

Parameter	Location	Frequency	Mining Phase
Water quantity (water level and/or discharge)	Tail Lake	Continuous monitoring of water levels	Construction, Operation, Closure, and Post-closure to end of treated tailings effluent discharge
	Doris Lake	Continuous monitoring of water levels	Construction, Operation, Closure, and Post-closure to end of treated tailings effluent discharge
	Doris Creek, upstream location (TL-2)	Continuous monitoring of water levels (new for 2011); Periodic flow measurements	Construction, Operation, Closure, and Post-closure to end of treated tailings effluent discharge
	Doris Creek, downstream location (TL-3)	Periodic flow measurements	Construction, Operation, Closure, and Post-closure to end of treated tailings effluent discharge
	Roberts Lake Outflow	Continuous monitoring of water levels; Periodic flow measurements	Construction, Operation through verification of fisheries No Net Loss mitigation measures
	Windy Lake and Outflow	Continuous monitoring of water levels; Periodic flow measurements	Construction, Operation through verification of fisheries No Net Loss mitigation measures
	Tide Gauge – Roberts Bay	Continuous monitoring of water levels	Optional (No requirement) Construction, Operation through verification of fisheries No Net Loss mitigation measures
Lake Evaporation (included in meteorology)	Doris Lake Watershed (Calculated)	Continuous during summer	Construction, Operation, Closure and Post-Closure to end of treated tailings effluent discharge

Although a continuous water level monitoring station had been installed in Doris Creek (TL-3) in previous years, a real-time hydrometric station with a satellite link will be installed in Doris Creek (TL-2) in 2011. This will allow the system to be tested prior to operations commencing. Hydrometric monitoring currently occurs at site TL-3 on Doris Creek and will commence prior to operations at site TL-2 in 2011.

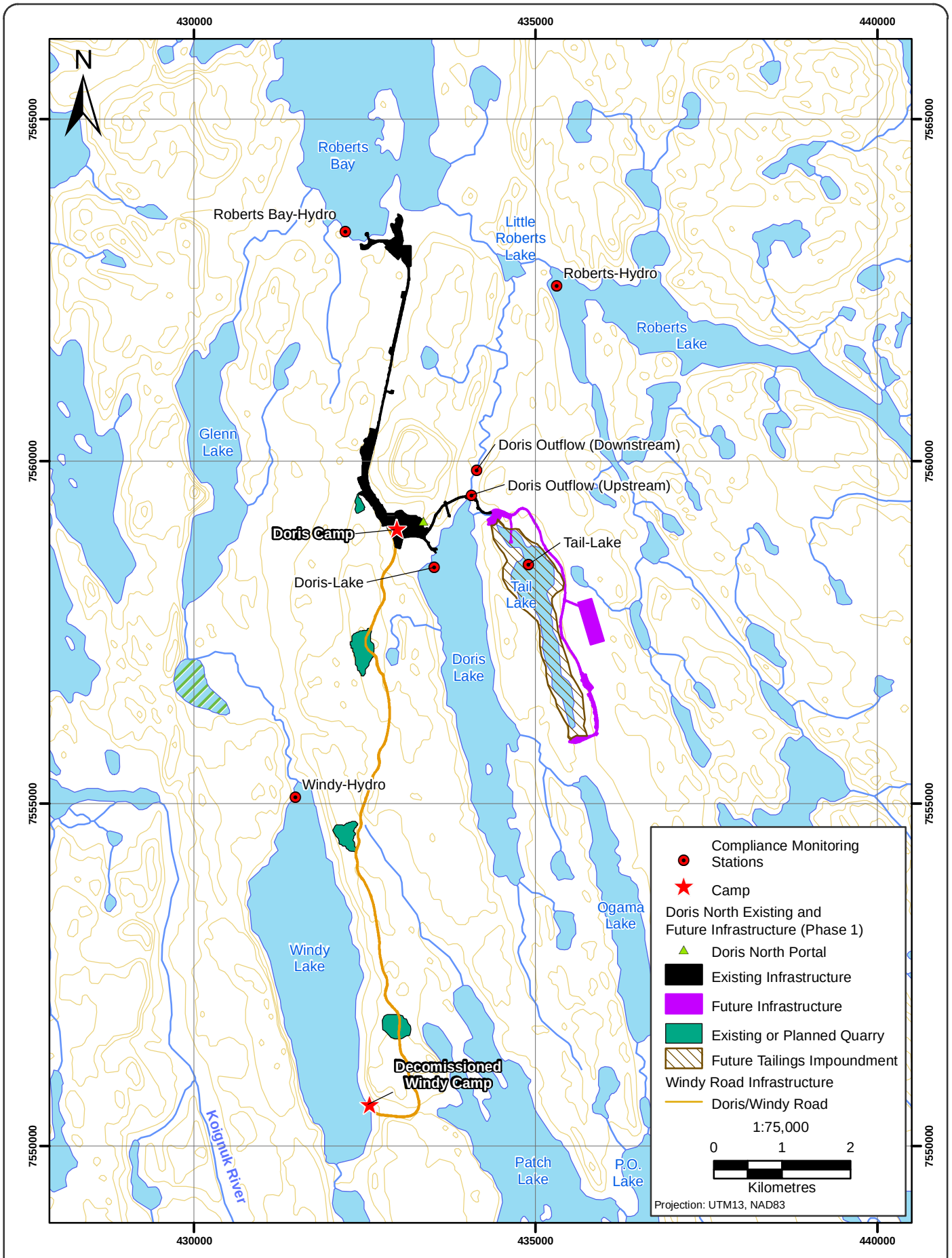

Figure 4.2-1

Hydrometric Monitoring Stations, Doris North Project

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All hydrometric stations will consist of a pressure transducer connected to an automated data logger. This setup will automatically measure and record water levels at 10 minute intervals. The pressure transducers will be associated with on-shore benchmarks, which will be re-confirmed annually in order to check and verify pressure transducer readings, as well as to determine the reliability of the water level data recorded between site visits. The hydrometric stations generally operate between June and September, when ice conditions permit. The hydrometric stations located at Doris Lake and Tail Lake will be the exceptions because the monitoring instrumentation is installed in water deep enough to prevent ice damage to the pressure transducer.

Each stream monitoring station is visited during four periods each year; in June (freshet), July, August, and September. During each period, a given station may be visited multiple times, particularly during freshet, when flow varies widely on a daily basis. During each site visit, current velocity measurements are collected and discharges determined. Discharges are computed from the stream velocity measurements using the velocity-area method which determines discharge per unit width for each sounding or vertical. Discharge measurements are used to either update existing stage-discharge relationships or to develop a relationship for the new proposed station. The stage-discharge relationships are expressed as rating curves. Stage-discharge rating curves (rating curves) are used to convert water level (stage) data recorded by the hydrometric monitoring stations into a discharge time-series or hydrograph. Several discharge samples are required during high, medium, and low flow conditions to establish an accurate stage-discharge curve. A minimum of four and up to seven stream discharge samples are completed at each hydrometric monitoring station to create a rating curve.

The information collected as part of the hydrological monitoring program is reported annually in a compliance report. This report includes the results of the development of stage-discharge curves and hydrographs, as well as the calculation of key hydrological parameters such as annual runoff, mean annual discharge, peak flows and low flows.

For additional details on the hydrology monitoring program, refer to the Doris North Gold Mine Project: Hydrology Compliance Report, 2010 (Rescan 2010d).

4.3 ADAPTIVE MANAGEMENT

During operations, the water level in the tailings impoundment area will be monitored to maintain a minimum of 4 m of coverage over the tailings. Water discharge will be monitored closely to ensure that the water level is maintained. If the water level does not have a minimum of 4 m of coverage over the tailings, water will not be discharged from the tailings impoundment.

The tailings effluent discharge rate may not exceed 10% of the background flow in Doris Creek as measured at monitoring station TL-2. If the discharge rate exceeds 10% of the background flow, the pumping rate will be decreased to re-establish compliance with the conditions of the water licence.

5. Site Water Monitoring

5. Site Water Monitoring

5.1 BACKGROUND AND RATIONALE

Site water monitoring is conducted in compliance with both the Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007) and the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006).

The North Gold Mine Project Type A Water Licence also requires that the following site water monitoring activities be conducted:

General

1. Part G. Item 1. The Licensee shall provide at least 10 days notice to the Inspector prior to any planned discharges of any Facilities. The notice shall include the estimated volume proposed for discharge and location.
2. Part G. Item 2. The Licensee shall ensure that all land applied discharges are performed in a manner that prevents erosion at the point of discharge and downstream.
3. Part G. Item 19. The Licensee shall operate the Sewage Treatment Plant, Landfill, Landfarm, Fuel Storage and Containment Facilities, Sedimentation Pond, Pollution Control Pond, and the Reagent and Cyanide Storage Facility sumps to the satisfaction of the Inspector.
4. Part J. Item 1. The Licensee shall install and maintain flow meters or other such devices, or implement suitable methods required for the measuring of water use and Effluent discharge volumes, to be operated and maintained to the satisfaction of an Inspector.
5. Part J. Item 3. The Licensee shall undertake the Water Monitoring Program detailed in the Tables of Schedule J.
6. Part J. Item 5. The Licensee, in consultation with an Inspector, shall establish the locations and GPS coordinates for all monitoring stations referred to in Schedule J.
7. Part J. Item 6. The Licensee shall install and maintain, to the satisfaction of an Inspector, signs that identify monitoring stations. The signs shall be posted in English, Inuktitut and Inuinnaqtun.
8. Part J. Item 9. All analyses shall be conducted as described in the most recent edition of "Standard Methods for the Examination of Water and Wastewater" or by other such methods approved by an Analyst.
9. Part J. Item 10. All compliance analyses shall be performed in an accredited laboratory according to ISO/IEC Standard 17025.
10. Part J. Item 11. The Licensee shall file a letter with the Board for review confirming application for accreditation for the on-site environmental laboratory prior to operations.

Water Use

1. Part E. Item 1. The Licensee shall obtain fresh water for domestic camp use, mining and milling and associated uses, from Doris Lake at SNP Station ST-7 using the Fresh Water Intake. The volume shall not exceed 480,000 cubic meters per year unless otherwise approved by the Board.

2. Part E. Item 3. The Licensee shall not use streams as a water source unless authorized and approved by the Board.
3. Part E. Item 4. The Licensee shall maintain the Fresh Water Intake to the satisfaction of the Inspector.
4. Part E. Item 5. The Licensee shall equip all water intake hoses with a screen of an appropriate mesh size to ensure that fish are not entrained and shall withdraw water at a rate such that fish do not become impinged on the screen.
5. Part E. Item 6. The Licensee shall not remove any material from below the ordinary high water mark of any water body unless authorized.
6. Part E. Item 7. The use of water shall not cause erosion to the banks of any body of water and the Licensee shall provide necessary controls to prevent such erosion. Sediment and erosion control measures shall be implemented prior to and maintained during the operation to prevent entry of sediment into water.
7. Part J. Item 12. The Licensee shall measure and record all flow and volume measurements on a monthly basis (unless otherwise stated):

    a. The volume of freshwater obtained from Doris Lake for potable water;

    b. The volume of freshwater obtained from Doris Lake for process water;

    c. The volume of reclaim water obtained from Tail Lake for process water at Monitoring Station TL-8; and

    g. The ice thickness in Tail Lake measured on a monthly basis during construction, operations and closure.

Construction and Reclamation Monitoring

1. Part D. Item 18. The licensee shall conduct daily visual inspections for all construction activity during spring freshet and during and after remarkable rainfall events with sampling of runoff/seepage where turbidity is evident.
2. Part D. Item 19. All surface runoff during the construction of any facilities, where flow may directly or indirectly enter a water body, shall meet the following effluent quality limits: TSS Maximum average concentration 50 mg/L, maximum concentration of any one grab sample 100 mg/L (ST-10) [Table 5.1-1].

Waste Water Treatment Facility

3. Part D. Item 20. The licensee shall ensure that the Sewage Treatment Plant is operated in accordance with conditions provided in Part G, Item 3 with compliance at monitoring stations ST-8 during construction.
4. Part G. Item 3. The Licensee shall operate the Sewage Treatment Plant in accordance with the following:

    a. All Sewage and greywater shall be collected and treated in the Sewage Treatment Plant;

    b. During the construction phase, all effluent from the Sewage Treatment Plant at monitoring station ST-8 shall not exceed the effluent quality limits [in Table 5.1-1].

    c. During site construction, treated effluent from the Sewage Treatment Plant shall be discharged approximately 400 metres north of the camp pad;

Table 5.1-1. Water Discharge Criteria (2AM-DOH0713 Water Licence)

Parameter	ST1, ST-3, ST11		ST4		ST5, ST6a, ST6b		ST8		ST10	
	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
pH	6.0 – 9.0	9	6.0 – 9.0	9	6.0 – 9.0	9	6 – 9	9		
Total Suspended Solids (TSS)	15	30	15	30	15	30	100	100	50	100
Total Ammonia-N	2	4	2	4						
Total Cyanide – T-CN	1	2								
Total Oil and Grease	5 and no visible sheen	10 and no visible sheen	5 and no visible sheen	10 and no visible sheen	5	10	5 and no visible sheen	10 and no visible sheen		
Total Aluminum – T-Al	1	2								
Total Arsenic – T-As	0.05	0.1								
Total Copper – T-Cu	0.02	0.3								
Total Iron – T-Fe	0.3	0.6								
Total Lead – T-Pb	0.01	0.02	0.01	0.02	0.01	0.02				
Total Nickel – T-Ni	0.05	0.1								
Total Zinc – T-Zn	0.01	0.02								
Benzene			0.37		0.37					
Toluene			0.002		0.002					
Ethyl Benzene			0.09		0.09					
BOD_5							80	80		
Fecal Coliforms							10,000 CFU/100 ml	10,000 CFU/100 ml		

d. Once the Tailings Impoundment Area is operational, all treated effluent from the Sewage Treatment Plant shall be discharged to the Tailings Impoundment Area; and

e. The Licensee shall notify an Inspector at least ten (10) days prior to start-up of the Sewage Treatment Plant and subsequent discharge from the facility.

5. Part G. Item 4. The Licensee shall submit a Sewage Treatment Management Plan, to the Board for review sixty (60) days prior to commissioning the Sewage Treatment Plant that takes into consideration operation, maintenance and sludge management.

6. Part J. Item 12. The Licensee shall measure and record all flow and volume measurements on a monthly basis (unless otherwise stated):

   f. The volume of sewage sludge removed from the Sewage Treatment Plant and the locations or method of sewage sludge disposal during construction, operation and closure

Site Water Management

7. Part F. Item 1. The Licensee shall submit to the Board for review by May 1, 2008, a revised Water Management Plan. The revised Plan shall include the following:

   a. A requirement to continuously monitor Doris Lake levels and outflow during the two (2) years of mining and beyond to confirm water balance model predictions;

   b. Requirements for on-going monitoring and calibration of the water quality model;

   c. A strategy to monitor and remove, where necessary, snow accumulation in the Pollution Control Pond, roads, ditches, and drainage channels; and

   d. The Plan shall consider the monitoring requirements set out in Parts J and K;

8. Part F. Item 2. In the event that the revised Water Management Plan required in Part F, Item 1 is not found acceptable to the Board, the Licensee shall provide a revised version to the Board for review within thirty (30) days of notification by the Board.

9. Part F. Item 3. The Licensee shall implement the Water Management Plan upon as approved by the Board.

Sedimentation and Pollution Control Ponds and Sumps

10. Part G. Item 20. All Water from the Pollution Control Pond shall be directed to the Tailings Impoundment Area, unless otherwise authorized by the Board.

11. Part G. Item 21. The Licensee shall operate and maintain the Sedimentation Pond and Reagent and Cyanide Storage Facility sumps in accordance with the following:

    a. Water discharged from the Sedimentation Pond and Reagent and Cyanide Storage Facility Sumps at monitoring stations ST-1 and ST-11 respectively shall not exceed the Effluent quality limits [in Table 5.1-1].

    b. The Licensee shall establish compliance with effluent quality limits prior to discharge [Table 5.1-1];

    c. Water from the Sedimentation Pond that is acceptable for discharge under Part G, Item 22(a) shall be discharged immediately south of the facility approximately 500 m upstream of Doris Lake, or as designated by an Inspector; and

    d. Sedimentation Pond Water that does not meet criteria in Part G, Item 21(a) shall be directed to the Tailings Impoundment Area.

12. Part G. Item 22. The Licensee shall operate and maintain the Sumps in accordance with the following:

    a. Water discharged from the Landfill Sump at monitoring station ST-3 shall not exceed the effluent quality limits [in Table 5.1-1].

    b. Water from the Landfill Sump that is acceptable for discharge under Part G, Item 22(a) may be discharged to the tundra immediately east of Quarry #2 or as designated by an Inspector;

    c. All Water discharged from the Landfarm Sump at monitoring station ST-4 shall not exceed the effluent quality limits [in Table 5.1-1].

    d. Water from the Landfarm Sump that is acceptable for discharge under Part G, Item 22(c) may be discharged to the tundra or as designated by an Inspector;

    e. Water discharged from the Fuel Storage and Containment Facility Sumps at monitoring stations ST-5, ST-6a and ST-6b shall not exceed the effluent quality limits [in Table 5.1-1].

    f. Water from the Fuel Storage and Containment Facility Sump that is acceptable for discharge under Part G, Item 22(e) may be discharged to the tundra or as designated by an Inspector;

    g. Sump water from the Landfill, Landfarm and Fuel Storage and Containment Facility that does not meet the criteria in Part G, Items 22(a),(c) and (e) respectively shall be directed to the Tailings Impoundment Area.

13. Part J. Item 20. The Licensee shall visually monitor and record observations on a daily basis during periods of discharge, all discharge onto the tundra from the:

    a. Landfill Sump;

    b. Sedimentation Pond;

    c. Landfarm Sump;

    d. Plant Site Fuel Storage and Containment Area Sump;

    e. Roberts Bay Fuel Storage and Containment Area Sumps (addition in Amendment 2 for second fuel storage area);

    f. Sewage Treatment Plant (during the construction phase); and

    g. Reagent and Cyanide Storage Facility Sumps (addition in Amendment 2). The monitoring results shall be made available to an Inspector upon request.

Schedule J of Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007), presents the Conditions Applying to General and Aquatic Effects Monitoring in summary tables. The tables that pertain to the site water monitoring program are presented in Tables 5.1-2 and 5.1-3.

Table 5.1-2. Site Water Monitoring Required Sample Analyses (Schedule J)

PARAMETER	Site Water Monitoring Stations										
	ST-1	ST-2	ST-3	ST-4	ST-5	ST-6a, 6b	ST-7	ST-8	ST-9	ST-10	ST-11
General (G)											
pH	x	x	x	x	x	x	x	x	x	o	x
TSS	x	x	x	x	x	x	x	x	x	x	x
Routine Other											
Electrical Conductivity										o	
Alkalinity		x									
Cl		x									
Nutrients (N1)											
Total Ammonia-N	x	x	x	x			x				
Nitrate-N	x	x					x				
Nitrite-N	x	x					x				
Nutrients (N2)											
Orthophosphate-P							x				
Total Phosphate-P							x				
Biological (B)											
BOD_5							x	x	x		
Fecal Coliforms							x	x	x		
Cyanide											
Free CN							x				o
Total CN	x	x	x				x				o
Sulphate	x	x	x								
Total Metals - unflitered (MT)											
T-Al	x	x	x				x				
T-As	x	x	x				x				
T-Cu	x	x	x				x				
T-Fe	x	x	x				x				
T-Ni	x	x	x				x				
T-Pb	x	x	x				x				
T-Zn	x	x	x				x				
Total Metals - Other											
Total Metals by ICP-MS*		x									
T-Ag							x				
T-Ca							x				
T-Cd							x				
T-Cr							x				
T-Hg							x				
T-Mo							x				
T-Se							x				
T-Tl							x				

(continued)

Table 5.1-2. Site Water Monitoring Required Sample Analyses (Schedule J) (completed)

PARAMETER	Site Water Monitoring Stations										
	ST-1	ST-2	ST-3	ST-4	ST-5	ST-6a, 6b	ST-7	ST-8	ST-9	ST-10	ST-11
Hydrocarbons (HC)											
Total Oil and Grease	x	x	x	x	x	x	x	x	x		x
Benzene				x	x	x					x
Toluene				x	x	x					x
Ethyl-Benzene				x	x	x					x
T-Pb				x	x	x					x
Discharge (D)											
Flow	x	x	x	x	x	x	x	x	x		x
Volume	x	x	x	x	x	x	x	x	x		x

Note: Coloured categories based on Schedule J Table 1
o - not a required parameter, but may be included in sample analyses
** definition: metals consistent with baseline data previously collected and any other metals of current interest*

Table 5.1-3. Sampling Frequency for Site Water Monitoring Analyses (Schedule J)

Station	Description	Phase	Monitoring Parameters (Table 5.1-2)	
			All Other Parameters Listed in Table 5.1-2	Discharge
ST-1	Discharge from Sedimentation Pond taken at a depth of ~0.25 m	Construction, Operation, Closure	Once before any discharge, daily when discharging onto the tundra	Daily during periods of discharge
ST-2	Discharge from Pollution Control Pond taken at a depth of ~0.25 m	Construction, Operation, Closure	Monthly during open water season	Daily during periods of discharge
ST-3	Discharge from Nonhazardous Landfill pollution control sump	Construction, Operation, Closure	Once before any discharge, daily when discharging onto the tundra	Daily during periods of discharge
ST-4	Discharge from Landfarm sump	Construction, Operation, Closure	Once before any discharge, daily when discharging onto the tundra	Daily during periods of discharge
ST-5	Discharge from the Plant Site Fuel Storage and Containment Area Sump	Construction, Operation, Closure	Once before any discharge, daily when discharging onto the tundra	Daily during periods of discharge
ST-6a and b	Discharge from the Roberts Bay Fuel Storage and Containment Area Sump	Construction, Operation, Closure	Once before any discharge, daily when discharging onto the tundra	Daily during periods of discharge
ST-7	Freshwater pumped from Doris Lake taken from a valve on the discharge end of the freshwater pump	Construction, Operation, Closure	Monthly	Monthly during periods of pumping
ST-8	Discharge from Sewage Treatment Plant bio-membrane	Construction, Operation, Closure	Monthly	Monthly during periods of discharge
ST-9	Runoff from Sewage Treatment Plant discharge - downstream of sewage treatment plant discharge point and just prior to flow entering Glenn Lake	Construction	Monthly	
ST-10	Site Runoff from Sediment Controls	Construction, Operations, Closure	Daily during periods of discharge	
ST-11	Discharge from the Reagent and Cyanide Storage Facility Sumps	Construction, Operations, Closure	Once before any discharge, daily when discharging onto the tundra	

Tailings Water Management

14. Part G. Item 25. The Licensee shall implement the Tailings Water Management Strategy in accordance with the following:
15. Part G. Item 26. All Water discharged from the Tailings Impoundment Area at monitoring station TL-4 shall not exceed the water quality limits [in Table 5.1-4].
16. Part G. Item 27. The Licensee shall ensure that effluent discharged from monitoring stations TL-1 and TL-4 is demonstrated to be non-acutely toxic in accordance with Part J, Item 8.
17. Part G. Item 28. During periods of discharge, water quality in Doris Creek at monitoring station TL-3 shall not exceed the greater of background water quality at the time of discharge as measured at monitoring station TL-2, or the water quality limits [in Table 5.1-4].
18. Part G. Item 29. The Licensee shall ensure that water within the Tailings Impoundment Area is maintained at an elevation of least 28.3 metres above sea level such that a minimum of four (4) metres of water cover is maintained over the tailings at all times.
19. Part G. Item 30. The Licensee shall ensure that the flow from the Tailings Impoundment Area into Doris Creek at monitoring station TL-4 does not exceed 10% of the background flow in Doris Creek as measured at monitoring station TL-2 at the time of discharge.
20. Part G. Item 31. The Licensee shall on a monthly basis, input average monthly water quality, hydrology and climate monitoring data in to the water quality model and perform the following assessment:

    a. Compare the predicted water elevation in the Tailings Impoundment Area to the measured elevations. If the difference between predicted and measured elevations is greater than 0.1 m, then the Licensee shall re-calibrate the volume rating curve;

    b. Compare the predicted water quality in the Tailings Impoundment Area to the measured water quality. If the difference between predicted and measured values is 20% or greater, then the cause(s) of the difference shall be identified and the water quality model shall be re-calibrated; and

    c. Predict the future discharge schedule and compare this prediction to the previously predicted discharge schedule. If necessary identify adaptive management strategies.

21. Part J. Item 4. The Licensee shall:

    a. Increase the sampling frequency to once every second day at monitoring stations TL-1, TL-2 and TL-3; should the measured concentration of any parameter listed under Part G, Item 28 at TL-3 deviate by more than 20% from that predicted by the water quality model; and

    b. Submit to the Board and an Inspector an understanding and justification of any discrepancy should the Licensee request a reduction in sampling frequency.

22. Part J. Item 8. The Licensee shall conduct Acute Lethality Testing , at monitoring station TL-1 prior to discharge and at monitoring station TL-4 monthly thereafter during discharge, in accordance with the following test procedures:

    a. Acute lethality to Rainbow Trout, Oncorhynchus mykiss (in accordance with Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13); and

    b. Acute lethality to the crustacean, Daphnia magna (in accordance with Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/14).

Table 5.1-4. Tailings Water Discharge Criteria

Parameter	TL1	TL3*	TL4	
	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)	Maximum Average Concentration (mg/L)	Maximum Concentration of Any Grab Sample (mg/L)
pH		6.0 – 9.5 s.u.	6.0 – 9.5 s.u.	6.0 – 9.5 s.u.
Total Suspended Solids (TSS)		15	15	30
Total Ammonia-N		1.54 [1]	6	
Total Cyanide – T-CN		0.01	1	2
Total Oil and Grease		5		
Chloride		150		
Free Chloride		0.005		
Nitrate N		2.9		
Nitrite N		0.06		
Total Aluminum – T-Al		0.1		
Total Arsenic – T-As		0.005	0.5	1
Total Cadmium – T-Cd		0.000017		
Chromium VI		0.001		
Total Copper – T- Cu		0.002	0.3	0.6
Total Iron – T-Fe		0.3		
Total Lead – T-Pb		0.001	0.37 Bq/L	
Total Mercury – T-Hg		0.000026		
Total Molybdenum – T-Mo		0.073		
Total Nickel – T-Ni		0.025	0.5	1
Total Selenium – T-Se		0.001		
Total Silver – T-Ag		0.0001		
Total Thallium – T-Tl		0.0008		
Total Zinc – T-Zn		0.03	0.5	1
BOD_5			80	160
Fecal Coliforms			10,000 CFU/100 mL	10,000 CFU/100 mL
Radium 226			0.37 Bq/L	1.11 Bq/L
Acute Lethality –	Non-acutely lethal		Non-acutely lethal	Non-acutely lethal

** Water quality in Doris Creek at monitoring station TL-3 shall not exceed the greater of background water quality at the time of discharge as measured at monitoring station TL-2, or the following water quality limits. Also see Water Licence requirement Part J, Item 4.*

[1] Ammonia discharge varies with pH and temperature as per Schedule G. Value listed based on pH 7.5 and temperature of 20

Schedule J of Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007), presents the Conditions Applying to General and Aquatic Effects Monitoring in summary tables. The tables that pertain to the tailings and tailing effluent water monitoring program are presented in Tables 5.1-5 and 5.1-6.

Table 5.1-5. Tailings and Tailing Effluent Water Monitoring Required Analyses (Schedule J)

PARAMETER	Tailings and Tailing Effluent Monitoring Stations											
	TL-1	TL-2	TL-3	TL-4	TL-5	TL-6	TL-7	TL-8	TL-9	TL-10	TL-11	TL-12
General (G)												
pH	x	x	x	x	x			x	x	x	x	x
TSS	x	x	x	x	x			x		x		x
Routine												
Electrical Conductivity											x	
TDS	x	x	x	x						x		
Alkalinity											x	
Acidity											x	
Total Inorganic Carbon						x	x					
Cl	x	x	x	x						x		
Dissolved Oxygen & Redox Potential	x									x		
Chemical Oxygen Demand									x			
Nutrients (N1)												
Total Ammonia-N	x	x	x	x	x			x		x	x	x
Nitrate-N	x	x	x	x	x			x		x	x	x
Nitrite-N	x	x	x	x	x			x		x	x	x
Nutrients (N2)												
Orthophosphate-P	x	x	x	x				x		x		
Total Phosphate-P	x	x	x	x				x		x		
Biological (B)												
BOD_5				x								
Fecal Coliforms				x								
Biological - Other												
Acute Lethality	x			x								
Cyanide												
Free CN	x	x	x	x	x			x		x		
Total CN	x	x	x	x	x			x	x	x	x	
WAD CN					x		x		x		x	
Cyanate					x		x					
Thiocyanate					x		x					
T-Radium 226				x								
Sulphate					x						x	x
Total Metals - unflitered (MT)												
T-Al	x	x	x	x	x	x		x		x		
T-As	x	x	x	x	x	x		x		x		

(continued)

Table 5.1-5. Tailings and Tailing Effluent Water Monitoring Required Analyses (Schedule J) (completed)

	Tailings and Tailing Effluent Monitoring Stations											
PARAMETER	TL-1	TL-2	TL-3	TL-4	TL-5	TL-6	TL-7	TL-8	TL-9	TL-10	TL-11	TL-12
T-Cu	x	x	X	x	x	x		x		x		
T-Fe	x	x	x	x	x	x		x		x		
T-Ni	x	x	x	x	x	x		x		x		
T-Pb	x	x	x	x	x	x		x		x		
T-Zn	x	x	x	x	x	x		x		x		
Total Metals - Other												
Total Metals by ICP-MS*					x						x	x
Total Metals ICP-MS including Sulphur						x	x					
T-Ag	x	x	x	x				x		x		
T-Ca	x	x	x	x						x		
T-Cd	x	x	x	x	x	x		x		x		
T-Cr	x	x	x	x	x	x		x		x		
T-Hg	x	x	x	x	x	x		x		x		
T-K	x	x	x	x						x		
T-Mo	x	x	x	x	x	x		x		x		
T-Mg	x	x	x	x						x		
T-Na	x	x	x	x						x		
T-Se	x	x	x	x	x	x		x		x		
T-Tl	x	x	x	x				x		x		
Dissolved Metals - Filtered (MD)												
D- Fe									x			
D-Cu									x			
D-As									x			
D-Zn									x			
D-Cd									x			
D-Ni									x			
Hydrocarbons (HC)												
Total Oil and Grease			x									
Discharge (D)												
Flow	x	x	x	x	x			x				x
Volume	x	x	x	x	x			x				x
Quantity - Other												
Water Level	x											
Moisture content							x					
Tonnage						x	x					

Note: Coloured categories based on Schedule J Table 1
** definition: metals consistent with baseline data previously collected and any other metals of current interest*

Table 5.1-6. Sampling Frequency for Tailings and Tailing Effluent Water Sampling Program (Schedule J)

			Monitoring Parameters (Table 5.1-5)							
Station	Description	Phase	All Other Parameters Listed in Table 5.1-5	Dissolved Oxygen and Redox Potential	Acute Lethality	Discharge	Biological	Cyanate and Thiocyanate	Tonnage of dry tailings solids	Visual Inspection for seepage
TL-1	TIA at the Reclaim Pump Barge – depth 1.5 m below surface	Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	Every second day for two (2) weeks prior to discharge and for two (2) weeks after discharge commences, then reducing to once per week during remainder of annual discharge period	Every second month	Once prior to discharge	Daily during periods of discharge				
TL-2	Doris Outflow Creek - upstream (at the flow monitoring station adjacent to the bridge)	Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	Every second day for two (2) weeks prior to discharge and for two (2) weeks after discharge commences, then reducing to once per week during remainder of annual discharge period			Daily during periods of discharge from Tail Lake				
TL-3	Doris Outflow Creek (~80 m downstream of the base of the waterfall)	Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	Every second day for two (2) weeks prior to discharge and for two (2) weeks after discharge commences, then reducing to once per week during remainder of annual discharge period			Daily during periods of discharge from Tail Lake				
TL-4	TIA Discharge End of-Pipe (taken at a valve at the discharge end of the transfer pump pipeline)	Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	Weekly during periods of discharge		Monthly during discharge	Daily during periods of discharge from Tail Lake	Monthly			
TL-5	Combined Tailings Discharged into TIA (Water Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	Daily initially, reduced to weekly after 3 months of operation			Daily initially, reduced to weekly after 3 months of operation		Quarterly		

(continued)

Table 5.1-6. Sampling Frequency for Tailings and Tailing Effluent Water Sampling Program (Schedule J) (completed)

			Monitoring Parameters (Table 5.1-5)							
Station	Description	Phase	All Other Parameters Listed in Table 5.1-5	Dissolved Oxygen and Redox Potential	Acute Lethality	Discharge	Biological	Cyanate and Thiocyanate	Tonnage of dry tailings solids	Visual Inspection for seepage
TL-6	Combined Tailings Discharged into TIA (Solid Component) taken from a valve in the mill at the discharge end of the mill tailings pumps	Operations	Sampled on a weekly basis with analyses carried out monthly on a composite sample of the TL-6 weekly samples						Monthly during periods of discharge	
TL-7	Filtered Cyanide Leach Residue sent underground as backfill	Operations	Monthly					Quarterly	Monthly	
TL-8	Reclaim water pumped from TIA to Mill Process water tank taken from a valve at the discharge end of the reclaim water pump	Operations	Monthly			Daily during periods of pumping				
TL-9	Barren Bleed Solution sent to tailings taken from a sampling valve within the mill	Operations	Monthly							
TL-10	Water Column in deepest portion of Tail Lake and at a location away from the TIA Reclaim water floating pump house, sampled at surface, mid-depth and near bottom.	Operation, Closure, Post Closure (for up to nine (9) years after cessation of mining)	Monthly during discharge starting two (2) weeks prior to start of discharge season							
TL-11	Seepage from underground backfilled stopes	Operations	Survey Twice annually							Survey Twice annually
TL-12	Underground Minewater – water pumped from the underground mine into the Mill tailings pump box	Operations	Monthly			Monthly during pumping				

Reporting

23. Part J. Item 21. The Licensee shall, within thirty (30) days following the month being reported, submit to the Board a monthly monitoring report in an electronic and hardcopy.

    The Report shall include the following:

    a. All data and information required by this Part and generated by the Monitoring Program in the Tables of Schedule J;

    b. Copies of results required by NIRB Project Certificate Item 10;

    c. An assessment of data to identify areas of non-compliance with regulated discharge parameters referred to in Part G;

    d. A summary of monthly operational assessments of the water balance and water quality model; and

    e. Results of daily visual assessment of suspended sediment along the perimeter of the Tailings Impoundment Area shoreline during construction, operations, and closure.

24. Schedule B. Item 1. [The Annual Report shall include] Summary of monthly monitoring reporting performed in accordance with Part J, Item 21. Summary shall convert daily volumes and tonnages to monthly and annual volumes and tonnages;

25. Schedule B. Item 4. [The Annual Report shall include] A summary of the results of the monthly water balance and water quality model assessment referred to in Part G, Item 31 and any re-calibrations that have been carried out. The report shall include:

    a. Relevant supporting data;

    b. a comparison of measured water balance and water quality values to predicted values;

    c. Monitoring and internal modelling results;

    d. Discharge volume calculations;

    e. a discussion of any discrepancies in model inputs;

    f. re-evaluation of Tailings Water management Strategy and a discussion of any changes to the discharge schedule; and

    g. Identification of any necessary adaptive management strategies.

26. Schedule B. Item 6. [The Annual Report shall include] An update of the current capacity of the Tailings Impoundment Area;

27. Schedule B. Item 7. [The Annual Report shall include] A comparison of the flows (m^3/day) at monitoring stations TL-1, TL-2, TL-3, and TL-4.

28. Schedule B. Item 9. [The Annual Report shall include] A list and description of all unauthorized discharges including volumes, spill report line identification number and summaries of follow-up action taken;

29. Schedule B. Item 10. [The Annual Report shall include] The results of continued aquatic effects baseline data collection, and the results of the Aquatic Effects Monitoring Program in accordance with Part K, Item 4;

30. Schedule B. Item 14. [The Annual Report shall include] A summary of modifications and/or major maintenance work carried out on the Water Supply and the Waste Disposal Facilities, including all associated structures, and an outline of any work anticipated for the next year;

In addition to the Type A Water Licence requirements listed above, the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006) lists the following requirements relating to the site water monitoring program:

31. Section 4.0. Item 9. HBML will fund and install an on-site laboratory for continuous and real-time monitoring of water quality contained within Tail Lake and Doris Creek after discharge. This will be done prior to the commencement of operations. The laboratory shall be certified, with standards to include the calibration of water quality monitoring instruments. HBML shall file proof of application to become accredited, upon the request of the NWB or NIRB's Monitoring Officer.
32. Section 4.0. Item 10. Upon the commencement of operations, HBML shall ensure that the monitoring of Tail Lake and Doris Creek water quality, above and below the waterfall, be verified and reported to NIRB three times during discharge by an independent, third party laboratory. The sampling must be carried out independently or supervised in which case HBML must 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.

5.2 STUDY DESIGN

The Type A Water Licence requirements Part F Item 1a and Part J Item 2 are addressed as part of the Hydrological Monitoring Program. Part D Items 18, and 19 are addressed in the Construction and Reclamation Monitoring Program.

The management commitments outlined above have been implemented on site as they have become applicable to site activities. As the site activities and processes come online, the site monitoring program will be modified to capture the additional applicable commitments.

Water samples are collected by the site Environment and Social Responsibility (ESR) Department staff as per the requirements of Schedule J, for currently active stations. All samples are shipped to ALS Laboratories for analysis. The ESR staff compare all of the sample results to the specific discharge concentration criteria provided in the Water Licence (Tables 5.1-1) to identify areas of non-compliance, and implement corrective actions if required.

The following SNP sampling stations will continue to be monitored at the established locations (Figure 5.2-1):

- ST-6: Rename to ST-6a. Discharge from the East Roberts Bay Fuel Storage and Containment Area
- ST-7: Freshwater pumped from Doris Lake - taken from a valve on the discharge end of the freshwater pump in the pumphouse
- ST-8 #1: Discharge from Sewage Treatment Plant bio-membrane Plant #1 – taken from the discharge valve at the plant
- ST-8 #2: Discharge from Sewage Treatment Plant bio-membrane Plant #2– taken from the discharge valve at the plant

Two SNP sampling stations will be relocated, with approval of the Inspector, in 2011:

- ST-9: Runoff from Sewage Treatment Plant discharge - downstream of sewage treatment plant discharge point upstream of Glenn Lake. The location of the sample may require relocation after the tundra sewage dispersal system is installed (upon approval of the Inspector).
- ST-10: Site Runoff form Sediment Controls – locations vary; to be determined in 2011 based on site runoff

In 2011, discharge locations for the following new SNP sampling stations will be established:

- ST-1: Discharge from Sedimentation Pond
- ST-2: Discharge from Pollution Pond – the TIA and mill with associated wastewater piping will not be completed until winter 2012/13 therefore, the pond will be treated as required and discharged into the Sedimentation Pond if water meets discharge criteria (upon approval of the Inspector).
- ST-4: Discharge from Land farm
- ST-5: Discharge from the Plant Site Fuel Storage and Containment Area
- ST-6b: Discharge from the West Roberts Bay Fuel Storage and Containment Area

Discharge locations for the following new SNP sampling stations will be established when the facilities are constructed:

- Station ST-3 will not be established until a landfill is constructed with KIA approval
- Station ST-11 will be established when the reagent and cyanide storage facility is constructed in 2012
- The TL stations will be established when the tailings facility construction is completed in winter 2012/2013 and prior to discharging water from the TIA

Sampling station ST-7 is in continuous use through the year and is sampled monthly at the water intake pumphouse, although compliance criteria are not established. This water is passed through a water treatment system including filtration, ozonation and UV radiation prior to distribution through the camp facilities. Process water will not be drawn from ST-7 until the mill and process plant are constructed in 2012/2013.

Sampling stations ST-8 and ST-9 are in continuous use through the year, and sampled monthly to monitor compliance with discharge criteria. ST-9 is only sampled during summer when the sampling location is not frozen. Corrective actions are implemented to address issues with the Sewage Treatment Plant function if sample results are not in compliance with discharge criteria.

Compliance with discharge criteria is established prior to discharging water from the sumps (ST-4, ST-5, ST-6a and b) and collection ponds (ST-1 and ST-2) onto the tundra. If the water quality is in compliance, the water is pumped to the designated discharge locations, as approved by the Inspector. These stations are only sampled and discharged as required during the year.

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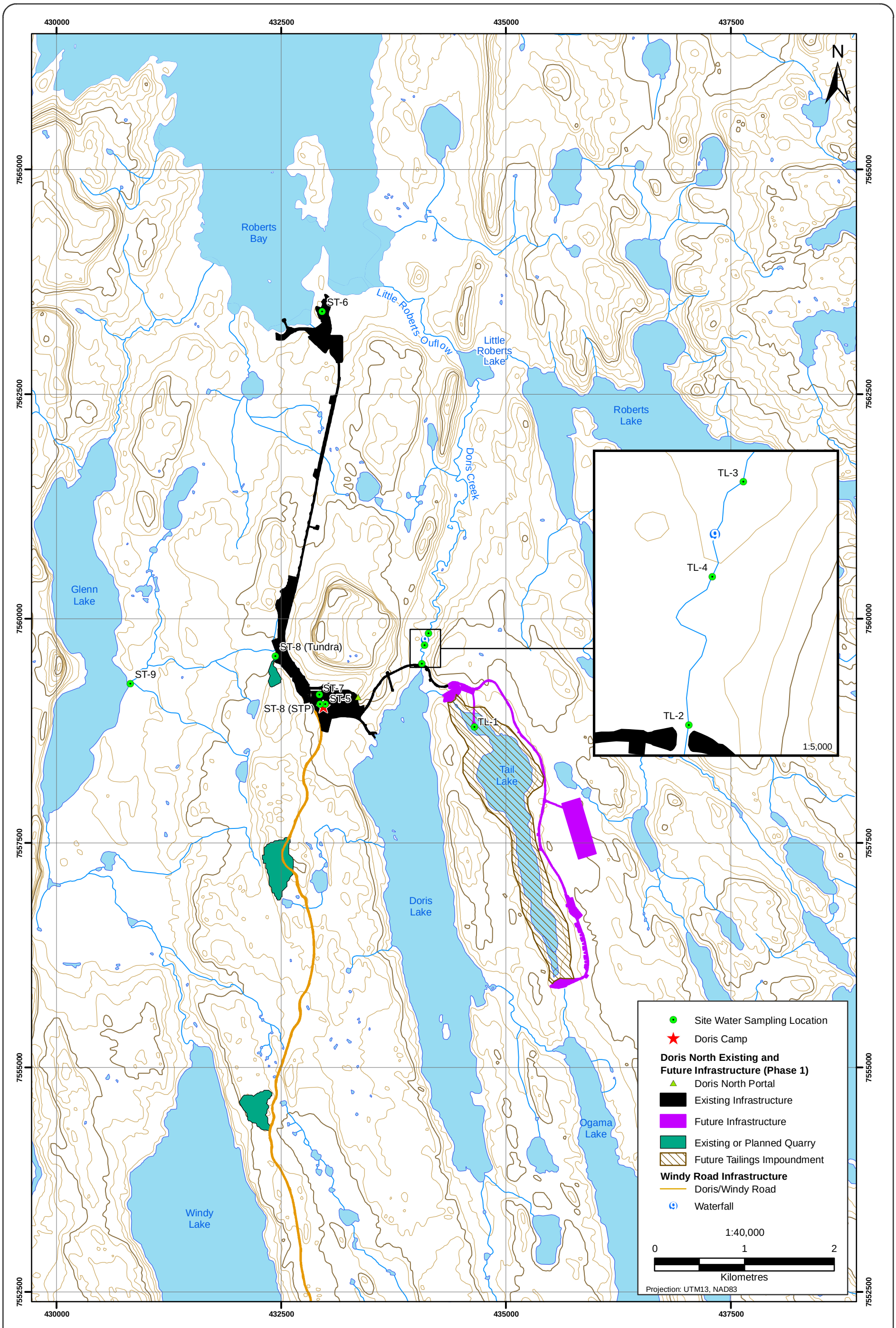

Figure 5.2-1

NEWMONT NORTH AMERICA

Site Water Monitoring Sampling Locations, Doris North Project

Figure 5.2-1

Rescan Engineers & Scientists

Station ST-10 may include multiple sampling locations that are identified during spring freshet or heavy precipitation events where runoff is observed from construction sediment control areas. Compliance with discharge criteria is monitored during runoff periods.

The results of the site water monitoring results are reported monthly to the Nunavut Water Board as per commitment Part J Item 21. Results are also included as a component of the Annual Report as specified in Part B Item 3 and Schedule B of the Water Licence 2AM-DOH0713. The most recent Annual Report was submitted in March 31, 2011 (HBML 2011a).

Additional information surrounding construction activities are submitted annually during years of construction to the Nunavut Water Board. The most recent construction report was submitted in March 31, 2011 (HBML 2011b).

In compliance with Part F Items 1, 2, and 3, an Interim Water Management Plan was submitted to the NWB on January 20, 2011 (SRK 2010b). This Plan has not yet been accepted.

5.3 ADAPTIVE MANAGEMENT

The adaptive management measures for non-compliant water sample results will vary dependent on the sampling station. The pollution and sediment control ponds and the sumps will not be discharged unless the water quality meets the discharge criteria outlined in Table 5.1-1. The full adaptive management plan will be completed prior to initiation of operations when the final Water Management Plan is completed (anticipated 2012); however, some preliminary examples are as follows:

- Sedimentation and Pollution Pond
    - Water will not be discharged from the sediment control pond if it does not meet the discharge criteria. Instead, water will be re-routed into the pollution control pond to be re-treated in the water treatment system. If required, water will be routed to the TIA rather than discharged onto the tundra.
- Sumps
    - Water will not be discharged from the sumps if it does not meet the discharge criteria. Instead, water will be treated using the oil-water separator or the treatment system at the pollution pond. If required, water will be routed to the TIA rather than discharged onto the tundra.
- Sewage Treatment Effluent
    - As water is continuously discharged to the tundra and is sampled monthly, if a sample indicates that the effluent does not meet discharge criteria, the non-compliance will be noted in the monthly report submitted to the NWB and an inspection will be completed to identify maintenance or process changes that must be performed on the treatment system to re-establish compliant effluent quality.

6. Tailings and Site Geotechnical Monitoring

6. Tailings and Site Geotechnical Monitoring

6.1 BACKGROUND AND RATIONALE

The following regulatory requirements relate to tailings (excluding water monitoring requirements) and site geotechnical monitoring:

Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007):

Geotechnical

1. Part F. Item 4. The Licensee shall carry out regular inspections of all water management structures during periods of flow (rock drains, culverts, sedimentation and pollution control ponds and associated diversion berms, reagent and cyanide storage facility sumps, and sedimentation control berm at the overburden dump) and the records be kept for review upon request of an Inspector. More frequent inspections may be required at the request of an Inspector
2. Part G. Item 2. The Licensee shall ensure that all land applied discharges are performed in a manner that prevents erosion at the point of discharge and downstream.
3. Part J. Item 18. "The Licensee shall ensure that a geotechnical inspection is carried out annually between July and September by a Geotechnical Engineer. The inspection shall be conducted in accordance with the Canadian Dam Safety Guidelines where applicable and take into account all major earthworks, including the following:

   a. North and South Dams;

   b. Geotechnical instrumentation and associated monitoring data;

   c. Tailings Impoundment Area shoreline and erosion strip survey monitoring results;

   d. Emergency Dump Catch Basins;

   e. All weather access roads;

   f. Roberts Bay Jetty;

   g. Landfill;

   h. Landfarm;

   i. Fuel Storage and Containment Facilities at the Plant Site and Roberts Bay site;

   j. Sedimentation Pond;

   k. Pollution control Pond;

   l. Sumps;

   m. Underground mine openings;

   n. Groundwater conditions underground; and

   o. Rock temperature measurements and groundwater inflow in the underground mine workings.

4. Part J. Item 19. The Licensee shall submit to the Board within sixty (60) days of completion of the geotechnical inspection, the Geotechnical Engineer's inspection report. The report shall

include a cover letter from the Licensee outlining an implementation plan addressing each of the Geotechnical Engineer's recommendations.

Tailings Management Plan

5. Part G. Item 23. The Licensee shall submit to the Board for review by September 1, 2008, a revised Tailings Management Plan. The Plan shall include Shoreline Erosion Protection Adaptive Management strategies for monitoring and control.
6. Part G. Item 24. The Licensee shall operate and maintain the Tailings Impoundment Area (TIA) to engineering standards such that:
   a. The Licensee shall maintain a minimum freeboard limit of one (1) meter below the top of the frozen core of the North and South Dams or as recommended by a Geotechnical Engineer;
   b. Implement contingency measures where necessary to prevent overtopping of the North Dam;
   c. Implement the Shoreline Erosion Protection and Adaptive Management strategies as required;
   d. The Licensee shall collect and return seepage from the TIA, as determined by monitoring and follow-up water quality analyses;
   e. The Licensee shall carry out at a minimum, weekly inspections to identify and remediate where necessary, areas of concern including issues of seepage, cracking, and ponding for all structures associated with the TIA including the North and South Dams, Emergency Dump Catch Basins, pipeline(s), pumps, mill tailings discharge points and other associated structures. The records shall be kept for review upon request of an Inspector;
   f. The Licensee shall consult the Geotechnical Engineer when significant issues associated with the TIA are observed and implement the Engineer's recommendations as necessary;
   g. The solids fractions of all mill tailings (except for filtered cyanide leach residue placed underground as mine backfill) shall be deposited and permanently contained within the Tailings Impoundment Area;
   h. An annual Geotechnical inspection shall be carried out in accordance with Part J, Item 19;
   i. The Licensee shall, during operations, conduct a bathymetric survey of Tail Lake on an annual basis during summer, to facilitate tailings deposition management;
   j. The Licensee shall, during construction, operations and closure, conduct a daily visual assessment of suspended sediment in the Tailings Impoundment Area;
   k. The Licensee shall perform more frequent inspection of the facilities at the request of an Inspector;
   l. The Licensee shall place all filtered cyanide leach residue underground as mine backfill to remain frozen within permafrost; and
   m. The Licensee shall provide at least ten (10) days written notice to an Inspector prior to any planned discharges from the Tailings Impoundment Area to Doris Creek.
7. Part J. Item 13. The Licensee shall measure and record in tonnes (unless otherwise stated) including the location of disposal (temporary and permanent) for the following:
   a. The daily dry tonnes of combined tailings placed in the Tailings Impoundment Area;
   b. The daily dry tonnes of cyanide leach residue; and
   c. The monthly quantity of ore processed.

Thermal Monitoring

8. Part J. Item 14. The Licensee shall undertake the Thermal Monitoring Program detailed in Table 3 of Schedule J.
9. Part J. Item 15. The Licensee shall continue to monitor thermistors located between the Tailings Impoundment Area and Doris Lake and between Doris Lake and the underground workings. The monitoring shall be consistent with the baseline thermal monitoring program and shall be included in Table 3 of Schedule J.
10. Part J. Item 16. The Licensee shall install additional thermistors to monitor rock temperatures surrounding the underground mine openings, particularly in the pillar adjacent to the Doris Lake Talik. These thermistors shall be added to Table 3 of Schedule J and shall be monitored on a monthly basis during operations and closure.
11. Part J. Item 17. The Licensee, in consultation with an Inspector, shall establish and confirm the locations and GPS coordinates for all monitoring stations referred to in Part J, Item 16.

Reporting

12. Part J. Item 21. The Licensee shall, within thirty (30) days following the month being reported, submit to the Board a monthly monitoring report in an electronic and hardcopy.

    The Report shall include the following:

    a. All data and information required by this Part and generated by the Monitoring Program in the Tables of Schedule J;

    b. Copies of results required by NIRB Project Certificate Item 10;

    c. An assessment of data to identify areas of non-compliance with regulated discharge parameters referred to in Part G;

    d. A summary of monthly operational assessments of the water balance and water quality model; and

    e. Results of daily visual assessment of suspended sediment along the perimeter of the Tailings Impoundment Area shoreline during construction, operations, and closure.

13. Schedule B. Item 3. [The Annual Report shall include] A Geochemical Monitoring and Waste Rock Storage Assessment that includes the following:

    a. For tailings solids:

        i. All geochemical data appended;

        ii. All tonnage data appended and locations of disposal;

        iii. Discussion of geochemical data (static and kinetic, if applicable) with relevant figures and calculation of NNP and NPR; and

        iv. Geochemical interpretation of data.

    b. For tailings supernatant:

        i. All geochemical data appended; and

        ii. Figures depicting time series of constituent concentrations and loads.

    d. For barren bleed stream:

i. Raw monthly monitoring results from monitoring station TL-9; and

ii. Figures depicting time series for each of the parameters

e. For cyanide leach residue:

i. Presentation of results of bi-annual underground inspection of the following:

1. location of inspection;

2. Extent of Freezeback of cyanide leach residue;

3 Seepage from the cyanide leach residue; and

4. Geochemical and inspection data of any samples taken from seepage from the cyanide leach residue including geochemical discussion of results.

14. Schedule B. Item 4. [The Annual Report shall include] A summary of the results of the monthly water balance and water quality model assessment referred to in Part G, Item 31 and any re-calibrations that have been carried out. The report shall include:

a. Relevant supporting data;

b. a comparison of measured water balance and water quality values to predicted values;

c. Monitoring and internal modelling results;

d. Discharge volume calculations;

e. a discussion of any discrepancies in model inputs;

f. re-evaluation of Tailings Water management Strategy and a discussion of any changes to the discharge schedule; and

g. Identification of any necessary adaptive management strategies.

15. Schedule B. Item 5. [The Annual Report shall include] Summary of the Geotechnical Inspection Report referred to in Part J, Item 18 that includes the following:

a. All quantities in cubic meters of dike seepage from the North and South Dams pumped back into the Tailings Impoundment Area;

b. As-built drawings and a summary of the mitigation works undertaken along the shoreline of the Tailings Impoundment Area in response to erosion, as stipulated in the Shoreline Adaptive Management Plan; and;

c. All data and information generated from the monitoring of all project geotechnical instrumentation.

16. Schedule B. Item 6. [The Annual Report shall include] An update of the current capacity of the Tailings Impoundment Area;

17. Schedule B. Item 7. [The Annual Report shall include] A comparison of the flows (m^3/day) at monitoring stations TL-1, TL-2, TL-3, and TL-4.

18. Schedule J – Conditions Applying to General and Aquatics Effects Monitoring.

Table 2 – Shoreline Erosion Monitoring Requirements [See Table 6.1-1]

Table 3 – Thermal Monitoring [See Table 6.1-2]

Table 6.1-1. Shoreline Erosion Monitoring (Schedule J)

Station	Description	Phase	Monitoring Parameters	Frequency
Monitoring Strip #1	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually
Monitoring Strip #2	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually
Monitoring Strip #3	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually
Monitoring Strip #4	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually
Monitoring Strip #5	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually
Monitoring Strip #6	Shoreline (location provided in S4 DWG T-14 dated March 2007)	Construction, Operations, Closure	Erosion via bathymetric survey of the underwater section of the monitoring strip down to the original Tailings Impoundment Area water level of 28.3 m	Annually

Table 6.1-2. Schedule J Table 3 Thermal Monitoring

Station	Location	Location Reference	Phase	Monitoring Parameters	Frequency
T1	Jetty	SD4 - DWG J-01	Operation	Temperature	A
T2	Jetty	SD4 - DWG J-01	Operation	Temperature	A
T4	Beach Laydown	SD4 - DWG S-01	Operation	Temperature	A
T5	Fuel Storage and Containment Facility at Robert's Bay		Operation	Temperature	A
T7	Airstrip	SD4 - DWG S-03	Operation	Temperature	A
T8	Airstrip	SD4 - DWG S-03	Operation	Temperature	A
T9	Airstrip	SD4 - DWG S-03	Operation	Temperature	A
T1	Bridge Abutment	SD4 - DWG S-12	Operation	Temperature	A
T2	Bridge Abutment	SD4 - DWG S-12	Operation	Temperature	A
DOR-1	Camp	to be confirmed	Operation	Temperature	A
DOR-2	Camp	to be confirmed	Operation	Temperature	A
DOR-3	Pollution Control Pond	to be confirmed	Operation	Temperature	A
DOR-4	Sedimentation Pond	to be confirmed	Operation	Temperature	A
DOR-5	Float Plane Dock Laydown Area	to be confirmed	Operation	Temperature	A
DOR-6	Road	to be confirmed	Operation	Temperature	A
DOR-7	Road	to be confirmed	Operation	Temperature	A
DOR-8	Road	to be confirmed	Operation	Temperature	A

(continued)

Table 6.1-2. Schedule J Table 3 Thermal Monitoring (completed)

Station	Location	Location Reference	Phase	Monitoring Parameters	Frequency
DOR-9	Road	to be confirmed	Operation	Temperature	A
DOR-10	Road	to be confirmed	Operation	Temperature	A
SRK-53	Shoreline	to be confirmed	Operation, Closure	Temperature	B
SRK-54	Shoreline	to be confirmed	Operation, Closure	Temperature	B
SRK-55	Shoreline	to be confirmed	Operation, Closure	Temperature	B
SRK-56	Shoreline	to be confirmed	Operation, Closure	Temperature	B
SRK-57	Shoreline	to be confirmed	Operation, Closure	Temperature	B
SRK-58	Shoreline	to be confirmed	Operation, Closure	Temperature	B
NI1-NI28	North Dam	SD4 - DWG T-09	Operation, Closure	Temperature	C
SI2-SI22	South Dam	SD4 - DWG T-10	Operation, Closure	Temperature	C

***A** - Monthly, increasing if warming trend is observed*
***B** - Monthly*
***C** - Monthly readings taken manually; data loggers installed to collect continuous data at key locations. Frequency maintained until dam reaches pseudo steady state conditions. The frequency may then be reduced but will have to coincide with the peaks of the annual climatic cycles*

Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

Thermal Monitoring

19. Appendix A: Addendum: EC. Item 1. HBML has committed to monitoring of permafrost in the vicinity of the North and South Dams, monitoring thermistors as long as they are operational, and monitoring seepage conditions to ensure design criteria are met. These monitoring measures will be further defined in the regulatory phase.
20. Appendix A: Permafrost. Item 1. Additional thermistors will be installed during construction.
21. Appendix A: Permafrost. Item 2. Reading of these thermistors will be included in routine site monitoring programs to ensure that the condition of the permafrost in close proximity to the key mine activity centres is being monitored to ensure that the permafrost integrity is being maintained through the planned design and mitigation strategies.

6.2 STUDY DESIGN

Details of the tailings and site geotechnical monitoring program for the Doris North site are provided in the Design reports for the Tailings Containment Area (SRK 2007) and the Site Infrastructure (SRK 2006), as well as in the Tailings Management Plan (Supporting Document S10i to the Revised Water License Application Support Document, April 2007 - Sections 4.1 and 4.2). Prior to beginning discharge into the TIA, a revised tailings management plan will be developed and submitted to the Nunavut Water Board.

HBML initiated the monitoring programs in July 2009, and the first two Annual Geotechnical Inspection Reports (SRK 2009a, 2011) have been submitted to the Nunavut Water Board.

Formal geotechnical Inspections have been carried out in 2009 and 2010 reports (SRK 2009a, 2011) and have been submitted to the NWB in fulfillment of commitments of the Water Licence Part F, Item 4, Schedule B, Item 5, and the Schedule J thermal monitoring requirements. These reports also fulfill the Project Certificate commitment Appendix A Addendum EC, Item 1 and Appendix A Permafrost, Item 2.

The main components of the tailings and site geotechnical monitoring program are as follows:

- HBML will prepare an Operation, Maintenance and Surveillance (OMS) Manual and an Emergency Preparedness Plan (EPP) prior to the start of operations at the TIA. These will be prepared in general accordance with the Dam Safety Guidelines published by the Canadian Dam Association.
- Mine operations staff must carry out daily visual inspections of both dams, taking note of any signs of settlement, unaccounted for drops in water levels, signs of seepage, or any signs of damage or vandalism to instrument clusters.
- Annually, a suitably qualified Professional Engineer registered in the Nunavut Territory must undertake a personal physical inspection of the dams and other surface infrastructure. This inspection must be carried out in the summer and must culminate in a detailed Geotechnical Site Inspection Report.
- Detailed monitoring instrumentation has been included in the dam design. This equipment is used to monitor the thermal and deformation regime of the dams, and include the following: settlement monitoring points, vertical and horizontal ground temperature cables, climactic monitoring, Tail Lake water level monitoring and bathymetric surveys.
- There will be no formal instrumentation in the spillway, since the spillway is only expected to be used in emergency events. Visual inspections of the facility will be undertaken as part of the daily operational inspections by the mine operations staff, and the facility will also be part of the annual Geotechnical Inspection.
- Record the status of each emergency dump catch basin, and trigger any maintenance works such as snow clearing or emptying of a spill. Damage to the liner must also be noted and instructions to carry out repairs must be documented.
- Mine operations staff must carry out daily visual inspections along the entire TIA shoreline taking note of, and recording any signs of shoreline erosion. In addition, the following permanent instrumentation will be installed around the TIA perimeter (note that some of this instrumentation has already been put in place): Ground temperature cables and survey transects.
- Surface infrastructure components will require two types of monitoring: Visual monitoring – physical inspection of all fill surfaces taking special care to identify any areas that may have undergone settlement; and thermal monitoring – to evaluate the depth of the active zone, such that advance warning of potential settlement can be determined.

The Tailings Impoundment Area (TIA) is currently under construction. Monitoring commitments relating to the TIA are therefore not yet applicable. These monitoring activities will commence after the TIA has been constructed.

6.3 ADAPTIVE MANAGEMENT

After the annual geotechnical inspection is completed, the geotechnical engineer will provide a written recommended actions memo to the HBML management team if geotechnical or other engineering issues are identified. The HBML management team will review and address the recommendations to resolve issues that were identified.

The tailings management plan will include an adaptive management strategy.

7. Quarry and Underground Waste Rock Monitoring

7. Quarry and Underground Waste Rock Monitoring

7.1 BACKGROUND AND RATIONALE

7.1.1 Quarry Rock

The Quarry Rock Monitoring Programs include geological inspections of the quarry face to detect and assess any unexpected changes in the geological or geochemical characteristics such that potentially acid generating rock is not used in site construction. Additionally, they include inspection and testing of the quarry rock following construction to verify that all of the quarry rock is non-acid generating, and seepage monitoring to confirm that the quarry rock is not resulting in acidic conditions or elevated concentrations of nutrients or metals. The following specific regulatory requirements for monitoring are also addressed:

Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007):

1. Part D. Item 9. The Licensee shall include, in addition to conducting Quarry Rock Construction Monitoring and Management in accordance with the Water Licence Application, Monitoring and Follow Up Plan, dated July 2007, the following:
   a. A subset of twenty (20) samples shall be subjected to Shake Flask Extraction (SFE) tests with an emphasis on near surface rock samples; and
   b. Submit to the Board for review no later than 6 months after the collection of samples, a report that presents the data collected from the Quarry Rock Construction Monitoring Program. The report shall include a discussion of the interpretation of the geochemical data.

2. Part D. Item 21. The Licensee shall conduct a Quarry Rock Seepage Monitoring and Management program in accordance with the Water Licence Application Monitoring and Follow Up Plan, dated July 2007 and in accordance with the following:
   a. The seep survey shall measure pH and Electrical Conductivity (EC) levels in the precipitation runoff and snowmelt that comes into contact with rock along the roadways, building pads and quarry sites;
   b. The seep survey shall measure pH and EC levels at several reference points on the tundra not subject to mine influences;
   c. The quarry rock seepage program shall be conducted on any ephemeral seepage present at the time of the quarry rock seepage monitoring program and not at pre-determined seepage stations;
   d. A minimum of at least 10% of the total sample set shall be submitted for secondary analysis, regardless of the values of measured field pH and EC; and
   e. The Quarry Rock Seepage Monitoring Program shall be expanded beyond the 100 samples to include monitoring of all rock drains.

3. Part D. Item 22. The Licensee shall provide a report that presents the data collected from the Quarry Rock Seepage Monitoring Program conducted under Part D, Item 21. The report shall include a discussion of the interpretation of geochemical data and shall be presented to the Board for review, no later than six (6) months after the collection of samples.

4. Schedule D. Item 1. The Construction Monitoring Report referred to in Part D, Item 8 shall include the following:

   f. Follow-up geochemical sampling of quarried rock used in construction of the site roads and pads to verify that the rock used is non-acid generating as predicted;

   k. Summary of the Quarry Rock Construction Monitoring Program referred to in Part D, Item 3;

   n. Summary of the Quarry Rock Seepage Monitoring Program referred to in Part D, Item 22;

   The report shall discuss the monitoring results, analysis and any mitigation measures employed as a result of the monitoring, for each of the items listed above.

Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

5. Section 4.0. Item 18. HBML shall submit to the NWB, as part of the water licence application, a program detailing the methodology for testing quarried rock for acid generation and metal leaching potential. The sampling, testing and analysis must be done by a professional geologist registered in Nunavut.
6. Section 4.0. Item 18. Commentary. NIRB expects any methodology to be certified by a Registered Professional and approved by the NWB. NIRB expects that any analysis of laboratory results must also be done by a Registered Professional. The designation of Registered Professional refers to all those professionals registered with NWT and Nunavut Association of Professional Engineers, Geologists, and Geophysicists (NAPEGG).
7. Appendix A: Addendum: INAC/Hatch Acres. Item 1. HBML will carry out additional work prior to the start of construction to verify that the quarried rock to be used for construction will be non-acid generating. QA/QC procedures will be in place during construction to verify that the rock used is geochemically stable.

7.1.2 Underground Waste Rock

Monitoring plans for the underground waste rock have recently been revised to address some changes to the mining plans. Under previous plans all of the waste rock was to be stored in temporary waste rock piles prior to eventual use as backfill in the underground mine. The revised plans call for more extensive monitoring of the solids to support the segregation of non-acid generating rock with low sulphides with more mineralized rock such that the non-acid generating rock could be used in construction. These plans still require approval by NWB. However, HBML intends to proceed with the monitoring to ensure that adequate segregation is occurring, and to support revised closure plans for this component of the site.

The following specific regulatory requirements for monitoring are specified in the Water Licence and Project Certificate:

Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007):

1. Part D, Items 9, 21, and 22, and Schedule D, Items 1f, 1k, and 1n (as above). [It is assumed that these requirements would also be applied to any non-mineralized waste rock used in construction].
2. Part G. Item 15. The Licensee shall submit to the Board for review by April 1, 2008, a Revised Waste Rock Management Plan.

3. Part G. Item 16. The Licensee shall store all potentially acid generating rock at the Temporary Waste Rock Pad prior to ultimate disposal underground as mine backfill, unless otherwise approved by the Board.
4. Part G. Item 17. All Waste Rock brought to surface from the underground shall be stored on the Temporary Waste Rock Pad and returned underground as backfill and is not to be used for any purpose unless otherwise approved by the Board.
5. Part G. Item 18. The Licensee shall segregate mineralized from un-mineralized Waste Rock on the Temporary Waste Rock Pad.
6. Part J, Item 12. The Licensee shall measure and record all flow and volume measurements on a monthly basis (unless otherwise stated):

   d. Tonnages of mineralized and un-mineralized waste rock stored on the Temporary Waste Rock Pad on a monthly basis during construction, operations, and closure;

   e. Tonnage of waste rock returned underground on a monthly basis during construction, operation and closure;

7. Part K, Item 6. The Licensee shall confirm the absence of seepage from the Temporary Waste Pad in groundwater downstream of the Pollution Control Pond.
8. Schedule B. Item 3. [The Annual Report shall include] A Geochemical Monitoring and Waste Rock Storage Assessment that includes the following:

   c. For waste rock:

      i. Tonnages of waste rock placed on the Temporary Waste Rock Pile by classification of mineralized and un-mineralized rock.

Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

9. Appendix A: Addendum: INAC. Item 5. Once the Doris North Mine is in operation HBML will initiate additional kinetic and static test work to further characterize the acid generating - metal leaching potential of mine rock and tailings with the objective of providing additional data for adaptive management should conditions change or the mine life be extended.

7.2 STUDY DESIGN

7.2.1 Quarry Rock

Details of the quarry rock monitoring program for the Doris North site were included in the 2007 Monitoring and Follow-up Plan (MHBL 2007). A comprehensive report documenting the results of the 2007 to 2009 monitoring results was submitted to NWB in November 2009 (SRK 2009b), and addressed the short-term requirements for all of the infrastructure components that had been constructed as of June 2009. A similar report is in preparation for additional infrastructure components constructed as of June 2010.

More recently, a Quarry Management and Monitoring Plan was prepared for Quarries A, B, and D (SRK 2010d). It is HBML's intention to carry out a similar level of monitoring for all of the active quarries and newly constructed infrastructure areas for the Project.

The main components of the quarry rock monitoring program are as follows:

- Visual inspections and sampling at the quarry face by site geologists when the quarries are in active use;
- Collection and testing of two samples per year from each active quarry for total sulphur analysis, and, if the sulphur content exceeds 0.1%, the samples would be subjected to full acid base accounting (ABA) tests. A subset of samples will be subjected to shake flask extraction tests. The testing would be done on the whole sample and on the -2 mm size fraction to determine whether there is any concentration of sulphides in the fine component of the rock;
- Quarry sumps will be monitored as described under the site water quality monitoring program (Chapter 5 above);
- After construction, the mined out quarries, and any roads and other infrastructure components that were constructed using the quarry or waste rock since the previous inspection will be inspected by a qualified geologist or geochemist to verify that the rock used in construction was suitable for that purpose. During the inspection, samples will be collected for total sulphur analysis. If the sulphur content exceeds 0.1%, the samples will be subjected to full ABA tests. A subset of samples will be subjected to shake flask extraction tests. Where possible, the testing would be done on the whole sample and on the -2 mm size fraction to determine whether there is any concentration of sulphides in the fine component of the rock;
- A seep survey will be conducted around all infrastructure components that have been constructed or modified within the previous 3 years, and in the mined out quarries. Field pH, electrical conductivity (EC), Eh, and temperature readings will be collected. A minimum of 10% of the samples will be submitted for laboratory analyses, as detailed in the Quarry A, B and D Management and Monitoring Plan (SRK 2010d). The seep survey will include all of the rock drains. Reference stations will also be established to provide a basis for comparing this to waters that are not influenced by the development activities; and
- An annual quarry monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).

7.2.2 Underground Waste Rock

Details of the underground waste rock monitoring program for the Doris North site are provided in the Doris North Waste Rock and Ore Management Plan (SRK 2010c). HBML initiated the monitoring programs in November 2010, and results from the first two months of monitoring will be incorporated in the annual Quarry and Underground Waste Rock Monitoring Report.

The main components of the underground waste rock monitoring program are as follows:

- Daily visual inspection of the working face and muck pile by a field geologist to confirm rock types, mineralogical characteristics, and to classify the rock as mineralized or non-mineralized;
- Sampling and testing of the underground waste rock, including ABA on a minimum of one sample per 5000 tonnes of rock, with additional analysis of total sulphur and TIC on some rock units (SRK 2010c), and shake flask extraction tests on one sample per 50,000 tonnes of rock;
- Monitoring and recording the volumes of waste rock mined and placed in the mineralized and non-mineralized areas of the waste rock stockpile, and any non-mineralized waste rock that is removed for use in construction (pending approval);

- Regular water quality monitoring will be carried out at a surveillance monitoring station ST-2 located in the pollution control pond, as described in Site Water Monitoring section above (Chapter 5);
- Annual inspections by a qualified geochemist of the designated non-mineralized areas of the waste rock pile to confirm that there are no areas with elevated amounts of sulphide mineralization, and inspections of the designated mineralized areas of the pile to look for signs of weathering and oxidation of the sulphides;
- Seep surveys along the down-gradient toe of the waste rock pile and below the pollution control pond and access road throughout operations and for at least 2 years following mining and backfilling activities. The seep survey will be completed at the same time and will follow the same procedures as used for the seep surveys around other infrastructure areas. Details of those procedures are provided in SRK 2010b. However, given the increased importance of obtaining samples from this area, all distinct seeps in the immediate vicinity of the waste rock pile (i.e. any seeps spaced more than 50 metres apart) will be tested for a full suite of laboratory parameters;
- Any non-mineralized waste rock in construction will also be inspected and sampled after construction is complete. The inspection and sampling protocols will be the same as those established for the quarry rock. The sampling density would be one sample per 10,000 tonnes of rock; and
- An annual quarry monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).

7.3 ADAPTIVE MANAGEMENT

Quarry rock that is expected to be potentially acid generating will not be used in construction activities. This material will be set aside in the quarry area if space is available, or will be placed on the waste rock storage pads.

If monitoring programs indicate that rock used in various infrastructure projects is leaching an unacceptable level of acid, HBML will discuss the results with the NWB to determine the appropriate course of action.

8. Waste Management

8. Waste Management

8.1 BACKGROUND AND RATIONALE

Part G of the Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007) outlines the "Conditions Applying to Waste Management and Waste Management Plans". These conditions, as well as other waste management-related commitments, are listed below:

1. Part G. Item 5. The Licensee shall dispose of all food waste in an incinerator designed for this purpose.
2. Part G. Item 6. The Licensee shall ensure that any on-site incinerator meets the requirements of the Canada-Wide Standards for Dioxins and Furans and Canada-Wide Standards for Mercury emissions.
3. Part G. Item 7. The Licensee shall submit to the Board for review by May 1, 2008 an Incineration Management Plan in conjunction with Part G, Item 9.
4. Part G. Item 8. The Licensee is restricted to the open burning of paper products, paperboard packing and untreated wood waste in accordance with the Government of Nunavut policy Municipal Solid Wastes Suitable for Open Burning.
5. Part G. Item 9. The Licensee shall submit to the Board for review by May 1, 2008, a revised Landfill Management Plan. The Plan shall consider the following:

   a. Recycling/segregation waste program;

   b. Incineration technology selected;

   c. Waste audit – amount and types of wastes to be incinerated or otherwise disposed;

   d. Consolidation of wastes;

   e. Operational and maintenance records;

   f. Operator Training;

   g. Emission measurements;

   h. Incinerator Ash disposal;

   i. Consideration for disposal of used oil and waste fuel; and

   j. Monitoring, characterization, and disposal of incinerator ash.

6. Part G. Item 10. The Licensee is authorized to dispose of and contain all non-hazardous solid wastes at the Landfill or as otherwise approved by the Board.
7. Part G. Item 11. The Licensee shall submit to the Board for review by June 1, 2008, a revised Hazardous Waste Management Plan. The handling and disposal of wood crates used in the shipment of sodium cyanide shall be included in the Plan.
8. Part G. Item 12. The Licensee shall back haul and dispose of all hazardous wastes generated through the course of the operation at an approved waste disposal site.
9. Part G. Item 13. The Licensee shall maintain records of all waste backhauled and confirmation of proper disposal. These records shall be made available to an Inspector upon request.

10. Part G. Item 14. The Licensee shall submit to the Board for review by June 1, 2008, a revised Landfarm Management Plan. The Plan shall include the following:

    a. Operation and maintenance considerations including the methods of characterization, segregation and treatment;

    b. Confirmation of the Soil Quality Remediation Objectives (SQROs) and distinction between where parkland versus industrial standards will be applied;

    c. Contingency measure for contaminated soils that do not meet the SQROs; and

    d. Any proposed future uses.

11. Part G. Item 19. The Licensee shall operate the Sewage Treatment Plant, Landfill, Landfarm, Fuel Storage and Containment Facilities, Sedimentation Pond, and Pollution Control Pond to the satisfaction of the Inspector.

12. Part J. Item 12. The Licensee shall measure and record all flow and volume measurements on a monthly basis (unless otherwise stated):

    f. The volume of sewage sludge removed from the Sewage Treatment Plant and the locations or method of sewage sludge disposal during construction, operation and closure; and

13. Schedule B. Item 3. [The Annual Report shall include] Annual Landfill Management report

14. Schedule D. Item 1. The Construction Monitoring Report referred to in Part D, Item 8 shall include the following:

    g. Monitoring of the waste management practices employed by the contractors and their employees (food waste, hazardous wastes such as engine oil and filters etc, non-hazardous wastes);

Additionally, the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006) outlines the following:

15. Appendix A: Grizzly Bear. Item 2. Education and reinforcement of proper waste management practices to all workers and visitors to the site

16. Appendix A: Grizzly Bear. Item 3. Implement appropriate waste management protocols, including burning all food wastes in an oil fired incinerator

17. Appendix A: Grizzly Bear. Item 4. Eliminate attractants (e.g. food waste, oil products) at the landfill site

18. Appendix A: Grizzly Bear. Item 5. Separation of food waste and non-food waste at source

19. Appendix A: Grizzly Bear. Item 6. Appropriate fencing around the landfill area

20. Appendix A: Grizzly Bear. Item 7. Burn waste oil in waste-oil furnaces or taken off-site for recycling

21. Appendix A: Grizzly Bear. Item 8. Designate contained areas for worker lunch and coffee breaks

22. Appendix A: Grizzly Bear. Item 9. Educate people on the risk associated with feeding wildlife and careless disposal of food garbage

23. Appendix A: Grizzly Bear. Item 10. Ongoing review of the efficacy of the waste management program and adaptive improvement

24. Appendix A: Health Services. Item 5. HBML will continue to follow health guidelines, procedures and protocols for camp food. Waste handling and storage will meet all appropriate territorial regulations and standards to avoid any health concerns for employees

8.2 STUDY DESIGN

The air quality monitoring section (Chapter 2) addresses Type A Water Licence Part G, Items 6 and 7. The Project Certificate Appendix A management commitments will be included in the Wildlife Management Best Practice Standard Operating Procedures currently being developed (see Chapter 12).

The following management plans were submitted to comply with the requirements of the water licence:

- Landfill Management Plan (EBA 2010)
- Landfarm Management and Monitoring Plan (SRK 2010a)
- Hazardous Waste Management Plan (SRK 2009d)
- Incinerator Management Plan (SRK 2009e)
- Sewage Management Plan (SRK 2009c)

The Doris North Project does not currently have a landfill. As such, all non-burnable waste materials, which include both hazardous and non-hazardous wastes, are packaged and backhauled to a qualified off-site waste management facility.

A logsheet for tracking the volumes of the individual waste streams that are backhauled or incinerated is maintained at the on-site waste management facility. Currently, burnable waste that may be open-burned includes clean wood and cardboard. These items are not weighed prior to burning due to the current location of the burn pan. Once the permanent waste management facility is constructed, and the burn pan is relocated to be near the facility, weights will be recorded for these items. This information is included in the annual licence report.

In an effort to reduce unsuitable domestic waste from entering the incinerator stream and from being brought to site, a number of strategies have been implemented:

- Recycling stations have been established throughout the main camp and facilities to collect tin, glass, and plastic;
- Reuseable water bottles, lunch kits, and lunch containers have been purchased for use at site to reduce the amount of disposable lunch packaging used on-site, with a vision of eliminating plastic lunch bags, tinfoil lunch trays, and disposable individual packaged lunch items;
- Kitchen bulk retrofit has been approved to allow for reduce or eliminate small serving or individual serving items, including condiments, yogurt, and individually packaged lunch snacks; and
- An awareness section has been included in the site orientation to encourage participation by employees to reduce waste and sort waste into appropriate recycling containers.

In an effort to improve incinerator efficiency, a complete refurbishing was completed for the incinerator, and all operators and maintenance personnel are required to be trained and certified as per the manufacturer’s operations and maintenance manual.

Annual site audits are completed by an external contractor to identify areas for continuous improvement in wildlife attractant management, and annual bear awareness training is mandatory for all personnel who work on the project site. The importance of proper waste management is a focal point of these activities.

As part of the sewage management plan, the volume of effluent discharged, and the volume of sludge pressed are recorded daily. This information is included in the monthly reports that are submitted to the NWB.

The landfarm is being constructed in 2011, and is expected to be in use by summer 2011. The facility consists of 3 ponds: contaminated soil, contaminated snow and clean water. All 3 ponds have sumps for water removal, provided that the water meets discharge criteria. Water will be transferred to the clean water pond after treatment using an oil-water separator to remove the hydrocarbons and lead. Water in the clean water pond will be analysed and discharged if it meets discharge criteria (details included in section 4 above).

The contaminated soil pond will be managed to facilitate degradation or volatilisation of hydrocarbon contaminants to remediate the soil for use in reclamation projects. The contaminated soil will be The LTA will be monitored weekly during summer months by the Environmental Technician to help ensure that conditions conducive to the attenuation of hydrocarbon contaminants are present (i.e. soil moisture, pH, and aeration), and the soil will be mixed, at minimum, once per month when the soil is not frozen. Soil samples will be collected at least twice per year and will be tested for CWS-PHC fractions (Fraction F1 thru F4), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Total Petroleum Hydrocarbons (TPH), and total metals using a 36 element ICP-MS scan (see Appendices B and E). Soil will be removed when the samples indicate that contamination is below the industrial screening levels.

8.3 ADAPTIVE MANAGEMENT

If current waste sorting procedures do not result in efficient operation of the incinerator, which meets incinerator emissions requirements, HBML will discuss the results with the NWB to determine the appropriate course of action. Additional waste sorting and reduction opportunities will be continuously implemented as reasonable opportunities are identified.

Water and soil from the landfarm will not be removed from the facility if it does not meet the sump discharge criteria, or the soil industrial screening levels.

9. Construction and Reclamation Monitoring

9. Construction and Reclamation Monitoring

9.1 BACKGROUND AND RATIONALE

Part D and Schedule D of the Doris North Gold Mine Project Type A Water Licence (2AM-DOH0713, issued September 19, 2007) outline the "Conditions Applying to Construction". These commitments, as well as other construction-related commitments, are listed below:

1. Part D. Item 1. The Licensee shall ensure that all fill material used is from an approved source and shall be free of contaminants.
2. Part D. Item 2. The Licensee shall ensure that any chemicals, fuel or wastes associated with the undertaking do not enter any water body.
3. Part D. Item 3. Equipment storage holding areas should be located on gravel, sand or other durable land, a distance of at least thirty (30) metres above the ordinary high water mark of any water body in order to minimize impacts on surface drainage and water quality.
4. Part D. Item 4. Sediment and erosion control measures shall be implemented prior to and maintained during the construction and operation where necessary to prevent entry of sediment into water
5. Part D. Item 5. The Licensee shall undertake appropriate corrective measures to mitigate impacts on surface drainage resulting from the Licensee's operations.
6. Part D. Item 6. The Licensee shall limit any in-stream activity to low water period. In-stream activity is prohibited during fish migration.
7. Part D. Item 7. The Licensee shall conduct construction monitoring during all phases of the project.
8. Part D. Item 8. The Licensee shall submit an annual Construction Monitoring Report no later than March 31 in the year following the calendar year being reported. The report shall be developed in accordance with Schedule D Item 1.
9. Part D. Item 9. The Licensee shall include, in addition to conducting Quarry Rock Construction Monitoring and Management in accordance with the Water Licence Application, Monitoring and Follow Up Plan, dated July 2007, the following:
   a. A subset of twenty (20) samples shall be subjected to Shake Flask Extraction (SFE) tests with an emphasis on near surface rock samples; and
   b. Submit to the Board for review no later than 6 months after the collection of samples, a report that presents the data collected from the Quarry Rock Construction Monitoring Program. The report shall include a discussion of the interpretation of the geochemical data.
10. Part D. Item 10. The Licensee shall tag any potentially acid generating rock identified through the Quarry Rock Construction Monitoring program for removal to the Temporary Waste Rock Pile, for ultimate disposal underground.

11. Part D. Item 11. The Licensee shall ensure that the construction and operation of the Fuel Storage and Containment Facility(s) meets, at a minimum, all applicable legislation and industry standards that include the following:

    a. Environmental code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products, 2003; CCME, PN 1326; and

    b. National Fire Code, 1995.

12. Part D. Item 13. The Licensee shall, for the purposes of bridge construction, ensure that all activities remain outside of the natural channel width by the placement of abutments, footings or armouring above the ordinary high water mark so that there is no restriction to the natural channel processes.

13. Part D. Item 14. The Licensee shall submit to the Board for review thirty (30) days following issuance of the licence, updated for construction drawings of the proposed all weather access road. This submission shall also include the following:

    a. The thickness of the various materials used at the coarse rock drain locations and for the general road fill;

    b. Details for the management of surface water adjacent to the access roads, including any contingency plans should coarse rock drains fail to operate and;

    c. Be signed and sealed by the appropriately qualified Engineer.

14. Part D. Item 15. The Licensee shall conduct all activities, including the construction of the all-weather roads, in such a way as to minimize impacts on surface drainage and shall immediately undertake any corrective measures in the event of pooling of water or any impacts on surface drainage.

15. Part D. Item 16. With respect to access road, pad construction or other earthworks where direct or indirect flow into a water body is possible, the deposition of debris or sediment into or onto any water body is prohibited. These materials shall be disposed a distance of at least thirty (30) metres from the ordinary high water mark in such a fashion that they do not enter the water.

16. Part D. Item 17. The Licensee shall monitor all activities for signs of erosion and shall implement and maintain sediment and erosion control measures prior to the undertaking to prevent entry of sediment into any water body.

17. Part D. Item 18. The licensee shall conduct daily visual inspections for all construction activity during spring freshet and during and after remarkable rainfall events with sampling of runoff/seepage where turbidity is evident.

18. Part D. Item 19. All surface runoff during the construction of any facilities, where flow may directly or indirectly enter a water body, shall meet the following effluent quality limits: TSS Maximum average concentration 50 mg/L, maximum concentration of any one grab sample 100 mg/L

19. Part D. Item 21. The Licensee shall conduct a Quarry Rock Seepage Monitoring and Management program in accordance with the Water Licence Application Monitoring and Follow Up Plan, dated July 2007 and in accordance with the following:

    a. The seep survey shall measure pH and Electrical Conductivity (EC) levels in the precipitation runoff and snowmelt that comes into contact with rock along the roadways, building pads and quarry sites;

b. The seep survey shall measure pH and EC levels at several reference points on the tundra not subject to mine influences;

c. The quarry rock seepage program shall be conducted on any ephemeral seepage present at the time of the quarry rock seepage monitoring program and not at pre-determined seepage stations;

d. A minimum of at least 10% of the total sample set shall be submitted for secondary analysis, regardless of the values of measured field pH and EC; and

e. The Quarry Rock Seepage Monitoring Program shall be expanded beyond the 100 samples to include monitoring of all rock drains.

20. Part D. Item 22. The Licensee shall provide a report that presents the data collected from the Quarry Rock Seepage Monitoring Program conducted under Part D, Item 21. The report shall include a discussion of the interpretation of geochemical data and shall be presented to the Board for review, no later than six (6) months after the collection of samples.
21. Part D. Item 23. The Licensee shall ensure that all rock used in construction is non-acid generating.
22. Part D. Item 24. The Licensee shall not use waste rock from underground for the construction of any infrastructure.
23. Part D. Item 25. The Licensee shall ensure that all containment and runoff control structures are constructed and maintained to prevent escape of wastes to the surface or groundwater systems.
24. Part D. Item 26. The Licensee shall submit to the Board for review, within ninety (90) days of completion of all structures designed to contain, withhold, divert or retain waters or wastes during the construction phase, a Construction Summary Report prepared by a qualified Engineer(s) that shall include as-built drawings, documentation of field decisions that deviate from original plans and any data used to support these decisions.
25. Part D. Item 27. The Licensee shall ensure that all construction of engineered structures is supervised and field checked by an appropriately qualified and experienced Engineer in such a manner that the project specification can be enforced and, where required, the quality control measures can be followed. The Licensee shall also ensure that the construction records of all engineered structures are maintained and made available at the request of the Board and/or an Inspector.
26. Part D. Item 28. The Licensee shall ensure all runoff and seepage from the Temporary Waste Rock Pad is directed to the Pollution Control Pond for collection and transfer to the Tailings Impoundment Area.
27. Part D. Item 29. The Licensee shall consider the principles of adaptive management in construction and operations.
28. Schedule B. Item 2. [The Annual Report shall include a] Summary of the Construction Monitoring Report referred to in Part D, Item 8 and outlined in Schedule D
29. Schedule B. Item 15. [The Annual Report shall include] A summary of any closure and reclamation work anticipated for the next year, including any changes to the implementation and scheduling
30. Schedule D. Item 1. The Construction Monitoring Report referred to in Part D, Item 8 shall include the following:

a. Blast vibration monitoring for quarrying activity carried out in close proximity to fish bearing waters;

b. Monitoring of the performance of erosion protection measures employed by the construction contractor;

c. Monitoring for sediment release from construction areas;

d. Monitoring for wildlife interactions;

e. Monitoring to ensure the protection of all migrating birds and their nesting sites;

f. Follow-up geochemical sampling of quarried rock used in construction of the site roads and pads to verify that the rock used is non-acid generating as predicted;

g. Monitoring of the waste management practices employed by the contractors and their employees (food waste, hazardous wastes such as engine oil and filters etc, non-hazardous wastes);

h. Monitoring of contractor's activity to minimize ground impacts to the tundra (i.e. keeping vehicles off the tundra and on constructed roadways);

i. Monitoring of dust generation and use of water by the contractor to manage dust emissions from crushing and construction activity;

j. Vegetation monitoring;

k. Summary of the Quarry Rock Construction Monitoring Program referred to in Part D, Item 3;

l. Summary of the construction of the North and South Dams;

i. Laboratory results of subsurface investigations of the dam foundations from undisturbed samples;

ii. Details of the geotechnical instrumentation and monitoring plan proposed to monitor the performance of the dams; and

iii. Results of subsurface investigations and laboratory analyses must be reviewed by HBML and the dam design modified accordingly under the supervision of a Geotechnical Engineer.

m. Summary of the items referred to in Part D, Item 15 with respect to updated construction drawings for the all weather access roads;

n. Summary of the Quarry Rock Seepage Monitoring Program referred to in Part D, Item 22; and

o. Status of the Construction Summary Report referred to in Part D, Items 27.

The report shall discuss the monitoring results, analysis and any mitigation measures employed as a result of the monitoring, for each of the items listed above.

Additionally, the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006) outlines the following:

31. Appendix A: Addendum: INAC/Hatch Acres. Item 1. HBML will carry out additional work prior to the start of construction to verify that the quarried rock to be used for construction will be non-acid generating. QA/QC procedures will be in place during construction to verify that the rock used is geochemically stable.

9.2 STUDY DESIGN

Many of the construction-related monitoring activities are components of other monitoring programs and are summarized in other sections of this report. The Air Quality Monitoring section (Chapter 2) addresses dust monitoring (Schedule D Item 1i). The site water monitoring section (Chapter 5) addresses construction runoff (Part D Item 20). The Quarry and Underground Waste Rock Monitoring section above (Chapter 7) addresses Type A Water Licence Part D Items 9, 21, 22, and Schedule D Item 1 f, k, and n, as well as Project Certificate Appendix A Addendum INAC/Hatch Acres, Item 1. The Waste Management section (Chapter 8) addresses Type A Water Licence Schedule D Item 1g. The Wildlife Monitoring section (Chapter 12) discusses Type A Water Licence Schedule D Item 1d, e and j.

A construction monitoring report, addressing all points outlined in Type A Water Licence Schedule D, is compiled annually and submitted to the NWB as a part of the Annual Reporting. The most recent construction monitoring report was submitted in March of 2011 for the 2010 calendar year (HBML 2011b). Some of the construction-related monitoring activities are conducted as components of other monitoring programs (e.g. quarry rock monitoring) and are reported only in summary in the construction report.

Sediment and erosion control measures are identified for each construction project during the project execution planning stage prior to beginning construction**.** Water samples are collected if substantial turbid runoff is observed from any construction area where the water may enter a waterbody. This situation is not encountered frequently in the project area, and sediment control measures are implemented to avoid the entry of turbid water into a waterbody.

Construction monitoring is implemented during all construction activities by a qualified engineer to ensure that the project is completed as per the design specification. Seep surveys and shake flask tests are conducted by the engineering consultant as part of the quarry rock monitoring program. Seep surveys measure the pH and electrical conductivity as required in the water licence, and unimpacted seeps or ephemeral streams are also sampled as control sites. A minimum of 100 sites are sampled, including control streams, and samples are collected at a minimum of 10% of the sites for analysis at an accredited laboratory.

9.3 ADAPTIVE MANAGEMENT

Sediment and erosion control systems are inspected visually to determine effectiveness and mitigation measures are implemented if the system is not performing as anticipated. Additional erosion control may be added, existing controls may be repaired or replaced as required.

If potentially acid generating rock is encountered, it is segregated within the quarry so that it is not used in construction activities. Space on the waste rock pad is limited, so quarry rock that is unsuitable for construction is currently being contained within the quarry itself.

10. Aquatic Effects Monitoring

10. Aquatic Effects Monitoring

10.1 BACKGROUND AND RATIONALE

The following requirements are outlined in the Doris North Project Type "A" Water Licence (Water Licence No. 2AM-DOH0713) issued by the Nunavut Water Board (NWB; September 19, 2007):

1. Part K. Item 7. The Licensee shall submit to the Board for approval by March 31, 2008, a proposal for the development of an Aquatic Effects Monitoring Plan (AEMP) in consultation with Environment Canada. The proposal for an AEMP shall consider modifications and advances in schedule which are consistent with the objectives and requirements of the Metal Mining Effluent Regulations (MMER);
2. Part K. Item 8. The Licensee and Environment Canada shall coordinate with the NWB to ensure that the advanced submission of the AEMP meets the requirements of MMER;
3. Part K. Item 9. The Licensee shall continue to collect baseline data consist[ent] with previously collected baseline data until such time as an AEMP is approved and implemented.
4. Schedule B. Item 10. [The Annual Report shall include] The results of continued aquatic effects baseline data collection, and the results of the Aquatic Effects Monitoring Program in accordance with Part K, Item 4.

10.2 STUDY DESIGN

In compliance with Part K, Item 7, HBML along with Rescan Environmental Services Ltd. (Rescan) developed an AEMP Plan in consultation with Environment Canada between December 2009 and February 2010. The final AEMP Plan, *Doris North Gold Mine Project: Aquatics Effects Monitoring Plan* (the Plan; Rescan 2011e), was submitted to the NWB on February 24, 2010, and the document was approved on March 25, 2010 under Motion 2009-23-L04. This document conformed to the methodologies and practices laid out in the MMER (2002), thus complying with Part K, Item 8 of the Type A Water Licence.

The Aquatic Effects Monitoring Program Plan (Rescan 2010c) has been approved by the NWB. The Aquatic Effects Monitoring Program will be carried out on an annual basis starting in 2010, as specified in the Plan. The AEMP is designed to meet the requirements of the MMER Environmental Effect Monitoring (EEM) Program.

The following components are sampled as part of the AEMP:

- Winter dissolved oxygen (lakes, marine);
- water quality (lakes, streams, marine);
- primary producers (phytoplankton (lakes, marine); periphyton (streams));
- benthic invertebrate community (lakes, streams, marine);
- sediment quality (lakes, streams, marine); and
- fish monitoring (lakes, marine).

The AEMP includes the monitoring of five lake sites (including two reference lakes), five streams sites (including two reference streams), and three marine sites (including one reference marine site)

(Figure 10.2-1). Table 10.2-1 presents the AEMP sampling locations and descriptions. 2010 was the first year of implementation of the AEMP, and results of the 2010 program can be found in the 2010 Aquatic Effects Monitoring Program Report, Doris North Gold Mine Project (Rescan 2011c).

Table 10.2-1. AEMP Sampling Locations, Descriptions, and Purpose, Doris North Project, 2010

Sampling Location	Coordinates (13W)	Description	Purpose
Doris Outflow	434177E 7559910N	Immediately downstream of discharge point from the Tailings Impoundment Facility	First exposure site downstream of effluent discharge location
Little Roberts Lake	434624E 7562747N	Small lake downstream of Doris Outflow	First and only lake exposed to upstream effluent discharge
Little Roberts Outflow	434367E 7563094N	Stream downstream of Little Roberts Lake	Second exposure stream downstream of effluent discharge location
Roberts Bay East	433430E 7563850N	Marine bay where Little Roberts Lake drains into	Marine receiving environment for freshwater system downstream of effluent discharge location
Roberts Outflow	435129E 7562881N	Stream upstream of Little Roberts Lake, which drains the much larger Roberts Lake	To characterize any influence of the abandoned silver mine on Little Roberts Outflow to differentiate this from potential effects of effluent discharge upstream
Doris Lake North	433815E 7558222N	Large lake located south of main Project site. North part of lake is adjacent to Project infrastructure.	Potential exposure site due to close proximity of Project infrastructure and explosives storage
Doris Lake South	434324E 7555120N	Large lake located south of main Project site. South part of lake is 4 km away from Project infrastructure.	South site can be used to characterize any potential changes to the lake (whether local or lake-wide)
Roberts Bay West (Jetty)	432479E 7563346N	Small marine bay where jetty is located.	Potential exposure marine area due to marine activities and infrastructure
Reference Lake D	447566E 7561201N	Small reference lake located west of the Project	Reference lake meant to closely resemble the morphology, habitat, and fish community of Little Roberts Lake
Reference D Outflow	448109E 7562830N	Reference outflow located west of the Project	Reference stream meant to closely resemble the morphology, habitat, and fish community of Little Roberts Outflow
Reference Lake B	424050E 7532000N	Large reference lake located southwest of the Project	Reference lake meant to closely resemble the morphology, habitat, and fish community of Doris Lake
Reference B Outflow	427150E 7530515N	Reference outflow located southwest of the Project	Reference stream meant to closely resemble the morphology, habitat, and fish community of Doris Outflow
Marine Reference Bay	441152E 7563018N	Marine bay located west of the Project	Marine reference area meant to provide a reference for the two potential marine exposure sites (Roberts Bay East, Roberts Bay West (Jetty))

The overall monitoring schedule for the AEMP is provided in Table 10.2-2. The AEMP will be conducted on an annual basis, but the required monitoring and reporting associated with the EEM cycle is currently planned for 2013 and 2014.

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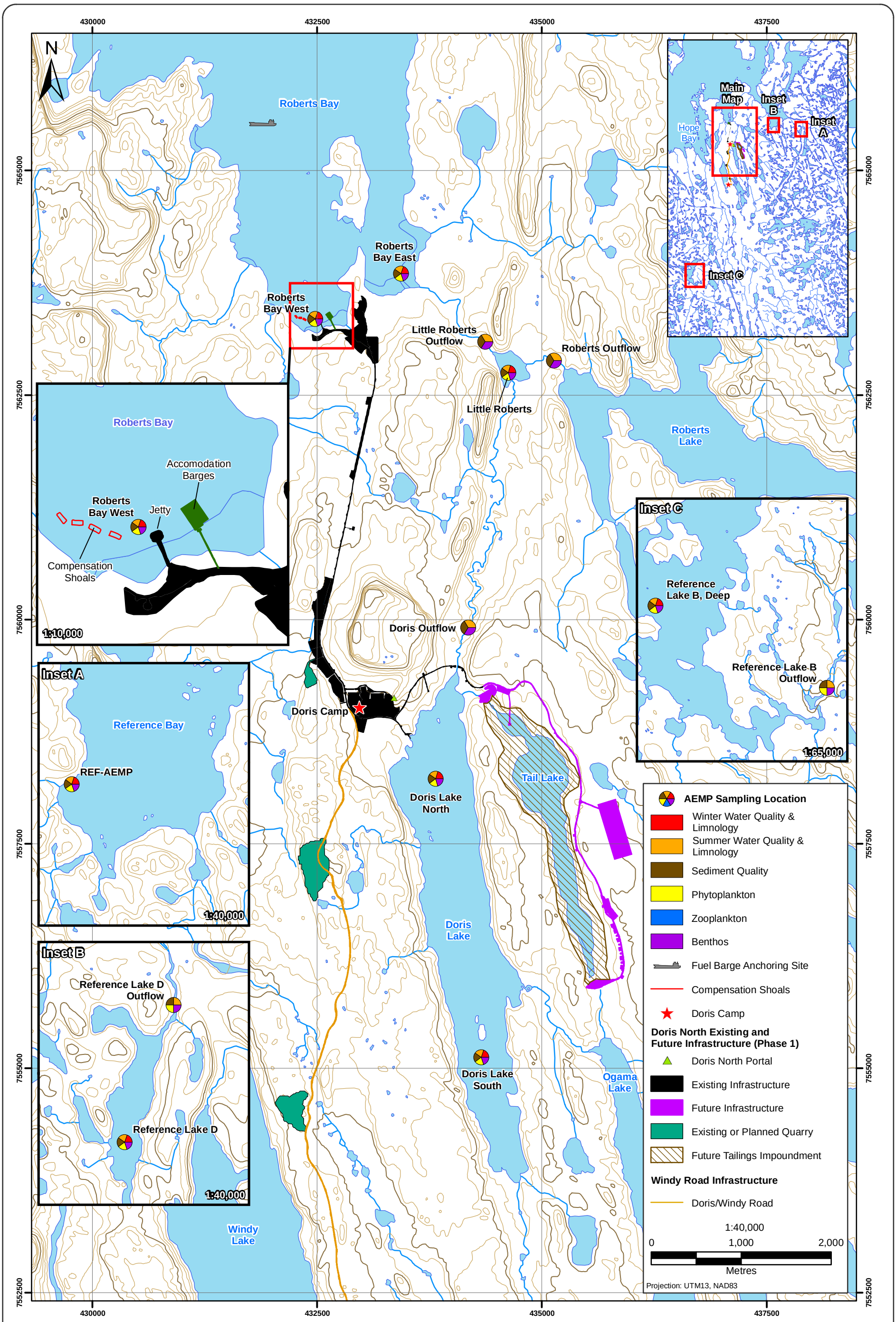

Figure 10.2-1

NEWMONT NORTH AMERICA

AEMP Sampling Locations, Doris North Project

Figure 10.2-1

Rescan Engineers & Scientists

Table 10.2-2. AEMP Monitoring Schedule, Doris North Project

Mine Phase:	Construction		Operation		Closure	
Year:	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
EEM Cycle:				**EEM First Study Design Report**	**EEM Cycle 1 Interpretive Report**	
Monitoring Component						
Lakes					Re-Evaluate AEMP Monitoring Schedule and EEM Cycles	
Water Quality	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Phytoplankton Biomass	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Sediment Quality	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Benthic Invertebrates	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Fish Population/Condition	1 time/yr	-	-	1 time/yr		
Fish Hg/Metal	1 time/yr	-	-	1 time/yr		
Streams						
Water Quality	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Periphyton Biomass	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Sediment Quality	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Benthic Invertebrates	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Fish Population/Condition	1 time/yr	-	-	1 time/yr		
Fish Hg/Metal	-	-	-	-		
Marine						
Water Quality	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Phytoplankton Biomass	4 times/yr	4 times/yr	4 times/yr	4 times/yr		
Sediment Quality	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Benthic Invertebrates	1 time/yr	1 time/yr	1 time/yr	1 time/yr		
Fish Population/Condition	1 time/yr	-	-	1 time/yr		
Fish Hg/Metal	1 time/yr	-	-	1 time/yr		

The MMER and the EEM requirements will apply to the Doris North Project once effluent is discharged at a rate exceeding 50 m^3/day or select deleterious substances are discharged into the environment. EEM requirements have been divided into two parts:

Part 1: Effluent and Water Quality Monitoring Studies (included in Site Water Monitoring); and,

Part 2: Biological Monitoring Studies (included in the AEMP).

The effluent and water quality monitoring studies 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 m^3/day or deleterious substances are discharged). This monitoring is outlined in the Type A Water Licence and is covered in this Report under the Site Water Monitoring chapter (Chapter 5). HBML 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, not less than a month apart, 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.

HBML will submit the design for the initial biological monitoring study 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.

All mines regulated by the MMER are required to conduct a minimum of two consecutive biological monitoring cycles. HBML 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, HBML 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, HBML will conduct a biological monitoring study within 24 months of the change.

If the same effects are found in two consecutive cycles, HBML 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, HBML 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 HBML, and the mine will return to conducting biological monitoring studies.

10.3 ADAPTIVE MANAGEMENT

The AEMP is a key component of adaptive management because it provides the annual monitoring data and analytic assessments required to determine if mining activity or natural variability are affecting the aquatic and marine ecosystems. Each year, the data collected as part of the AEMP will be screened, reviewed, and analyzed to determine if any changes have occurred in the aquatic environment. Results of that evaluation will be described in an annual report. The significance of change, and whether it is a mine effect or natural variation, will be determined using a combination of statistical analyses, graphical analyses, and the use of professional judgement.

During and after the analysis of each year's AEMP data, mining activities that may be responsible for environmental changes will be evaluated and potential mitigation measures will be determined on the basis of present and future risk to the aquatic environment. If there is insufficient data available to justify changing mining practices, then additional effects studies could be implemented to collect data to better assess ecological risk. If mitigation measures are commissioned, then follow-up monitoring should be conducted to assess the effectiveness of those measures.

11. Fish Monitoring

11. Fish Monitoring

11.1 BACKGROUND AND RATIONALE

The fish monitoring for the Doris North Project is designed to comply with four legal documents related to fish and fish habitat. These include the Habitat Compensation Plan for the creation of a Tailings Impoundment Area (TIA) in the former Tail Lake under Schedule 2 of the MMER, and three Fisheries Authorizations related to the Roberts Bay Jetty (DFO File No. NU-02-0117), Roberts Bay Jetty Improvement (DFO File No. NU-10-0028) and the Doris Mine Site Fisheries Authorization for Tail Outflow (DFO File No. NU-02-0117.3).

The monitoring requirements and schedules for the four programs are presented below, according to each legal document. The monitoring sites are illustrated in Figure 11.1-1.

11.1.1 Jetty Fisheries Authorization

The Fisheries Authorization granted for the construction of the Roberts Bay Jetty (DFO File No. NU-02-0117) addresses three conditions for monitoring in Roberts Bay:

5. Implementation of a sediment transport and deposition monitoring program;
6. A photographic record of construction activities (*completed in 2008)*; and
7. Implementation of a fish habitat monitoring program.

The construction of the jetty resulted in the alteration of 0.176 ha of fish habitat. In order to compensate for this alteration, four underwater rock reefs (or shoals) were constructed in 2008. These compensation shoals were intended as habitat for benthic invertebrates, Arctic char, lake trout, coregonids, and sculpin (Golder 2007).

The monitoring requirements and schedule stated in the Jetty Authorization (DFO File No. NU-02-0117, issued June 2007) are as follows:

5.1. The approved monitoring plan shall be implemented in the following years: 2009, the year prior to mine construction, Year of mine construction, Year-2 of mine operation, Year-2 of active mine post-closure (i.e., year prior to jetty lowering to below high water level), Year-1 post lowering of jetty, and Year-2 post lowering of jetty. The detailed Monitoring Plan shall include, but not be limited to, the following:

5.1.1. The stability and successful utilization of all compensation features shall be assessed according to the schedule in 5.1 above.

5.1.2. If at any time during the monitoring period, compensation features are not functioning as intended, measures shall be identified to reduce the risk of future failure and additional compensation shall be created to meet the No Net Loss guiding principle using an adaptive management approach.

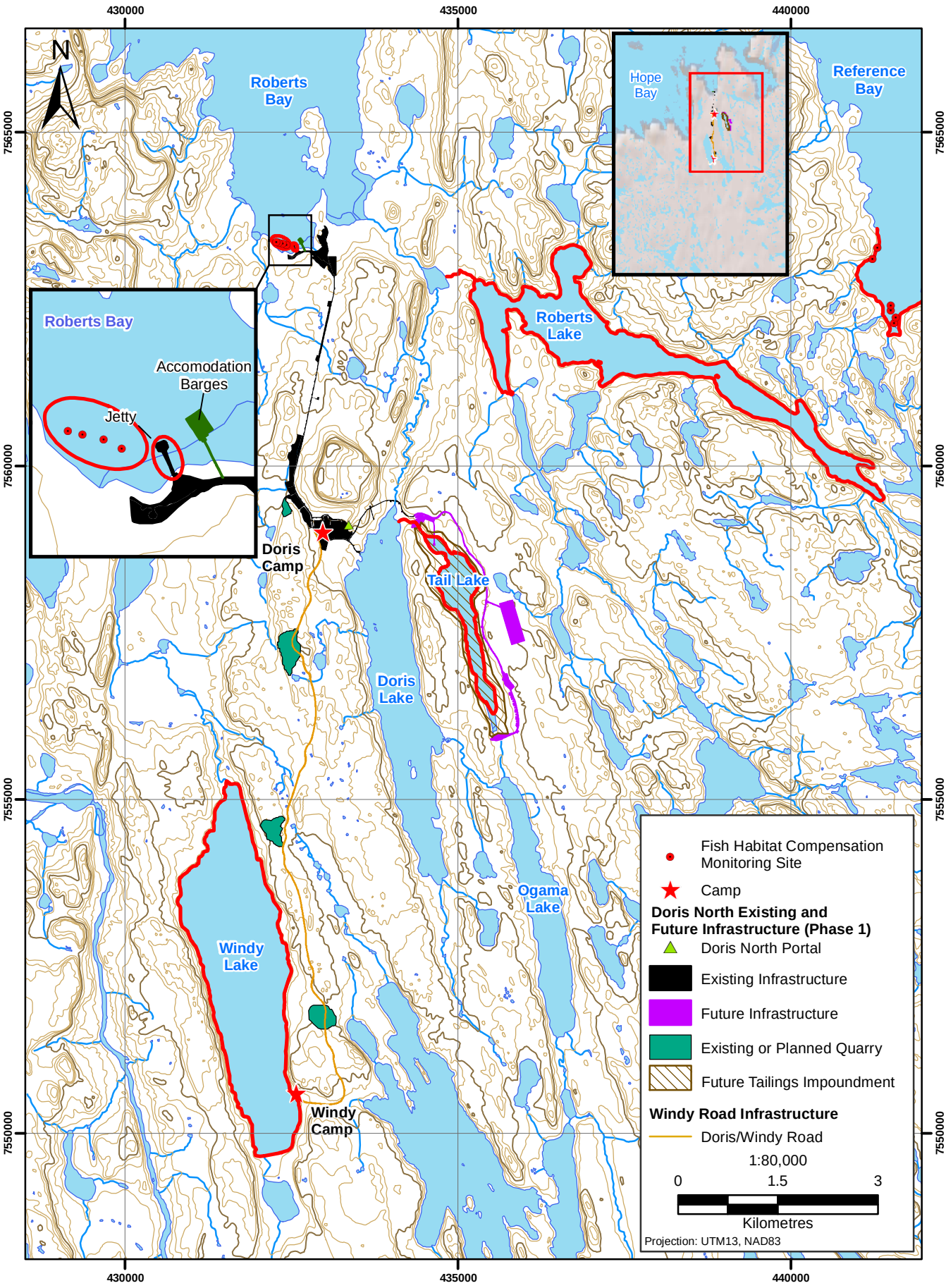

Figure 11.1-1

Fish Habitat Compensation Monitoring Sites for the Doris North Project

NEWMONT NORTH AMERICA

Rescan Engineers & Scientists

5.2. A photographic record of before, during and after construction, showing that all works and undertakings have been completed according to the approved Plan and conditions of this Authorization, shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans, Fish Habitat Management, Eastern Arctic Area, on or before, December 31, 2008 and according to the schedule in 5.1 above.

Completed December 2008 (Golder 2008).

5.3. A written report summarizing the above mentioned results shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans – Fish Habitat Management, Eastern Arctic Area on, or before, December 31, 2008 and according to the schedule in 5.1 above.

Completed December 2008 (Golder 2008).

5.4. The effects of the jetty on nearshore sediment transport shall be monitored during the following years: 2008, 2009, Year of mine construction, Year-2 of mine operations, Year-2 active mine post-closure (i.e., year prior to jetty lowering to below high water level), Year-1 post-lowering of jetty.

11.1.2 Jetty Improvement Fisheries Authorization

The jetty created under the above Fisheries Authorization was constructed with a design life of only 2 years – the expected lifespan of the Doris North Mine – and with the knowledge that annual maintenance would be required during that period. The jetty was expected to slowly erode due to wave action over a 10 year period following mine closure. That plan has changed because the jetty has suffered a loss of material at the northeast end and because HBML deferred the start of developing the Doris North Mine in lieu of exploration activities. Hence, HBML intends to upgrade and modify the jetty to extend its lifespan.

The construction that is scheduled for winter 2011/2012 will minimize erosion and any future loss of material at the deepwater end of the jetty. The addition of an apron along the jetty will also protect the slope by adding scour protection against wind-driven waves and boat wakes. The apron will also provide new habitat for invertebrates and fish and the sheet piles will provide vertical habitat for invertebrates and algae.

The proposed improvements/modifications to the jetty in Roberts Bay will result in a HADD. The original Authorization was for a jetty footprint of 1,760 m^2. The proposed changes will increase the footprint to 2,445 m^2, therefore leading to a difference of 685 m^2. An additional 170 m^2 of the original habitat used as compensation will be lost. For compensation, habitat will be created along the length and at the toe of the jetty. A total of 785 m^2 of habitat will be created by adding a protection apron to the base of the toe of the jetty slope. The addition of an apron along the jetty will also protect the slope by adding scour protection against wind driven waves and boat wakes. Additional habitat will be created in Roberts Bay by the construction of two underwater rock reefs (or shoals) similar to the ones created for the original compensation.

The monitoring requirements and schedule stated in the Roberts Bay Jetty Improvement Authorization (DFO File No. NU-10-0028, issued May 14, 2010) are as follows:

5.1. A Construction Monitoring Program shall be implemented to ensure the works were conducted within the schedule of the Proponent Plan and this Authorization were followed, by:

5.1.1. Providing a photographic record of before, during and after construction, showing that all works and undertakings have been completed according to the approved Proponent Plan and conditions of this Authorization.

5.1.2. Providing dated photographs of the sediment control works and details of how they functioned to mitigate impacts to fish habitat.

5.1.3. Providing details of any contingency measures that were followed in the event that mitigation measures do not function as described in the Proponent Plan.

5.1.4. The photographs for each period of documentation shall be taken from the same vantage point(s), direction and angle of view.

5.1.5. All photographs shall be clearly labelled with the date, location and viewing direction. The photographic locations and viewing directions shall be indicated on a plan view drawing of the work site and clearly indexed to the photographs.

5.1.6. A written report summarizing the above monitoring results shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans – Fish Habitat Management, Eastern Arctic Area by December 31, 2011.

(This date will require an extension as the shoals will not be constructed by the end of 2011.)

5.2. A Compensation Monitoring Program shall be implemented as outlined in the "Application for Authorization for Works or Undertakings Affecting Fish Habitat – Doris North Jetty Improvements, prepared by Rescan Environmental Services for Hope Bay Mining Limited, dated February 2010".

5.2.1. The Compensation Monitoring Program shall be implemented in the following years: 2012 – Year-1 after construction; 2013 – Year-2 after construction; and Year-3 of monitoring shall occur in 2015.

5.2.2. A written report summarizing the above results shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans – Fish Habitat Management, Eastern Arctic Area by December 31 of each year of the program (i.e. 2012, 2013 and 2015).

5.3. At mine closure, the Proponent shall develop a Jetty Lowering Monitoring Program incorporating the monitoring and reporting requirements of the original authorization (NU-02-0117).

5.3.1. The Jetty Lowering Monitoring Program shall be implemented in the first year of active mine post-closure (i.e. year of jetty lowering to below high water level), year-1 post-lowering of jetty and year-2 post-lowering of jetty.

11.1.3 Tail Outflow Fisheries Authorization

Tail Lake will be converted into a Tailings Impoundment Area (TIA) by constructing a dam across the upstream end of Tail Outflow during winter when Tail Outflow is dry or frozen to the streambed. As a result of the construction of North Dam, Tail Outflow will cease to flow. Fish habitat in Tail Outflow that will be covered by the North Dam will be permanently lost, and fish habitat downstream of the dam to the confluence of Tail Outflow and Doris Outflow will be temporarily lost.

The strategy to compensate for the loss of fish habitat in Tail Outflow is to install two rock shoals in Windy Lake to increase the quantity and quality of juvenile lake trout rearing habitat (Rescan 2010h).

The monitoring requirements and schedule stated in the Doris Mine Site Fisheries Authorization for Tail Outflow (DFO File No. NU-02-0117.3, issued January 19, 2011) are as follows:

5.1. The Proponent shall conduct monitoring of the compensatory habitat according to the approved Monitoring Plan and Criteria below:

5.1.1. The Monitoring Plan shall be implemented during Year One (the first year following construction of the compensatory habitat), Year Two, Three and Five.

5.1.2. The Monitoring Plan shall include, but not be limited to the following:

5.1.1.2. Assessing the stability and successful utilization of all compensation features according to the Monitoring Plan and schedule in 5.1.1 above.

5.1.1.3. Conducting a control-impact study design to compare the compensation shoals with two reference habitat types in the littoral zone of Windy Lake according to the Monitoring Plan and schedule in 5.1.1 above.

5.1.1.4. Conducting the assessment based on density and diversity of benthic invertebrates and periphyton and the number of fish observed or captured according to the Monitoring Plan and schedule in 5.1.1 above.

5.1.3. If at any time during the monitoring period, compensation features are not functioning as intended, measures shall be identified to reduce the risk of future failure and additional compensatory habitat shall be created to meet the No-Net-Loss guiding principle using an adaptive management approach.

5.1.4. A written report summarizing the results of the monitoring shall be submitted to DFO on, or before December 31 of each monitoring year, according to the schedule in 5.1.1 above.

11.1.4 Tail Lake Schedule 2 Fish Monitoring Obligations

The creation of a TIA in the former Tail Lake will result in the destruction of fish habitat in Tail Lake. Under the “No Net Loss” guiding principle of Fisheries and Oceans Canada (DFO), this necessitated the creation of habitat compensation plan to replace the lost habitat productivity at a minimum 2:1 ratio. The Doris North Project “No Net Loss” Plan Revision 6 (Golder 2007) outlines the proposed fisheries mitigation and compensation developed in discussion with the DFO and KIA. The plan was updated in 2010 to include detailed design drawings for the proposed compensation program as part of permitting requirements under the Fisheries Act. Rescan submitted an update to the No Net Loss Plan in 2010 (Rescan 2010h, 2010g).

11.1.4.1 Fish Habitat Compensation Plan

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 three main components, as follows:

8. Creation of four rock shoals in Windy Lake to increase the quantity and quality of juvenile lake trout (*Salvelinus namaycush*) rearing habitat;

9. Creation of pool habitat in stream E09, a tributary to Roberts Lake, to increase the quantity and quality of nursery habitat for Arctic char; and,
10. Create a narrow channel through the Roberts Outflow boulder garden to improve access of fish, primarily Arctic char (*Salvelinus alpinus*).

11.1.4.2 Doris Lake Willow Monitoring Program

In addition to the above components associated with the fisheries compensation program, HBML 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, HBML conducted a detailed survey of the willow habitat along this section of shoreline during the summer of 2007 (i.e., prior to construction).

11.1.4.3 Tail Lake Fish-Out

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 tenet of respect for fish, as required by Item 9 of Appendix A: Addendum Fish in the Project Certificate. The Tail Lake Fish-Out Plan has been submitted to DFO and will be implemented in 2011. The fish will be removed through a netting program with the assistance of local Inuit fishers. Prior to removal of fish from the lake and possible distribution of the fish for use as animal food, lake trout will be collected from Tail Lake. Tissue samples from a sample of the fish (i.e., 15 fish) will be analysed for metal contaminants as precautionary testing to confirm the fish are suitable for human or animal consumption.

11.2 STUDY DESIGN

11.2.1 Jetty Fisheries Authorization

11.2.1.1 Sediment Monitoring

Bathymetric surveys of Roberts Bay and Reference Bay have been conducted to assess sediment transport and the extent of sediment deposition adjacent to the compensation shoals and jetty (Rescan 2010f). A digital echo-sounding system was used to collect depth measurements along pre-set transect grids. Future bathymetric data collected will be compared to previous years, specifically the year prior to jetty construction (2006) and the years following jetty construction (2008 and 2009), as stated in Section 5.4 of the Fisheries Authorization (DFO File No: NU-02-0117).

11.2.1.2 Biological Monitoring

The fish habitat monitoring program was developed to monitor the stability of fish habitat compensation structures, specifically the jetty and shoals, and their use by fish. Compensation shoals were monitored in 2009 and 2010 using a Control/Impact study design. The constructed shoals and side-slope of the jetty are considered to be the impacted study area. The control or reference study site that was established in Reference Bay in 2009 will continue to be used because the shoals in its littoral zone are similar to the constructed habitat in Roberts Bay and because they will not be impacted by future Project activities.

For years when biological monitoring will occur, the fish habitat monitoring program will be conducted over two sampling periods during the open-water season. The first sampling event will take place at

the end of July, when the ice will have thawed. The second sampling event will take place in late August. As part of this program, the following components are sampled on the constructed compensation shoals in Roberts Bay and on the naturally-occurring shoals in Reference Bay:

- periphyton biomass (as indicated by the concentration of chlorophyll *a*);
- periphyton cell density and taxonomic composition;
- benthic invertebrate density and taxonomic composition;
- fish community species richness, numbers, catch-per-unit-effort (CPUE) and biological characteristics (e.g., length, weight, condition, age and growth); and
- use of habitat by fish, as indicated by snorkel surveys.

Colonization of compensation structures by primary and secondary producers was assessed in 2009 and 2010 by sampling both periphyton and benthic macroinvertebrates (aka benthos) communities using artificial substrate samplers. The fish community was sampled using minnow traps and crab traps. Minnow traps were used to sample juvenile fish and small forage fish. Crab traps were used to sample large-bodied invertebrates (aka macro-invertebrates) such as crabs and isopods, but they will also capture fish.

Snorkel surveys of compensation and natural shoals were conducted to assess the stability of the compensation structures and fish use of shoals. Transects were conducted over and around constructed and reference shoals, as well along the side-slope of the jetty. Number and type of organisms, species, and sizes were recorded and underwater photographs of representative organisms were taken when possible. Observations of fish behavior and habitat preferences were taken.

Results to date have indicated that the shoals are being colonized by algae and benthic invertebrates and are being used by several species of marine fish.

This monitoring was conducted beginning in summer 2008, following the year of jetty construction and will be conducted in the future during Year-2 of operation and in Year-2 of active post-closure (i.e., year prior to jetty lowering to below water).

11.2.2 Jetty Improvement Fisheries Authorization

Fish habitat compensation structures (two compensation shoals in Roberts Bay) are currently planned to be constructed during the winter of 2011/2012 and will be monitored for stability, the establishment of primary and secondary producers and for use by fish.

The two compensation shoals are planned to be constructed west of the Doris Jetty and north of the original four compensation shoals. Monitoring will be conducted similarly and synchronously with the existing four compensation shoals in Roberts Bay. The base of the jetty will also be monitored as part of the program.

The first year of the Monitoring Plan would be implemented in 2013 (one year after construction of the shoals and the apron). The second year of monitoring would occur in 2014 (2 years after construction of the structures) and the third year of monitoring would occur in 2016. At mine closure, it is proposed to synchronize the monitoring and reporting requirements of both Fisheries Authorizations (DFO File Nos: NU-02-0117 and NU-10-0028). This would entail three years of monitoring starting with the first year during active mine post-closure following with two years after reclamation.

11.2.3 Tail Outflow Fisheries Authorization

11.2.3.1 Creation of Rearing Habitat in Windy Lake

Two shoals will be constructed in Windy Lake to replace habitat lost in Tail Outflow, as required under Fisheries Authorization NU-02-0117.3.

During the construction and deployment of the rearing shoals, a Qualified Environmental Professional (QEP) will oversee the construction process and ensure that it adheres to DFO operational guidelines. As part of the Fisheries Authorization for Tail Outflow, and the compensation plan for the Tail Lake TIA, a QEP is required to be on site at all times during any in-water construction.

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 Windy 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 ("natural fines") and the second type of control areas will consist of similar habitats to the treatment areas ("natural shoals"). 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 be conducted during Years One, Two, Three and Five following construction of the compensation habitat. The main benchmarks of success will be the density and diversity of benthic invertebrates and periphyton and the number of fish observed or captured using the shoal habitat. Fish sampling methods would include snorkelling, underwater videography and minnow traps.

11.2.3.2 Monitoring Construction of the Tail Lake North Dam

The creation of a TIA in Tail Lake will require the construction of dams at the northern and southern end of the lake. Because the construction of the North Dam will will result in the loss of fish habitat in Tail Outflow, a Fisheries Authorization (NU-02-0117.3) was issued for Tail Outflow. A requirement of this Fisheries Authorization is that a QEP is on site to monitor all in-water construction activities. The construction monitor is tasked with ensuring the implementation of the designs as authorized by DFO, and ensuring that no deleterious substances are released into the water or onto the ice at Tail Outflow. Results will be reported following each monitoring year in compliance with Item 2 of Appendix A: Addendum Fish in the Project Certificate.

11.2.4 Fisheries Compensation Plan for Tail Lake

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

11.2.4.1 Creation of Rearing Habitat in Windy Lake

As part of the compensation for the loss of Tail Lake, four shallow near-shore rearing shoals in Windy Lake will be created. The original No Net Loss Plan outlined the creation of rearing habitat in Doris Lake. However, the water clarity in Doris Lake is insufficient for snorkel surveys of the proposed rearing habitat. Windy Lake was therefore proposed (and approved by DFO) as the habitat compensation site. Windy Lake is the clearest lake in the northern Hope Bay Belt area. Initial surveys in 2010 indicated that Windy Lake would be suitable for compensation activities and that the addition of compensation shoals would increase the available complex habitat for lake trout rearing (Rescan 2011a).

The shoals will be constructed and monitored as per the two Windy Lake shoals discussed in the Tail Outflow Fisheries Authorization section above.

11.2.4.2 Creation of Rearing Habitat in a Tributary to Roberts Lake

As part of the compensation for Tail Lake, 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. Baseline studies of several Roberts Lake tributaries were conducted in 2010 (Rescan 2011a). These and previous studies (Golder 2006a; Rescan 2010a) indicated that Arctic char do in fact use tributaries as rearing habitat during their first two years of life. Stream E09 was suggested as the best candidate for creation of rearing habitat. This stream connects Roberts Lake to a smaller lake to the southeast, which contains adult Arctic char. Juvenile Arctic char were found rearing in stream E09 but not in large numbers. Several cascades in the lower reaches of this stream may limit upstream movement of juvenile fish from Roberts Lake. Removal of the boulders creating these cascades would result in easier upstream passage of juveniles and would also create pool habitat suitable for rearing.

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. Results will be reported following each monitoring year in compliance with Item 2 of Appendix A: Addendum Fish in the Project Certificate.

11.2.4.3 Enhancement in Roberts Outflow

Additional compensation for Tail Lake will involve the enhancement of the boulder garden in Roberts Outflow 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. One of the key measures of success will be the provision of nearly unrestricted passage of Arctic char into Roberts Lake in low to moderate flow years.

A measure of Arctic char production in the Roberts Lake system will be obtained by monitoring the out-migration of smolts (i.e., first time migrants to the ocean). The size of the smolt run downstream, which normally occurs in early to mid-July, is a 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.

Fish fences have been installed in Roberts Outflow (2003, 2004, 2005, 2010) and Little Roberts Outflow (2006, 2007) to count the number of smolts migrating out of Roberts Lake. 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.

The measure of success of the enhancement program will 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.

In addition to the six weeks of fish fence monitoring to determine smolt passage, the boulder garden will be inspected for stranding of adult Arctic char. Visual inspections will be conducted twice per week throughout the summer, by one or more biologists. The number of stranded or dead Arctic char, if any, will be counted. The walking survey will be done in less than half an hour with helicopter escort to prevent grizzly bear encounters.

A fish sampling program will also be conducted in Roberts Lake during years when the fish fence is operational. This program will use trap nets to capture juvenile Arctic char in shallow nearshore waters.

11.2.4.4 Doris Lake Willow Monitoring Program

This program will include 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 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, a detailed survey of the willow habitat along this section of shoreline was conducted during the summer of 2007 (i.e., prior to construction). The survey methods included 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 were 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. Monitoring will be conducted once prior to construction (2007), 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. Results will be reported following each monitoring year in compliance with Item 4 of Appendix A: Addendum DFO in the Project Certificate.

11.2.4.5 Tail Lake Fish-Out

The fish-out of Tail Lake will be a one-time occurrence during the summer of 2011. The fish-out will be conducted in accordance with 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 tenet of respect for fish, as required by Item 9 of Appendix A: Addendum Fish in the Project Certificate.

The fish-out will occur in two phases; an initial mark-recapture phase and a subsequent removal phase. The mark-recapture phase will attempt to mark 250 lake trout - approximately 10% of the population of lake trout in Tail Lake. Based on the number of recaptures of tagged fish, the total number of lake trout in Tail Lake will be estimated. Existing estimates suggest a total population of about 2500 fish (Golder 2007), but these estimates are based on very low recapture rates.

Once an estimate of the total population is available, the second or removal phase of the fish-out will begin. The objective of this phase is to remove all fish from Tail Lake, or at least as many as possible. This will involve intensive gill netting and angling. Since all fish will be sacrificed for human or canine consumption, samples of fish tissue and aging structures will be taken from a portion of the lake trout captured. Tissue analysis will determine the level of metals and other potential toxins to determine the suitability of lake trout for consumption. The fish-out results will be reported following the fish-out in compliance with Item 1 of Appendix A: Addendum Health Canada in the Project Certificate.

11.3 ADAPTIVE MANAGEMENT

When monitoring identifies situations where the project is having an impact on fish or fish habitat beyond the mitigated expectations outlines in the Doris North EIS, or the Project is found to be out of compliance with permit requirements, a management response will be triggered.

Adaptive management will be developed on a case-by-case basis and could include some of the following measures:

- If approaching severe weather or persistent bear activity at the Roberts Outflow fish fence are likely to preclude sampling for more than two days, the fish fence will be left open to avoid excessive mortalities;
- If approaching severe weather is likely to preclude trap net sampling in Roberts Lake for more than two days, the trap nets will be removed to avoid excessive mortalities;
- If sampling activity at the fish fence caused damage to the tundra, steps will be taken to reduce foot traffic on the tundra (i.e. construction of raised wooden walkways around the sampling site;
- If tagging of fish leads to excessive mortality (> 5% of tagged fish), technicians will be given an on-site refresher course in tagging and animal handling techniques, and/or the tag injection equipment may be changed or replaced as necessary;
- Use of wildlife deterrents to encourage wildlife avoidance of fish sampling areas at the fish fence and Tail Lake fish processing dock (*i.e.*, noise);
- If the fish-out does not catch all marked fish and/or the entire number of fish as calculated from mark-recapture experiments, fishing effort and efficiency will be increased by adding additional gear types (e.g. smaller gill nets meshes, longer net sets, beach seines); and
- Ensuring that bear fences are charged and operational at all times to avoid mortality of fish in the fish fences.

12. Wildlife and Vegetation Monitoring

12. Wildlife and Vegetation Monitoring

12.1 BACKGROUND AND RATIONALE

HBML is committed to complying with the wildlife and vegetation requirements outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006). Specific text relating to the Wildlife Monitoring and Mitigation Plan of the Project Certificate is as follows:

1. Section 4.0. Item 22. HBML, in consultation with GN-DoE and KIA, shall immediately begin the design and implementation of baseline data collection methods to establish both the wolverine and grizzly bear population of the Hope Bay Belt region. Any baseline data results shall be reported to NIRB's Monitoring Officer.
2. Section 4.0. Item 23. HBML shall designate one of its employees as a primary wildlife contact for the mine, who will work with NIRB's Monitoring Officer and regulatory officials in communicating on-site activities and to fulfill reporting requirements.
3. Section 4.0. Item 24. As part of the training for HBML's on-site wildlife specialist, HBML shall provide training to that person in areas of bear encounters and safety, effects of noise on wildlife, recording wildlife sightings, waste management, records management, and reporting to NIRB's Monitoring Officer and regulatory officials.
4. Section 4.0. Item 25. HBML shall file a monitoring plan focused on assessing and mitigating interaction between humans and wildlife at the mine site, including associated infrastructure such as the TIA, roads, and activity at the waterfall. A quarterly report must be sent to NIRB's Monitoring Officer on interactions that have occurred, any effect the interaction may have had on humans and wildlife, and mitigation measures taken to avoid similar interactions in the future.
5. Section 4.0. Item 26. HBML shall consult with local Elders, Kitikmeot Hunters and Trappers Organizations, the Nunavut Wildlife Management Board, GN-DoE, and NIRB's Monitoring Officer to review and discuss the results of wildlife monitoring and develop mitigation measures, including measures to discourage wildlife and birds from coming into contact with Tail Lake and contaminated areas of the mill site. HBML shall incorporate a plan for this consultation into a revised Wildlife Monitoring and Mitigation Plan.
6. Section 4.0. Item 26. Commentary: Consultation under this section should include EC
7. Section 4.0. Item 27. HBML shall update and revise the Wildlife Mitigation and Monitoring Plan to reflect these terms and conditions and shall submit the revised Wildlife Mitigation and Monitoring Plan to NIRB. NIRB may consult with relevant Government departments and the Nunavut Wildlife Management Board prior to approving the revised Wildlife Mitigation and Monitoring Plan. The Wildlife Mitigation and Monitoring Plan must be submitted within three (3) months of the issuance of a Project Certificate and it must be approved by NIRB prior to the commencement of construction. HBML must also submit an updated plan on an annual basis which must also be approved by NIRB.
8. Section 4.0. Item 27. Commentary: NIRB expects the annual plan to include the quarterly plans and the fourth quarter report then becomes part of the annual report.

The Type A Water Licence also includes commitments for wildlife and vegetation:

9. Part L. Item 9. The Licensee shall implement progressive reclamation, including revegetation as soon as practically possible.
10. Schedule D. Item 1. The Construction Monitoring Report referred to in Part D, Item 8 shall include the following:

    d. Monitoring for wildlife interactions;

    e. Monitoring to ensure the protection of all migrating birds and their nesting sites;

    h. Monitoring of contractor's activity to minimize ground impacts to the tundra (i.e. keeping vehicles off the tundra and on constructed roadways);

    j. Vegetation monitoring;

    The report shall discuss the monitoring results, analysis and any mitigation measures employed as a result of the monitoring, for each of the items listed above.

12.2 STUDY DESIGN

In fulfillment of the requirements of the project certificate, Wildlife Monitoring is conducted and reported quarterly and annually (Section 4.0 Item 25 and 27). The most recent annual Wildlife Mitigation and Monitoring Program (WMMP) report was submitted on January 28th 2011 and reported data collected during 2010 (Rescan 2011g).

The Wildlife Mitigation and Monitoring Plan (Rescan 2011f) presents the methodologies for wildlife monitoring planned for 2011 and beyond, as part of the Doris North Wildlife Mitigation and Monitoring Program. This Plan is a living document that will be updated on an annual basis in compliance with Section 4.0 Item 27. The Plan is the result of a series of communications between the Nunavut Impact Review Board (NIRB), Government of Nunavut Department of Environment (GN DOE), and HBML from December 10, 2007 to July 7, 2010), that have led to the drafting of a Memorandum of Understanding (MOU) between HBML and GN DOE. The MOU will finalize the revised wildlife commitments that both parties agreed to in principle during a teleconference held on January 17, 2011. This MOU is currently waiting for sign off by the GN DOE. The 2011 WMMP Plan is based on the HBML commitments expressed at the January 17, 2011 teleconference and on comments and discussions held between HBML, GN DOE, and NIRB from 2007 to 2011.

The Type A Water Licence requirements will be addressed in Wildlife Management Best Practice Standard Operating Procedures that are currently under development. These procedures will also address the management and mitigation measures outlined in North Gold Mine Project Certificate Appendices, listed under "Caribou", "Grizzly Bear", "Breeding Birds & Waterfowl", "Raptors", and "Vegetation".

The Wildlife Mitigation and Monitoring Plan (Rescan 2011f) presents the methodologies for wildlife monitoring planned for 2011 and beyond, as part of the Doris North Wildlife Mitigation and Monitoring Program. The specific objectives of the Plan are to:

1. Comply with the wildlife requirements outlined in the Doris North Project Certificate and Water Licence;
2. Update the existing Plan, to incorporate any updates or regulatory feedback to the annual WMMP;
3. Describe the WMMP Plan, which is designed to reduce the risks and disturbance to wildlife VECs and habitat; and

4. Ensure the WMMP Plan is based on methods consistent with other monitoring programs in the Arctic as much as possible, in order to be able to utilize site-specific information in a regional context where applicable (e.g., participating in government lead regional monitoring programs, etc.).

In compliance with Section 4.0, Item 22, baseline data collection began immediately after the issuance of the Project Certificate in 2006 and is ongoing. HBML has designated the on-site Environment and Social Responsibility coordinator as the primary wildlife contact for the mine (Section 4.0, Item 23) and this person receives training as specified in Section 4.0 Item 24.

12.2.1 Study Area

The general study area comprises about 3,700 km^2 of the Hope Bay Greenstone Belt (HBGB) and is based on the Regional Study Area (RSA) surveyed for ungulates, carnivores, waterfowl, upland breeding birds, and raptors during previous baseline studies (Figure 12.2-1). Both traditional and scientific knowledge indicate that barren-ground caribou have used this area for calving (Ahiak herd) and as wintering grounds (Dolphin-Union herd), and is home to a number of other species including grizzly bears, wolverines, raptors, and waterfowl. Many species of migratory songbirds and shorebirds breed in the uplands and lowlands associated with lakes and wetlands.

The study area is located in the northern portion of the Southern Arctic Ecozone, and on the border between the Bathurst Hills and the Queen Maud Gulf Lowlands ecoregions. The study area lies within the zone of continuous permafrost, and the region is classified as having a low Arctic ecoclimate, characterized by shrub tundra vegetation, such as dwarf birch, willow, northern Labrador tea, *Dryas* spp., and *Vaccinium* spp. Cottongrass is common throughout the area, except in very wet and very dry areas.

12.2.2 Selection of Wildlife Species for Monitoring and Mitigation

Based on the findings of the environmental assessment (MHBL 2005), and the comments and recommendations of stakeholders, the following VECs were selected for mitigation and monitoring:

- W4ildlife habitat;
- Caribou (Dophin-Union and Ahiak herds);
- Grizzly bears;
- Wolverines;
- Upland breeding birds (migratory songbirds, shorebirds, ptarmigan and short-eared owls);
- Waterfowl; and
- Raptors (e.g., falcons, eagles, hawks, ravens, and owls).

Interactions with other wildlife species (e.g., muskox, wolves, foxes, hares, ground squirrels, and marine mammals) are monitored to develop preventive mitigation of potential direct mine-related incidents that could, if not managed, lead to injury or mortality (Golder 2006b). For each VEC, data on a number of biological (measured) indicators are used to monitor for potential project-related effects.

A full description of the Wildlife Mitigation and Monitoring Program can be found in the Wildlife Mitigation and Monitoring Plan (Rescan 2011f).

12.3 ADAPTIVE MANAGEMENT

When monitoring identifies situations where the project is having an impact on wildlife or vegetation beyond the mitigated expectations outline in the Doris North EIS, or the Project is found to be out of compliance with permit requirements, a management response will be triggered

Adaptive management will be developed on a case-by-case basis and could include some of the following measures:

- Evaluation of alternate dust suppression methodologies, of dust generation management strategies;
- Re-evaluation of waste management practices and employee education courses focusing on the Waste Management Plan and the storage of wildlife attractants;
- Employee education and awareness programs may be enhanced to better address specific wildlife attractant and waste disposal issues.
- If monitoring identifies a particular waste item (*i.e.*, juice boxes) as an especially problematic attractant, it may be banned from project sites.
- Use of wildlife deterrents to encourage wildlife avoidance of mine facilities (*i.e.*, noise).
- Reduction of speed limits, lower traffic volumes and installation of more road signs indicating that animals have the right-of-way;
- Reduction in length and height of snow windrows during periods of caribou presence;
- Changing construction or blasting plans to avoid active raptor and migratory bird nests encountered during construction;
- Initiation of revegetation in areas to be reclaimed; and
- Ensuring that wildlife entry-points into buildings are sealed.

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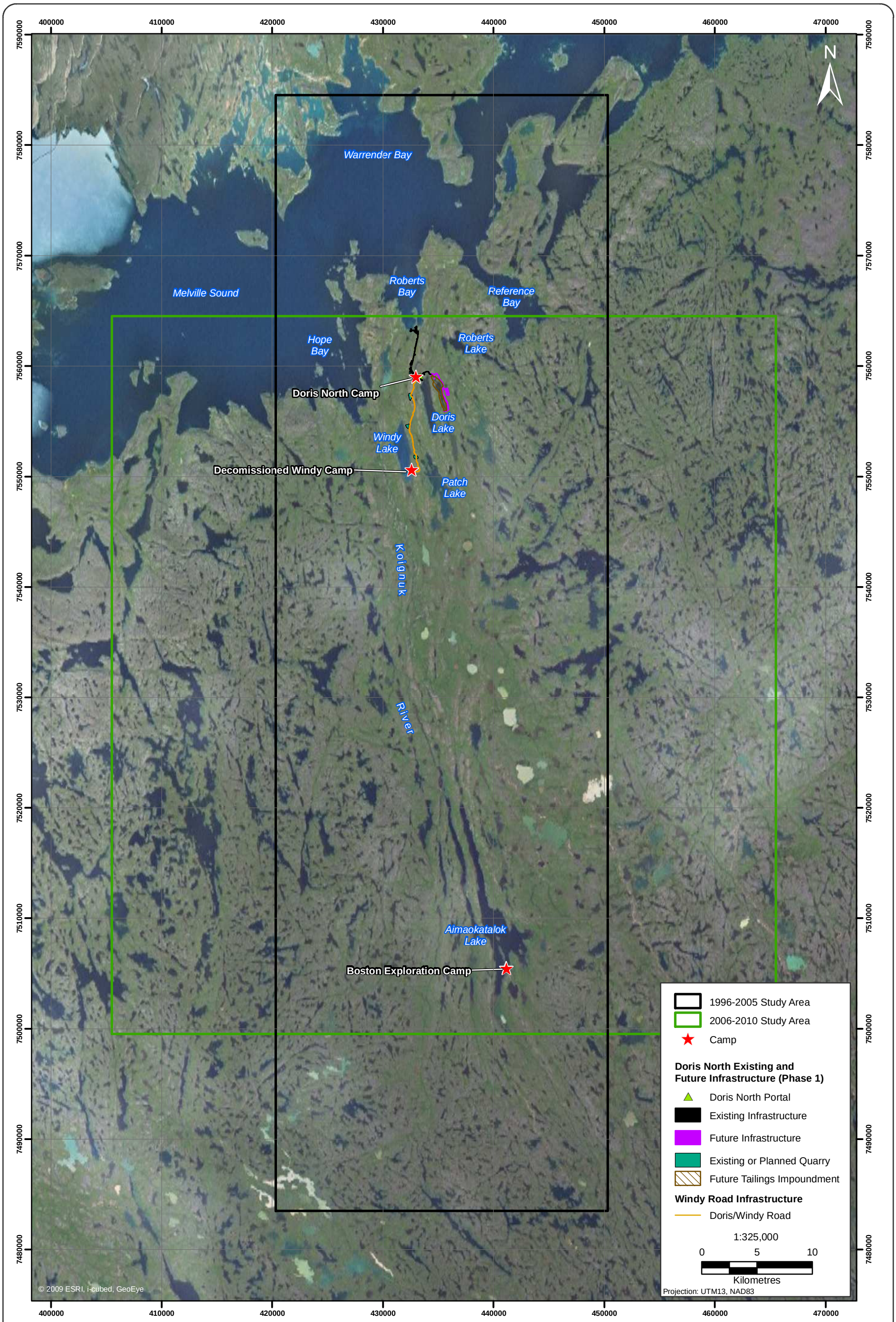

Figure 12.2-1

NEWMONT The Gold Company

General Study Area for the Wildlife Mitigation and Monitoring Program, Doris North Project

Figure 12.2-1

Rescan Engineers & Scientists

References

References

Alberta AMD. 1989. *Air Monitoring Directive (AMD) Appendix A-6 Determination of Dustfall*. Alberta Environment (amended in 2006).

CCME. 2000. *Canada-Wide Standards for Mercury Emissions*. Quebec City: Canadian Council of Ministers of the Environment.

CCME. 2001. *Canada-Wide Standards for Dioxins and Furans*

Quebec City: Canadian Council of Ministers of the Environment. .

EBA. 2010. *Quarry A Landfill Management Plan, Doris North Property, NU*. Prepared for Hope Bay Mining Ltd. by EBA Engineering Consultants Ltd. June 2010.

Golder. 2006a. *Doris North Project Aquatic Studies, 2005*. Prepared for Hope Bay Mining Ltd. by Golder Associates Ltd. December 2006.

Golder. 2006b. *Doris North Project: Wildlife Mitigation and Monitoring Program*. Prepared for Hope Bay Hope Bay Mining Limited by Golder Associates Ltd. June 2006.

Golder. 2007. *Doris North Project No Net Loss Plan, Revision 6, 2007*. Prepared for Miramar Hope Bay Ltd. by Golder Associates Ltd.

Golder. 2008. *Report Phase 2 Remedial Action Plan, Tundra Mine Site, Northwest Territories*. Public Works and Government Services: Golder Associates Ltd.

HBML. 2011a. *2010 2AM-DOH0713 Type A Water Licence Annual Report*. Hope Bay Mining Ltd. March 2011.

HBML. 2011b. *2010 2AM-DOH0713 Type A Water License Construction Monitoring Report Doris North Project Nunavut Water Board*. Hope Bay Mining Ltd. March 2011.

MHBL. 2005. *Final Environmental Impact Statement, Doris North Project*. Miramar Hope Bay Limited.

MHBL. 2007. *Monitoring and Follow-Up Plan, Doris North Project, Nunavut*. Miramar Hope Bay Ltd. April 2007.

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 Manunscript Report of Fisheries and Aquatic Sciences 2328 (1995): xiii+65 p*

Rescan. 2010a. *2009 Freshwater Fish and Fish Habitat Baseline Report, Hope Bay Belt Project*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. May 2010.

Rescan. 2010b. *Doris North Gold Mine Project: 2010 Meteorology Compliance Report*. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. November 2010.

Rescan. 2010c. *Doris North Gold Mine Project: Aquatic Effects Monitoring Plan*. Vancouver, BC: Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. Feburary 2010.

Rescan. 2010d. *Doris North Gold Mine Project: Hydrology Compliance Report, 2010*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. November 2010.

Rescan. 2010e. *Doris North Gold Mine Project: Noise Abatement Plan*. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. December 2010.

Rescan. 2010f. *Doris North Gold Mine Project: Roberts Bay Jetty Fisheries Authorization Monitoring Report*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. December 2010.

Rescan. 2010g. *Hope Bay Belt Project: Updates to the Doris North No Net Loss Plan for Tail Lake*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. September 2010.

Rescan. 2010h. *Hope Bay Belt Project: Updates to the Doris North No Net Loss Plan for Tail Outflow*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. September 2010.

Rescan. 2011a. *2010 Doris North Mine Site Fisheries Authorization Monitoring Report*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. January 2011.

Rescan. 2011b. *Doris North Gold Mine Project: 2010 Air Quality Management Plan*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. March 2011.

Rescan. 2011c. *Doris North Gold Mine Project: 2010 Aquatic Effects Monitoring Program Report*. Vancouver, BC: Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. May 2011.

Rescan. 2011d. *Doris North Gold Mine Project: 2010 Noise Compliance Report*. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd. March 2011.

Rescan. 2011e. *Doris North Gold Mine Project: Air Quality Compliance Report Q3 and Q4, 2011*. Prepared for Hope Bay Mining Ltd. by Rescan Environmental Services Ltd. April 2011.

Rescan. 2011f. *Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Plan*. Prepared for Hope Bay Hope Bay Mining Limited by Rescan Environmental Services Ltd. April 2011.

Rescan. 2011g. *Doris North Gold Mine Project: Wildlife Mitigation and Monitoring Program Report, 2010*. Prepared for Hope Bay Hope Bay Mining Limited by Rescan Environmental Services Ltd. January 2011.

SRK. 2006. *Design of Surface Infrastructure Components, Doris North project Nunavut, Canada*. Prepared for Miramar Hope Bay Ltd. by SRK Consulting Inc. October 2006.

SRK. 2007. *Design of the Tailings Containment Area, Doris North Project, Hope Bay, Nunavut, Canada*. Prepared for Miramar Hope Bay Ltd. by SRK Consulting Inc. March 2007.

SRK. 2009a. *2009 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. November 2009.

SRK. 2009b. *Bay Project, Quarry Monitoring*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. November 2009.

SRK. 2009c. *Doris North Infrastructure Project Sewage Management Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. March 2009.

SRK. 2009d. *Hazardous Waste Management Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. Sept 2009.

SRK. 2009e. *Incinerator Management Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. July 2009.

SRK. 2010a. *Doris North Land Farm Management and Monitoring Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. May 2010.

SRK. 2010b. *Doris North Project Interim Water Management Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. December 2010.

SRK. 2010c. *Doris North Waste Rock and Ore Management Plan*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. December 2010.

SRK. 2010d. *Quarry A, B and D Management and Monitoring Plan, Revision 01*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. October 2010.

SRK. 2011. *2010 Annual Geotechnical Inspection, Doris North Project, Hope Bay, Nunavut*. Prepared for Hope Bay Mining Ltd. by SRK Consulting Inc. March 2011.

Wright, D. G. and G. E. Hopky. 1998. Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters. *Canadian Technical Report of Fisheries and Aquatics Sciences 2107 Department of Fisheries and Oceans, Winnipeg, MB and Ottawa, ON, Canada*