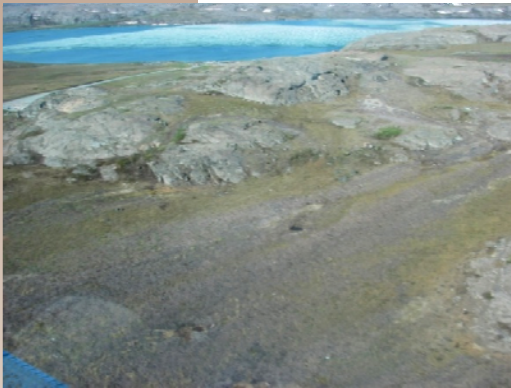


# Hope Bay Mining Ltd.

## Hope Bay Project Quarry A, B & D Management and Monitoring Plan

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Hope Bay, Nunavut, Canada



*Prepared for*

***Hope Bay Mining Ltd.***

*Prepared by*



*Project Reference Number*  
SRK 1CH008.038.002



***April 2010***

# **Hope Bay Project Quarry A, B & D Management and Monitoring Plan**

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**SRK Project Number 1CH008.038.002**

**April 2010**

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# 1 Introduction

Hope Bay Mining Ltd. (HBML), a wholly owned subsidiary of Newmont Mining Company, is conducting advanced exploration and developing the infrastructure at the Hope Bay Mining Project in the Hope Bay Belt, Nunavut, Canada. The project site is located on Inuit Owned Land in the West Kitikmeot region of Nunavut approximately 125 km southwest of Cambridge Bay and 75 km northeast of Umingmaktok.

The project is owned and operated by:

**Operator:** Hope Bay Mining Ltd.  
Suite 300 -899 Harbourside Drive  
North Vancouver, B.C. V7P 3S1

**Parent Company:** Newmont Mining Corporation  
1700 Lincoln Street  
Denver, Colorado  
USA 80203

An integral part of the activities associated with the advanced exploration and infrastructure development program is the construction of various facilities and the development of an all-weather road between the Doris Camp and Windy Camp at the Hope Bay Project site.

This Hope Bay Project *Quarry A, B & D Management and Monitoring Plan* has been prepared by Hope Bay Mining Ltd. in accordance with Inuit Owned Lands (IOL) License KTP308Q010 issued by the Kitikmeot Inuit Association, Water Licence No: 2BE-HOP0712 and Water Licence No: 2AM-DOH0713 issued to HBML by the Nunavut Water Board (NWB).

## 2 Background

### 2.1 Regulatory Approvals

In order to construct facilities, to optimize the construction of the Doris-Windy all-weather road and minimize environmental impacts, clean rock from three quarries (Quarry A, B and D) located along the proposed road alignment will be used for fill (Figure 1). The rock from each of these quarries has been characterized geochemically (SRK, 2008), and was classified as not potentially acid generating, according to Sobek NP/AP ratios. The quarry rock was approved by the responsible regulatory agencies for use in the road development.

*Pursuant to the Nunavut Waters and Nunavut Surface Rights Tribunal Act and the Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board issued Nunavut Water Board Type B Water License No. 2BE-HOP0712 to the Hope Bay Regional Exploration Project - Windy Camp and Nunavut Water Board Type A Water License 2AM-DOH0713 (Water License) to the Doris North Project. These licenses are currently in good standing. The Doris - Windy Road is the road to Windy Camp and supports regional exploration activities in the Hope Bay Belt, which are covered by the Type B Water Licence No. 2BE-HOP0712. Because that licence does not address construction and quarrying activities, HBML has opted to implement Part D and Schedule D - Conditions Applying to Construction in the Type A Doris Water Licence 2AM-DOH0713 licence related to quarrying and placement of rock to insure that the highest regulated requirement for the management of construction rock is uniformly applied throughout the Hope Bay Belt. The relevant sections are Part D 9, 9b, 10, 21 and 22 and Schedule D a, k and n.

On September 08, 2008, Hope Bay Mining Ltd. made an application to access Inuit Owned Lands (IOL) to quarry 1,000,000 cubic metres (m<sup>3</sup>) from Quarry A, 78,000 cubic metres (m<sup>3</sup>) from Quarry B and 165,000 cubic metres (m<sup>3</sup>) from Quarry D in the vicinity of Doris and Windy Lake, NU. Authority was granted on October 02, 2008 in the form of Quarry Permit Agreement KT308Q010.

Within the Water License and Quarry Permit Agreement, a number of specific conditions apply to quarrying, infrastructure construction, management and monitoring.

This *Hope Bay Project Quarry A, B & D Management and Monitoring Plan* has been prepared by Hope Bay Mining Ltd. and is submitted to meet the requirements of the conditions related to quarrying, infrastructure and road construction, their management and monitoring as defined in the Water Licences and the Quarry Management Agreement.

## 2.2 Quarry Development and All-Season Road Construction

Figure 1 provides the proposed route of the Doris-Windy all-weather road as well as the location of Quarry A, B and D. Table 1 provides a summary of the general location and estimated size of each of the three quarries. Detailed plans of each of the quarries are shown in Figures 2 through 4.

**Table 1: Summary of Quarries**

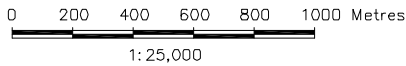
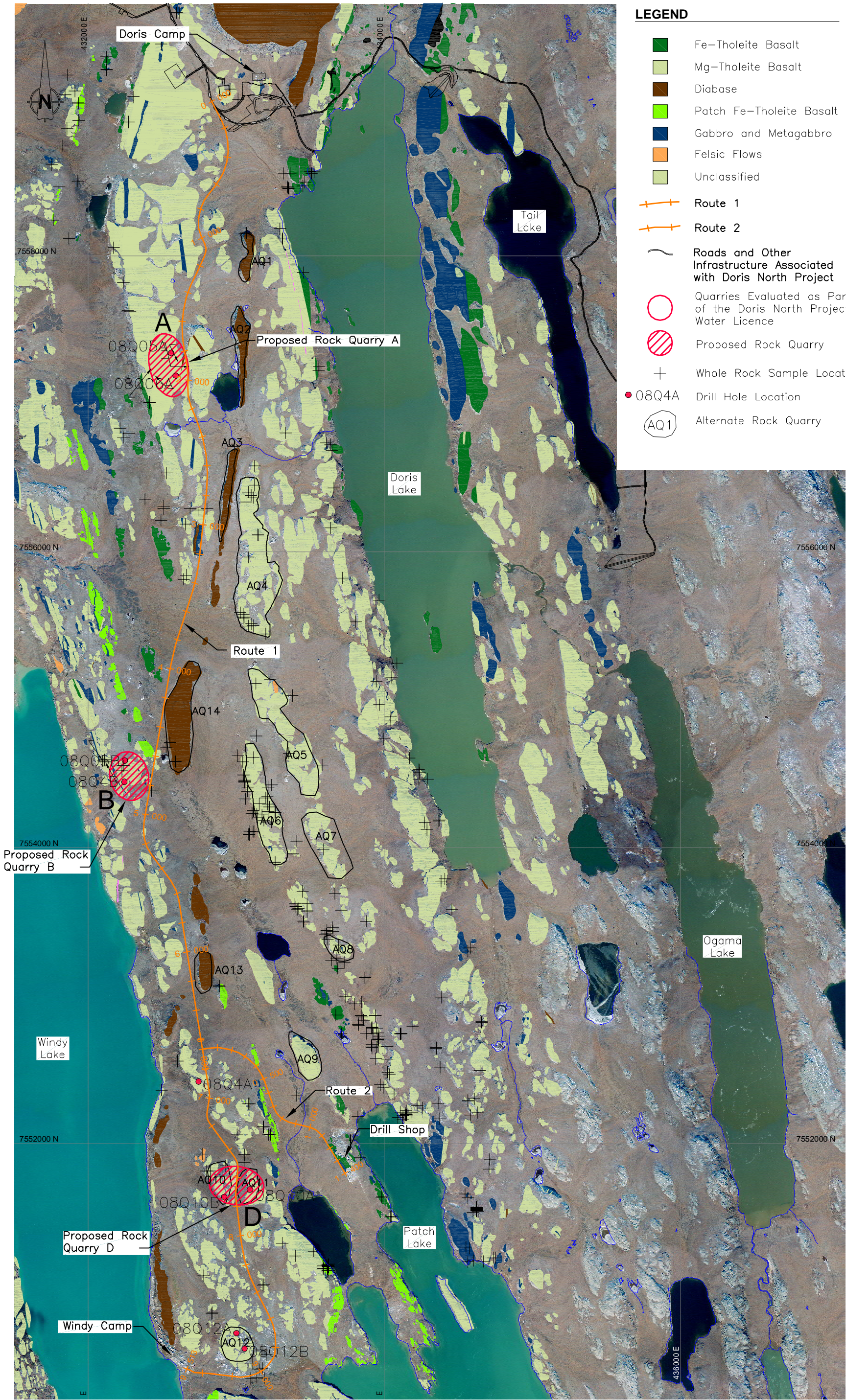
Quarry	Location	Approximate Size
<b>A</b>	Inuit Owned Lands Parcel BB-60 NTS Plate 77 A/03 Easting 432504.755 Northing 7556847.554	15.5 hectares
<b>B</b>	Inuit Owned Lands Parcel BB-60 NTS Plate 77 A/03 Easting 432320.868 Northing 7554541.122	9.8 hectares
<b>D</b>	Inuit Owned Lands Parcel BB-60 NTS Plate 77 A/03 Easting 433032.445 Northing 7551533.868	11.7 hectares

Of the three, Quarry A and D are anticipated to be the primary source of rock fill materials for fill and construction of the Doris-Windy all-weather road. Quarry B is a backup source of rock fill and will only be developed in the event that Quarry A and D do not provide material of sufficient quality and quantity to complete planned activity. No additional roads are required to access Quarry A or D as the proposed road alignment from Doris to the Windy Camp passes through the two quarries. If required, a very short access spur will be constructed to establish Quarry B.

Essentially, the quarrying, infrastructure and road construction activities will consist of drilling, blasting, mucking crushing, haulage to usage locations (e.g. the advancing road limit), end dump and levelling.

In order to reduce hauls distances, associated fuel consumption and dust generation, the crusher, which is currently located adjacent to Quarry #2 near the Doris camp, will be re-located to a position within Quarry D when conditions within the quarry are suitable. A 100m x 100m crusher pad will be built within the quarry limits to accommodate the crushing operation and to stockpile run of quarry and crushed material.





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HOPE BAY MINING LTD

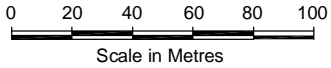
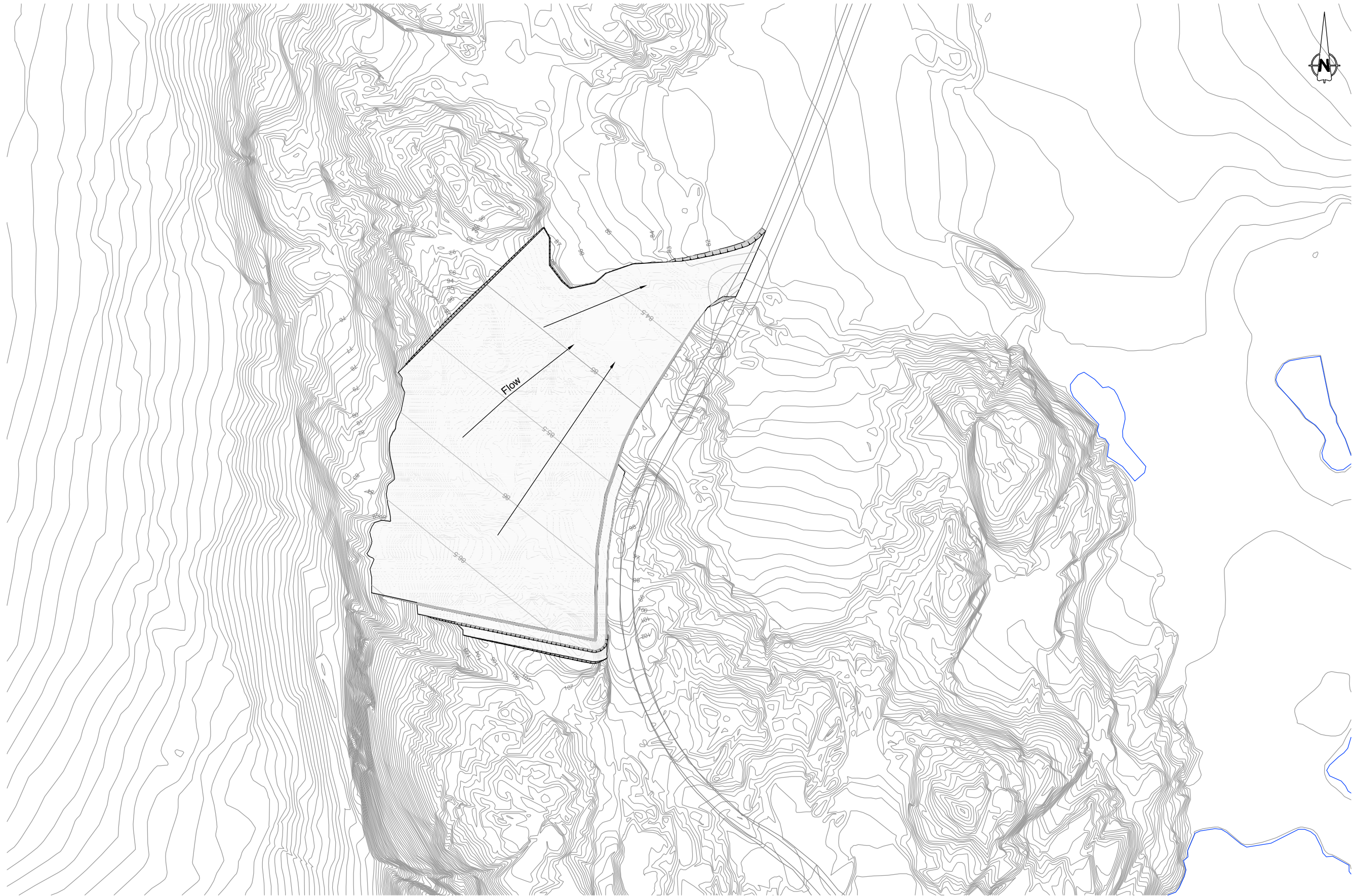
Doris Camp - Windy Camp Access Road

Route and Quarry Location

DATE: Apr. 2010  
APPROVED: MK  
FIGURE: 1



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Hope Bay Project

Quarry A  
Drainage Plan

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HOPE BAY MINING LIMITED

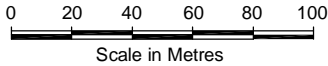
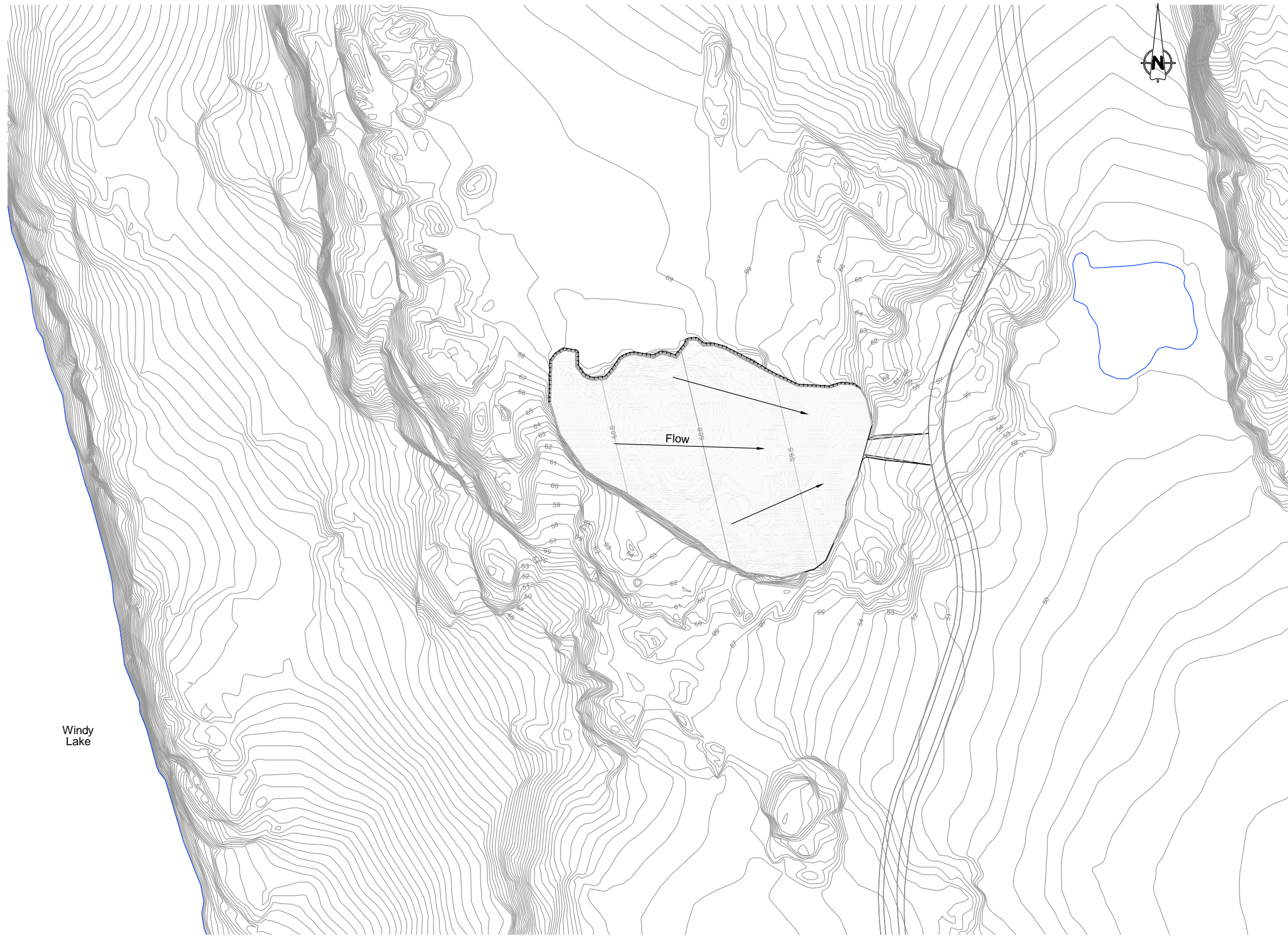
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Apr. 19, 2010

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MK

FIGURE:  
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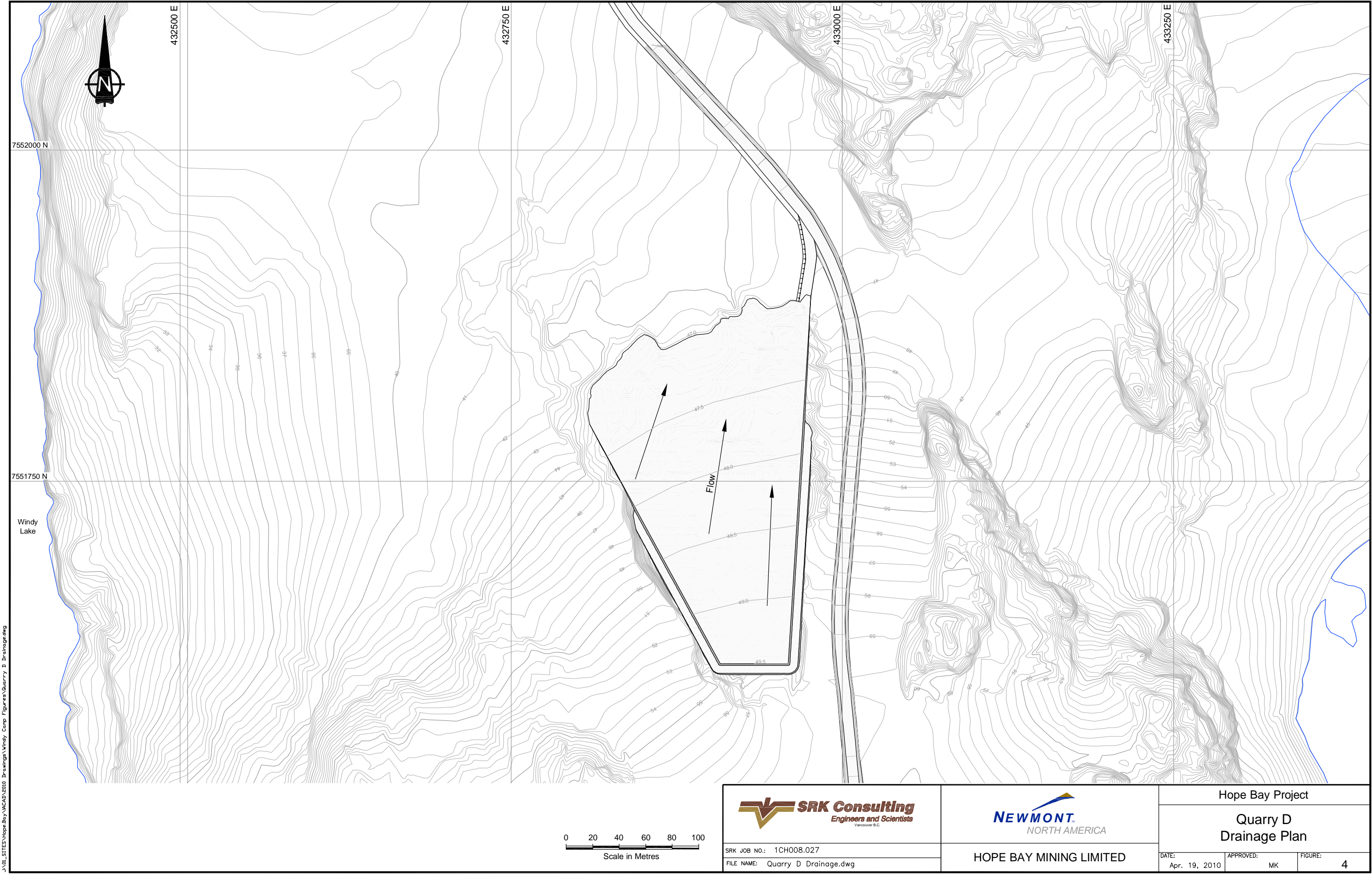


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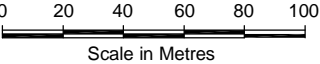


 SRK Consulting Engineers and Scientists Vancouver B.C.	 NEWMONT NORTH AMERICA	Hope Bay Project		
		Quarry B Drainage Plan		
SRK JOB NO.: 1CH008.027	HOPE BAY MINING LIMITED	DATE:	APPROVED:	FIGURE:
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 SRK Consulting Engineers and Scientists Vancouver B.C.	 NEWMONT NORTH AMERICA	Hope Bay Project		
		Quarry D Drainage Plan		
SRK JOB NO.: 1CH008.027	HOPE BAY MINING LIMITED	DATE:	APPROVED:	FIGURE:
FILE NAME: Quarry D Drainage.dwg		Apr. 19, 2010	MK	4

## **3 Quarry Management**

### **3.1 Pre-Development**

#### **3.1.1 Quarry Material Characterization**

Geochemical characterization studies of all potential quarry materials for the Hope Bay project have been carried out by Rescan (2001), AMEC (2005) and SRK (2007). Quarry materials from Quarry A, B & D for the construction of the Doris-Windy all-weather road were geochemically characterized in 2008 during a larger study of five potential quarry sites at the Hope Bay project site. The results of the characterization are reported in *Geochemical Characterization of Quarry Materials for the Doris-Windy All-Weather Road, Hope Bay Project* (SRK 2008).

During that characterization, a total of 120 samples, providing a spatially and geologically representative set of samples, were subject to acid-base accounting with total inorganic carbon to classify acid-rock drainage (ARD) potential, and elemental analysis by aqua regia digestion followed by 35 parameter ICP-MS to examine elevated solid-phase parameters. Eight (8) samples were subjected to shake flask extraction to assess mineral weathering and nine (9) samples subjected to quantitative mineralogy by Rietveld-XRD in order to investigate carbonate composition.

Based on this geochemical characterization program, the material from the three quarries was consistently non-acid generating, the potential for metal leaching was low and therefore the material is considered suitable to be used as construction material.

#### **3.1.2 Archaeology Survey**

An archaeological survey of the quarries and the Doris-Windy all-weather road route has been conducted and buffers established to ensure that the development of Quarry A, B and D and the road do not impact any such sites.

#### **3.1.3 Notification of Intent to Enter Quarry Lands**

In keeping with Article 28 of the Inuit Owned Lands (IOL) License KTP308Q010 issued by the Kitikmeot Inuit Association (KIA), Hope Bay Mining Ltd. will give the KIA notice of its intent to enter upon the lands defined in the license at least ten (10) business days prior to the commencement of activities.

### **3.2 Operations**

#### **3.2.1 Residual Explosives**

The majority of the rock fill will be blasted using a bulk form of Ammonium Nitrate (AN) and fuel oil mixture to make the blasting product ANFO. ANFO is soluble in water and nutrient rich in environmental terms. From a blasting perspective, ANFO is only ideally suited for dry hole application. In the event that ANFO is loaded into a wet borehole inadvertently, an incomplete



detonation of the product may occur. In such instances, residual ammonia nitrate may remain in the rock fill and be inadvertently transferred with the road construction material, causing nutrient loadings to the receiving environment.

The potential for wet-holes in the quarries is considered to be low due to the land-based nature of the quarry sites and the presence of permafrost below the outcrops. However, even though the quarry area is assumed to be dry, a contingency will be available. The potential for wet holes will be evident at the time of drilling and without fail at the time of loading each blast hole. The blaster responsible for loading and firing the drilled pattern begins the loading process by walking the entire pattern and checking the actual drilled depth of each hole versus the plan and noting any conditions such as water in each hole. This information is recorded on the blast pattern record sheet required by regulation to determine the amount and type of explosive required in each hole including the delay detonators used. The presence of water in any drill hole requires one of several approaches to be taken to ensure proper and complete explosive detonation. One way is to attempt to dewater the hole using a down hole dewatering pump and truck so that a poly borehole liner can be lowered into the hole and ANFO poured inside the bag.

In the event that an incomplete detonation of the product occurs, it is likely that an orange colour smoke plume would be observed rising from the affected area. The blaster is required by the regulations to make an inspection of the blasted area, make note of blast holes that may have experienced incomplete detonation and mark those locations with flagging.

Information from the blaster's inspection will be noted in the blast pattern log and the daily operations shift log communicated to all field supervision personnel. The flagged off area will remain until the excavation equipment advances up to within half the hole spacing distance at which time the suspect material would be more closely inspected for the presence of ANFO.

### **Contingency - Identification of Un-detonated or High ANFO Residue Areas**

Material considered un-detonated or high in ANFO residue, which will contain potentially elevated level of nutrients (primarily ammonia) will be selectively excavated and hauled to one of the previously mined-out quarries. The material will be placed within the quarry in a manner that ensures that all leachate either remains within the quarry or discharges in a manner and at a location that ensures that it will not enter any stream or fish bearing waters.

### **Contingency - Spill of ANFO**

In the unlikely event that a spill of the ANFO occurs during the charging of the holes for blasting, all activities within the quarry will be suspended until the clean-up is complete and the clean-up of the spilled material will be initiated immediately and the material disposed of in an appropriate manner.

### 3.2.2 Blast Management

The quarry sites have been deemed suitable for use providing that the archaeological site buffer zone is kept intact, therefore due care will be taken in order to maintain the integrity of these sites. The blasts will be designed to shoot away from the archaeological sites. Prior to any blast, the rock face will be cleaned to minimize the potential of fly rock.

The following blasting method will be applied:

- *Powder factor* - 1.0;
- *Stemming* - 1.5m (with 3/8" crushed rock);
- *Pattern* - 2.1m x 2.1m; and
- *Delays* - Single hole delay with offset timing will be used in order to limit the blasting to one hole at a time which will reduce the vibration to a minimum.

Single hole delay's will also be used for maximum shot placement away from any identified potential archaeological sites and row timing will be increased to prevent back break and insure all rock is moving in a forward motion away from the archaeological sites.

As an addition precaution, the blast limits will be set 60 m from the recommended 30 m buffers zones located in the quarries. This extra buffer will offer further protection from any possible disturbance to potential archaeological sites.

### 3.2.3 Precipitation/Snow Melt Water Management

The development of each quarry will proceed in a manner that, to the extent possible, ensures that all water entering the quarry as a result of precipitation or snow melt is retained within the quarry boundaries. Generally, this will be accomplished by ensuring that the quarry floors are sloped toward a natural low area of the quarry floor and, if required, the creation of a quarry sump to collect the waters and settle out suspended solids.

In the event that the quarry sump requires pumping, field pH, EC, Eh and ammonia concentration using colorimetric analysis will be conducted and a sample collected before pumping. Field pH, EC, and Eh measurements will also be obtained from a reference site located away from the influence of the quarry, road or other mine related activities. If the field pH in the sump measures between 6 and 8.5, the EC measures less than (<) 500  $\mu\text{S}/\text{cm}$  and the ammonia concentrations are less than 2.0 mg/L, pumping of the sump will be undertaken. Care will be taken not to disturb settled solids in the bottom of the sump and pumping of the sump will only take place when conditions are suitable. Care will also be taken to ensure that discharged water does not enter fish bearing waters and that the pump discharge is positioned in a manner that minimizes erosion and siltation of the area downstream of the discharge.

### **Contingency - Sump Water Requires Special Handling**

In the event that the field measurements exceed the specified values for pH, EC or ammonia, the vacuum truck will be used to remove sump water which will then be used to water down the road construction taking care not to discharge the water onto the road surface near stream crossings or any fish bearing waters.

### **3.2.4 Dust Management**

The major source of dust generation during the operations of the quarries will be in Quarry D when the crusher is relocated to the area and operational. Dust suppression will be limited to the application of clean water to affected areas and a record of the volume of water used for this purpose will be maintained.

### **3.2.5 Materials Quarried and Removed**

In keeping with Article 26 of Inuit Owned Lands (IOL) License KTP308Q010 issued by the KIA, a record of the quantity of granular materials quarried and the quantity of granular materials removed from each quarry will be maintained.

### **3.2.6 Equipment Re-fuelling**

In the event that re-fuelling of mobile equipment is required in one of the active quarries, it will be conducted in a location and at a time that will ensure that any spill of fuel or lubricants is effectively contained within the quarry area and clean-up is easily accomplished. During this activity, all re-fuelling equipment will be equipped with a Spill Kit suitable for the materials being handled and a functioning fire extinguisher suitable for the materials being transferred.

### **Contingency - Spill during Re-fuelling**

In the unlikely event that a spill does occur during re-fuelling activities, clean-up of the spilled material will be initiated immediately and all activities within the quarry suspended until the clean-up is complete and the material disposed of in an appropriate manner as per the requirements specified in the *Hope Bay Project Spill Contingency Plan, March 2010*.

## **3.3 Post-Operations**

Once quarrying activities in each individual quarry are completed, all foreign materials will be removed for appropriate reuse or disposal. Vertical walls within the mined out quarry will be inspected to ensure that they do not pose an unreasonable safety risk and, if required, remediation activities undertaken to address residual safety concerns.

The quarries may be used for laydown areas or for the development of other infrastructure components. In the event that a particular mined out quarry is to be re-commissioned or employed in a new role, appropriate applications will be made to the respective regulatory authorities.

## **4 Operational Inspections and Monitoring**

### **4.1 Quarry Operations**

#### **4.1.1 Quarry Visual Inspections**

During quarrying operations, a visual inspection of the quarry face to verify the geological characteristics of the rock will be conducted by a qualified field geologist or geochemist at least once per week. The purpose of the inspection will be to confirm the presence of the expected rock types and that disseminated sulphides only (e.g. not veins) are being exposed and therefore used in road construction. A secondary objective of the inspection will be to confirm the absence of any fibrous forms of actinolite in the quarry material.

Prior to the inspections, site personnel will develop a traffic control plan to ensure that it is safe to work within the quarry and will inform any vehicle operators as to the location and timing of the inspection work.

The inspectors will walk from one side of the quarry around to the other side examining both the surface and the exposed bedding material along the side of the quarry for any anomalous rock types (i.e. other than Mg-theolite basalts) or significant amounts of sulphide. If present, these materials will be examined, described, and located on a map. In addition, at regular 100 metre intervals, the inspector will stop and complete a close inspection of the rocks, breaking open several rock clasts and describing what they see. The results of each inspection will be recorded on data sheets, and reported in the Construction Monitoring Report submitted by March 31 of the year following construction.

#### **Contingency - Identification of Inappropriate Quarry Rock**

In the unlikely event that the visual inspection identifies potentially acid generating rock, the geologist will “tag” the material for avoidance or removal. If the material is excavated, it will be hauled back to one of the previously mined-out quarries. The rock fill will then be placed within the quarry and covered with a minimum of 2 metres of the more typical Mg-theolite basalt that was approved for use in the road. Permafrost is expected to slowly aggrade into the rock fill, slowing the rates of sulphide oxidation substantially, and eventually shutting off seepage pathways. The clean rock cover would act as a thermal blanket to keep the active freeze/thaw zone away from the more reactive rock.

In the unlikely event that the visual inspection identifies fibrous actinolite, the geologist will “tag” the material for avoidance or removal. If the material is excavated, it would be hauled back to one of the previously mined-out quarries and covered with a 1.0 m layer of benign rock and a record of the location maintained.

### 4.1.2 Quarry Rock Sampling

During quarrying activities, 2 samples of blast material from each quarry will be collected and submitted to an accredited external lab for sulphur analysis. In the event that the results return a sulphur value of greater than (>) 0.1 % sulphur, the samples will be subjected to acid-base accounting (ABA) confirmatory test work including shake flask extraction tests on a representative subset of samples. Each sample will consist of a whole rock sample and a sample sieved to pass a -2 mm screen for a potential total of 12 ABA analyses. The sample locations will be pre-determined to ensure that they reflect a random selection of the rock fill material used in road construction.

The objective of this program will be to confirm previous rock characterization results and to assess the ARD potential of the fine fraction, which tends to concentrate sulphide minerals.

The following information will be recorded for each sample collected:

- Location of sample point;
- GPS coordinates of the sample point;
- Name of the quarry from which the rock fill originated;
- The name of the person who performed the sampling;
- Date and time of sampling;
- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and
- Results of analysis.

The results of the analysis will be reported in Construction Monitoring Report submitted by March 31 of the year following construction. The report will include a discussion and interpretation of the geochemical data collected.

### 4.1.3 Quarry Sump Monitoring

The development of each quarry will proceed in a manner that, to the extent possible, ensures that all water generated as a result of precipitation or snow melt is retained within the quarry boundaries. Generally this will be accomplished by ensuring that the quarry floors are sloped toward the centre and, if required the creation of a quarry sump to collect the waters and settle out suspended solids.

After significant precipitation events, the quarry area will be inspected and the water level in the quarry sump assessed. In the event that the quarry sump requires pumping, field pH, EC, Eh and ammonia concentration using colorimetric analysis will be conducted and a sample collected before pumping. Field pH, EC, and Eh measurements will also be obtained from a reference site located away from the influence of the quarry, road or other mine related activities. If the field pH measures between 6 and 8.5, the EC measures less than (<) 500 µS/cm and the ammonia concentrations are less than 2.0 mg/L, pumping of the sump will be undertaken. Care will be taken not to disturb settled

solids in the bottom of the sump and pumping of the sump will only take place when conditions are suitable. Care will also be taken to ensure that discharged water does not enter fish bearing waters and that the pump discharge is positioned in a manner that minimizes erosion and siltation of the area downstream of the discharge.

### **Contingency - Sump Water Requires Special Handling**

In the event that the field measurements exceed the specified values for pH, EC or ammonia, the vacuum truck will be used to remove sump water which will then be used to water down the road construction taking care not to discharge the water onto the road surface near stream crossings or near any fish bearing waters.

## **4.1.4 Blast Vibration Monitoring**

Shock waves from blasting in close proximity to fish bearing water does pose the potential of causing detrimental shock wave effect on fish. None of the quarries scheduled for development are located in close proximity to fish bearing waters. Notwithstanding this, the single hole delay with offset timing methods employed during quarry blasting will limit the blasting to one hole at a time and reduce the resulting vibrations to a minimum. As a result, no vibration monitoring is proposed during the operation of Quarry A, B or D or during the road construction activities.

## **4.1.5 Dust**

The major source of dust generation during the operations of the quarries will be in Quarry D when the crusher is relocated to the area and operational. Passive (observation) dust monitoring after blasting in all quarries and during operations of the crusher in Quarry D will be limited to an assessment conducted during the other regularly scheduled visual inspections of operations (i.e. the pre-blast inspection, the post blast inspection, and regular environmental personnel inspections). The results will be recorded by the site personnel. Dust suppression will be limited to the application of clean water to affected areas and a record of the volume of water used for this purpose will be maintained.

## **4.2 Infrastructure & Doris-Windy All-Weather Road**

### **4.2.1 Visual Inspection**

During all construction activities a visual inspection by site personnel will be conducted of the quarries, construction areas and the advancing area of the road construction activity at least once per week. The inspection will focus on identification and removal of foreign and/or spilled materials, assessing the level of sedimentation resulting from rock placement (particularly during periods of precipitation), the extent of dusting and the transport of dust onto the surrounding tundra.

A record of the time, place and results of each inspection will be maintained as will a photographic record of “items of interest” (i.e. dusting, wildlife encounters, foreign or spilled material, etc.) identified during the inspection.

## **5 Post-Construction Inspections and Monitoring**

### **5.1 Quarry**

A visual inspection of each mined out quarry will be completed at least once per year in order to ensure that the site remains safe and no environmental or public health and safety concerns are manifest. In the event that potentially acid generating waste rock has been placed in one or more of the mined-out quarries, the area will be inspected to ensure that the 2 metre cover remains and that seeps from the material are not in evidence.

In the event that the inspection identifies ponded water within the mined out quarry, field measurement of the pH, EC and Eh of both the pond and a reference site will be conducted and a sample collected preserved in the appropriate manner and submitted to an accredited laboratory for pH, Total Suspended Solids (TSS), Total Sulphate, Total Ammonia, Nitrate, Alkalinity, ICP Metals analysis.

Records of the inspections and findings of each will be maintained and reported in the appropriate manner.

### **5.2 Infrastructure & Doris-Windy All-Weather Road**

#### **5.2.1 Road Seep Survey and Sampling**

During the spring freshet in the year following completion of the construction of the Doris-Windy all-weather road, an inspection of the entire road will be conducted by a qualified field geologist or geochemist in order to characterize the rock used in construction and to identify and sample ephemeral seeps occurring through the road construction material. The objective of this program will be to confirm that an environmentally-significant level of metal leaching is not occurring from the road materials.

Seeps will be located by walking along the downstream side of the road and looking and listening for signs of flowing water. In low lying areas where the direction of surface water flow is not evident, both sides of the structure will be inspected. Where surface flows are identified, the upstream side will be inspected to determine whether the flow originates from the upstream side or whether it is likely to originate from within the rock fill material. Most samples will target the latter, more ideal type of seep. However, a modest number (maximum of one location every two km of road) will be collected at locations where there is moderate upstream flow component. In these cases, samples will be collected from both upstream and downstream of the road.

A survey stake will be installed to mark the location of each seep sampled and the following information recorded:

- Description of the seep location;
- GPS location of the seep;

- A photographic record of the seep;
- A description of the flow pattern and magnitude of flow;
- Field pH, EC, Eh and temperature readings; and
- Field pH, EC, Eh and temperature measurements at a reference site located away from the influence of the road or other mine related activities.

At a minimum, a water sample will be collected from 10% of the identified ephemeral seeps (regardless of the field measurement values) appropriately preserved and submitted for laboratory analysis. The following information will be recorded:

- The name of the person who performed the sampling;
- Date and time of sampling;
- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and
- Results of analysis.

All of the samples collected will be preserved in an appropriate manner, labelled and submitted to an accredited laboratory for analysis of pH, TDS, acidity and/or alkalinity, sulphate, total ammonia, nitrate, and a full suite of metals by ICP-MS.

A second follow-up seep survey will be completed immediately before freeze up the same year (depending on conditions observed) or during the spring freshet the following year. The follow-up survey will revisit the sites identified during the initial seep survey and repeat the actions of the initial survey.

The results of the seep survey will be reported in a flow up Addendum to the Construction Monitoring Report submitted by March 31 of the year following construction. The Addendum will include a discussion of the interpretation of the geochemical data collected.

### 5.2.2 Road Material Sampling

Once the all-weather road construction is complete, an inspection of the entire road length will be conducted by a qualified field geologist or geochemist to characterize the rock used in construction. That inspection will include the collection of a total of 19 samples of *in situ* rock fill from pre-determined points along the road route (approximately 1 sample per 0.5 kilometres of road). Each sample will consist of a whole and a sample sieved to pass a -2 mm screen. The sample locations will be pre-determined to ensure that they reflect a random selection of a representative sample of the *in situ* rock fill from each quarry used to construct the road.



All of the samples will be submitted to an accredited external lab for sulphur analysis. In the event that the results return a sulphur value of greater than (>) 0.1 % sulphur, the samples will be subject to acid-base accounting (ABA) and shake flask extraction tests on a representative subset of samples. Testing will be completed on both the fines and the whole sample, for a total of 28 analyses.

The objective of this program is to confirm previous rock characterization results and assess the ARD potential of the fine fraction, which tends to concentrate sulphide minerals.

The following information will be recorded for each sample collected:

- Description of the sample point;
- GPS Coordinates of sample point;
- An estimate of which quarry the rock fill originated from;
- The name of the person who performed the sampling;
- Date and time of sampling;
- Date of analysis;
- Name of person who performed the analysis;
- Analytical method or techniques used; and
- Results of analysis.

The results will be reported in an Addendum to the original Construction Monitoring Report. The Addendum will include a discussion and interpretation of the geochemical data collected.

### **5.2.3 Infrastructure Seep Survey and Sampling**

In the event that clean quarry rock from any of the three quarries (Quarry A, B and D) is used in the construction of any other infrastructure, the area in which the rock is used will be incorporated in the ongoing seep and sampling program currently established for the project. This includes, at a minimum, incorporate the requirements specified in Part D and Schedule D - Conditions Applying to Construction in the Type A Doris Water Licence 2AM-DOH0713 licence related to quarrying and placement of rock. The monitoring a sampling will be completed in order to insure that the highest regulated requirement for the management of construction rock is uniformly applied throughout the Hope Bay Belt.

### **5.2.4 Contingency - Inappropriate Construction Material Identified**

In the unlikely event that the results of the seep monitoring/sampling program or the road material sampling program indicate the presence of potential metal leaching (ML) or acid-rock drainage (ARD) further investigations will be undertaken to define the extent and assess the potential impacts of the material. If warranted, and after discussion with the appropriate regulatory agencies, the material will be excavated and hauled to one of the previously mined-out quarries. The rock fill will

then be placed within the quarry and covered with a minimum of 2 metres of the more typical Mg-theolite basalt. Permafrost is expected to slowly aggrade into the rock fill, slowing the rates of sulphide oxidation substantially, and eventually shutting off seepage pathways. The clean rock cover will also act as a thermal blanket to keep the active freeze/thaw zone away from the more reactive rock.

### **5.3 Summary of Inspections and Monitoring**

Table 1 provides a summary of the monitoring required during and after quarry mining and the construction of the Doris -Windy all-weather road.

**Table 2: Hope Bay Quarry & Doris-Windy Road Monitoring Summary**

Aspect	Monitoring Activity	Monitoring Type	Data Management & Reporting
<b>Pre-development</b>	Geochemical characterization of quarry material	Sample and analysis of rock	Complete and presented in: <b><i>Geochemical Characterization of Quarry Materials for the Doris-Windy Road</i></b> , SRK, August 2008
	Archaeological survey	Field inspections and establishment of buffers	Post survey report.
<b>Quarry Operations</b>	Pre-blast inspection	Identify "wet holes" and clean spilled ANFO	Maintain field notes.
	Post-blast inspection	Confirm ANFO consumption (minimal misfires)	Maintain field notes.
	Weekly visual inspection by field geologist of geochemist	Confirm rock types (no fibrous actinolite) and presence of disseminated sulfides (not veins)	Maintain field notes. Report results in subsequent Construction Monitoring Report
	Maximum of 6 representative samples of blast material (two from each quarry) during quarry operations (whole rock and screened)	Sulphur analysis and, if required, Acid Base Accounting (ABA) and shake flask extraction analysis of representative subset of samples	Maintain field notes. Report results in subsequent Construction Monitoring Report
	Weekly inspection - site environmental personnel	Visual inspection	Maintain field notes on inspection time and results.
	Amount of material quarried and amount removed	Amount of material quarried in m <sup>3</sup> . Amount of material removed in m <sup>3</sup> .	Maintain record and monthly reporting to Kitikmeot Inuit Association
<b>Post-precipitation Event</b>	Inspect quarry for ponded water (sump)	If ponded water is present - Field pH, Electric Conductivity (EC) Eh and ammonia of pond. Field pH, EC and Eh of reference site.	Maintain field notes. Report results in subsequent Construction Monitoring Report
	Prior to pumping and discharge of sumps	Water sample collected for analysis of pH, Total Suspended Solids, Total Sulphate, Total Ammonia, Nitrate, Alkalinity, ICP Metals Scan	Maintain field notes. Report results in subsequent Construction Monitoring Report
<b>Post-Construction</b>	Maximum of 19 representative samples of road bed material (whole rock and screened)	Sulphur analysis and, if required, Acid Base Accounting (ABA) and shake flask extraction analysis of representative subset of samples	Maintain field notes. Report results in subsequent Construction Monitoring Report
	Field identification of seeps &/or runoff from Doris-Windy road during spring freshet (2 years).	Field pH, EC and Eh of seeps and runoff Field pH, EC and Eh at reference site.	Maintain field notes. Addendum to Construction Monitoring Report
		Water sample submitted for pH, Total Sulphate, Total Ammonia, Nitrate, Alkalinity, ICP Metals Scan	Maintain field notes. Addendum to Construction Monitoring Report
	Annual inspection of mined out quarries. If ponded water is present.	Field pH, Electric Conductivity (EC) and Eh of pond. Field pH, EC and Eh of a reference site. Sample and analysis of pH, Total Suspended Solids, Total Sulphate, Total Ammonia, Nitrate, Alkalinity, ICP Metals Scan	Maintain field notes. Appropriate reporting

## 6 Reporting

As per the requirement specified in Item 8, Part D of the Nunavut Water Board Water License 2AM DOH0713, a Construction Monitoring Report will be prepared and submitted no later than March 31 of the year following construction. That report will include responses to the commitments made in the *Water License Application. Monitoring and Follow Up Plan, July 2007*, all requirements specified in Nunavut Water Board Type A Water License 2AM-DOH0713, Nunavut Water Board Type B Water License No. 2BE-HOP0712 and Quarry Permit Agreement KT308Q010. Generally, this will include, but not necessarily limited to:

- A summary of all inspections conducted during quarry activities and road construction;
- A summary of all monitoring conducted;
- All data generated from the analysis of monitoring samples;
- The results of all samples collected and submitted for analysis;
- A summary of all mitigation activities undertaken as a result of monitoring;
- The results of the follow-up geochemical sample analysis of quarried rock used in construction of the roads to verify that the rock used is non-acid generating as predicted;
- The results of monitoring of dust generation and use of water by the contractor to manage dust emissions from crushing and construction activity;
- A summary of post-operational activities and condition of each quarry; and
- Updated “As-built” drawings of the constructed infrastructure and all weather roads.

## 7 Document Control Record

This, the *Hope Bay Project Quarry A, B & D Management & Monitoring Plan* April 2010, has been reviewed and is approved by:

### Document Approval

Position	Name	Signature	Date
Environmental Compliance Manager			
Environmental Affairs Manager			
Environmental & Social Responsibility Director	Chris Hanks		4-27-10
Operations Manager			

The re-issuance of this document have been reviewed and approved by the Quality Assurance and Management and are authorized for use within Hope Bay Mining Ltd.

### Document Control Revision History

Document Control Revision History					
Rev. No.	Page No.	Details of Revision	Name	Initial	Date

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## 8 References

SRK Consulting, 2008. Geochemical Characterization of Quarry Materials for the Doris-Windy All-Weather Road, Hope Bay Project, Final. Prepared for Hope Bay Mining Ltd., August 2008.

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

This report, **“Hope Bay Project, Quarry A, B & D Management and Monitoring Plan,”** was prepared by SRK Consulting (Canada) Inc.

**Prepared by**

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Don Hovdebo  
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**Reviewed by**

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