# Doris North Project
# Interim Water Management Plan

## Revision 5

**Report Prepared for**

## Hope Bay Mining Ltd.

**Report Prepared by**

SRK Consulting (Canada) Inc.
1CH008.069
December 2012
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# Doris North Project
# Interim Water Management Plan

## Revision 5

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# 1 Introduction

Hope Bay Mining Limited (HBML) was conducting advanced exploration and developing the infrastructure for the Doris North Mine (the Project) in Hope Bay, Nunavut, Canada, but has been placed into Care and Maintenance. The Project is located on Inuit Owned Land administered by the Kitikmeot Inuit Association (KIA), in the West Kitikmeot region of Nunavut approximately 125 km southwest of Cambridge Bay and 75 km northeast of Umingmaktok.

This *Doris North Interim Water Management Plan* (the Plan) has been prepared by HBML in accordance with Type A Water Licence No. 2AM-DOH0713 (the Licence), and subsequent amendments to the Licence issued to HBML by the Nunavut Water Board (The Board). The Licence sets out a number of terms and conditions related to the management of water at the Doris North site. All of these terms and conditions have been considered throughout the development of the Plan. A table of concordance was prepared and provides the specific Terms and Conditions of the Licence that pertain to the management of water within the Doris North Mine Area of the Doris North site and where in the Plan the condition is addressed (Appendix A).

## 1.1 Purpose and Scope of the Plan

The purpose of the Plan is to update and replace the February 2012 Interim Water Management Plan (SRK 2012). The Plan addresses the requirements of the Licence listed in Part F, which are:

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 and Sediment Control Ponds, roads, ditches, and drainage channels; and

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

The Water Management Plan presented in the 2007 Licence application by Miramar Hope Bay Mining Ltd. (MHBL) anticipated water would be deposited to the Tail Lake Tailings Impoundment Area (TIA) during mining operations (MHBL 2007a and 2007b). During 2011, the Doris North Mine area managed water according to the Hope Bay Interim Water Management Plan (SRK 2011).

The interim water management plan implemented in 2012 was described as Alternative 1 in the approved February 2012 version of the plan (SRK 2012). This alternative collecting runoff and underflow from the Doris North waste rock, camp and mining pads and then pumped this water to Tail Lake. A dedicated pipeline conveyed this water to Tail Lake. HBML will implement this water management strategy during Care and Maintenance and until the site is either closed and reclaimed or proceeds into operation and tailings are discharged to Tail Lake. A final water management plan will be developed and implemented prior to depositing tailings into Tail Lake.

The Plan addresses the short-term water management needs of the Project (Figure 1). The Plan describes how to manage runoff and underflow from this area. Runoff and underflow result from snowmelt and precipitation events. The Plan addresses these components of the overall Hope Bay Water Management Plan (MHBL 2007a and 2007b) from January 1, 2012 until the site goes into production or closure.

Prior to the Doris North Mine/ Mill being in production and tailings deposition in the Tail Lake TIA begins, HBML will submit a comprehensive Water Management Plan detailing the integration of all previously approved components and those that are currently in the regulatory process for the Project involving the conservation, use, reuse, treatment and release of water to the environment as per the Licence and NIRB Project Certificate Number 003.

This Plan addresses:

- Diversion of non-impacted runoff and underflow from entering the Doris North Mine Area;
- Collection of contact and non-contact runoff;
- Interception of underflow from the pads;
- Collection, management and/or treatment of potentially impacted underflow and runoff;
- Management of extreme rainfall events up to a 1 in 25 year 24 hour duration storm event; and
- Protection of surface water bodies from potentially impacted runoff from the Doris North Mine and Camp.

## 1.2 Responsibility

The overall responsibility for the implementation, operation and monitoring of the Interim Water Management Plan rests with HBML General Manager of Operations. The General Manager will be responsible to ensure that all necessary resources and personnel are made available, to ensure that components of the water management plan such as pipelines, diversion berms, lined ponds, and silt curtains are ready for operation prior to onset of freshet and that these facilities are maintained throughout the open water season and properly taken off line prior to freeze up in the fall.

The Environment and Social Responsibility Site Manager and Permitting Manager will be responsible for reporting requirements related to all monitoring associated with all component parts of this plan.

# 2 Site Description

## 2.1 Climate

Climatic data has been collected for the project at the Boston and Windy camps during exploration activities between August 1993 and 2003. Additional meteorological data has been collected from the Doris North climate station between March 2004 and December 2008. These local datasets and longer term regional datasets collected from a variety of Environment Canada meteorological weather stations such as Cambridge Bay and Kugluktuk have been used to profile the annual climatic patterns of the Doris North site (Golder 2009). The meteorology station at Doris continues to operate, and the data can be used to update the water balance models in future years.

The mean annual temperature at the site is -12.4$^{o}$C. During the winter months, October to May, the daily temperature typically ranges from -50$^{o}$C to +11$^{o}$C. In the summer months, June through September the mean daily temperatures ranges between -14$^{o}$C and +30$^{o}$C.

The prevailing winds for the region are from west and west-northwest and blow from this direction approximately 20% of the time. South-westerly winds blow less than 2% of the time. Winds from the prevailing wind direction have the greatest wind speeds.

Precipitation on the site occurs as rainfall and snow fall. The mean annual rainfall is 98.7 mm. The mean annual snowfall is 133.8 mm or 80.2 mm snow water equivalent (SWE). The total annual precipitation, water equivalent, is 178.9 mm (Golder 2009). Annual evaporation rate, which occurs during the open water season, is 220 mm. The mean relative humidity is 78% for the project area (Golder 2009). The 1 in 25 year 24 hour precipitation event is reported to be 37.8 mm.

Over 50% of the region's water comes from snow melt. This volume is dependent on the quantity of snow, its distribution, redistribution by wind or man, and sublimation. The rates of sublimation depend primarily on wind, or the redistribution of snow and the relative humidity.

## 2.2 Permafrost

The Doris North Mine area and the overall Project are underlain by continuous permafrost. The estimated permafrost depth is approximately 500 m. Taliks (permafrost free zones) exist under large lakes. The upper most 0.5 m to 1.0 m of permafrost thaws during the summer and is called the active layer.

## 2.3 Hydrology

The Doris North Mine Area is a sub-basin of the Doris Lake drainage basin (Figure 1). The catchment naturally drains south towards Doris Lake.

Flows in this sub-basin are consistent with all drainage basins within the Project area with peak flows occurring during freshet. Based on mean annual precipitation rates and no losses by infiltration, ice entrainment, evapotranspiration and sublimation (i.e., a runoff coefficient of 1), the annual runoff volume from this basin would be approximately 64,000 $m^3$.

In this Plan, the portion of the sub-basin upgradient of the pads on which mine and mine support infrastructure are constructed is referred to as the Divertible Area (Area 1 on Figure 1) and the downgradient mine and mine support pads are termed the Mine Area (Areas 2 and 3 on Figure 1). In 2012 the Diversion Berm was constructed. Runoff and underflow from the Divertible Area of the Doris North Mine Area sub-basin (the area north of the Diversion Berm) can be diverted away from the mine and mine support infrastructure by constructing a diversion berm. Runoff and underflow downgradient of the Diversion Berm will come in contact with HBML construction, exploration and/or mining related facilities. Using the average annual precipitation and assuming no losses from infiltration, ice entrainment, evapotranspiration and sublimation (i.e., a runoff coefficient of 1), the maximum average annual runoff volumes from Divertible Area and Mine Area are approximately 26,000 $m^3$ and 38,000 $m^3$, respectively.

## 2.4 Hydrogeology

Groundwater occurs below the permafrost, in taliks below large lakes and in the active layer (the upper most 0.5 m to 1.0 m) of the tundra during the summer months. The permafrost is essentially impervious and limits groundwater recharge. Seasonal groundwater flow in the active layer of the tundra above the permafrost and within the rock pads on which infrastructure is constructed is called underflow in the Plan. Underflow is expressed as surface seeps in areas where the active layer thins or as groundwater discharge to seasonal streams.

## 2.5 Facilities

Mine and mine support facilities are built on pads below the Diversion Berm. These facilities are listed in Table 1 and are shown on Figure 2. Additional new facilities may be constructed, but these would not change the Plan.

The area below the Diversion Berm where these facilities are constructed can be divided further into two parts based on the type of material the runoff will encounter. Figure 1 shows these two areas downgradient of the Diversion Berm. The grading of individual camp pads was designed such that surface runoff from the pads is directed to either the Sedimentation Pond or the Pollution Control Pond.

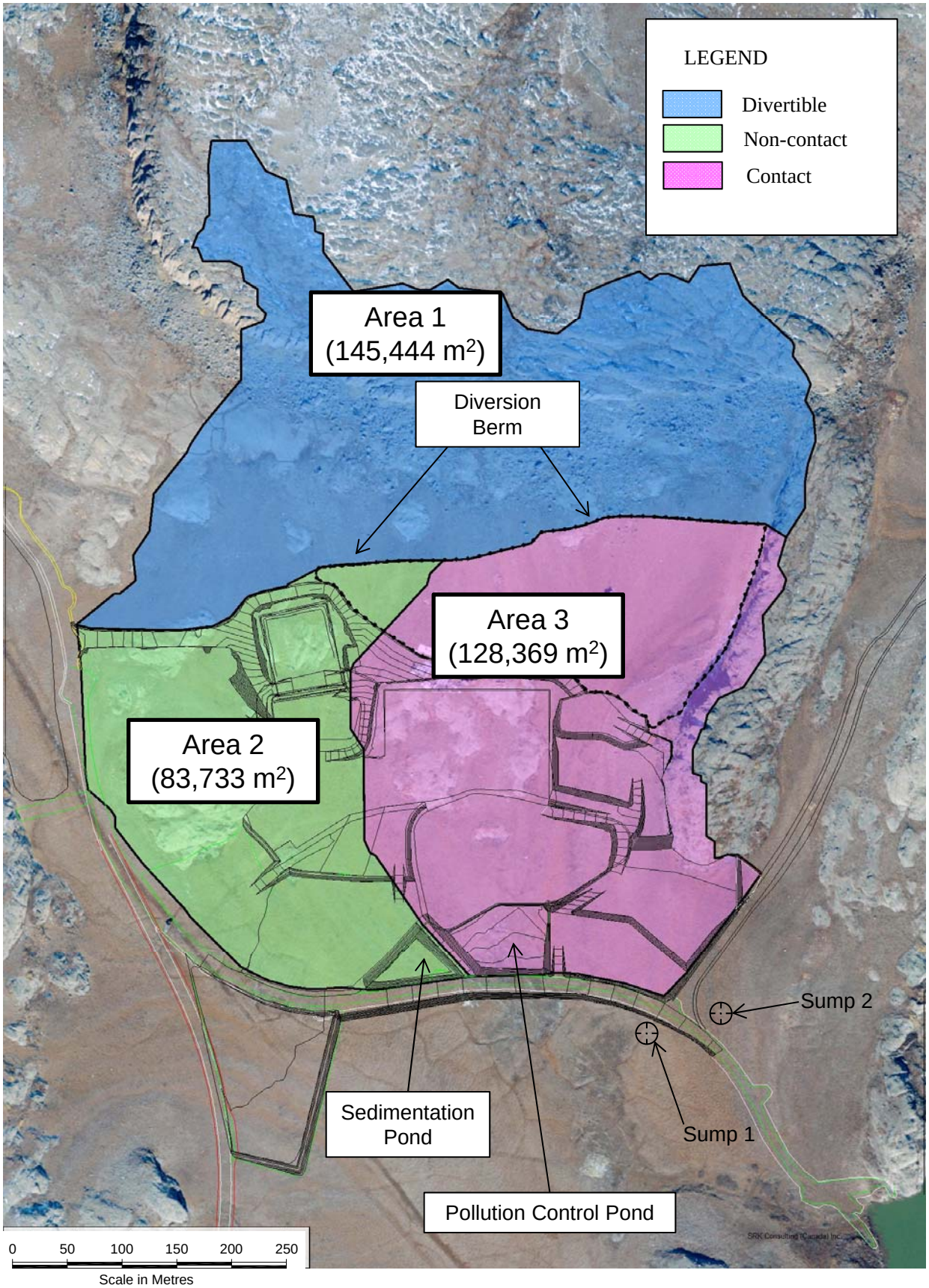
Runoff and underflow from the eastern portion of the area below the Diversion Berm (Area 3 on Figure 1) is contact water as it may be affected by the waste rock or the brine mixing area for the underground mining operation.

Runoff and underflow from the western portion of the area below the diversion berm (Area 2 on Figure 1) is non-contact water.

**Table 1: Facilities within the Mine Area**

| Facilities in Area 2 (non-contact water) | Facilities in Area 3 (contact water) |
|---|---|
| Doris North Tank Farm (Pad R) | Mill Terrace (Pad D) |
| Lay Down Area (Pad B) | Ore Storage Pad ( Pads Q, H/J) |
| Administrative Buildings/Dry (Pad C) | Waste Rock Storage (Pad I) |
| Warehouse/Laydown Area (Pad Y) | Waste Rock Storage (Pad F/G) |
| Lay Down Area (Pad E/P) | Pad T (to be constructed if the project moves to operations) |
| Main Camp (Pad X) | |

Pad R (Fuel Storage Area) is enclosed by a containment berm that prevents water from flowing to the Sedimentation Pond or the Pollution Control Pond. Water contained within this berm is sampled and compared to the licence discharge criteria. If the water is impacted by hydrocarbons, the water will first be treated using an oil water separator, and if treatment does not result in compliant water quality, the water may be transferred to the Sedimentation Pond (Surge Pond) for transfer to Tail Lake.

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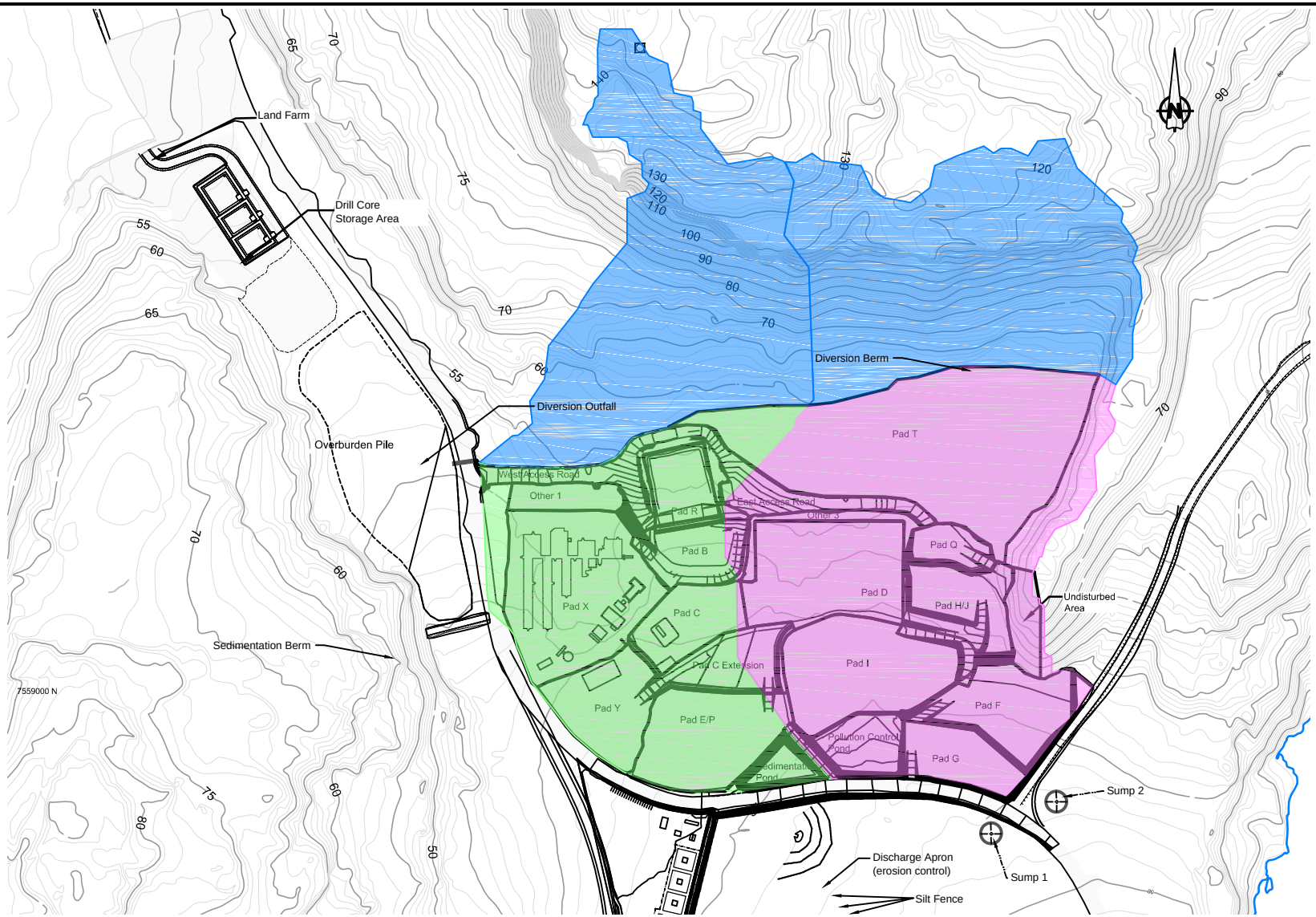
| | | |
|---|---|---|
| srk consulting | NEWMONT NORTH AMERICA | Doris North Camp |
| | | **Water Management Areas** |
| Job No: 1CH008.050<br>Filename:DorisNorth_WaterManagementFigure1…Rev10.pptx | HOPE BAY MINING LTD. | Date: Dec. 5, 2012 / Approved: TS / Figure: **1** |

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| srk consulting | NEWMONT NORTH AMERICA | Doris North Camp |
| SRK JOB NO.: 1CH008.050 | | Doris North Mine Area and Land Farm |
| FILE NAME: 1CH008.050-WMP_Figure2_wjm_IM_rev04.dwg | HOPE BAY MINING LTD. | DATE: Dec. 2011 / APPROVED: TS / FIGURE: 2 |

# 3 Water Management

## 3.1 Operational Water Management Plan

The Water Management Plan presented in the 2007 Water Licence application by MHBL used the Tail Lake TIA as the ultimate location to discharge impacted water during operations. This plan included a Sedimentation Pond to capture precipitation and snowmelt in the form of runoff and underflow from the non-contact portion of the Mine Area (Area 2), and a Pollution Control Pond to capture precipitation and snowmelt in the form of runoff and underflow from the mill area, ore stockpile and temporary waste rock pile (Area 3). According to the 2007 Water Management Plan, water collected in the Pollution Control Pond was to be pumped to the Tail Lake TIA during operations. The water reporting to the Sedimentation Pond will be sampled and if the analytical results meet the effluent quality limits outlined in Part G, 21 (a) of the Water Licence (Table 2), the water will be discharged on land immediately south of the pond, approximately 500 m from Doris Lake.

**Table 2: Effluent Discharge Limits as Per Part G, 21 (a) of the Licence**

| Parameter | Maximum Average Concentration (mg/L) | Maximum Concentration in any Grab Sample (mg/L) |
|---|---|---|
| pH | 6.0-9.0 | 9 |
| Total Suspended Solids | 15 | 30 |
| Total Ammonia –N | 2 | 4 |
| Total CN | 1 | 2 |
| Total Oil and Grease | 5 and no visible sheen | 10 and no visible sheen on pond |
| 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 |
| Total Nickel – T-Ni | 0.05 | 0.1 |
| Total Zinc – T-Zn | 0.01 | 0.02 |

During the 2011 open water season, the site operated under the 2011 Interim Water Management Plan (SRK 2011). During 2012 open water season, the site operated under the February 2012 Interim Water Management Plan (SRK 2012) which was approved by the NWB. This revision of the Interim Water Management Plan will continue to be implemented unless the project is taken out of care and maintenance and enters closure and reclamation or operations.

## 3.2 Interim Water Management Strategy

The current water management strategy is to convey intercepted runoff and underflow to Tail Lake, and discharge of compliant water from Tail Lake to the Doris Creek Waterfall, as permitted in the project Water Licence. Water will be managed as described in this plan during care and maintenance or construction until the site is in production and tailings are discharged to the Tail Lake TIA, or if the project goes straight to closure and reclamation.

The potential impact on Tail Lake water quality was evaluated and confirms there are will be no significant effects. The site water balance and quality model was used to predict water quality in Tail Lake if runoff and underflow from the Mine Area was discharged to Tail Lake. The results showed that discharging intercepted runoff and underflow from the Mine Area to Tail Lake had no significant effect on water quality in Tail Lake. Concentrations of all constituents were below Item 26 of the Licence. Similarly the water quality in Doris Creek was predicted if Tail Lake water were then discharged to Doris Creek. The predicted concentrations in Doris Creek were lower than Item 28 of the Licence. Water quality predictions indicate that the discharge of Mine Area runoff and underflow to Tail Lake and the subsequent discharge of Tail Lake to Doris Creek will not exceed the water quality criteria in the Licence.

Sample results from the 2012 sampling program confirmed that the water inputs into Tail Lake did not result in a detectable change in water quality.

In accordance with this Plan, the water quality of the Tail Lake discharge and Doris Creek will only be monitored when water is discharged from Tail Lake.

## 3.3 Interim Plan

The water management plan for the open water season during the pre-production period was designed to manage water for the design hydrologic conditions. The design basis and water management components are described in the sections below.

### 3.3.1 Design Basis

Precipitation or snowmelt on the rockfill pads is the source of runoff and underflow.

For the purposes of designing this water management plan, we have assumed that 80% of the snow is removed from the Mine Area as part of normal operations. This snow will be stockpiled near the Overburden Stockpile upgradient of the sedimentation berm outside of the Mine Area.

The Plan (facilities and mode of operation) was designed to manage site runoff and underflow for the 1:20 wet year, during which a 1 in 25 year, 24 hour storm occurs during the month with the highest base flow. The maximum runoff volume (i.e., a runoff coefficient of 1) for this storm from Area 2 (84,000 $m^2$) and Area 3 (128,000 $m^2$) are 3,200 $m^3$ and 4,900 $m^3$, respectively. These are conservative estimates of the runoff volume. The actual volume of runoff would be lower (i.e., runoff coefficient less than 1).

The rockfill pads are relatively permeable and sheet flow over the rockfill has not been observed. Some portion of incident precipitation likely infiltrates into the rockfill pads and then migrates as underflow to the collection point of the mine area watershed. Even during the largest precipitation event in 2011 (July 1 – 17.3 mm) sheet flow over the pads was not observed; however, increased seepage of underflow into the Pollution Control Pond was observed. This indicates that flows

intercepted by the Pollution Control Pond and the Sumps will be attenuated because these flows occur primarily as underflow and not surface runoff. In Area 3, surface runoff was observed flowing into the Pollution Control Pond.

In the 2011 open water season, surface water runoff was not observed on the non-contact portion of the site (Area 2). Runoff or underflow did not collect in the Sedimentation Pond. Most of the incident precipitation and snowmelt in Area 2 likely migrated primarily as underflow that deflected eastwardly toward the Pollution Control Pond due to subsurface conditions. Seeps were observed on the south side of the road embankment near the location of Sump 1.

### 3.3.2 Description

The following is a synopsis of the interim water management plan:

- Site runoff and underflow is intercepted by the Sedimentation Pond, Pollution Control Pond and Underflow Interception Sumps;
- Intercepted water is pumped to the Sedimentation Pond;
- Water is pumped from the Sedimentation Pond to Tail Lake as per Part G 20 of the Licence;
- Water is discharged from Tail Lake to Doris Creek such that the water elevation is maintained at a minimum of 28.3 m above sea level (masl) as per Part G 29 of the Licence;
- The discharge rate from Tail Lake to Doris Creek will increase the flow in Doris Creek to a maximum of 10% above baseline conditions; and
- The water is compliant with Part G 21, 26, 27 and 28 of the Licence.

The water management strategy for extreme precipitation events will follow the same process as described above, however, HBML has constructed a contingency pipeline that will allow direct pumping from the pollution control pond as well as the redundant pumping capacity for pumping from the sedimentation pond.

### 3.3.3 Components

The following components are in place for managing water as described in this plan:

#### Diversion Berm

HBML constructed a diversion berm to separate the Divertible Area from the Mine Area. The purpose of the berm is to divert runoff and underflow from the undisturbed portion of the catchment (approximately 145,000 $m^2$) to the southwest before it contacts the Mine Area. This diversion reduced the total catchment draining to the Sedimentation and Pollution Control Ponds (i.e., the Mine Area) to 212,000 $m^2$.

#### Sedimentation Pond

All facilities constructed on the non-contact side of the Mine Area (Area 2 in Figure 1) are graded to convey surface runoff to the Sedimentation Pond. As mentioned above, surface runoff to the Sedimentation Pond was never observed in 2011. At the end of the 2011 open water season, the Sedimentation Pond was fully lined with an impermeable geomembrane liner. Surface runoff, if present, will still flow to the Sedimentation Pond; however, underflow from this portion of the site will bypass the Sedimentation Pond and be captured by the two interception sumps. Because the Sedimentation Pond is not expected to intercept any water, it will be used as the collection pond to provide excess surge capacity for water management during the design event. The Sedimentation Pond has a full storage capacity of 3,325 $m^3$.

This pond will be used to collect water from a variety of sources prior to discharge to Tail Lake. The Sedimentation Pond will routinely receive flow from:

- Surface flow of Area 2, if present;
- Pollution Control Pond; and
- Underflow interception sumps.

The Sedimentation Pond may periodically, if warranted, receive water from:

- Temporary Holding Pond (Pad D);
- Landfarm Ponds;
- Quarry 1 Tank Farm;
- Vent Raise Tank Farm;
- Doris North Tank Farm (Pad R);
- Temporary Wash Bay;
- Roberts Bay Tank Farm (RBTF);
- Other small secondary containment facilities on site; and
- Excess mine water (if encountered or produced).

Water from these locations will first be treated at the source, if necessary, by a mobile oil water separator. Compliant water will then be discharged according to the Licence. If the water is non-compliant with other requirements of the Licence, it will then be discharged to the Sedimentation Pond.

Sewage and grey water will continue to be treated, discharged to tundra and monitored in accordance with the Waste Water Management Plan.

## Pollution Control Pond

All facilities constructed on the contact side of the Mine Area (Area 3 in Figure 1) are graded to convey runoff to the Pollution Control Pond. The Pollution Control Pond is partially lined to intercept runoff and underflow from the site. Sheet flow over the crush rock pads during a storm event has not been observed at the site. Seepage into the Pollution Control Pond along the northern perimeter is frequently observed. It is likely that a portion of the incident precipitation would infiltrate into the pads and flow as underflow in the pad or active layer to the Pollution Control Pond. This would attenuate peak runoff during the storm and the volume that is collected by the Pollution Control Pond over the event.

Following the rebuild of the Pollution Control Pond during 2011, the full storage capacity is 2992 $m^3$. This volume is less than the volume during 2011. The operating strategy for this pond is that pumping capacity (with redundancy) capable of conveying peak flows to the pond is installed. Intercepted water will be transferred to the Sedimentation Pond.

## Underflow Interception Sumps

Two shallow underflow interception sumps (Sump 1 and Sump 2) were constructed on the southeast corner of the Mine Area south and north of the Float Plane Access Road. The sump locations were sited based on the presence of seeps in this area which suggests that it is an area of groundwater discharge from the active layer. The sumps consist of a 3 m diameter insulated corrugated metal pipe approximately 2.5 m tall. The pipe is perforated and has larger slots that extend above the ground surface to intercept surface flow. The pipe was driven to a depth approximately 1 m below the active layer. A float activated sump pump is used to pump water from the sump. Intercepted underflow is pumped to the Sedimentation Pond.

## Temporary Holding Pond (Pad D)

In 2011, a temporary lined pond was constructed on the mill pad (Pad D) to hold excess site water. The pond has a capacity of 5,499 $m^3$. This pond will remain in place to serve as additional containment in the event of large storm events. If the project resumes construction, this pond would need to be removed to allow construction of the mill facility. The water in the temporary mill pad pond will be transferred to the Sedimentation Pond as required.

## Pipelines and Pumps

A pumping system and pipeline was constructed to convey water from the Surge Pond to Tail Lake. Pumping capacity at each location (Pollution Control Pond, the Surge Pond, and Tail Lake) of discharge are sized to convey the maximum flows for the design event. Redundant pumping capacity is on standby at each location in the event of an upset. The pipeline to convey water from the site to Tail Lake is also redundant. A pumping system and pipeline has been constructed to discharge Tail Lake water to Doris Creek. Pump and piping will also provide capacity for conveying runoff from a 1:100 year storm event.

1:20 Wet Year
+
1:25 yrs 24 Hr storm

Diverted Run-off

Non-Contact Run-off

Contact Run-off

Underflow

Sump #1

Sump #2

Pollution Control Pond

Surge Pond/Sedimentation Pond

Excess Mine Water

Underground Mine

Transferred using VacTruck

Tail Lake TIA

Temporary Wash Bay

Landfarm

Quarry 1 Tank Farm

RBTF

Vent Raise Tank Farm

Doris North Tank Farm

**Legend:**

Staff Gauge

Flow Meter

srk consulting

NEWMONT NORTH AMERICA

Doris North Camp

**Water Management System Alternative 1**

Job No: 1CH008.050

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HOPE BAY MINING LTD

Date: Jan. 19, 2012

Approved: TS

Figure: **3**

## 3.4 Implementation

HBML has implemented the previously approved water management system described above. The existing water management system is composed of:

- Sedimentation Pond;
- Pollution Control Pond;
- Diversion Berm;
- Two Underflow Interception Sumps;
- Pumping capacity with redundancy to meet conveyance needs for the design event and redundant pipelines to Tail Lake;
- Pumps, flowmeters and staff gauges as noted in Figure 3; and
- Pumping capacity, pipeline and flowmeters to discharge Tail Lake water to Doris Creek.

# 4 Quality Management and Reporting

## 4.1 Inspections

Visual inspections of all pads and diversion channels located throughout the Doris North Mine Area will be completed by operations staff. These inspections will look for the following types of issues:

- Drainage channels have not been inadvertently blocked or re-routed in a manner that could alter the intended routing of the clean runoff to the Sedimentation Pond and the potentially contaminated water to the Pollution Control Pond;
- Signs of erosion occurring during high flow periods;
- Integrity of silt curtains and erosion protection at point of discharge if discharging compliant water to the tundra;
- Daily inspection of the Diversion Berm during freshet and heavy rainfall – check for structural integrity, blockages and ponding;
- Daily inspection of each pond in the system confirming structural integrity and water levels;
- Daily inspection of all pumps and pipeline checking for leaks, operation of flowmeters etc.; and
- Daily inspection of all sumps checking for leaks, operation of flowmeters etc.;
- Any irregularities identified during the visual inspections will be recorded on inspection sheets and immediately relayed to the General Manager of Operations and/or the Engineering, Procurement and Construction (EPC) Manager in order to ensure immediate corrective action can be implemented.

Inspection sheets must be retained for presentation to inspectors and Environment and Social Responsibility (ESR) upon request. Regular inspection of all upstream diversion berms will be conducted to ensure the integrity of these structures.

## 4.2 Monitoring

Continuous monitoring of Doris Lake water levels and outflows will continue under the hydrologic baseline characterization. These data will be used to calibrate the existing water balance and quality model.

All ponds will be constructed with permanent staff gauges to allow for visual monitoring of incoming flows to each pond. Daily volumes will be recorded in a water management operations log sheets. The log sheets will be maintained by the site operations staff.

Instantaneous flow and total volume will be monitored on all transfer pumps shown in Figure 2. These will be recorded in the water management operations log sheets.

In accordance with the Licence requirements, the water quality of any water discharged from the Mine Area be tested for compliance with the Effluent Discharge Limits. Confirmation of compliance will be required prior to discharging any water from the facility.

Sampling of the following locations will only occur when water is discharged to and from Tail Lake. Water quality and flow will be monitored at:

- The withdrawal point in Tail Lake (TL-1) or at the end of the discharge pipe from Tail Lake to Doris Creek (TL-4). The water entering and exiting the pipe is not being altered along the route, only one end of the pipe needs to be sampled to produce a result that is representative of both stations;
- Doris Creek upstream of the discharge location (TL-2); and
- Downstream of the Tail Lake discharge location (TL-3) will also be monitored.

Water quality in the Pollution Control Pond (ST-2) and Sedimentation Pond (ST-1) will be monitored in accordance with the Water Licence (once monthly during the open water season).

The ESR staff will conduct monitoring, under the ultimate accountability of the HBML General Manager of Operations.

All sampling procedures and QA/QC activities are described in the Quality Assurance and Quality Control Plan (HBML 2012).

## 4.3 Reporting

As per the requirement specified in Item 8, Part D of the Licence, 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 Licence Application Monitoring and Follow Up Plan, July 2007* (MHBL, 2007) and all requirements specified in the Licence.

The Construction Monitoring report will document the construction of new components of the water management system. The report will include but not necessarily be limited to the following:

- A summary of all inspections conducted during construction;
- Updated “As-built” drawings of the constructed infrastructure; and
- All inspection and monitoring data compiled will be documented and incorporated into the existing monthly and annual monitoring reports submitted to the Board.

Monthly water quality monitoring reports will be prepared. These reports will include:

- A water quality data summary;
- A summary of flow and stage monitoring in the water management system; and
- An assessment of data to identify areas of non-compliance with regulated discharge parameters referred to in Part G.

Until the project goes into operations and tailings begin being deposited into Tail Lake, HBML will not be reporting the following monthly:

- A summary of monthly operational assessments of the water balance;
- Water quality model including model calibration; and
- A water balance of all water transfer within the water management system.

The water movement data that is collected as part of the water management procedure will be used to update and calibrate the water balance and water quality model annually.

# 5 Revision Record

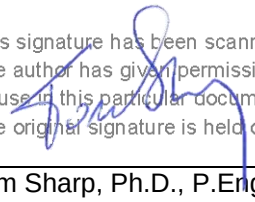
This Interim Water Management Plan will be reviewed at least once per calendar year and revised as required. Each revision will be recorded in Table 3.

**Table 3: Revision Record**

| Revision Number | Review Date | Description of Revisions | Revised By |
|---|---|---|---|
| 0 | April 2007 | Original | Miramar |
| 1 | December 2010 | Interim Water Management Plan, complete revision | SRK |
| 2 | July 2011 | Addressed comments received by the NWB | SRK |
| 3 | December 2011 | Addressed comments received by the NWB | SRK |
| 4 | February 2012 | Complete revision | SRK |
| 5 | December 2012 | Updated to address care and maintenance and completed construction activities | SRK |

The "**Doris North Project - Interim Water Management Plan**", has been prepared by SRK (Consulting) Canada Inc.

## Prepared by

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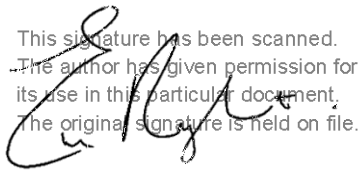


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# 6 References

Golder, 2009. Doris Project Area 2008 Hydrology Baseline Update – Draft Report, December 2009.

HBML, 2012. Quality Assurance and Quality Control Plan, Revision 7.1, November 2011

MHBL, 2007a. Revised Water Licence Application Support Document. April 2007.

MHBL, 2007b. Water Licence Application Monitoring and Follow Up Plan. June 2007.

SRK Consulting, 2011. Hope Bay Interim Water Management Plan (revised), August 2011.

SRK Consulting. 2012. Hope Bay Interim Water Management Plan, February 2012.

# Appendix A: Table of Concordance

## Table of Concordance

| Location in Licence | Licence Condition | Document Reference |
|---|---|---|
| Part D – 5 (page 5) | The Licencee shall undertake appropriate corrective measures to mitigate impacts on surface drainage resulting from the Licencee's operation. | Sections 3.3.1 through 3.3.4 |
| Part D – 18 (page 6) | The Licencee shall conduct daily visual inspections for all construction activity during spring freshet & during & after remarkable rainfall events with sampling of runoff/seepage where turbidity is evident. | Sections 4.1 and 4.2 |
| Part D – 19 (page 6) | 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. | Section 3.1 |
| Part D – 25 (page 7) | The Licencee shall ensure that all containment & runoff control structures are constructed & maintained to prevent escape of wastes to the surface or groundwater systems. | Sections 3.3.1 through 3.3.4 |
| Part F – 1 (page 9) | The Licencee shall submit to the Board for review by May 1, 2008, a revised Water Management Plan. | This Interim Water Management Plan fulfills this condition until tailings are discharged to the TIA. |
| 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; | Section 4.2 |
| b | Requirements for on-going monitoring and calibration of the water quality model; | Section 4.2 |
| c | A strategy to monitor and remove where necessary snow accumulation in the Pollution Control Pond, roads, ditches, and drainage channels; | Section 4.2 |
| d | The Plan shall consider the monitoring requirements set out in Parts J and K; | Sections 4.1 and 4.2 |
| Part F – 4 (page 9) | The Licencee 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) and the records be kept for review upon request of an Inspector. More frequent inspections may be required at the request of an Inspector. | Sections 4.1 and 4.2 |
| Part G – 2 (page 9) | The Licencee shall ensure that all land applied discharges are performed in a manner that prevents erosion at the point of discharge and downstream. | Section 4.1 |
| Part G – 21 (page 12) | The Licencee shall operate and maintain the Sedimentation Pond in accordance with the following | |
| a | Water discharged from the Sedimentation Pond at monitoring station ST-1 shall not exceed the following effluent quality limits | Section 3.1 |
| b | The Licencee shall establish compliance with effluent quality limits prior to discharge; | Sections 3.2 and 3.3.4 |
| c | Water from the Sedimentation Pond that is acceptable for discharge under Part G, Item 21(a) shall be discharged immediately south of the facility approximately 500 m upstream of Doris Lake, or as designated by an Inspector; and | Sections 3.3.1, 3.3.2, and 3.3.4 |

| Location in Licence | Licence Condition | Document Reference |
|---|---|---|
| d | Sedimentation Pond Water that does not meet criteria in Part G, Item 21(a) shall be directed to the Tailings Impoundment Area. | Section 3.3 |
| Part J – 1 (page 18) | The Licencee 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. | Sections 4.1 and 4.2 |
| Part J – 18 (page 21) | The Licencee 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: | |
| j | Sedimentation Pond; | Sections 4.1 to 4.3 |
| k | Pollution Control Pond; | Sections 4.1 to 4.3 |
| Part J – 20 (page 21) | The Licencee shall visually monitor and record observations on a daily basis during periods of discharge, all discharge onto the tundra from the: | |
| b | Sedimentation Pond; | Sections 4.1 to 4.3 |
| Part J – 21 (page 21) | The Licencee shall, within thirty (30) days following the month being reported, submit to the Board a monthly monitoring report in an electronic and hardcopy. | Section 4.3 |
| Part K – 1 (page 22) | The Licencee shall submit to an Analyst for approval by March 1, 2008, a Quality Assurance/ Quality Control Plan that includes field and laboratory procedures and requirements. This Plan shall be developed in accordance with the *1996 Quality Assurance (QA) and Quality Control (QC) Guidelines for Use by Class "A" (INAC)*. | Section 4.2 |