2014 2AM-DOH1323 Type A Water Licence

Construction Monitoring Report

Doris North Project

Nunavut Water Board

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Introduction

This Construction Monitoring Report summarizes the monitoring results, analysis and any mitigation measures employed as a result of the monitoring of the items required under Schedule D of the Nunavut Water Board licence 2AM-DOH1323.

In 2014, no construction activities took place at the Doris North site because the project was under care and maintenance. Some maintenance work was undertaken at the jetty to armour the jetty sides as a follow-up to storm damage repairs in 2013, at the recommendation of the Geotechnical Engineer. Repairs were also made to the bulk fuel storage tank pedestals in the Roberts Bay 20M L Tank farm to correct and prevent minor erosion noted on the gravel footings.

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

No quarrying activities took place in 2014 so no blast vibration monitoring was undertaken.

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

Due to the fact that no construction was undertaken in 2014, no new erosion protection measures were put into place and no monitoring was required.

c. Monitoring for sediment release from construction areas

Due to the fact that no construction was undertaken in 2014, no monitoring for sediment releases from construction areas was performed.

d. Monitoring for wildlife interactions

Results from the 2014 Wildlife Mitigation and Monitoring Program indicated that:
Wildlife mitigation and monitoring requirements for the Project were set out in the Doris North Gold Mine Project Certificate (Nunavut Impact Review Board (NIRB) No. 003) and the Kitikmeot Inuit Association (KIA) Commercial Land Lease (No. KTCL313D001). Monitoring activities are summarized in the Wildlife Mitigation and Monitoring Plan, which is revised regularly. In 2014, data pertaining to the care and maintenance phase of the current Wildlife Mitigation and Monitoring Plan were collected (Rescan 2013b). In addition to care and maintenance phase studies, upland bird, waterbird, and raptor surveys were conducted in 2014. Wildlife interactions were documented using a number of methodologies, including remote cameras, TMAC interactions, incidents and mortalities reporting, direct habitat loss

calculations, and incidental observations. Results from the 2014 Wildlife Mitigation and Monitoring Plan Compliance Program (the 2014 Program) are summarised below.

A remote camera monitoring program was employed in 2014 to monitor for potential interactions between Valued Ecosystem Components (VEC) species, muskox, and nest predators in the area immediately surrounding Project infrastructure, in accordance with requirements set out in the Doris North Gold Mine Project Certificate and KIA Land Lease. Cameras were deployed at Treatment sites (cameras within 1 km of infrastructure) and Control sites (cameras >1 km from infrastructure) from September 2013 to August 2014. Several Treatment and Control cameras were set in strategic locations to monitor for interactions of certain wildlife species with specific Project facilities and natural habitat features. These included monitoring caribou activity at two caribou crossing ramps along the Doris-Windy All-Weather-Road (AWR) and several locations along the coastline where Dolphin and Union caribou may cross to and from the sea ice during their seasonal migrations. A remote camera was also used to monitor for grizzly bear, wolverine, and nest predator activity at the Roberts Bay waste management facility. A camera was placed at the boulder garden on Roberts Creek outflow, as foraging opportunities available to larger predators (e.g., grizzly bear) in this area may influence how all other species use the area. Results from remote camera monitoring programs were as follows:

- Caribou were recorded at remote cameras from June to August 2014; no caribou were recorded over the winter from September 2013 to June 2014. Caribou events were recorded at both Treatment and Control camera monitoring locations. Caribou events were more frequently recorded at Control cameras relative to Treatment cameras, although more Treatment cameras recorded caribou events as compared to Control cameras. These results, of numerically more observations near Project infrastructure than tundra habitat in 2014 suggest that caribou are not actively avoiding the site. Based on the timing of all caribou events, caribou observations were likely of animals from the Beverly herd, which are expected to be in the vicinity of the Project during the calving and post-calving period from the late spring through summer. All events took place during the post-calving and summer period for the Beverly herd. On one occasion, a single caribou was observed near one of the two caribou crossing ramps along the Doris-Windy Lake AWR, but the caribou was not observed to use the ramp to cross the road. No caribou were recorded at the Control camera located at Roberts Creek outflow.

- Grizzly bear events were only recorded at Control cameras from September 2013 to May 2014, while events were recorded at both Treatment and Control cameras from June through August, 2014. From June to August, events occurred less frequently at Treatment cameras than at Control cameras. These results suggest that grizzly bear were not interacting with Project facilities more than the surrounding tundra habitat during the 2014 camera study. From

September 2013 to August 2014, no grizzly bear were recorded on Treatment cameras located at the Roberts Bay waste management facility. Grizzly bear were recorded at the Control cameras at the Roberts Creek outflow in June (2 events) and August (1 event); however, there was no negative interaction between the bears and the boulder garden fish fence.

- All wolverine events recorded from September 2013 to August 2014 took place at Control cameras, suggesting that wolverine were not interacting with Project facilities more than the surrounding tundra habitat. From September 2013 to August 2014, no wolverine were recorded on Treatment cameras located at the Roberts Bay waste management facility or at the Control cameras at Roberts Creek outflow which suggests that these facilities are not functioning as attractants to wolverine.

- Muskox events were recorded only at Control cameras from September 2013 to May 2014, while events were recorded at both Treatment and Control cameras from June through August, 2014. From June to August 2014, muskox were detected at more Treatment cameras (3 cameras) than Control cameras (1 camera), however too few muskox were observed to draw a comparison between Treatment and Control cameras. Muskox were recorded at the Control camera located at Roberts Creek outflow in July 2014. Approximately six individuals were observed foraging near Roberts Creek across the span of a week; there was no negative interaction between the muskox and fish fence.

- Nest predators observed by remote camera included Arctic and red fox. Arctic and red fox were recorded from September 2013 to May 2014, and only red fox was recorded from June to August 2014. Fox events were recorded at both Treatment and Control cameras from September 2013 to August 2014, and events occurred more frequently at Treatment cameras. These results suggest that foxes do occasionally use habitat near the Project. No foxes were seen at Treatment cameras located at the Roberts Bay waste management facility from September 2013 to August 2014. Only one fox event was recorded at the Control camera located at Roberts Creek outflow, where a red fox was recorded crossing the creek in mid-November. There was no negative interaction between the fox and the fish fence.

Wildlife interactions were monitored and mitigated on a case by case basis in 2014 and were reported directly to the NIRB and the KIA by TMAC, in compliance with KIA Land Lease requirements and Doris North Gold Mine Project Certificate requirements. There were a total of 11 wildlife interactions reported in 2014 that included eight grizzly bear, one ground squirrel, one muskoxen, and one red fox. Two of the reported interactions (red fox and ground squirrel) were mortalities. Two interactions, one involving a grizzly bear

and a second involving a herd of muskoxen, required wildlife deterrence. The remainder of the interactions involved potential bear encounters that were resolved either by the extraction or relocation of field crew or because the bear left the area.

Direct habitat loss associated with the footprint size is reported as part of the annual Wildlife Compliance Monitoring Program, in accordance with requirements set out in the Doris North Gold Mine Project Certificate. The total habitat loss predicted in the Final Environmental Impact Statement (FEIS) for the Project was 57 ha. Following the start of construction of the Project, minor changes to project infrastructure were identified resulting in an increase in the total project footprint and corresponding area of habitat loss predicted in the FEIS. The current footprint has resulted in a total habitat loss of 72.9 ha, which represents a 0.5% increase in the amount of suitable habitat lost relative to the Local Study Area (LSA), from 1.8% to 2.3%. The incremental loss of suitable habitat in the environmental assessment area ranged from 0.01% to 0.6% for caribou, grizzly bear, wolverine, upland breeding birds, waterfowl, and raptors. These increases are considered minimal and the predictions of the FEIS on the VECs remain valid in respect of the constructed project footprint.

Current and historical incidental wildlife observations were reviewed to generate an understanding of wildlife species richness in the Study Area, and to identify potential interactions of wildlife recorded by site personnel. Incidental observations were sourced from observations in the Project wildlife sightings log from 2009 to 2014, incidental observations made by wildlife biologists while conducting wildlife surveys at the Project from 1996 to 2014, and observations of grey wolf from the remote camera program in 2014. In general, the species recorded incidentally in the Project wildlife sightings log aligned with species recorded by ERM biologists during targeted surveys in the Study Area. Overall, two bird species were recorded incidentally in 2014 that had not been previously recorded in the wildlife sightings log or during wildlife surveys: American robin and Thayer's gull. One incidental observation from the wildlife sightings log represented an interaction with Project infrastructure: A common redpoll built a nest on one of the wildlife camera stands and laid five eggs; this represents the first record of an upland breeding bird nesting on wildlife camera stands at this site.

Upland breeding birds were surveyed in 2014 using point count and PRISM plot methods. Statistical differences in species richness and densities were found between Treatment and Control sites using Generalized Linear Modelling (GLM). Habitat type was not a significant predictor of songbird density. The presence of active nests indicated successful breeding was occurring within 1 km of infrastructure, though modelling results suggest that upland breeding bird species assemblage and abundance may have been somewhat lower near infrastructure.

To determine whether the Project might have affected the species richness or density of waterfowl and seabirds (waterbirds) in the Study Area during the northern migration/

establishment of nesting territories period (spring pair survey) and the brood rearing period (summer brood survey), waterbirds were surveyed in three survey blocks: two sites near Project activities (Doris and Roberts Bay blocks) and one reference site (Control block). In 2014, waterbird species richness was generally similar in the Control, Doris North, and Roberts Bay blocks, while abundance was slightly greater in the Doris North block than in the Control and Roberts Bay blocks. Species richness and abundance have generally been similar or greater during both survey periods (pair and brood surveys) during post-development years (2009 to 2013) as compared to pre-development years (2006 to 2007). During post-development years, abundance has generally been somewhat greater in the Control block as compared to the pre-development period in both Treatment and Control blocks. The average number of broods has increased during post-development years as compared to pre-development years, suggesting that there were no measurable negative effects associated with mine operations during brood rearing. Species habitat associations and differences in available habitat may be contributing to long-term differences in species richness and abundance at Treatment and Control blocks.

To determine whether the Project might have affected the distribution, occupancy rate, nest success rate, or productivity of raptors nesting in the study area, raptors were surveyed by helicopter to monitor nest occupancy, success, and productivity in the Treatment Area and Control Area. Raptors are relatively common in the study area because the rocky dykes in the area provide abundant good cliff nesting habitat. Nest productivity and success are highly variable between years throughout the study area. Results from 2014 indicate Raptors do not appear to be avoiding nesting in areas where they may interact with the Project and Project-related disturbance on a regular basis early in the breeding season. Occupancy of nesting territories was greater in the Treatment Area compared to the Control Area in 2014. Across years, 2014 appeared to be a year with high occupancy rates (birds establishing nests), as the occupancy rate recorded in both the Treatment and Control Area were the greatest recorded since 2009. However, after a high rate of occupancy (nest building), there was a high rate of nest failures in both Treatment and Control areas in 2014. Raptor nest success (producing eggs) and productivity rates (producing chicks) were higher in the Treatment Area relative to the Control Area in 2014. Therefore, it is possible that 2014 may have been a poor year for raptor breeding, potentially due to a snowfall event that occurred in early June when raptors were incubating eggs.

Overall, results of the 2014 Wildlife Mitigation and Monitoring Program suggest the Project is having no measurable effects on wildlife which suggests that mitigation measures have been effective in reducing potential effects of the Project on wildlife.

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

Construction activities that have the potential to disturb or destroy avian ground-nesting sites are timed to avoid the nesting season. No construction occurred in 2014 so monitoring was not required.

f. Waste Rock and Quarry Monitoring Report, including the following:

i. A summary of geochemical inspections;
ii. Results of the seep surveys;
iii. Results of geochemical sampling and analysis; and
iv. A summary of all mitigation activities undertaken as a result of monitoring

Annual geochemical reporting requirements for the Doris North mine, Hope Bay project include results from the quarry rock, Doris North underground waste rock and seepage monitoring programs. In 2014, the monitoring program was limited to the seepage survey as there was no development of the underground mine or at any of the quarries. This report presents results of the 2014 freshet seep survey. The objective of the seepage monitoring program is to confirm that the water quality associated with these materials is within expected ranges. The seepage program was completed in accordance with conditions outlined in Part D "Conditions applying to Construction and Operations" Item 20 of Water License 2AM-DOH1323 (Nunavut Water Board 2013) and the Quarry A, B & D Management and Monitoring Plan, Revision 01 (SRK 2010).

Seep survey locations were established opportunistically by walking the toes of all roadways, building pads and quarry sites along the Doris North and Doris-Windy roads. A total of 26 seepage sites and 3 reference sites were established and measured for field parameters. As per the water license, a minimum of 10% of the total sample set, including any sites with elevated conductivity, were submitted to a laboratory for an extended analytical suite. A total of 11 samples were collected and analyzed at a commercial laboratory.

The results of the 2014 sampling program indicated that there are no issues with respect to metal leaching or acid rock drainage (ML/ARD) in seepage associated with the infrastructure at Hope Bay. Results were comparable to previous seepage surveys with an improvement in seepage quality from waste rock influenced areas. All parameters were compared to the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life to screen for elevated parameters. Comparisons to these criteria were used solely for screening purposes and are not directly applicable because the seep locations do not support aquatic life. Seepage from waste rock influenced areas had elevated levels of ammonia, chloride and nitrate compared to CCME water quality guidelines though levels have decreased gradually since 2012, suggesting that active flushing of drilling brines and blasting residues from the waste rock pile is ongoing. Seepage is managed in accordance with the Doris North Interim Water Management Plan, revision 5 (SRK 2012).

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)

Waste management practices are routinely monitored during site inspections by TMAC Environment Department staff and other departmental managers and supervisors, specifically targeting food waste (animal attractant) management practices and adherence to established site waste sorting and handling procedures at all shops and work areas. Secondary containment for all liquid, hazardous or other potentially contaminating products is checked and corrective actions implemented where needed. KBL Environmental was contracted in 2014 to manage site waste handling and lead backhaul packaging to meet regulatory requirements.

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

Routine travel is restricted to established/permitted routes during winter and summer.

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

Dustfall monitoring was not performed in 2014 as no crushing or construction activity took place at Doris North.

Water use for dust suppression along high traffic areas of roadways was tracked by TMAC. Water for dust suppression was obtained from both permitted lake sources and from containment berm water complaint for discharge to the environment. Table 1 indicates the total volume of water applied to the road system per month, in cubic metres, from both fresh and recycled sources for dust suppression in 2014. A total of 1,106m^3 of water was used.

Table 1 – Volume of water applied for dust suppression at the Doris North project in 2014 in cubic metres (m^3)

Date	Lake Source Volume (m^3)	Recycled Source Volume (m^3)
June	67	571
July	56	181
August	168	-
September	2	60
Total	**293**	**812**

TMAC has approval from the Inspector and the GN-DOE to use the non-toxic dust suppressant EK-35 in areas of high use, such as the airstrip and main camp road, when required. EK-35 was not used in 2014.

j. Vegetation monitoring

Vegetation monitoring was not undertaken in 2014.

k. Summary of the Quarry Rock Construction Monitoring Program referred to in Part D, Item 9

No quarrying or construction was undertaken in 2014. As a result, no monitoring program took place.

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

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

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

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

North Dam construction started in February 2011 and was completed on May 7, 2012. A comprehensive as-built report was prepared and submitted to the NWB on November 6, 2012. This as-built report contains all the relevant information including results of geotechnical investigations undertaken during construction by appropriately qualified professionals, and details of any instrumentation installed within the dam.

m. Summary of the items referred to in Part D, Item 13 with respect to updated construction drawings for the all-weather access roads

The all-weather road between Roberts Bay and Doris Camp was completed in 2008 and as-built drawings were provided to the NWB. The all-weather road to the TIA is partially constructed; it currently reaches the North Dam and extends to the TIA to the future Reclaim Barge access point. The road to the South Dam is not constructed. An as-built of the road constructed so far can be found in the as-built drawings submitted to the NWB on November 6, 2012.

n. Summary of the Quarry Rock Seepage Monitoring Program referred to in Part D, Item 20

No quarrying or construction was undertaken in 2014. As a result, no monitoring program took place.

o. Status of the Construction Summary Report referred to in Part D, Item 25

No construction occurred at Doris North in 2014. As a result, no construction summary report was prepared.