



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Environmental Protection Operations Directorate (EPOD)
Prairie & Northern Region (PNR)
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT X1A 2P7

March 14, 2017

ECCC File: 6100 000 003/015
NWB File: 8BC-JER----

Stephanie Autut
Executive Director
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

via email: licensing@nwb-oen.ca

RE: 8BC-JER---- – Indigenous and Northern Affairs Canada (INAC) – Jericho Diamond Mine Site Stabilization Plan

Attention: Stephanie Autut

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board regarding the Jericho Diamond Mine Site Stabilization Plan and is submitting comments (Attachment A) via email. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

Should you require further information, please do not hesitate to contact me at (867) 669-4732 or Emily.Nichol@canada.ca

Sincerely,

Emily Nichol
Environmental Assessment Coordinator

Attachment A: Environment and Climate Change Canada's Comments and Recommendations for the Jericho Diamond Mine Site Stabilization Plan

cc: Bradley Summerfield, Senior Environmental Assessment Coordinator
Georgina Williston, Head, Environmental Assessment North (NT and NU),
PNR-EPOD

Attachment A – Environment and Climate Change Canada’s Comments and Recommendations for the Jericho Diamond Mine Site Stabilization Plan

1. Diversion Channel Modifications and Carat Lake Inflows

Reference:

- Design-Build Services Terms of Reference, Jericho Mine Site Stabilization, Public Services and Procurement Canada, July 2016 (Section 1.5.2 Design/Deconstruction Scope of Work).
- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 2.2.2 Open Pit Remediation, Section 4.3.2 Hydrology and Hydrogeology, and Section 5 Monitoring Program Recommendations).

Background and ECCC’s Comments:

The diversion channel, which carries flows from Lake C1 to Carat Lake, will be rerouted into the open pit to create a pit lake over the next approximately 11 to 15 years. A plug will be installed to prevent flow down the existing C1 Diversion.

Erosion control measures will need to be put in place on the new C1 alignment (listed as mitigation in Table 13 Assessment of Impacts on Hydrology and Hydrogeology, pg. 33) to minimize impacts on Carat Lake.

The Design-Build Services Terms of Reference for the Jericho Mine Site Stabilization, included the following in the scope of work “construct a *channel through the C1 Diversion to divert the C1 flow back into the Open Pit, install a plug to prevent flow down the alignment of the existing C1 Diversion, cut a separate channel to breach and divert future flow out of the Open Pit, and design both breaches to ensure their long term performances*” (Section 1.5.2, pg. 5).

Very little is included to provide direction on avoiding instability and preventing erosion. The proposed construction of the outflow channel well in advance of discharge from the filled pit could minimize uncertainty with respect to performance (e.g., issues such as thermal erosion), and should include sufficient stabilization and erosion prevention measures.

ECCC’s Recommendation:

- ECCC recommends that the Proponent develop an Erosion and Sediment Management Plan. This Plan should specifically address the realignment of the diversion channel for both inflow and outflow sections.

2. Filling of the Open Pit

References:

- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 2.2.2 Open Pit Remediation and Section 4.3.2 Hydrology and Hydrogeology).
- Jericho Environmental Site Assessment Phase III: Environmental Site Assessment, Materials Survey and Geotechnical Evaluation, Jericho Diamond Mine, Nunavut, December 2014 (Section 7.6 Open Pit).

Background and ECCC's Comments:

The Proponent states that "*establishing the natural surface water flow patterns by removing C1 diversion (Appendix A, Figure 5) will expedite pit filling and provide a fresh source of recharge for the pit lake. Diverting the C1 stream back to the pit is a necessary site stabilization measure because it restores the natural flow path through the pit area and provides a consistent source of inflow for the pit lake. It also removes any question about long-term performance of the C1 diversion and significantly reduces pit filling times... pit lake water quality modelling will be completed as part of a detailed closure design, and regular water quality testing will be completed on pit water to identify loading trends and pit infill rates. The nominal pit lake water elevation of 479 m will leave a portion of the southern pit high wall exposed*" (Section 2.2.2, pg. 5).

The open pit is approximately 80 m deep, and currently has about 27 m of water depth with the pit water elevation at 435.4m in 2014. Long-term stability of the open pit will be evaluated as part of the pit closure, specifically during pit filling. Ongoing monitoring should also include water quality and physical conditions within the pit lake (e.g., temperature, density stratification). The thermal regime, water quality, and meromixis potential of the relatively deep pit lake will require ongoing investigation.

The Proponent states that "*pit water will be monitored as the water level increases to see if water quality will be acceptable for release before it overtops; appropriate treatment or water management will be implemented, if necessary, to ensure pit lake outflow does not negatively impact Carat Lake*" (Section 4.3.2, pg. 33).

If treatment is needed, the mitigation proposed (Table 13 Assessment of Impacts on Hydrology and Hydrogeology, pg. 34) is to route outflow through shallow ponds and wetlands to provide further treatment. The main shortfall of this proposed mitigation is uncertainty around the efficacy of such treatment, and limitations of suitable terrain between the open pit lake and Carat Lake.

Recommendations:

- ECCC recommends that the Proponent complete monitoring of the open pit water quality and modeling of closure water quality early in the pit filling process in order to detect potential issues with water quality in time to develop robust contingency plans for treatment if required.
- ECCC recommends that the Proponent define standards for water quality that are acceptable for release to Carat Lake in advance of release.

3. Remediation of the Processed Kimberlite Containment Area

References:

- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 2.2.3 Processed Kimberlite Containment Area and Section 4.3.4 Soils and Terrain).
- Jericho Environmental Site Assessment Phase III: Environmental Site Assessment, Materials Survey and Geotechnical Evaluation, Jericho Diamond Mine, Nunavut, December 2014 (Section 6.4.1.3 PKCA Discharge).

Background and ECCC's Comments:

Remediation of the Processed Kimberlite Containment Area (PKCA) will need to be done such that physical stability and acceptable water quality are attained. It is proposed to breach the West Dam to allow water to drain out of Cell C, and to stabilize and cap Cell A using coarse kimberlite.

The 2014 Environmental Site Assessment Phase III report includes data for water quality over the period 2005 to 2014, with gaps. Trends have been identified for most parameters as decreasing steadily since mine closure. Data for 2011 and 2014 for the full suite of parameters measured at the outflow of Cell C show acceptable water quality. Discharge from the PKCA would flow from Cell C to Stream C3, into Lake C3, and then to Carat Lake.

Stabilization of the breached dike and erosion control measures in the immediate channel would be necessary. Ongoing drainage from the PKCA would be expected, and it was not clear if volumes have been estimated.

The Proponent states that "*the channel bottom and sideslopes would be armoured with coarse PK to prevent erosion damage. The coarse PK will also be used as a cover for Cell A*" (Section 2.2.3, pg. 6). Table 15 Assessment of Impacts on Terrain, states that for mitigation it will be necessary to "*cap the PK cover with some waste rock or till to provide erosion protection and a more varied reclamation surface*" (Section 4.3.4, pg. 37).

The proposed use of coarse processed kimberlite as a closure cover raises concerns for the breakdown of the coarse PK over time. The Ekati Diamond Mine found that over time, weathering of the coarse PK has occurred, and resulted in release of fines and loss of structure of the materials. If coarse PK is to be used as a cover material, it should be fully covered with sufficient depth of non-acid generating waste rock to prevent weathering. In addition, the coarse PK piles should be stabilized to minimize weathering and erosion. It is not clear if any geochemical characterization of the coarse PK has been completed, and that would be useful to have for designing closure configurations.

ECCC's Recommendations:

- ECCC recommends that the Proponent estimate flow volumes over time and use the estimates to appropriately design the spillway out of Cell C through the West Dam.
- ECCC recommends that the Proponent include sufficient armouring to prevent weathering and/or erosion for coarse kimberlite used in the remediation of the PKCA.

4. Management and Monitoring Plans

Reference:

- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 5 Monitoring Program Recommendations).

Background and ECCC's Comments:

The Proponent lists the following short and long-term monitoring program recommendations:

- *“annual geotechnical monitoring of remaining water and building infrastructure for the first 2 years and then determination of long term monitoring;*
- *monitor water quality (including uranium), thermal regimes, and stratification potential of the pit during the filling period;*
- *monitor effect of runoff diversion to fill the pit lake on Carat Lake levels;*
- *water quality monitoring in the coarse PK and the kimberlite piles should be continued at the east sump post closure to establish trends;*
- *monitoring water quality and sediment loading during any instream work;*
- *field inspections of erosion and sediment control measures to ensure surface runoff is not contributing to sediment loading of watercourses and water bodies;*

- *monitoring for signs of erosion near reclaimed lands where surface soil was replaced or till was graded during contouring*” (Section 5, pg. 45).

Remediation activities will rely on appropriate monitoring to evaluate effectiveness of the work being done, and to identify any issues that arise in connection with the remedial measures. The development of management and monitoring plans could include recommendations identified in Section 5 Monitoring Program Recommendations. These plans could include details on environmental sampling procedures and programs during the stabilization work, as well as a long term monitoring plans for the site.

ECCC's Recommendation:

- ECCC recommends that the Proponent identify how the short and long-term recommendations made in Section 5 of the Environmental Screening Report will be addressed and identify how the effectiveness of *proposed* mitigation measures will be evaluated.

5. Management of Camp Wastewater

References:

- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 4.3.2 Hydrology and Hydrogeology and Section 4.3.3 Aquatic Ecology).
- Jericho Mine Wastewater Treatment Plant Design Plan, Addendum, Tahera Diamond Corporation, January 2006.
- Nunavut Impact Review Board (NIRB) Part 1 and 2 Application, Jericho Mine Site Stabilization Project, September 2016.

Background and ECCC's Comments:

Camp wastewater (sewage and greywater) will be treated on site and discharged in accordance with permits (Section 4.3.2, Table 13 Assessment of Impacts on Hydrology and Hydrogeology). In the application for the Jericho Mine Site Stabilization Project the Proponent references following Tahera Diamond Corporation's 2006 Wastewater Treatment Plant Operations Plan, which uses a collection tank and RBC treatment system.

The Proponent states that “*waste water will be treated and tested before released into the Project area*” (Section 4.3.3, pg. 35). No information is provided on where the treated wastewater will be discharged (i.e., whether to sumps on land, or in such a fashion that effluent would enter surface waters). Concerns with effluent going into surface waters would include the addition of nutrients, and the possibility of deleterious substances entering waters frequented by fish.

ECCC's Recommendation:

- ECCC recommends that the Proponent dispose of treated camp wastewater such that the Proponent remain in compliance with the *Fisheries Act* 36(3).

6. Landfarm Operation and Closure

Reference:

- Environmental Screening Report, Jericho Mine Site Stabilization Plan, August 2016 (Section 2.2.7 Contaminated Soil and Section 4.3.4 Soils and Terrain - Table 16 Assessment of Impacts on Soils).

Background and ECCC's Comments:

The landfarm will be constructed to manage hydrocarbon-contaminated soils on site, and is proposed to be constructed within the existing tank berms, which will be lined. There will be a leachate collection system, with collection in a sump area in one corner. No information has been provided on how leachate and water/precipitation that collects in these berms will be managed.

Recommendation:

- ECCC recommends that the Proponent develop a Landfill Management Plan that identifies management and disposal of any liquids from the landfarm.

7. Spill Contingency Contact Numbers

Reference:

- Jericho Mine Site Stabilization, Interim Spill Contingency Plan, July 2016 (Section 7 Contact Numbers).

Background and ECCC's Comments:

The Proponent has listed the contact number "*Environment Canada 867-945-4644*" (Section 7).

In the case of a spill or emergency, the 24 Hour NWT/NU Spill Report Line should be contacted first by the Proponent (which the Proponent has stipulated in Section 4). The NWT/NU Spill Report Line will then involve ECCC Emergencies when appropriate.

For information relating to the environmental enforcement and reporting requirements under the Canadian Environmental Protection Act and the Fisheries Act the Proponent can contact ECCC Environmental Enforcement at (867) 669-4730.

Recommendation:

- ECCC recommends that the Proponent remove the Environment Canada phone number from Section 7 of the Interim Spill Contingency Plan.