



# Giant Mine Environmental Assessment

## Technical Session Undertakings

EA No: 0809-001

November 14, 2011

### UNDERTAKING RESPONSE

EA No: 0809-001

Undertaking No: 5

#### Date Received

Transcript: Day 3, pg. 21

#### Undertaking:

The Giant Mine Project Team (GMPT) to provide clarification to the parties on how it sees the Baker Creek North diversion being deployed as a contingency.

Also to include the current thinking and outline an approach to the current thinking that the project requires.

Also to include a quick summary of the process that would be followed for any authorizations for the contingencies – e.g. how the GMPT would go about following the directive from the Inspector for this work.

Also to include a discussion of the backwater flow from the diversion entry to Yellowknife Bay.

#### Response:

Occurrences at the Giant Mine in 2011, including unanticipated subsidence near B1 Pit and heavy ice accumulation over the preceding winter, have led to questions about how conditions or events such as these may affect the risk of underground mine flooding. As a responsible owner / manager, Aboriginal Affairs and Northern Development Canada (AANDC) plans to conduct a risk mitigation analysis to evaluate the immediate and long-term probabilities and consequences of events such as these, to identify feasible approaches for mitigating these risks and to identify thresholds at which action is required. A workshop for this analysis is planned for early 2012.

The North Diversion work that has been performed to date was a high-level feasibility assessment to determine if it was worth considering as a potential mitigation alternative. The feasibility assessment indicated that the North Diversion is likely feasible and will be included as one of many alternatives to be evaluated during the workshop.

It is our understanding that the North Diversion is presently unrelated to the directive from the AANDC Inspector. Should a decision be made to proceed with implementation of a North Diversion, the process



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would depend on whether the activity was a planned one, to address a long-term risk, or an emergency one, to address an immediate crisis. It is our understanding that required authorizations would include:

- Canada *Fisheries Act*: An Authorization would be required from Fisheries and Oceans Canada (DFO) under Section 35 of the *Fisheries Act*. Compliance with other sections of the *Act*, including Section 20 (construction of fish-ways), Section 22 (water for descent of fish) and Section 36(3) (deposit of deleterious substances) may also be required. It is our understanding that DFO has a provision for emergency Authorizations, should that be required to respond to an immediate crisis.
- MVRMA Requirements – Possible Land Use Permit and Water Licence as required by the Mackenzie Valley Land and Water Board (MVLWB).

Other possible authorizations to be confirmed could include permits for quarrying and blasting and an approval under the *Navigable Waters Protection Act*.

This list does not include study permits for archaeology, wildlife, fisheries and animal care that may be required to undertake studies to support the design, construction or post-construction monitoring. Compliance with the Canada *Migratory Birds Convention Act* may be required if the North Diversion is likely to disturb migratory birds, and it is understood that North Diversion lakes host migratory waterfowl.

The North Diversion flow would enter Yellowknife Bay through an expansion of the existing Shot Lake outlet channel, which is located approximately 300 m west of the Ingraham Trail (Highway 4) bridge over the Yellowknife River. The existing City of Yellowknife water intake is located upstream of the bridge. A small peninsula is located on the west (right downstream) bank of the Yellowknife River downstream of the bridge, meaning that the flow distance from the mouth of the Shot Lake outlet channel to the water intake is approximately 600 m. Half of that distance is through Yellowknife Bay and half upstream along the Yellowknife River channel (Figure 1).

The watershed area of the Yellowknife River at the outlet of Prosperous Lake, well upstream of the Highway 4 bridge, is 16,300 km<sup>2</sup>. This is over 100 times the watershed area of Baker Creek, and flows are correspondingly greater. The Yellowknife River is also currently regulated by the Bluefish Hydro project, meaning that the low flows are greater than they would be under natural circumstances. The lowest mean daily flow measured at the outlet of Prosperous Lake, since the station was re-established in 1987, was 9.39 m<sup>3</sup>/s in November 1994. This compares to the highest flow (over 40 years of record) on Baker Creek of 8.45 m<sup>3</sup>/s in May 1991. In addition to this, high flow periods on Baker Creek would be unlikely to correspond to low flow periods on the Yellowknife River, due to regional similarities in snowpack, snowmelt and to a lesser extent, rainfall.

It is possible that water levels at Great Slave Lake affect water levels in the lower Yellowknife River, as was suggested at the technical session in October 2011. However, this does not mean that water from the lake actually flows upstream. Rather, as long as there is enough water flowing in the Yellowknife River, the lake water levels cause a backwater effect which raises the water levels and reduces mean flow velocities upstream.





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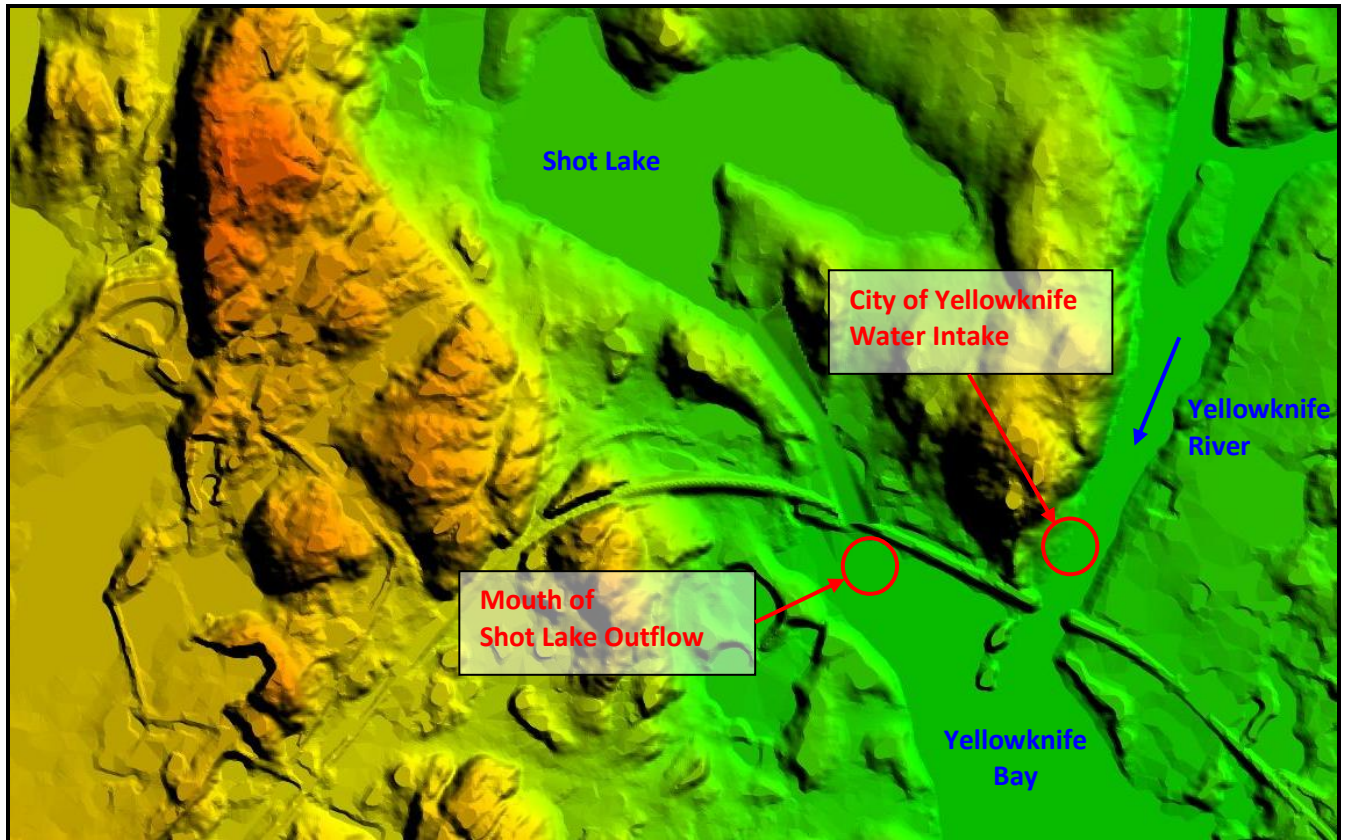


Figure 1: Digital Elevation Model of Yellowknife Bay at Mouth of Yellowknife River

Low flows on the Yellowknife River are still likely to be large enough to prevent intrusion of Great Slave Lake water (including that mixed with outflow from the North Diversion) upstream to the existing City of Yellowknife water intake. The slight constriction at the bridge, due to headslope fills, would increase flow velocities at this section and be of further benefit.