NWB Tools

Richard Dwyer <richard.dwyer@nwb-oen.ca>

Revision 1: 3AM-IQA1626 Application for Emergency Amendment City of Iqaluit

Bonhomme, Erica <Erica.Bonhomme@stantec.com> Tue, Aug 7, 2018 at 1:22 PM
To: "Janusz, Richard" <Richard.Janusz@dfo-mpo.gc.ca>, Dave Baines <dave.baines@nwb-oen.ca>
Cc: Licensing Department <licensing@nwb-oen.ca>, "Weir, Dixon" <Dixon.Weir@colliersprojectleaders.com>, "Hodgins, Kevin" <Kevin.Hodgins@stantec.com>, "Allain, Erik (AADNC/AANDC)" <erik.allain@canada.ca>, Karén Kharatyan <karen.kharatyan@nwb-oen.ca>, Teresa Meadows <tmeadows@meadowslaw.ca>, "tracey.mccaie@aandc.gc.ca" <tracey.mccaie@aandc.gc.ca>, "landsmining@aandc.gc.ca" <landsmining@aandc.gc.ca>, "david.rochette@canada.ca" <david.rochette@canada.ca>, "spencer.dewar@canada.ca" <spencer.dewar@canada.ca>, "Dow, Larry" <Larry.Dow@dfo-mpo.gc.ca>, Sharon Ehaloak <sehaloak@nunavut.ca>, Brian Aglukark <aglukark@nunavut.ca>, "Chiperzak, Doug" <Doug.Chiperzak@stantec.com>, Matthew Hamp <M.Hamp@city.iqaluit.nu.ca>, "Archibald, Steve" <Steve.Archibald@colliersprojectleaders.com>, "Luzi, David" <David.Luzi@stantec.com>

Hi Richard, please see responses below:

1. Your summary of the August 3rd call noted that 'DFO would like to know what the drawdown in the Apex…will be." Are you going to provide information on the anticipated flow removal as compared to the historic, period of record, flow range and the present flow? Presumably, 2018 flows are 'tracking' some sort of historic percentile exceedance flow, what might that be? Given that 2018 flows may be 'tracking' a historic exceedance flow level, or levels, what might the outlook be for the planned withdrawal. Would the withdrawal comply with the DFO (2013) lower risk criteria (only remove water if flow is above 30% of the historic period of record mean annual discharge (MAD), and if the flow is greater than 30% MAD, only remove a maximum of 10% of the instantaneous flow)? If not, would the water withdrawal allow flow to remain somewhere within the historic range? If so, at what percentile exceedance might the flow, with water withdrawal, be? If not, how low would the river flow be reduced and what percentile exceedance might that be?

Analysis of historic data will require some additional time; this will provided to DFO by end of day August 10. At current flows in the within the Apex River, the planned withdrawal rate does not exceed the guidelines of > 30% MAD and 10% of instantaneous flow. Once flows in the Apex have subsided the intention is to maintain the 30% MAD flow, though the 10% instantaneous withdrawal limit may be exceeded if conditions allow as based on monitoring of fish habitat.

2. From August 3rd, you say that 'DFO requests consideration of a fish rescue program should stranded fish be identified.' When do you anticipate providing a plan for fish rescue? Given that a fish rescue program may be used to estimate serious harm as death of fish, what would your plan be for estimating the species and numbers of stranded fish, the species and numbers released alive, and the species and numbers that die – within areas you can reach but also extrapolated to estimate impact for all areas that might be affected by drawdown and stranding of fish?

The mitigation table submitted in Rev2 of the "3AM-IQA1626 Application for Amendment – Supporting Submission" provides a description of the fish rescue. Yes, fish captured and released alive will be enumerated as well as fish mortalities. It is suggested that fish mortalities would be frozen and sampled later in a lab to collect biological information as there is little known about this population. Extrapolating all areas which may be affected by water drawn down would likely result in a much higher estimated on the

impact on fish as not all areas are likely used by fish. We could consider using a smaller area which has a higher potential to provide fish habitat, in discussion with DFO.

3. In the supporting information you say that phase 1 has to be the removal of water from the Apex River as that is the only equipment ready to use. You suggest that additional equipment may be 'on the way' for phase 2 which would see water diverted from the 'unnamed' lake to the Apex and then on to Lake Geraldine. When do you anticipate phase 2 being ready?

Phase 2 is being considered as an alternate to Phase 1. Equipment required for Phase 2 is in the process of being sourced (i.e. additional 4" hoses). It will only be used should flows in the Apex drop past a level where adequate water can be harnessed. We are planning on harnessing water in the Apex using a 30% MAD limit. Should this value increase, we will be required to reduce pumping rates and consider the alternate source.

4. You say that the 'unnamed' lake is likely fishless yet it seems quite large and deep (up to 18 m).
   a. What information or rationale do you have to suggest that the lake is fishless?

It is only an assumption due to the low productivity of the lake based on water sampling conducted on the lake (see Medeiros et al (2012). Patterns in the limnology of lakes and ponds across multiple local and regional environmental gradients in the eastern Canadian Arctic. Inland Waters 2, pp. 59-76, DOI: 10.5268/IW-2.2.427). We cannot confirm whether fish are present or absent from the lake at this time.

   b. You say the lake is over 1Mm2 in area. Do you mean over 1 million m2? Otherwise, what area is the lake in hectares

The surface area of the lake is 1,000,000 m2 = 100 ha

   c. Do you have an estimate of mean depth – it is important in getting an idea of lake volume – which, in turn, is important in determining what volume might be safely withdrawn if the lake is fish bearing?

Spot depth measurements of the lake have exceeded 18 m in places (Medeiros, pers.comm.). The lake doesn't appear to have any shallow sloping areas or wetlands. While it is not confirmed whether fish are present, on the basis that the lake is assumed to be greater than 6 m deep on average, it is unlikely that the 10% allowable under-ice withdrawal would be exceeded (2 m ice depth) if the full 400,000 m3 were to be withdrawn during the open water period. Spot depth measurements have been requested of Dr. Medeiros from his scientific study of the lake.

   d. How would you go about determining the winter under ice water volume without and with the water withdrawal?

A more precise estimation of under ice volume would require bathymetric survey. This is recommended to be done if the source is to be investigated as a long-term solution.

   e. If water is withdrawn, what would the anticipated under ice depth become.

This cannot be precisely answered without bathymetric survey.

   f. Should the lake be, or possibly be, fish bearing, would there be under ice, post-water withdrawal oxygen suitability monitoring? What form would the monitoring take?. The necessity for this type of monitoring would be dependent on the bathymetry and volume calculations for the lake.

As there is no winter DO data for this lake it would difficult to relate DO levels to drawn down. Due to the size and depth of the lake and its low nutrient levels (Medieros 2012; pers. comm.), DO monitoring at this time is not considered. If a bathymetric survey is conducted and volume estimated for the lake this monitoring option can be revisited.

5. In the supporting information, you say that some lakes near Lake Geraldine may be used if their depth is likely to make them fishless.
    a. What depth criteria would you use to declare them likely fishless and why do you consider that rationale to be valuable?

Lakes that freeze to bottom, or where winter DO levels are not able to support overwintering fish are likely to be fishless. This may be determined through depth soundings, local knowledge or bathymetric survey. Thee DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut would apply.

    b. Do you have estimates of area and mean depth or other information to determine volume?

Additional information would be required to be collected before determining these lakes are suitable for withdrawal.

    c. How would you go about determining the winter under ice water volume?

As above

    d. When might the lakes near Lake Geraldine start to be used for water supply?

At some point during the 2018 program, once information is available as to their suitability.

6. You say that there will be two pumps and a maximum pumping rate, for the Apex River, of 95 L/s. You also talk about ramping flow up and down to protect fish from stranding or displacement.
    a. How would you use your proposed pumps to achieve ramping rates? What sort of flow changes would the pumps produce?

The falling limb of the hydrograph observed in the Apex River this year an average rate of 20 L/hr was calculated. This rate will be implemented for the ramping up program. Once the pumps are at full capacity (95 L/s), fluctuations in the hydrograph will be a result of natural conditions. Each of the pumps will have meters attached. Throttling valves are also on each to allow for adjustment of flow. With there being two pumps, if needed, one train could be shut off completely.

    b. What sort of changes in flow from day to day occur in the period of record and how close will your proposed or possible ramping rates be to natural flow changes?

See above and in Rev2 of the “3AM-IQA1626 Application for Amendment – Supporting Submission”

7. You refer to providing DFO compliant fish screens on the diversion pumps. Will you be providing fish screen design details and, if so, when?

Please refer to Rev2 of the “3AM-IQA1626 Application for Amendment – Supporting Submission”

8. You refer to modular cofferdams to intercept or direct water for pumping stations. How would these cofferdams work and how might they affect flow?

A cofferdam is intended to be used to create deeper areas for the pumps, and as a means to train water down a defined channel in the case of the Unnamed lake diversion. The downstream 30% MAD will be maintained.

Erica Bonhomme

Stantec Environmental Services - Northern Canada

Direct: 867 920-2882 ext 426
Mobile: 867 445-7388
erica.bonhomme@stantec.com

From: Janusz, Richard [mailto:Richard.Janusz@dfo-mpo.gc.ca]
Sent: Monday, August 06, 2018 9:38 PM
To: Bonhomme, Erica <Erica.Bonhomme@stantec.com>; Dave Baines <dave.baines@nwb-oen.ca>
Cc: Licensing Department <licensing@nwb-oen.ca>; Weir, Dixon <Dixon.Weir@colliersprojectleaders.com>; Hodgins, Kevin <Kevin.Hodgins@stantec.com>; Allain, Erik (AADNC/AANDC) <erik.allain@canada.ca>; Karén Kharatyan <karen.kharatyan@nwb-oen.ca>; Teresa Meadows <tmeadows@meadowslaw.ca>; tracey.mccaie@aandc.gc.ca; landsmining@aandc.gc.ca; david.rochette@canada.ca; spencer.dewar@canada.ca; Dow, Larry <Larry.Dow@dfo-mpo.gc.ca>; Sharon Ehaloak <sehaloak@nunavut.ca>; Brian Aglukark <aglukark@nunavut.ca>; Chiperzak, Doug <Doug.Chiperzak@stantec.com>; Matthew Hamp <M.Hamp@city.iqaluit.nu.ca>; Archibald, Steve <Steve.Archibald@colliersprojectleaders.com>
Subject: RE: Revision 1: 3AM-IQA1626 Application for Emergency Amendment City of Iqaluit

Erica,

Do you anticipate providing any further information in support of your application? For example:

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    a. How would you use your proposed pumps to achieve ramping rates? What sort of flow changes would the pumps produce?

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