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Memo

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Re: Interim Memo - Technical Review of Hydrology and Aquatic Ecosystems Sections of the Environmental Impact Statement for the Springbank Off-Stream Reservoir Project

1.0 INTRODUCTION

The Springbank Off-Stream Reservoir Project (SR1; the Project) is a proposed project to construct a flood control structure on the Elbow River west of Calgary, Alberta. The project is required to receive both federal (Canada) and provincial (Alberta) approval. The Project entered the federal Environmental Assessment (EA) process in 2016 pursuant to the requirements of the then-in-force *Canadian Environmental Assessment Act*, 2012. The EA process is now nearing its conclusion and Stoney Nakoda Nation (SNN) is planning to make several sets of final interventions to Alberta's Natural Resources Conservation Board (NRCB) and to the Impact Assessment Agency of Canada (IAAC; the Agency).

To support its work, SNN has retained PGL and its subconsultant, Boreal Water Resources Ltd. (Boreal), to complete a review of two subjects (hydrology and design; aquatic ecology) contained within the Project's Environmental Impact Assessment (EIA) and provide comments regarding both (a) their scientific/technical sufficiency for effects assessment and (b) their sufficiency as a decision-making tool regarding potential effects to SNN's interests.

Central to our review has been whether the EIA has been scoped, and the right data has been collected, to address concerns about regional and cumulative effects on SNN's interests and the way in which effects to key biophysical disciplines affect the ability to speak to these effects.

2.0 SCOPE OF THE REVIEW

The EIA at issue was prepared for and by Alberta Transportation. Entitled "Springbank Off-stream Reservoir Project – Environmental Impact Assessment," the version being reviewed is dated 2018 and, by virtue of being posted on the public record[1], is assumed to be the most recent version of the EIS. The sections that have been reviewed are as follows:

- EIS Volumes 3A & 3B, Section 06 – Hydrology
- EIS Volumes 3A & 3B, Section 08 – Aquatic Ecology

To supplement our review of the Aquatic Ecology material, we have reviewed a PowerPoint presentation on potential habitat offsetting options prepared by the Proponent and presented to SNN in November 2020, as well as documents listed in Section 6.0 – References.

[1] Springbank Off-stream Reservoir Project EIA - Volume 1: Project Description (ceaa-acee.gc.ca)

3.0 LIMITATIONS

SNN requested an extension of three months from the NRCB to complete a fulsome review of the EIA in order to prepare its interventions. This extension was denied. As a result, the current review has been significantly constrained by the time available to complete the work. The results below must be considered a 'high level' review and cannot be construed as a complete list of issues that may affect the usefulness of the EIA as a tool for assessing impacts to SNN. This caveat is particularly important given the interconnected nature of the various sections of the full EIA and our inability to review all of them due to time constraints.

4.0 TECHNICAL COMMENTS BY SUBJECT MATTER

Our technical comments are arranged by technical discipline, per the EIA Table of Contents.

4.1 Hydrology

SNN posed several questions for consideration as we completed our review; answers to these questions will help SNN evaluate the significance of Project effects on its interests. We have addressed these questions in sections 4.1.1 through 4.1.3, below. Sections 4.1.4 through 4.1.6 identify a number of additional issues that may affect SNN's ability to rely on the Project EIA for decision-making.

4.1.1 Why weren't flood management options on the Bow River considered?

As stated by the proponent, "*[t]he purpose of the Project is to help reduce the effects of future extreme floods on infrastructure, water courses and people in the City of Calgary and downstream*" (Alberta Transportation, 2021). Safeguarding Calgary from floodwaters can be achieved a number of ways, including controls on the Elbow River and/or the Bow River and its tributaries. However, when SNN questioned why options were not considered on the Bow River, the Proponent's response was "*[t]he scope of Project focuses on flood mitigation within the Elbow River watershed*" (IAAC, 2021). This response does not sufficiently answer the question as to why flood mitigation options were not considered on the Bow River system.

While it is possible that this justification exists somewhere within the background materials, Boreal has been unable to find this within the time afforded for this review. We cannot, therefore, answer SNN's question. In order that SNN be able to consider the Project in the context of broader flood protection for the region, we kindly request that the Proponent provide additional clarity to SNN regarding regulation of the Elbow River over alternative sites in the Bow watershed. We would specifically recommend that useful information in this regard would be consideration of comparisons between the current flood control option (SR1) with scenarios that explore concomitant flood control in the Bow/ Kananaskis watersheds, or an alternative flood control structure on the Bow River.

4.1.2 Is the Project enough to protect the people of Calgary?

While there is no doubt that the proposed project, if operated as intended, will help to reduce flood magnitudes in downstream reaches, it is unclear what the future extents of inundation will be after this project is commissioned. That is, are there conditions under which the Elbow River could still overtop its banks, leading to flooding in communities up- or downstream of the Project infrastructure. Put most simply, we understand SNN's question to be: *does this project do enough to protect downstream values from future flooding?*

The design flood (equivalent to the 2013 flood) peaked at 1,170 m^3/s. The Project's diversion channel is limited to a capacity of 600 m^3/s, meaning that in an event the size of the design flood, up to 570 m^3/s will still be released downstream. This flow is greater than a 1-in-50 year flood at the diversion structure and it is understood that this residual is to be attenuated by the Glenmore Reservoir. However, this would appear to neglect the addition of unmitigated inflows sourced between the diversion site and Sarcee Bridge.

Through our brief review of the Project materials, we were unable to find any information related to inundation mapping and/or risk assessment for floods of different magnitudes. Based on what we reviewed, we do not feel there is enough information in the EIA to answer SNN's question in the affirmative. We

therefore recommend that the Proponent be requested to provide additional information relating to future inundation downstream of the diversion for SNN to review in order that potential effects on their interests can be properly evaluated. Of specific interest would be inundation modelling and any flood hazard/risk assessment that has been completed to date for operational scenarios up to and including the design flood estimate of 1,170m^3/s.

4.1.3 Has the Project considered the effects of climate change on flood frequencies and volumes?

Further to the above point, in the time available for reviewing the EIA documentation, Boreal was unable to identify any information related to future effects that climate change may have on the frequency or magnitude of peak flows in the Elbow River basin. It is well-documented that climate change is expected to result in increased intensity and duration of storm events, which would translate into more severe flooding conditions in the Elbow River. Specifically, it is understood that the past is no longer a predictor of the future where flood return periods are concerned: in terms of flow magnitude, the "new normal" 100year flood will be larger than the historical record suggests; in frequency terms, the historical 100 year flood will occur more frequently than every 100 years.

The Water Survey of Canada (WSC) station used for determining the design flood for this Project was station no. 05BJ004: Elbow River at Bragg Creek, AB. The annual maxima flow series (the largest flows occurring in each year) for this station exhibits a distinct upward trend with time, even when the 2013 event is excluded. This observation, coupled with the potential for future increases in storm intensity, suggests that the diversion will be activated more frequently than the EIA suggests. This also raises the possibility of the occurrence of floods that are larger than the design flood within the anticipated project life.

Given the above, we cannot answer SNN's question in the affirmative. The Proponent is requested to clarify how climate change was considered in the development of this project or rationalize why it was excluded from consideration.

4.1.4 Larger-scale Hydrological Effects

The EIS sections reviewed are largely limited to discussions of effects to sediment transport and channel aggradation/degradation. There is no consideration given to large but localized effects associated with the installation and operation of the temporary diversion works (cofferdam, right-bank diversion channel, etc.) or permanent structures. Without proper mitigations, these Project elements could result in excessive bed scour, bank erosion or slope failure, along with consequent effects to environmental values as excess sediments are transported downstream.

Further, there is no consideration given to what design floods might be adopted for the construction period to protect against flooding of the active work areas and associated environmental effects. The Proponent should define this risk somewhere in the Project materials and mitigations should be proposed. This presents a much greater risk than turbidity increases, which appears to be the focus of the EIA mitigations.

Taken together, these issues suggest that potential downstream effects have not been fully considered and that further work is required to assess potential effects of Project infrastructure on river shape, depth, and velocity downstream of the project infrastructure, with consequent effects on downstream aquatic ecology. Once this work is done, it may be possible to develop detailed mitigations that could address these concerns.

4.1.5 Infrastructure Damage

The service spillway concept includes two 24 m wide Obermeyer gates separated by a central pier. It is noted that, in practice, the gates will only be raised when the river flow exceeds 160 m^3/s, of which there have been twelve occurrences since 1934. This would mean that the Obermeyer gates are in the lowered position for most of their design life and where they will be exposed to erosion from bedload material passing over the structure. From personal experience (D. McCoy), such erosion can destroy the fasteners between Obermeyer panels and remove protective coatings, thereby accelerating corrosion. As well, leaving the

spillway in a lowered position exposes the panels and the rubber bladder to anchor ice, which can further accelerate deterioration and may hinder use until ice thaws at the start of the freshet.

It would be useful if the Proponent could provide additional information regarding how it will ensure that the Obermeyer gates are operationally-ready and in good repair given their infrequent use along with extended periods of being exposed to flow, bedload and ice build-up: this material has not been presented in the reviewed sections of the EIS

4.1.6 Other Issues

Further to the above, we note a number of outstanding questions relating to the following issues, which we have not had time to address:

- Design and operational concerns with the currently proposed concept;
- Construction staging and how this may be used as a mitigation tool;
- Sediment transport and the re-introduction of fines back into the river long after a flood has passed; and
- Aggradation and degradation of the river bed under the various proposed flooding scenarios.

These will be discussed at greater length in revisions to this memo, to be delivered no later than March 3, 2021.

4.2 Aquatic Ecology

Aquatic ecology is the study of the biological communities inhabiting water. It includes the study of fish, fish habitats, and the biotic communities on which fish depend for survival.

As with the Hydrology review, SNN posed a number of questions for consideration during our technical review. These are addressed in sections 4.2.1 and 4.2.2; additional concerns are noted in Sections 4.2.3.

4.2.1 Are the fish and fish protection mitigations adequate?

The mitigations provided are identified for construction in sufficient detail that short term construction effects may be adequately managed. Of greater concern are two issues:

- Reliance on as-yet undeveloped management plans (see section 4.2.2) for fish protection during and following a flood; and
- Insufficient investigation and carry-forward of hydrological effects (see section 4.1.6 of the current memo), with consequential effects on fish and fish habitat.

Further, a salvage plan for fish trapped within the reservoir and stranded during release was not initially identified as needed and, if it has subsequently been proposed, has not been developed in sufficient detail to determine if it is sufficient to prevent significant fish mortality.

4.2.2 Is the fish habitat offsetting plan sufficient?

The EIA notes that Project construction will result in the permanent alteration of fish habitat. It further notes that “with mitigation, dry operations is [sic] unlikely to result in permanent alterations to fish habitat that could affect fish, including fish that support CRA fisheries, or their distribution or abundance in Elbow River.” The Application, however, does not provide sufficient detail regarding the mitigations to support this statement.

Further, it is understood that the Project will require a permit pursuant to the federal Fisheries Act and that, to that end, Fisheries and Oceans Canada (DFO) is now beginning engagements with SNN and other nations regarding offsetting of altered habitat.

The deferral of detailed offsetting to the post-approval period severely constrains the ability of the EIS to make meaningful conclusions regarding residual impacts to fish: without understanding what the detailed mitigations will be (DFO generally requires conceptual engineering designs to evaluate the adequacy of offsetting), it is not possible to conclude that dry operations are "unlikely to result in permanent alterations to fish habitat."
Finally, we note that in initial discussions, the Proponent has proposed to develop offsetting for habitat losses in the Elbow River in the Bow River watershed. While this nominally 'offsets' losses, habitat in the Bow is not of benefit to fish being impacted within the Elbow River and the suggestion that substituting harvesting in the Bow for the lost ability to harvest in the Elbow fails to understand the importance of place in the exercise of traditional practices.

4.2.3 Species assessed

It is understood that it is not possible to study every species and it is therefore standard practice in EA to select species for study that are representative of the broader range of species. In general, the desire is to study species that reflect a broad range of ecological niches and human uses; a rationale is provided for species selection and omission.

We note that Table 8-4 (Vol 3A, Section 8) identifies five fish species – Burbot, Northern Pike, Trout, Sucker, and Mountain Whitefish – as used by SNN for traditional purposes. We further note that of these, only trout and mountain whitefish (Table 8-6, Vol 3A, Section 8) were selected as indicators of aquatic ecology and habitat quality/quantity. We finally note that no rationale was provided for the selection of indicator species.

The failure to include burbot as an indicator species, without providing a rationale for doing so, is of concern. Burbot are outliers in terms of their needs compared to the species selected for study: they are winter (January/February) spawners where trout and whitefish are spring and fall spawners respectively; and, they prefer to spawn in deep pools where trout and whitefish prefer riffles and runs respectively.

This suggests that the assessment may not adequately identify effects on this species and/or may not have identified sufficient mitigation during construction or appropriate habitat offsetting to prevent adverse effects to this species and the fisheries relying on them.

5.0 CONCLUSIONS

The reviewers were asked to consider whether the information provided in the hydrology and aquatic ecology sections are technically robust and sufficient as a basis on which SNN – or regulators acting in SNN's interests – can make a determination of the effects of the Project on SNN's rights.

To the extent that there are significant technical questions outstanding regarding the biophysical information used to assess environmental effects, we are of the view that the potential residual adverse effects of the project on hydrology and aquatic ecology are likely to have been underestimated.

These shortcomings may lead to an underestimation of impact to SNN's rights and, as such, should not be considered a reliable basis on which to make regulatory decisions. If provided, we are of the view that the additional information requested above will improve the reliability of the EIS.

6.0 REFERENCES

Alberta Transportation, 2018. Springbank Off-stream Reservoir Project, Environmental Impact Assessment, Volume 1: Project Description. Prepared by Stantec, March 2018.

Impact Assessment Agency of Canada (IAAC), 2021. Springbank Off-stream Reservoir Project, Draft Environmental Assessment Report. 176 p.