

Ms. Linda Heron
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Dear Ms. Heron:

Thank you for your letter dated August 22, 2019, in which you asked a number of questions with respect to the Draft Environmental Report for the Calabogie Generating Station Re-Development. In order to provide the most accurate responses to your comments and questions we have put them into a table format with your comments and questions in the left and centre columns and a response from Ontario Power Generation and Arcadis in the right column. Please see below.

Date:
October 21, 2019

Contact:
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Our ref:
30000724-00008

Comment	Question	Response
<p>1. Fish Passage</p> <p>Section 2.4.3.5 of the ER indicates that the redeveloped Calabogie GS will be “eel ready”, meaning it “<i>will be planned, designed and executed in anticipation of adaptive management strategies that can be applied as circumstances change around the presence of American Eel in the vicinity of the station</i>”.</p>	<p>Q1: I just want to verify that this means that eel passage will be fully completed and in place by the time the redeveloped GS is up and running?</p>	<p>For your background, in 2011 correspondence between OPG and the Ministry of Natural Resources concluded that there were no known occurrences of American Eel, or areas of protected habitat at or in the immediate area of Calabogie Generating Station, the Stewartville Generating Station (downstream) or Mountain Chute Generating Station (upstream). OPG is not aware of any new documented occurrences of American eel since 2011, and the two barriers to eel movement downstream of Calabogie have not been altered (Arnprior and Stewartville GSs). In recent years, efforts to recover American Eel in the Ottawa River have been in play, including construction of an eel passage structure on the Ottawa River at Chaudière GS. OPG also complies with the Endangered Species Act for American Eel through its Mitigation Plan activities at Chats and Chenaux GS on the Ottawa River. All of this is to say that as circumstances continue to change and American eel recover further up the system, OPG will be prepared to further support its recovery up the Madawaska River.</p> <p>The new Generating Station is being designed for American Eel passage. However, only certain components of it will be initially constructed.</p> <p>The new Generating Station will be constructed to facilitate upstream movement of eels. OPG will install a ladder in the tailrace of the proposed new station. The ladder will lead to a trap/tank where any eels can be counted and tagged prior to manually moving the fish upstream of the station.</p> <p>For future downstream passage, if eels are moved upstream of the station, or if there is a documented presence of large eels upstream of the proposed station, OPG will procure and install an inclined screen rack with spacing of no more than 19 mm. The inclined screen will lead to a bypass structure that will allow eels to move downstream and prevent entrainment. When installed the inclined screen would be deployed from July through September. The screen would be removed after September to minimize clogging from leaf debris in the fall and ice damage in the winter. By making provisions now for the future downstream passage of eels, the future retrofit (permanent ladder, inclined screen and bypass) will be relatively easy to add on later.</p>

Comment	Question	Response
	<p>Q2: Has OPG considered including fish passage for other species of fish, such as Walleye and River Redhorse? If not, why?</p>	<p>Providing passage for species such as Walleye and River Redhorse was not deemed necessary. Unlike the migratory American Eel, the other species are able to complete their life histories as resident populations within the reach between the Calabogie GS and the Stewartville GS.</p> <p>For downstream passage, the intake design proposed for the Calabogie GS offers a screened intake with specifically designed slow, fish friendly, approach velocities. These design characteristics prevent fish from becoming exposed to the risk of the turbines in the generating station and avoids the need for fish friendly turbines.</p>
<p>2. Water Levels and Flow Velocity</p> <p>Peaking operations, with the variable flow discharge and ramping patterns, the rate and frequency of water level changes, and the amount of time the station is at its maximum discharge level, can all have a significant impact on the degree of channel and bank erosion.</p>	<p>Q3: What mitigation measures will be implemented to reduce channel and bank erosion resulting from the increased flow velocity from 60 to 160 cms?</p>	<p>As indicated in the Reports, there is no increase in flow on the River but rather merely an increase in flow through the powerhouse with a proportionate decrease in flow through the existing South Channel sluiceway.</p> <p>The powerhouse peak flow of 160 cms is significantly lower than the flows that have been passed at the station as a whole during the spring time and during and after major flooding events. The station has passed flows of up to 745 cms in 2019. Therefore, the increase in flows through the powerhouse only represent a small proportion of the total flow in the river during peak times.</p> <p>As shown on various Figures (see Figure 2-5 or 2-3), the flows from the powerhouse and South Channel Sluiceway come together less than 200 meters from the powerhouse.</p> <p>Considering the above, the only risk of increased channel and bank erosion would come from the area immediately downstream of the powerhouse but before the confluence with the flow through the South Channel Sluiceway. OPG would be concerned with any channel or bank erosion in this area. As such, OPG is requiring the DB Contractor to ensure the banks and channel in this area are stable to prevent any significant erosion. It is very much in OPG's interest to ensure that this erosion would not occur.</p> <p>OPG would monitor to see if erosion is occurring. However, examination of older aerial photography of the River suggests that the River's banks in the discussed area are quite stable.</p>

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<p>3. Water Levels and Flow Velocity</p> <p>In Table 6-2, Page 6-6 of the ER, you make comment that <i>“OPG will continue to operate the Calabogie GS and the other plants on the Madawaska River in full accordance with all flow and water level targets and compliance conditions in the Madawaska River Water Management Plan, including the summer conditions.”</i></p>	<p>Q4: A common practice amongst hydroelectric proponents has been to use seasonal flows and water level targets to peak on a daily basis to service peak demand. Has this been your common practice to date?</p>	<p>The operation of the existing plant is based on a daily/weekly cycle, with the inflow passed through the plant over a daily or weekly period. The 2009 Water Management Plan (WMP) notes that operation of the plant takes into consideration energy demands, recreational opportunities as well as walleye spawning activities.</p> <p>OPG does not propose to alter the existing water management compliance requirements associated with this facility. The redevelopment of the Calabogie GS will continue to be operated in full accordance with all of the flow and water level targets and compliance conditions identified in the Water Management Plan including all fisheries and other aquatic life requirement. Daily flows will remain unchanged but additional portion of river flow will pass through the plant to generate electricity rather than just passing through the spillway gates.</p>
<p>4. Water Levels and Flow Velocity</p> <p>You said, <i>“Daily flow and water level conditions will remain unchanged from the existing situation”</i>.</p>	<p>Q5: Will the number and frequency of daily water level fluctuations increase in the new operating strategy?</p>	<p>Please see response above.</p>
<p>5. Water Levels and Flow Velocity</p>	<p>Q6: With total flow velocity increasing from 60 or 66 to 160 cms², what will the tailrace substrate consist of and how will it and habitat be protected against erosion and shifting?</p>	<p>The tailrace will be protected from erosion and movement by matching the size of bed material with the anticipated water velocities.</p> <p>The bed material in the current tailrace channel is comprised of a mix of bedrock, cobble/boulder and gravel towards the end of Cross Island. The highest water velocities are experienced immediately downstream of the generating station and the size of the substrate are larger to ensure that the channel does not experience bed scour.</p> <p>To ensure habitat is protected, the upgraded project will match existing substrates and use a series of graded bed materials to cover the invert of the tailrace. Cobble and boulder substrate will be placed in the portion of the tailrace that experiences that highest flow conditions and smaller grades of cobble and gravel will be placed along the tailrace margins that do not experience scouring flows. Additional cobble and gravel material will be placed over near the end of Cross Island where the south channel and the tailrace become confluent.</p>

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<p>6. Water Levels and Flow Velocity</p>	<p>Q7: What species will be targeted?</p>	<p>We are somewhat uncertain as to what this question is asking but we are guessing that the questioner is asking about use of the tailrace substrate by fish species. Assuming that is the question we provide the following response.</p> <p>There are small areas of the tailrace and the downstream section of the South Channel Sluiceway that are likely being used for walleye spawning now. OPG anticipates that there will continue to be areas downstream of the powerhouse and South Channel Sluiceway that have appropriate conditions for walleye spawning. They would essentially be the “targeted species”.</p>
<p>7. Turbines</p>	<p>Q8: Will OPG consider installing fish/eel friendly turbines?</p>	<p>OPG has incorporated some features into the design to prevent and reduce fish/eel impingement/entrainment. The intake design OPG has proposed for the Calabogie GS offers a screened intake with specifically designed slow approach velocities to avoid fish impingement and entrainment.</p> <p>With respect to future eel passage, the use of a screened intake with slow intake approach velocities minimizes turbine mortality, especially for long bodied eels that have an increased risk of entanglement in a spinning turbine. This downstream mitigation avoids fish and eel mortality by eliminating exposure to turbine blades or pressures but has negative consequences to generation capacity due to increased head losses. Future Eel passage downstream will be through a specifically designed bypass to avoid turbine mortality. The project has traded off head loss to minimize future eel mortality.</p>
<p>8. Climate Change</p> <p>The effect of damming on methane emissions conducted in a central European impounded river revealed that the reservoir reaches are a major source of methane emissions and that areal emission rates far exceed previous estimates for temperate reservoirs or rivers. It showed that sediment accumulation correlates with methane production and subsequent ebullitive release rates. Results suggested that sedimentation-driven methane emissions from</p>	<p>Q9: Section 4.7.1, P-4-50 of the ER states, “<i>OPG has been an active corporation in better understanding the effects of climate change on its facilities and operations</i>”, but will OPG consider the effects that a redeveloped Calabogie Dam will have on climate change over the next 100 years?</p>	<p>The Question states: “but will OPG consider the effects that a redeveloped Calabogie Dam will have on climate change over the next 100 years?” The question and the reference to the European article seems to infer that the Calabogie Dam will have a negative effect on climate over the next 100 years related to the impoundment of the River.</p> <p>Please note that OPG is not redeveloping dams, it is redeveloping an existing generating station that has been in place for over 100 years. The existing dams are not being changed, and as indicated in a number of locations in the Reports, OPG intends to manage the Madawaska River in full accordance with all of the flow and water level targets and compliance conditions identified in the WMP.</p> <p>The proposed project does not propose any impoundment of the existing Madawaska River. For this reason there are no methane emissions related to the Calabogie redevelopment, This project is replacing an existing GS just upstream in the existing forebay of the exiting GS.</p>

Comment	Question	Response
<p>dammed river hot spot sites can potentially increase global freshwater emissions by up to 7%.¹</p>		<p>There is no inundation associated with the construction of this project, and no removal of any plant material.</p> <p>Having dams and the ability to control water are critical to managing water and flooding therefore beneficial to mitigating the impacts of climate change. The proposed project will also increase the renewable power generated at the facility.</p> <p>It is possible that the questioner is suggesting or inferring that the dam that controls Calabogie Lake water levels should be removed? OPG would note that there are hundreds of cottages and permanent homes situated around Calabogie Lake that have been constructed and lived in with expectations that Lake levels are managed according to the existing Water Management Plan. Furthermore, there are numerous property owners downstream of Calabogie GS that also rely on the facility's ability to control flood flows. As well, there is a significant amount of other public infrastructure such as roads that have been built around and near the Lake and use of which is dependent on relative certainty with respect to Lake levels.</p> <p>The water levels that are prescribed in the Madawaska River WMP can only be maintained by the existing control structures. It is OPG's view that removing the control facilities would be unacceptable to virtually all property owners upstream and downstream of the facility and moreover it would further weaken the ability to manage water levels during flood events. Therefore, removing the water control facilities would seem likely to be a very economically costly alternative for hundreds of households and government bodies. Furthermore, OPG does not have the authority to remove dams along the Madawaska River system as part of this Project.</p> <p>Within a Canadian context a number of recent projects in Quebec and Manitoba have demonstrated the net benefits of hydropower from the perspective of reducing greenhouse gas emissions. For example, there is readily available research from Hydro Quebec on reservoirs and greenhouse gas emissions: https://www.hydroquebec.com/sustainable-development/specialized-documentation/ghg-reservoir.html. All of this evidence suggests that hydropower is a much preferred option over any fossil fuel based electrical generation. The article referred to in the question seems to refer to the River Saar that is located in France and Germany. The watershed conditions with between the Saar and Madawaska with respect to sediment would appear to be extremely different. The</p>

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		Madawaska River watershed is generally forested with little urban or agricultural development and is located on the Canadian Shield and therefore, large amounts of sediment do not appear to be discharged along the way. Regardless, the proposed project does not result in any new impoundment which is the root of the concern expressed in the article.
	Q10: Will the dam design have adequate spill capacity and resilience to withstand the extremes of climate change?	OPG is currently assessing the facility with respect to MNRF Dam Safety Guidelines and has been in contact with the Ministry on this topic. Dam Safety requirements will be addressed in a separate project from the powerhouse redevelopment. Climate change is an element OPG is considering as part of the Dam Safety Assessment.

We hope that the above responses adequately address all your questions. We will be including the comments, questions and responses as part of the public record. If you have any further questions, please do not hesitate to contact us.

Sincerely,

Arcadis Canada Inc.



Phil Shantz, M.E.S., M.C.I.P., R.P.P
Vice-President

c.c. Svetlana Helc, Ontario Power Generation
Gillian MacLeod, Ontario Power Generation