

# Analysis of BC Hydro's Proposed Changes to the Generating Station and Spillway Design for the Site C Clean Energy Project

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# 1 Introduction

BC Hydro is in the early construction phase of developing a dam and 1,100-megawatt hydroelectric generating station on the Peace River in northeastern British Columbia (B.C.). The Site C Clean Energy Project (the Project) will be the third in a series of dams on the Peace River. Construction of the Project began in summer of 2015 and is anticipated to be completed in 2024.

The Project was subject to both the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and B.C.'s *Environmental Assessment Act*. The environmental assessment was conducted by a joint review panel established by the former Minister of the Environment and the Government of B.C. The former Minister issued a Decision Statement under CEAA 2012 for the Project on October 14, 2014, (re-issued on November 25, 2014) following a Governor in Council decision allowing the Project to proceed.

The Decision Statement contains over 80 legally binding conditions, which include mitigation measures and follow-up program requirements that BC Hydro must comply with throughout the life of the Project. The B.C. Environmental Assessment Office (EAO) issued an Environmental Assessment Certificate under the provincial *Environmental Assessment Act* on October 14, 2014, which contained a Project Description and 77 legally binding conditions.

On February 8, 2018, BC Hydro informed the Canadian Environmental Assessment Agency (the Agency) of proposed changes to the design of the Project with respect to the generating station and spillways as described in section 4.3 of the Environmental Impact Statement submitted by BC Hydro in January of 2013.

On March 9, 2018, BC Hydro formally applied to amend the provincial Environmental Assessment Certificate. The Environmental Assessment Certificate amendment application contains technical information regarding the Project changes and potential adverse environmental effects associated with those proposed changes. As part of the provincial process to consider the application, the EAO created a technical working group made up of representatives from provincial, federal and local government agencies, and Indigenous groups. The technical working group members reviewed the Environmental Assessment Certificate amendment application and provided comments to the EAO. The Agency considered information contained within the application and comments submitted by the working group in its assessment.

The Agency conducted an analysis of the proposed Project changes and the potential adverse environmental effects of those changes to determine:

- whether the changes constitute a new or different designated project that may require a new environmental assessment; and
- whether any changes may be required to the mitigation measures and follow-up requirements in the environmental assessment set out as conditions in the Decision Statement.

This report provides a summary of the proposed Project changes, an analysis of whether these changes may result in adverse environmental effects that may not have been considered in the original

environmental assessment, and consideration of whether existing mitigation measures and follow-up requirements set out as conditions in the Decision Statement are still applicable or need to be modified.

The Agency is of the view that the proposed Project changes do not constitute a new or different designated project that may require a new environmental assessment, and that the mitigation and follow-up requirements included as conditions in the Decision Statement remain relevant without any requirement for changes.

## 2 Proposed Project Design Changes

BC Hydro is proposing changes with respect to the design of the generating station and spillway. These changes could alter the initial assessment of adverse environmental effects to the following valued components: fish and fish habitat, migratory birds and federally listed species at risk, current use of lands and resources for traditional purposes, and archaeological and heritage resources. The proposed design changes are illustrated in Figures 1 and 2.

### 2.1 Change to Generating Station

In the Environmental Impact Statement, BC Hydro specified that the transformers would be located on the downstream side of the powerhouse. Instead, BC Hydro has proposed that the transformers be located on a transformer deck upstream of the powerhouse. This would eliminate the risk of an oil spill in the tailrace in the event of a catastrophic failure of a transformer and would reduce noise pollution downstream of the facility.

### 2.2 Changes to Spillway Design

The Environmental Impact Statement described a spillway design with seven radial gates, eight undersluices (e.g., covered gates) and an auxiliary spillway to provide additional flow capacity in the unlikely event that some or all of the seven spillway gates become inoperable during an emergency. BC Hydro's proposed design change provides for three radial gates, six low level outlets, and an auxiliary spillway. These changes are expected to optimize the capacity of the spillway and reduce undesirable hydraulic pressures by reducing the width of the spillway and lowering the elevation of the stilling basin. BC Hydro expects this change will increase the safety and reliability of the spillway operation.

The discharge capacities of the spillway design set out in the Environmental Impact Statement would allow BC Hydro to operate within the requirements of the conditional water licences for the Project under the B.C. *Water Sustainability Act*. At normal reservoir elevation, water would be stored between the elevations of 460 meters, the minimum operating level, and 461.8 meters, the full supply level.

The revised design would provide an increased discharge capacity at the normal reservoir elevation. Under the Environmental Impact Statement design, the capacity of the spillway at the full supply level of 461.8 meters would be 10,100 cubic meters per second ( $m^3/s$ ). The revised design increases this capacity by 900  $m^3/s$  to 11,000  $m^3/s$ . As a result, the spillway is less likely to increase (surcharge) the reservoir elevation under extreme high flow scenarios. The ability of the spillway to discharge more water at

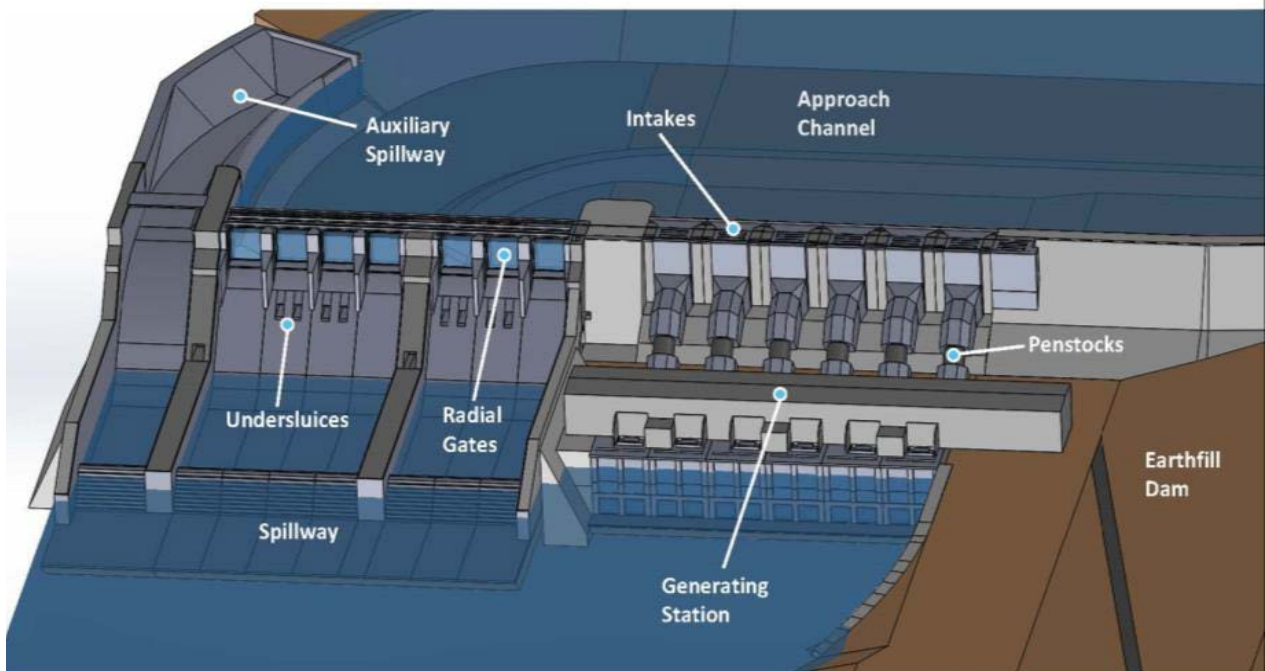
normal reservoir elevation will reduce the duration of extreme floods; this will, in turn, mitigate the extent and duration of any potential surcharging above 461.8 meters.

The Environmental Impact Statement also described the spillway as having a discharge capacity of 17,300 m<sup>3</sup>/s at the maximum flood level of 466.3 meter elevation. This is the maximum permissible reservoir level during the most severe flood that may be reasonably expected to occur. Because BC Hydro's revised spillway design would pass a greater volume of water at normal elevations, the maximum flood level of 466.3 meters would be even less likely, i.e. less than 1 in 1000 years. Should this unlikely event occur, the revised spillway design discharge capacity of 16,700 m<sup>3</sup>/s would safely convey the probable maximum flood volume and maintain a reservoir level below 466.3 meters.

### 2.3 Agency's Analysis of Changes

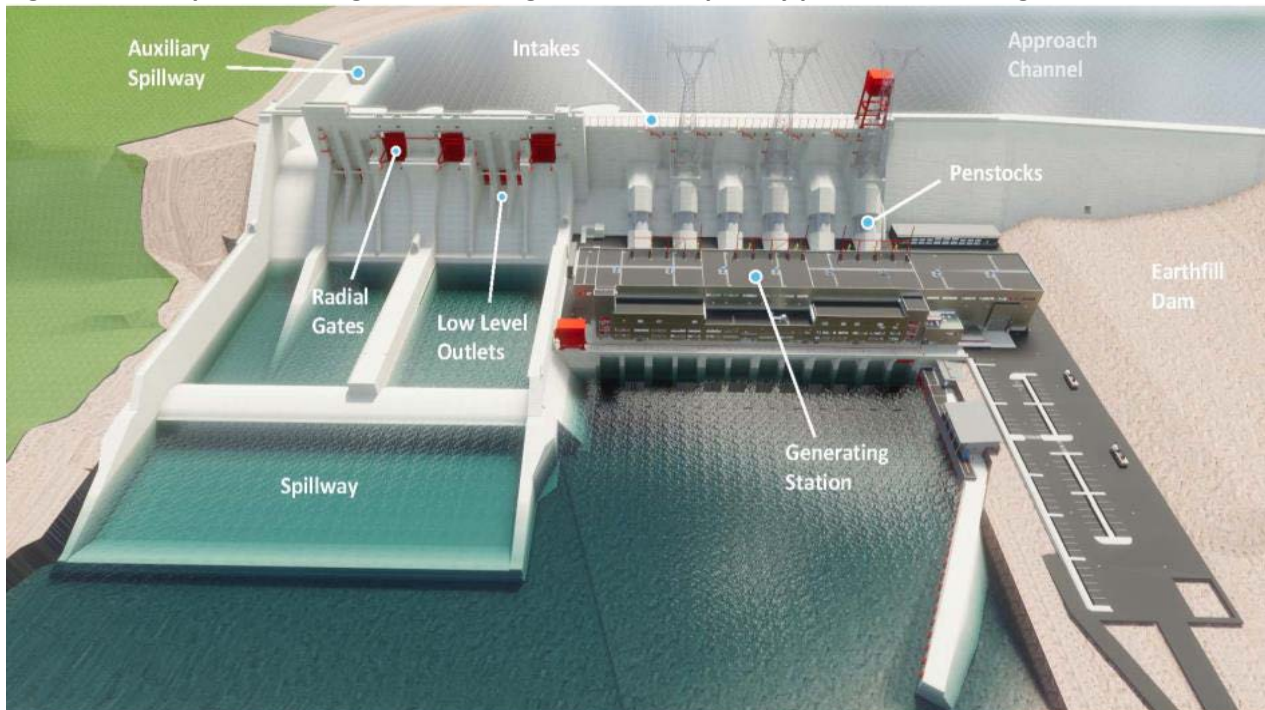
The *Regulations Designating Physical Activities* under CEAA 2012 identify the physical activities that constitute designated projects that may require an environmental assessment. On their own, the proposed Project design changes are not physical activities described in the Regulations. Consequently, the Agency determined that the changes do not constitute a new or different designated project that may require a new environmental assessment.

**Figure 1. Conceptual Drawing of Generation Station and Spillway per Environmental Impact Statement Design**



Source: Letter from BC Hydro to Canadian Environmental Assessment Agency dated February 8, 2018

**Figure 2. Conceptual Drawing of Generating Station and Spillway per Modified Design**



Source: Letter from BC Hydro to Canadian Environmental Assessment Agency dated February 8, 2018

### 3 Potential Adverse Environmental Effects from Proposed Project Changes

The following is an analysis of whether any of the changes to the generating station and spillway design would require modifications to the mitigation measures and follow-up requirements set out as conditions in the Decision Statement.

#### 3.1 Fish and Fish Habitat

Fish and fish habitat was assessed during the environmental assessment as it is an environmental effect to be taken into account under section 5 of CEAA 2012 for which mitigation measures were developed. The Decision Statement includes conditions in relation to fish and fish habitat.

##### 3.1.1 Proponent's Assessment

BC Hydro (the proponent) identified that the proposed relocation of the transformers upstream of the powerhouse would reduce the potential effects from an oil spill on fish and fish habitat downstream of the tailrace. BC Hydro identified that the proposed changes to the design of the spillway may affect fish and fish habitat if they generate dissolved gases that can be harmful to fish, or if they cause the entrainment of fish.

###### *Total Dissolved Gas*

Total dissolved gas levels that exceed 125 percent of atmospheric pressure (saturation) can cause gas bubble disease in fish that remain in the shallow water depths. The changes to the Project would result in a less than one percent increase in dissolved gases relative to what was predicted and assessed in the Environmental Impact Statement. Following the changes in Project design, dissolved gases are expected to be 113 percent to 120 percent (+/-4 percent margin of error) saturation. This is below the 125 percent saturation threshold that could pose a risk to fish.

###### *Entrainment*

BC Hydro indicated that the changes in the configuration of the revised spillway and generating station design are unlikely to change fish entrainment rates or survival of entrained fish in the spillway as the physical factors would be unchanged from the original design. As a result, no incremental effects are anticipated for fish and fish habitat.

##### 3.1.2 Agency's Analysis and Conclusions

The Agency accepts the proponent's determination that the design changes to the generating station and spillway would not result in any additional adverse environmental effects to fish and fish habitat as assessed through the initial environmental assessment. The Agency is therefore not proposing any changes to the mitigation measures previously identified in the environmental assessment.

Fisheries and Oceans Canada (DFO) reviewed the information provided by BC Hydro on the relocation of the transformers and determined that there will likely be no interaction with fish or fish habitat. With respect to the modifications to the spillway design, DFO issued a Paragraph 35(2)(b) *Fisheries Act* Authorization for Site C Main Civil Works and Facility Operations to BC Hydro on July 27, 2016 (re-issued

on August 22, 2016). On March 15, 2018, DFO advised that the modified spillway design would continue to be covered under this authorization.

## **3.2 Migratory Birds and Species at Risk**

Migratory birds and federally listed species at risk could be affected by the design changes. Both were assessed during the environmental assessment, and the Decision Statement includes related conditions.

Subsection 79(2) of the *Species at Risk Act* (SARA) requires the identification of the Project's adverse effects to SARA listed wildlife species and their critical habitat. If the Project is carried out, SARA requires that measures be taken to avoid or lessen those effects and that such effects be monitored.

### **3.2.1 Proponent's Assessment**

The proponent noted that the proposed relocation of the transformers and changes to the spillway would not change the land or instream footprint and concluded that there would be no additional Project-related effects to migratory birds or species at risk.

### **3.2.2 Agency's Analysis and Conclusions**

The Agency accepts the proponent's determination that the design changes to the generating station and spillway would not result in any additional adverse environmental effects to migratory birds and species at risk as assessed through the initial environmental assessment. No additional land would be lost, and no additional noise or light pollution would be generated that might affect wildlife including migratory birds. The Agency is therefore not proposing any changes to the mitigation measures previously identified in the environmental assessment.

## **3.3 Current Use of Lands and Resources for Traditional Purposes**

The proposed changes to the Project could impact Indigenous peoples by affecting the current use of lands and resources for traditional purposes. Current use was assessed during the initial environmental assessment and the Decision Statement includes related conditions.

### **3.3.1 Proponent's Assessment**

Design changes to the generating station and spillway will not result in a change to the land or instream footprint and therefore does not change the outcome of the effects assessment for wildlife resources or fish and fish habitat. Consequently, BC Hydro concluded that the effects assessment on activities including hunting, fishing and trapping activities would remain the same as what was assessed during the environmental assessment.

### **3.3.2 Agency's Analysis and Conclusions**

The Agency accepts the proponent's determination that the design changes to the generating station and spillway would not result in any additional adverse environmental effects to current use of lands and resources for traditional purposes as assessed through the initial environmental assessment. The Project footprint remains the same and no use of or access to areas of current use would change as a result of



the design changes. The Agency is therefore not proposing any changes to the mitigation measures previously identified in the environmental assessment.

### **3.4 Archaeological and Heritage Resources**

The proposed changes to the Project could impact Aboriginal peoples by affecting archeological and heritage resources. Archeological and heritage resources were assessed during the environmental assessment and the Decision Statement included related conditions.

#### **3.4.1 Proponent's Assessment**

BC Hydro predicted that changes to the transformer location, spillway design, and spillway discharge capacity are not anticipated to have any adverse effects on archaeological and heritage resources. The relocation of the transformers will not result in a change to the land or instream footprint of the generating station and spillway. In addition, the changes to the spillway design and discharge capacities will not result in a change to the normal reservoir operating levels (between 460.0 meters and 461.8 meters elevation). BC Hydro predicted that the proposed design changes would not affect the conclusions in the environmental assessment regarding the effects of the Project on archaeological and heritage resources.

#### **3.4.2 Agency's Analysis and Conclusions**

The Agency accepts the proponent's determination that the design changes to the generating station and spillway would not result in any additional adverse environmental effects on archaeological and heritage resources as assessed through the initial environmental assessment. The Agency is therefore not proposing any changes to the mitigation measures previously identified in the environmental assessment.

## **4 Consultation with Indigenous Groups**

Indigenous groups were defined in the Decision Statement as "Reservoir Area Aboriginal groups" and "Immediate Downstream Aboriginal groups." Reservoir Area Aboriginal groups include: Saulteau First Nations, Blueberry River First Nations, West Moberly First Nations, Doig River First Nation, McLeod Lake Indian Band, Halfway River First Nation, and Prophet River First Nation. Immediate Downstream Aboriginal groups include: Horse Lake First Nation, Métis Nation British Columbia, Kelly Lake Métis Settlement Society, Duncan's First Nation, and Dene Tha' First Nation. As the Agency does not expect the changes to the Project design to affect the Decision Statement, no consultation was sought on this analysis document.

The EAO requested comments on the proponent's application to amend the provincial Environmental Assessment Certificate from the technical working group, which included several of the Aboriginal groups listed above, from March 16, 2018 to April 3, 2018. The Agency and EAO met with McLeod Lake Indian Band and Doig River First Nation to discuss the potential effects related to the generating station and spillway design changes. McLeod Lake Indian Band expressed concerns about the survival of fish that would be captured downstream of the dam and relocated upstream of the dam. Doig River First Nation expressed concerns about the changes to the reservoir level, the potential increase of fish species adapted to a reservoir environment and decrease of fish species adapted to a river environment, habitat

enhancement downstream of the dam, and upstream fish passage. These concerns resulted in a second meeting on May 7, 2018 with Doig River First Nation, the Agency, EAO and proponent. The questions raised during the second meeting were specific to the use of the auxiliary spillway, placement of the radial gates, use of the low level outlets during flood events, and changes to the normal and flood reservoir levels. The Agency was satisfied with the level of detail provided by the proponent in answering these concerns. The Agency considered all of these discussions as part of its analysis of the Project design changes.

## **5 Conclusion**

Considering the potential adverse environmental effects of the proposed Project changes, and in light of views received through the EAO technical working group and through consultation meetings, the Agency determined that it is not necessary to change the mitigation measures and follow-up requirements set out as conditions in the Decision Statement.