

ENVIRONMENTAL BACKGROUND

VOLUME 2, SECTION 11

The Environmental Impact Statement (EIS) details the environmental assessment undertaken for the Site C Clean Energy project. The EIS includes the project rationale, identifies potential effects and proposes measures to avoid or mitigate these effects. The EIS also describes the benefits Site C would provide for customers, Aboriginal groups, northern communities and the province as a whole.

Site C would introduce changes to the physical environment and these predicted changes to land, water and air were taken into account in the assessment of the potential effects on valued components, where relevant. The technical investigation of the potential changes to the physical environment is described in the Environmental Background section of the EIS (Section 11) and is supported by an extensive volume of technical data reports. The following attributes were evaluated:

Geology, Terrain & Soils

- The EIS includes a description of bedrock and surficial geology, key landforms, seismic conditions and geotechnical and geochemical processes.
- Predicted changes to erosion and slope stability as a result of the creation and operation of the proposed reservoir are also described. Reservoir impact lines delineating zones of potential flood, erosion, landslide, and landslide-generated wave hazards are provided in the EIS.

Land Status, Tenure and Project Requirements

- The EIS includes a discussion of potential changes to tenured areas (including private, BC Hydro-owned and Crown land), and the requirements to acquire or obtain new rights over private or government-owned property to construct and operate the project.

Surface Water Regime

- Hydraulic models were used to predict the potential changes in the hydrological regime (reservoir levels, seasonal flow patterns and water level) from Peace Canyon dam to Peace Point, Alberta, and the main drainage tributaries to the proposed reservoir (Lynx Creek, Farrell Creek, Halfway River, Moberly River).
- The volume of water within the 1.8 m normal operating range (i.e., the active storage volume) would be 165 million cubic meters.
- Due to the limited active storage volume of the reservoir, Site C has limited ability to influence the flow regime. Hydraulic modelling studies predict that changes would be negligible beyond the Town of Peace River, Alberta.



Water Quality

- Water quality conditions were assessed from the forebay of Williston reservoir through the Dinosaur reservoir and the Peace River valley along the Peace River, to upstream of the confluence with the Alces River, including Peace River tributaries in this area. Water quality parameters, including nutrient and metals concentrations, suspended sediment levels, dissolved gas pressure levels, pH, alkalinity, and temperature, were measured and concentrations are summarized and compared to B.C. and Canadian Water quality guidelines.
- Without the project, some of these parameters currently exceed guidelines under baseline conditions.

Groundwater Regime

- The location of water wells, springs, infrastructure and land use that could be influenced by changes to the groundwater regime from Peace Canyon dam to the proposed Site C dam were identified. The analysis includes changes to slope stability, land or resource use, subsurface geology, aquifers and water table positions, as well as potential changes to groundwater chemistry due to the release of non-natural sources or natural sources.
- Studies indicate that the project would not lead to changes in groundwater quality; however, there would be changes to groundwater levels in proximity of the proposed Site C reservoir.

Thermal and Ice Regime

- Modeling was used to predict changes to water temperature and ice regimes of the Peace River in the proposed reservoir and downstream to Fort Vermilion, Alberta. The results were used to identify potential changes to the timing of ice cover formation and breakup, extent of ice cover, ice thickness and conditions that affect river transportation.
- The studies suggest that the project would lead to a reduction in the maximum upstream extent of the ice cover but that there would be no influence of the project on the ice regime downstream of Carcajou which is located approximately 550 km downstream of the Site C dam.



Fluvial Geomorphology & Sediment Transport

- Predictive modelling was used to describe changes to suspended sediment dynamics (inflow, deposition and outflow) in the proposed reservoir, as well as suspended sediment concentrations and tributary sediment mixing, bed material mobilization, channel erosion and deposition downstream of the Site C dam to Peace Point, Alberta.
- The studies predict that the proposed reservoir would trap a portion of the sediment delivered from tributaries, while the remainder (mostly clay) would be transported out of the reservoir and down the Peace River. There would be an overall reduction in the suspended sediment load downstream due to the creation of the reservoir.

Methylmercury

- Under natural conditions, mercury (Hg) occurs in low concentrations in all environmental media, including water, soil, sediment, plants and in all terrestrial and aquatic animals. Over time, inorganic Hg is captured from the atmosphere by the leaves and needles of plants, which fall to

the ground, accumulate, and are sequestered and concentrated into terrestrial soils. When soils are flooded, degradation of the organic material creates favorable conditions for sulfate-reducing bacteria that transform or “methylate” some of the inorganic Hg into organic mercury, primarily methylmercury (MeHg). MeHg concentrations are higher in large-bodied, longer-lived animals, especially those at the top of the food chain such as predatory fish. A range of methods was used to predict the Hg and MeHg concentrations in water and biota (invertebrates, fish) over the life of the Site C reservoir and downstream to Many Islands, Alberta.

- The analysis concluded that there may be an increase in MeHg concentrations in fish in the reservoir for a period of time before returning to pre-project levels, which are relatively low compared to other Canadian lakes and reservoirs.

Microclimate

- Data for temperature, precipitation, wind speed, relative and absolute humidity and fog for the Peace River valley and North Peace Regional airport were analyzed. Results of the climate monitoring network in the Peace River valley and the Weather Research and Forecast model were used to predict potential changes to micro-climate parameters, including precipitation levels, fog, wind speed and direction, air temperature, barometric pressure, humidity, solar radiation and heat flux.
- Results suggest there may be modest increases in annual fog hours in the study area, a slight increase in temperature in the winter and a slight decrease in the summer adjacent to the reservoir, and an increase of less than 1 degree in the annual average temperature within 1 km of the reservoir.



Air Quality

- Existing conditions and predicted project-related changes to air quality, including ambient levels and air quality emissions during construction activities and operations in an area that encompasses the project were analyzed. The analysis included current ambient levels of nitrogen oxides, sulphur dioxide, particulate matter and other possible contaminants and emissions (ozone), as well as an emissions inventory for vehicles and equipment, clearing and burning, extraction and handling of materials and fugitive emissions.
- The studies indicate that there may be temporary increases in ambient particulate levels in the vicinity of the dam site during construction. Ambient air criteria for all other parameters would meet current Provincial and Federal guidelines for air quality.

Noise and Vibration

- Existing conditions and predicted project-related changes to noise and vibration at certain locations used by people and wildlife near the project activity zone were analyzed. Noise levels were modelled for construction and operations scenarios, including topographic, temperature and wind effects on noise propagation of transportation and equipment generated sound emissions. The EIS also describes blasting vibration and “sound-induced” or airborne vibration.
- The analysis of noise from construction activities indicates that noise guidelines may be exceeded in some locations.

Electric and Magnetic Fields (EMF)

- EMF are found wherever electricity is generated, delivered, or used, including power transmission and distribution lines, wiring in homes, workplace equipment, electrical appliances, power tools, and electric motors. Transmission lines produce both electric and magnetic fields. Electric and magnetic fields were calculated for the two new 500 kV lines which will replace the existing 138 kV lines.
- Based on the analyses of EMF, no adverse human health effects associated with exposure will occur.

The relationship between technical study topics and valued components is summarized in the following table:

Technical Study	Valued Component
Geology, Terrain & Soil	Agriculture; Community Infrastructure and Services; Forestry; Greenhouse Gases; Heritage; Navigation; Outdoor Recreation and Tourism; Vegetation and Ecological Communities; Visual Resources; Wildlife Resources; Fish and Fish Habitat; Current Use of Lands and Resources for Traditional Purposes; Oil, Gas and Energy; Harvest of Fish and Wildlife Resources
Surface Water Regime	Community Infrastructure and Services; Fish and Fish Habitat; Harvest of Fish and Wildlife Resources; Navigation; Outdoor Recreation and Tourism; Transportation; Current Use of Lands and Resources for Traditional Purposes; Wildlife Resources
Water Quality	Fish and Fish Habitat; Human Health
Groundwater Regime	Agriculture; Community Infrastructure and Services; Human Health
Thermal and Ice Regime	Fish and Fish Habitat; Navigation; Outdoor Recreation and Tourism; Transportation; Wildlife Resources; Current Use of Lands and Resources for Traditional Purposes
Fluvial Geomorphology and Sediment Transport	Community Infrastructure and Services; Fish and Fish Habitat; Greenhouse Gases; Navigation; Vegetation and Ecological Communities; Wildlife Resources; Oil, Gas & Energy; Human Health (water quality)
Methyl Mercury	Human Health; Fish and Fish Habitat
Micro-Climate	Agriculture; Navigation; Transportation
Air Quality	Greenhouse Gases; Human Health
Noise and Vibration	Fish and Fish Habitat; Human Health; Wildlife Resources
Electric and Magnetic Fields	Human Health

ABOUT THE SITE C CLEAN ENERGY PROJECT

Site C is a proposed third dam and hydroelectric generating station on the Peace River in northeast B.C. Site C would provide 1,100 megawatts (MW) of capacity, and produce about 5,100 gigawatt hours (GWh) of electricity each year – enough energy to power the equivalent of about 450,000 homes per year in B.C.

Site C is undergoing a cooperative environmental assessment by the Canadian Environmental Assessment Agency (CEA Agency) and the British Columbia Environmental Assessment Office (EAO). The environmental assessment process commenced in August 2011 and is anticipated to take approximately three years to complete.

FOR MORE INFORMATION visit bchydro.com/sitec

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