

PHYSICAL ENVIRONMENT

Stage 3 of the Site C Clean Energy Project (Site C) is the environmental and regulatory review phase. As part of an environmental assessment of Site C, BC Hydro will identify and assess potential project effects — environmental, economic, social, heritage and health — and opportunities to provide lasting benefits for the region and First Nations. Where effects cannot be avoided, BC Hydro will identify and evaluate options for mitigation.

This study update provides an overview of work completed to date and currently underway and is current as of fall 2011. Studies may be changed or revised in scope or timing on the basis of input from regulators, government agencies, First Nations, stakeholders and the public as part of the pre-application stage of the environmental assessment process.

The Site C project requires environmental certification and other regulatory permits and approvals before it can proceed to construction. In addition, the Crown has a duty to consult and, where appropriate, accommodate Aboriginal groups.

DEFINITION

The development of the Site C dam would affect aspects of the physical environment including hydrology and water quality, groundwater, climate, and air quality.

STUDY PURPOSE

The purpose of the physical environment study program is to characterize existing river hydrology, water quality, and atmospheric baseline conditions, and to assess potential environmental effects associated with the proposed project. The studies will also be used to explore mitigation options to avoid or minimize potential environmental effects, where possible.

STATUS OF STUDIES

Consultation

The following feedback was received during Stage 2 consultation:

- First Nations and local, provincial and federal government agencies were invited to review and provide input into the Stage 2 study at the Greenhouse Gas (GHG) Technical Advisory Committee (TAC). The GHG TAC provided input and advice on the assumptions and modelling methods used by BC Hydro's consultant in developing a GHG emissions model for Site C. Detailed modelling results were part of Stage 2 and these GHG estimates will be updated during the environmental assessment process to reflect any refinements to the Project plans.
- During Stage 2 Project Definition Consultation in May/June 2008:

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- Participants commented that BC Hydro should look at maintaining static water levels when evaluating operation of the dam and water management. BC Hydro's evaluation of water management options in Stage 3, including reservoir water levels and downstream flows, will include the potential effects of water levels on the environment.
- Issues were raised about the project's potential effect on GHG emissions, local climate (i.e. fog), and air quality. BC Hydro has initiated local level climate modeling, water temperature modeling and the collection of valley bottom wind data. During Stage 2, BC Hydro developed a preliminary estimate of GHG emissions from the potential project (construction and operations).

During Stage 3, consultation results will be considered, along with financial and technical input, as the Site C project moves forward through the regulatory review stage and refines project plans.

Stage 3 Work

During Stage 3, Physical Environment studies on hydrology and climate will continue. These include water management studies (flows, levels, timing), water temperature and sediment transport modelling, an assessment of potential impacts to groundwater usage, an assessment of the potential for contaminated soils within the project area, local climate modelling, air quality and noise assessments, and updating the GHG emissions estimate. Studies have been expanded in Stage 3 in response to input received during consultation on modelling GHGs emissions, the local climate and air quality, and the proposed reservoir water levels.

Below is a summary of the work underway as part of the 2010/2011 season. Study areas vary by study topic, but generally encompass the Project Area, including the proposed Site C Reservoir and the core river corridor from downstream into Alberta. The spatial extent of individual studies may be extended if the results suggest that effects extend beyond the initial study boundaries.

Hydrology and Water Quality

- **Water Level & Flows Assessment**

Computer models are being used to assess the proposed reservoir levels and potential changes to downstream flows and fluctuations during construction and the operating phase of the project.

- **Flood Forecasting Network**

Plans to install a network of 10 automated, real-time climate, snow and hydrometric monitoring stations within the watersheds that discharge into what would become the Site C reservoir have been developed. These data would be used for flood forecasting during construction and long-term operations planning in the proposed Site C reservoir.

- **Water Temperature & Ice**

A three-dimensional model of the proposed Site C reservoir is being used to examine the water temperature and ice characteristics of the proposed reservoir. Changes to water temperatures downstream will be assessed using the fish productivity model. A comprehensive ice simulation model is being used to assess potential changes to ice conditions downstream of the dam by

simulating river ice processes. The model is applicable to a wide range of hydraulic engineering needs including ice jam related flood analysis studies, applications to winter navigation and transportation, and ice-related environmental studies.

- **Groundwater Studies**

Part of Stage 3 work will be to characterize the existing groundwater regime in the project area where slope stability, land use, or groundwater use could potentially be affected as a result of reservoir filling.

- **Sediment Transport Studies**

Studies are underway to refine the understanding of sediment transport and potential downstream geomorphologic changes. This work includes the installation and operation of suspended sediment gauging stations in the Peace River and its tributaries, completion of topographic and hydraulic surveys, and the development of hydrological models to characterize conditions throughout the proposed reservoir, outflows and tributary arms.

Atmospheric Studies

- **Local Climate**

BC Hydro has established a climate network of eight stations within the Peace River valley. Data collected by this network will allow for a better understanding of the existing climate conditions in the area. The monitoring program will record precipitation levels, wind speed and direction, air temperature, humidity, solar radiation and other heat changes. These observations will also be used to calibrate local climate model that would be used to predict potential changes to the microclimate as a result of the project.

Analysis performed in the study will include a model evaluation, investigation into the change in climate at several locations along the Peace River, and a spatial assessment and analysis of several climate objectives including estimating any expected changes to fog frequency and density, crop drying, airport visibility and precipitation and icing on highways and roads.

- **Air Quality**

Air quality monitoring stations were installed in 2011 near the proposed Site C dam site in Old Fort and in the Peace River Valley at Attachie Flat, midway between Fort St. John and Hudson's Hope. The stations are recording atmospheric levels of particulate matter less than 10 and 2.5 microns (PM₁₀ and PM_{2.5}, respectively).

- **Noise & Vibration**

Noise monitoring was conducted at 13 locations in the proposed project area to characterize the baseline sound environment and gather on-site noise level measurements at identified locations/areas of concern.

Using the baseline data, BC Hydro will apply noise modelling to characterize the expected noise effects at identified locations/areas. Vibration modelling will also to be conducted to characterize potential impacts associated with construction activities.

- **Greenhouse Gas Emissions (GHG) Studies**

In Stage 2, BC Hydro developed a preliminary GHG emissions estimate. The Intergovernmental Panel on Climate Change model guidelines were used to estimate reservoir and land use change emissions. Construction-phase emissions were based on preliminary estimates for quantities of fuel, electricity and materials required during project development. These GHG estimates will be updated to reflect refinements to the project plans.

Stage 3: Consultation

The Site C project requires environmental certification and other regulatory permits and approvals before it can proceed to construction.

The Stage 3 environmental and regulatory review process will include opportunities for consultation and input by the public, Aboriginal groups, communities, property owners and stakeholders.

In addition to the consultation opportunities led by the environmental regulatory agencies within the environmental assessment process, BC Hydro will lead several streams of public and stakeholder consultation during Stage 3:

- Regional and Local Government Liaison
- Property Owner Liaison
- Local Area Consultation
- Preliminary Design Consultation

BC Hydro and Aboriginal groups are also engaged in a thorough consultation process that will continue through all stages of the project.

How Input Will Be Used

A Consultation Summary Report will be prepared and released on the project website following each consultation period and Consideration Memos will be prepared, indicating how input has been considered, along with technical and financial information, for project designs or plans, including engineering and environmental mitigation plans.

FURTHER INFORMATION

The following information can be found at www.bchydro.com/sitec:

1. Field Studies Notices – Monthly updates on field studies.
2. Site C Clean Energy Project: Project Description Report. BC Hydro. 2011. (pages 126-128).
3. Stage 2: Consultation and Technical Review., BC Hydro. 2009. (pages 92-95).
4. BC Hydro Peace River Site C Hydro Project: Project Definition Consultation, Round 1 Summary Report, September 26, 2008. 2008. (pages 53-56).
5. Peace River Site C Hydro Project Stage 2 – Baseline Greenhouse Gas Emissions Report. 2009.
6. Preliminary GHG Emissions Estimate from Construction Materials – Site C Hydro Project. BC Hydro Memo. 2009.

7. Baseline Data Collection – Peace River Watershed Water Quality and Dinosaur Lake Limnology Sampling – 2008. 2009.
8. Baseline Data Collection – Water Quality, River Sediment, Soil, and Vegetation Samples from the Peace River Watershed – 2007. 2009.
9. Project Definition Consultation Discussion Guide and Feedback Form Round 2. October/November 2008. (pages 22-23).
10. Site C Feasibility Review: Stage 1 Completion Report. 2007. (pages 35-36, 47-48).

INQUIRIES

Updates on field studies are available at www.bchydro.com/sitec and in the Community Consultation offices in Fort St. John and Hudson's Hope.

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