

## RESERVOIR IMPACT LINES

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 term “reservoir impact line” refers to a boundary beyond which lands adjacent to a reservoir are not expected to be affected by the creation or normal operation of the reservoir. Reservoir impact lines related to flooding, stability, erosion and landslide-generated waves are envisioned for the Site C Clean Energy Project and are defined starting on page 2.

The purpose of the impact line approach is to:

- Ensure safety;
- Maximize land use flexibility; and
- Minimize the amount of land required for the project.

The impact lines would have implications for zoning and property requirements, and for easements for the project, as well as for defining local boundaries to assess environmental and socio-economic impacts.

### STUDY PURPOSE

The purpose of the reservoir impact lines study is to define reservoir impact lines around the Site C reservoir and to make recommendations for future land use planning based on these impact lines. To develop the reservoir impact lines for Site C, BC Hydro is gathering more information about shoreline conditions through undertaking geotechnical investigations along the proposed reservoir slopes. The results will be used to conduct more detailed erosion, groundwater and slope stability modeling.

## STATUS OF STUDIES

### Background

The Site C reservoir will have several different impacts on the land adjacent to the reservoir. These effects are a result of altering the flood hazard, increased groundwater levels, shoreline erosion through wave action, increased landslide activity in some locations, and landslide-generated wave hazards.

When Site C was initially examined more than 30 years ago, a “safeline” around the potential reservoir was established. Since then, a modern impact lines approach was adopted by BC Hydro, consistent with international guidelines from the International Commission on Large Dams. This current approach would set out a suite of reservoir impact lines for Site C which set lines more specifically based on the type of hazard, and then consider land use planning within these impact lines. This approach is consistent with the recommendation from the British Columbia Utilities Commission in the early 1980s to, where possible, minimize the land acquisition required for the project.

### Impact Line Definitions

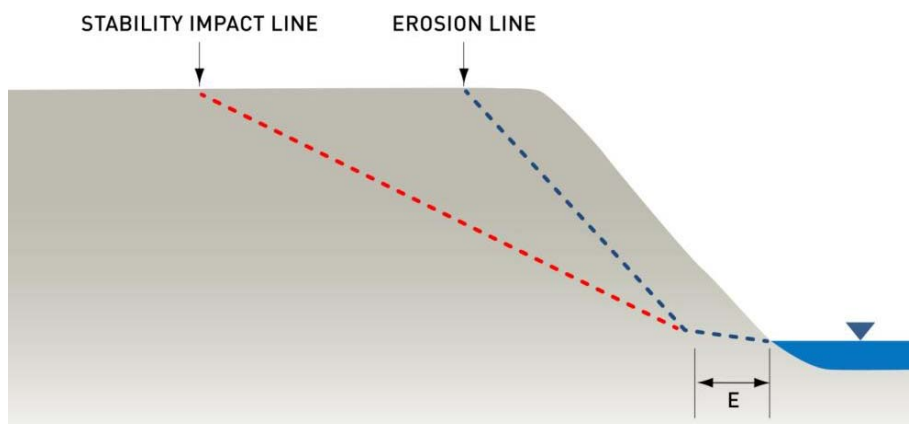
Four impact lines related to flooding, stability, erosion and landslide-generated waves are envisioned:

#### Flooding Impact Line

The Flooding Impact Line is defined by a specific elevation above reservoir full supply level where land is not expected to be flooded as a result of the creation, or the maximum normal operating level, of the reservoir. The Flooding Impact Line includes allowance for a 1000-year flood plus waves from a 200-year wind storm and potential reservoir surcharge caused by spillway operations.

#### Stability Impact Line

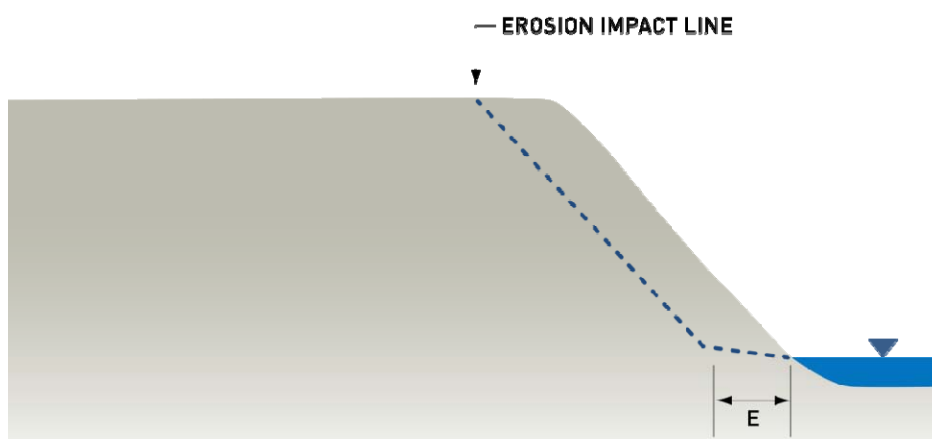
The Stability Impact Line is defined as the boundary beyond which the land adjacent to the reservoir is not expected to be affected by landslides resulting from the creation or maximum normal operation of the reservoir.



The potential impacts of changes in groundwater levels on the stability of slopes will be accounted for in the stability impact line. Potential effects of changes in groundwater levels caused by the presence of the reservoir, water supply, agricultural land productivity, and other effects on land use will be undertaken as part of the environmental assessment.

## Erosion Impact Line

The erosion impact line is defined as the boundary beyond which the land adjacent to the reservoir is not expected to be affected by progressive shoreline erosion and regression as a result of the creation or maximum normal operation of the reservoir.



## Landslide Generated-Wave Impact Line

In addition, site-specific analysis will be done to determine if areas could be affected by waves generated by a landslide into the reservoir. In these areas, a landslide generated wave impact line would be developed. The dam is designed to safely accommodate the largest possible wave that could be created by a landslide into the reservoir.

## Consultation

Stage 2 public and stakeholder consultation participants indicated that the residents of the Peace River are aware of and concerned about how reservoir shoreline conditions – such as erosion and stability – might affect issues such as public safety, property use, recreation and the environment.

The impact lines approach was a consultation topic during Stage 2 consultation in May/June 2008. Participants were presented with information regarding the impact line approach, including the impact lines defined above, and asked for their level of agreement with the impact line approach.

Overall, 64 per cent of participants agreed (“strongly” or “somewhat” agree) with the Reservoir Impact Lines approach to property and land use impacts, while 22 per cent were neutral and 15 per cent disagreed (“strongly” or “somewhat” disagree).

These consultation results were considered as the impact line approach was further developed as part of Stage 3.

### **Stage 3 Work – Geotechnical Investigations**

As part of Stage 3, BC Hydro is undertaking geotechnical investigations along the proposed reservoir slopes to gather more information about shoreline conditions. This geotechnical investigations program, which began in April 2011, consists of surface inspections, subsurface investigations and the installation and monitoring of geotechnical instruments on both private and Crown land where there are residences, municipal infrastructure and sections of Highway 29.

The study area for geotechnical investigations includes the north bank of the proposed reservoir from several kilometres upstream of Hudson's Hope to between Wilder and Tea Creek, and sites on the south bank opposite the area between Lynx Creek and Bear Flat.

The geotechnical investigations will:

- Investigate areas of erosion and landslide potential;
- Investigate the geology and sample soil and rock;
- Investigate the geology for bridge foundations for the proposed Highway 29 realignment at Lynx Creek, Farrell Creek, Cache Creek and Halfway River;
- Confirm baseline groundwater conditions; and
- Monitor groundwater levels and surface and subsurface movement.

The data collected will be used to develop and refine the position of the impact lines. This work is expected to be ready in 2012 and will be made available to local and regional governments, property owners, First Nations and communities.

The reservoir impact lines will be based on the reservoir on day one of operation. Ongoing monitoring will be proposed and would take place during construction, reservoir filling and operation. Impact lines may be adjusted based on this future monitoring of shoreline conditions.

### **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 use in project designs or plans, including engineering and environmental mitigation plans.

### FURTHER INFORMATION

Further information is available on the Site C website: [www.bchydro.com/sitec](http://www.bchydro.com/sitec). The following are available in the Site C Reports section of the website.

1. Project Description Report. May 2011. (page 125).
2. Stage 2 Report: Consultation and Technical Review. Fall 2009. (page 65).
3. Peace River Site C Hydro Project – Stage 2 Engineering Services Summary Report. 2009. (pages 65-68).
4. Project Definition Consultation Round 1 Summary Report. September 2008. (page 24).
5. Site C Feasibility Review: Stage 1 Completion Report. BC Hydro. 2007. (page 49).

### INQUIRIES

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

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