

PROJECT OVERVIEW

Introductory Meeting – Fort St John

October 5, 2011

Site C Project Team

Agenda

- Site C Overview
Danielle Melchior
- Project Description
John Nunn
- Setting
 - Socio-Economic and Heritage
Siobhan Jackson
 - Environmental Setting
Paul Higgins
- Consultation and Engagement
Trevor Proverbs,
Dave Conway
- Next Steps
Danielle Melchior



Beaufort Sea



USA

Nunavut

Great Bear Lake

Mackenzie River

NWT

Yukon

Great Slave Lake

River

Manitoba

Lake Athabasca

British Columbia

Peace River

USA

Finlay River

Fort St. John

Williston Reservoir

Pacific Ocean

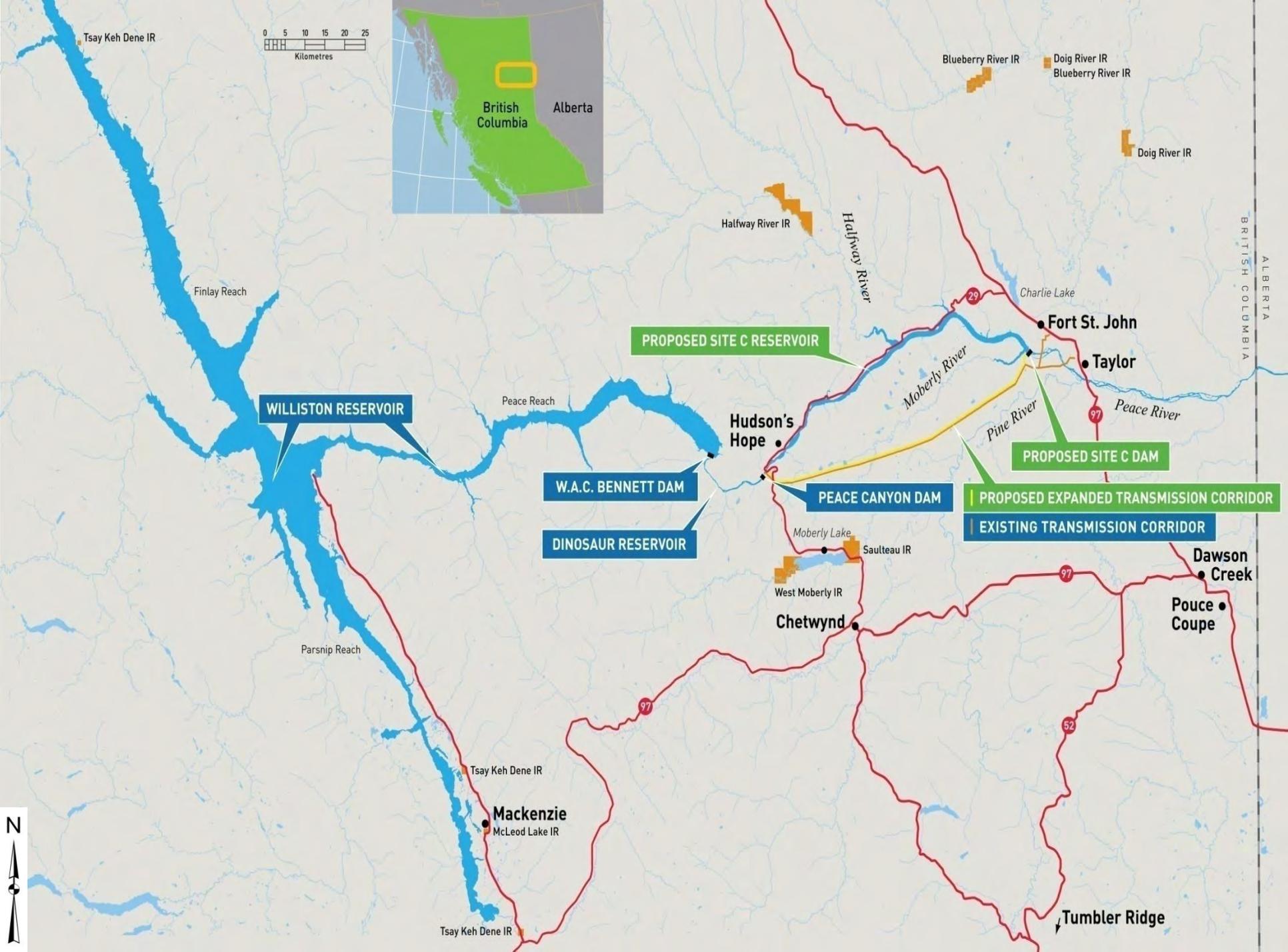
Saskatchewan

Alberta

Location of Proposed Site C Dam

Parsnip River

0 1,000 km



About Site C

- A third dam and hydroelectric generating station on the Peace River
- A publicly owned facility
- Would provide 5100 GWh, enough energy to power more than 450,000 homes per year
- Firm energy will support renewables
- 35,000 direct and indirect jobs
- Reducing our carbon footprint – low GHGs



Multi-Stage Evaluation Process



 Provincial government decision on whether to proceed to next stage

Project Description Report

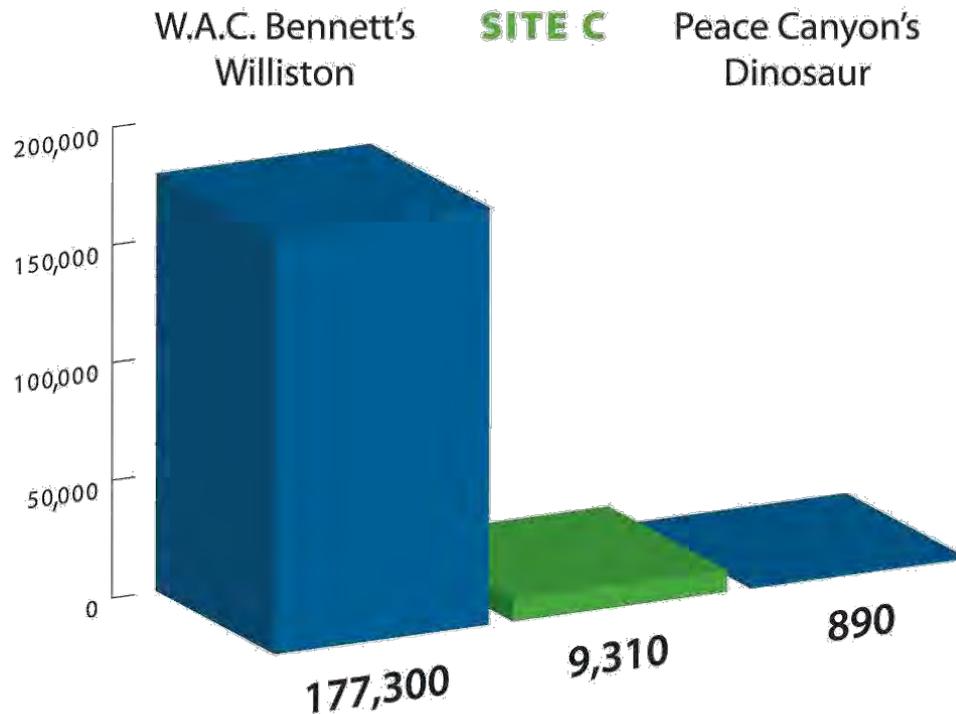
Purpose:

1. Determines need for EA
2. Promotes regulator coordination
3. Formal regulatory process initiated once regulators review and accept PDR
 - ✓ Submitted to BCEAO and CEAA on May 17, 2011
 - ✓ Acceptance announced in August 2011



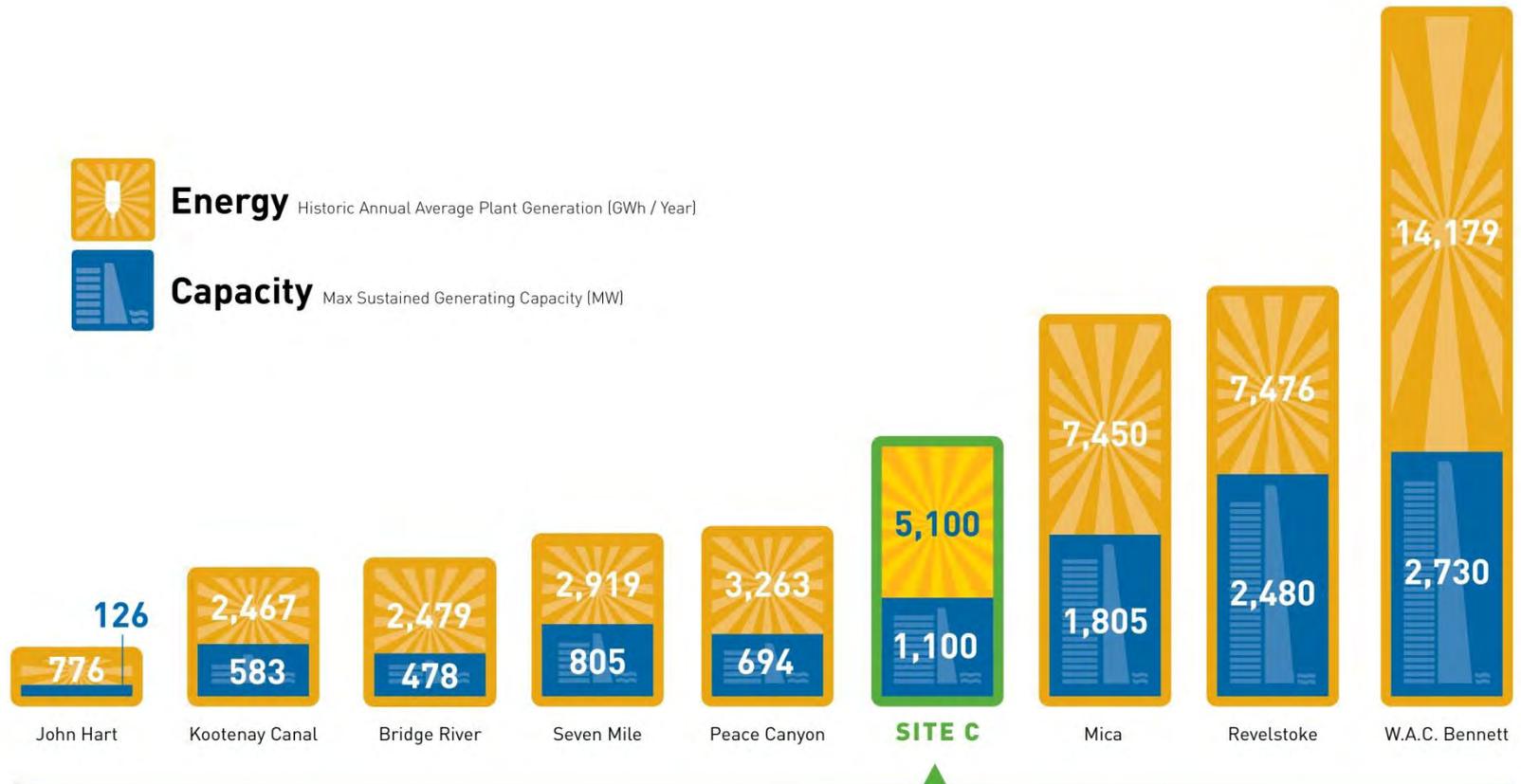
Site C's Reservoir Area

Reservoir Area (hectares)



- Site C would produce approximately 35% of the electricity of the W.A.C. Bennett Dam with five per cent of the reservoir area

A Mid-Sized Hydroelectric Facility



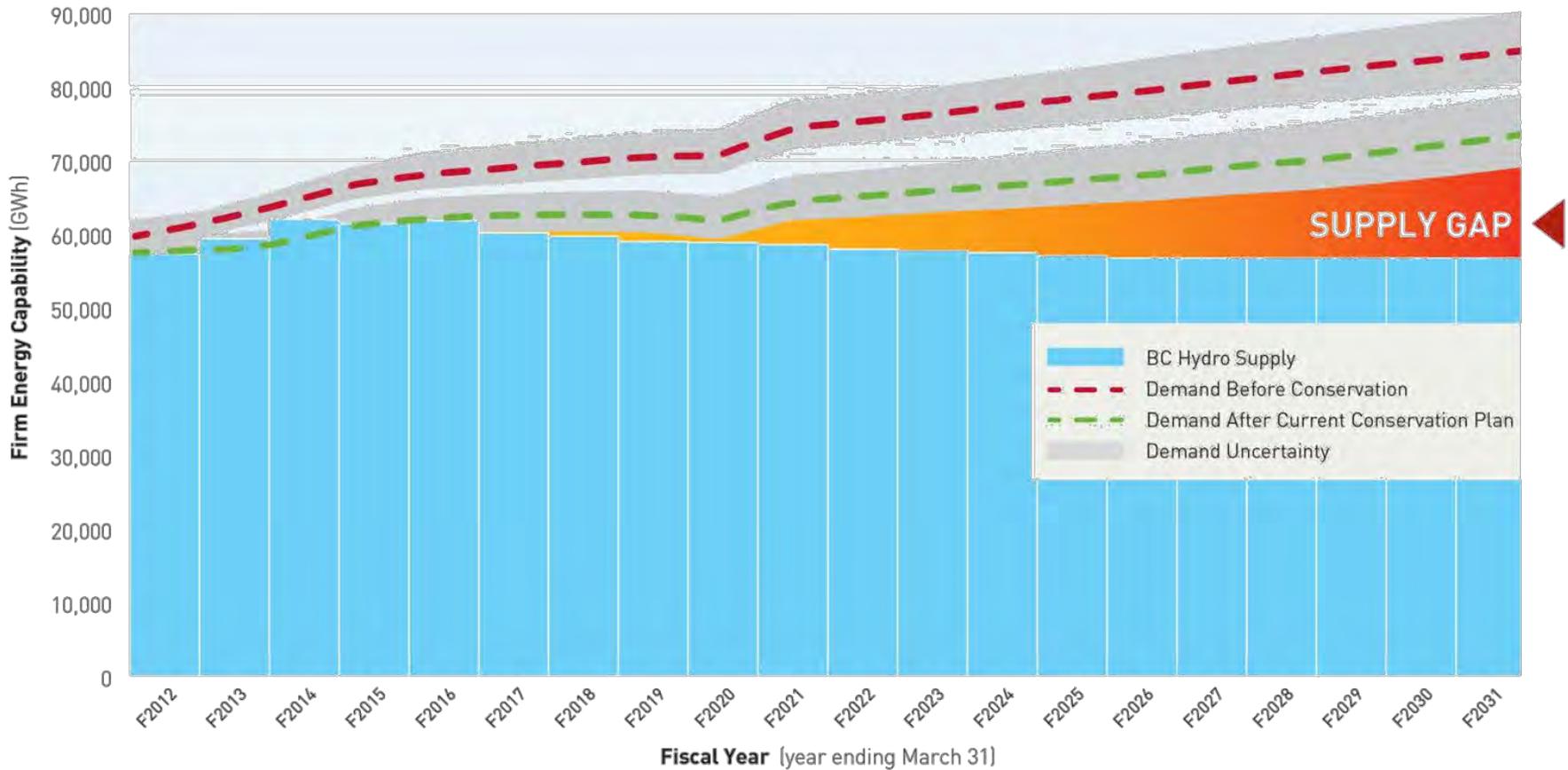
Energy Planning

BC Hydro Energy Planning Methods

BC Hydro has a mandate to provide cost-effective, reliable electricity to its service area

- Need for additional resources based on forecast gap between demand and available resources, reflecting:
 - Current and forecasted electricity demand
 - Current and forecasted electricity conservation measures
 - Existing and committed generation resources
 - Uncertainties in load growth and project delivery
- Methodology established in BC Hydro's Long-Term Acquisition Plan (LTAP) and Integrated Resource Plan (IRP) processes

Meeting Demand



Meeting Future Growing Demand

- B.C.'s electricity needs expected to grow by approximately 40 per cent over the next 20 years
- Demand driven by industrial growth
- Province's population is estimated to grow by more than one million people in 20 years
- Emerging trends could increase demand (e.g., electric vehicles)
- BC Hydro has been a net importer of electricity in nine of the last ten years



Our Plan to Meet Demand



Conserving more

Power Smart; energy efficiency standards for buildings; rate incentives; public campaigns



Buying more

Wind; small hydro; biomass; geothermal



Building more

Reinvesting in existing assets, considering new options for firm energy

Alternatives Analysis

- The 2010 Resource Options Report being developed for the IRP will contain preliminary data on alternative resources, including:
 - Energy and capacity demand-side management
 - Other Supply Options:
 - Onshore and offshore wind
 - Small hydro
 - Biomass
 - Pumped storage
 - Geothermal
 - Natural gas –fired generation
 - Upgrades to existing BCH facilities
 - Solar and others

Updated Project Cost Estimate

- Estimated capital cost of \$7.9 billion, and cost per megawatt hour ranging from \$87 to \$95
 - Reflects key upgrades to the project design, and current market prices for labour, equipment and materials
- Site C would be among the most cost-effective resource options to help meet B.C.'s future electricity needs

Project Description

Project Components and Activities

- Dam, Generating Station & Reservoir
- Highway 29 and Construction Access Roads
- Transmission
- Reservoir Slopes
- Offsite Construction Materials
- Reservoir Preparation and Clearing
- Workforce Requirements and Worker Accommodation

Oversight

- Peer Reviews
- Use of Independent Experts: Spillway Design, Geotechnical, Reservoir Shoreline Studies
- International Technical Advisory Board
- BC Hydro Executive and Project Board
- BC Hydro Board



CLEAN
ENERGY PROJECT

DAM AND GENERATING STATION



Log Boom

Reservoir

Access Road

Earthfill Dam

Transmission Lines

Generating Station

Overflow
Auxiliary Spillway

Centre Wall

Spillway

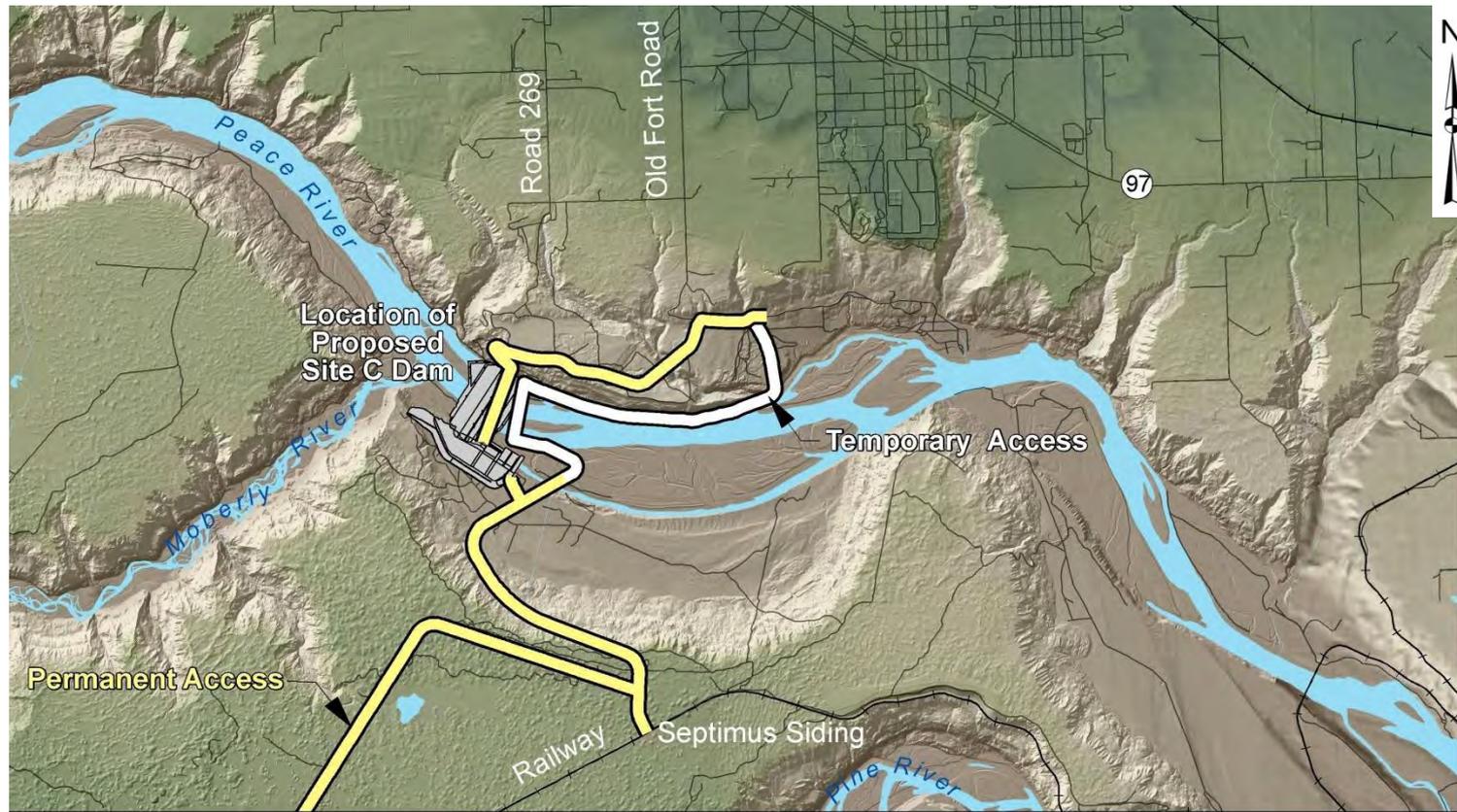
Access Road



Dam and Generating Station

Type:	Earthfill dam
Height:	60 metres above riverbed
Length:	1,050 metres
Energy:	5,100 GWh/yr
Capacity:	Up to 1,100 MW
Generating Units:	6 Francis turbines; 183MW per unit

Roads and Temporary Access Bridge



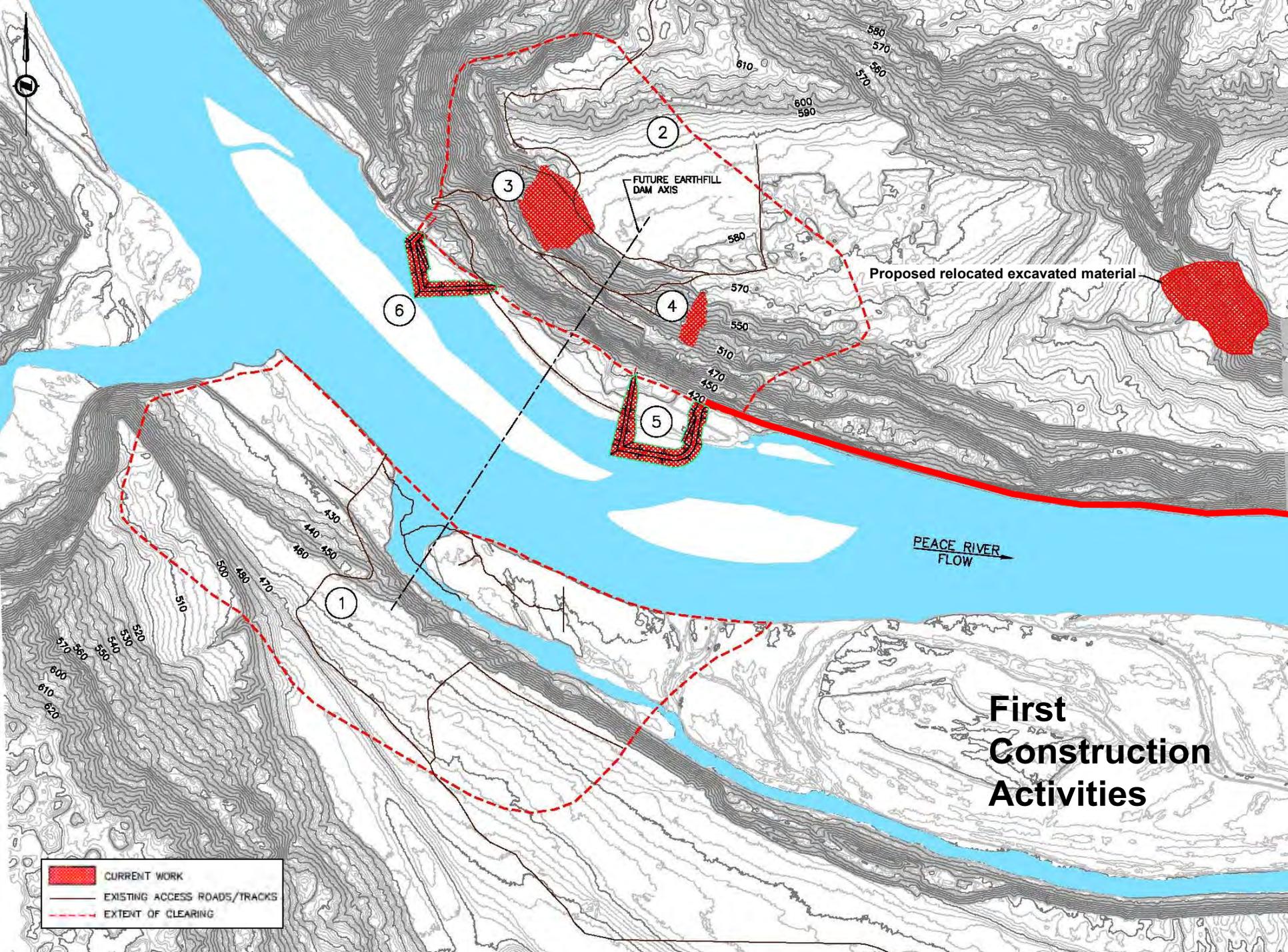
Reservoir

Total Reservoir Surface Area:	9,310 hectares
Total Flooded Land Area*:	5,340 hectares
Crown land:	4,318 hectares (81%)
BC Hydro-owned land:	666 hectares (12%)
Private land:	356 hectares (7%)
Maximum Normal Reservoir Fluctuation:	1.8 metres
Length:	83 kilometres
Width:	2-3 times the current river (on average)
Extent of Flooding of Tributaries:	
Lynx Creek	0.8 kilometres
Farrell Creek	2.5 kilometres
Halfway River	14 kilometres
Cache Creek	8 kilometres
Moberly River	10 kilometres

* Based on proposed reservoir elevation of 461.8m

Planned Sequence of Construction

*The project design continues to evolve
and this information is subject to change*



2

3

4

5

6

1

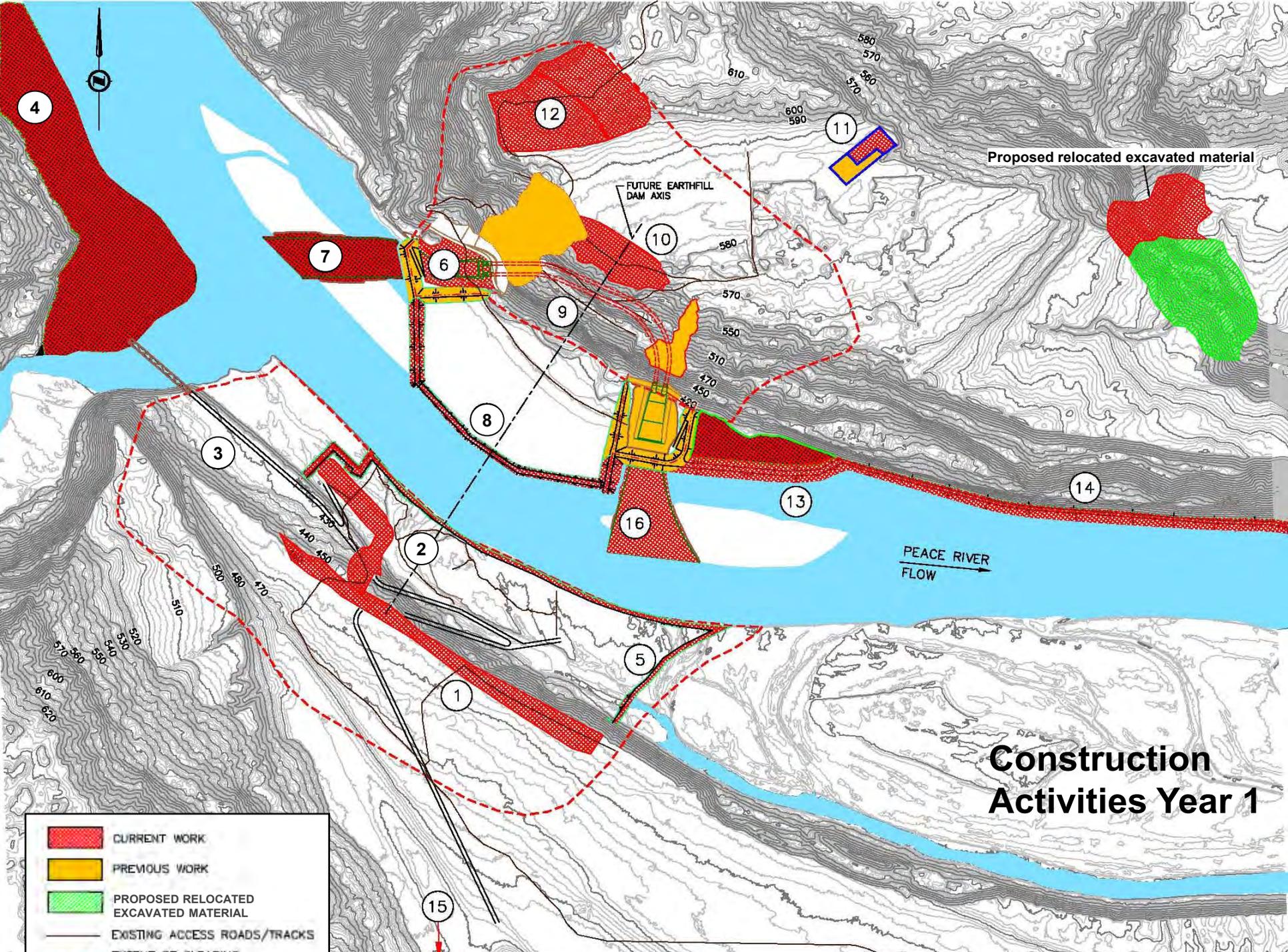
FUTURE EARTHFILL
DAM AXIS

Proposed relocated excavated material

PEACE RIVER
FLOW

First
Construction
Activities

-  CURRENT WORK
-  EXISTING ACCESS ROADS/TRACKS
-  EXTENT OF CLEARING



4

12

11

Proposed relocated excavated material

7

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FUTURE EARTHFILL
DAM AXIS

9

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14

16

PEACE RIVER
FLOW

2

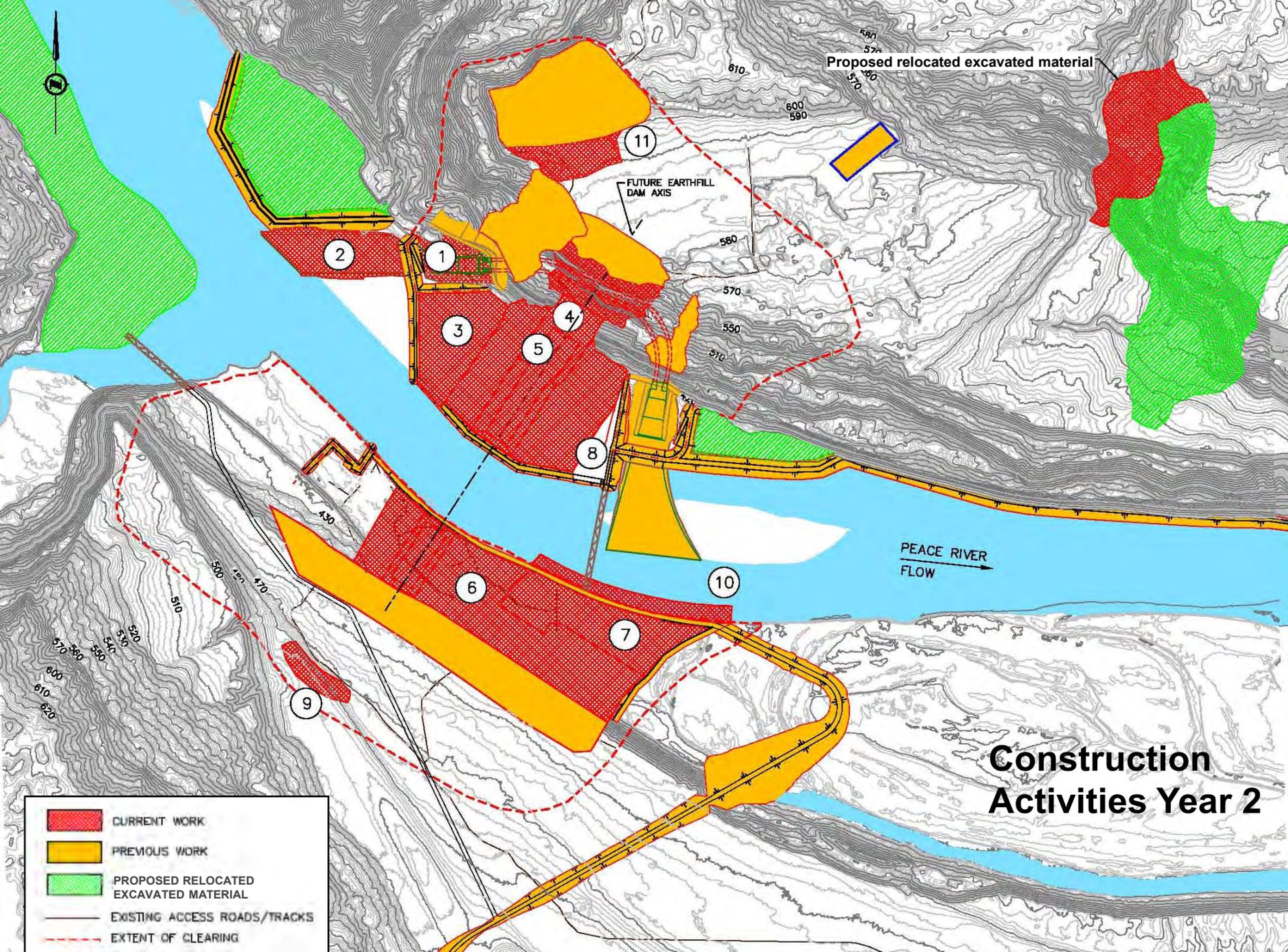
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15

**Construction
Activities Year 1**

	CURRENT WORK
	PREVIOUS WORK
	PROPOSED RELOCATED EXCAVATED MATERIAL
	EXISTING ACCESS ROADS/TRACKS



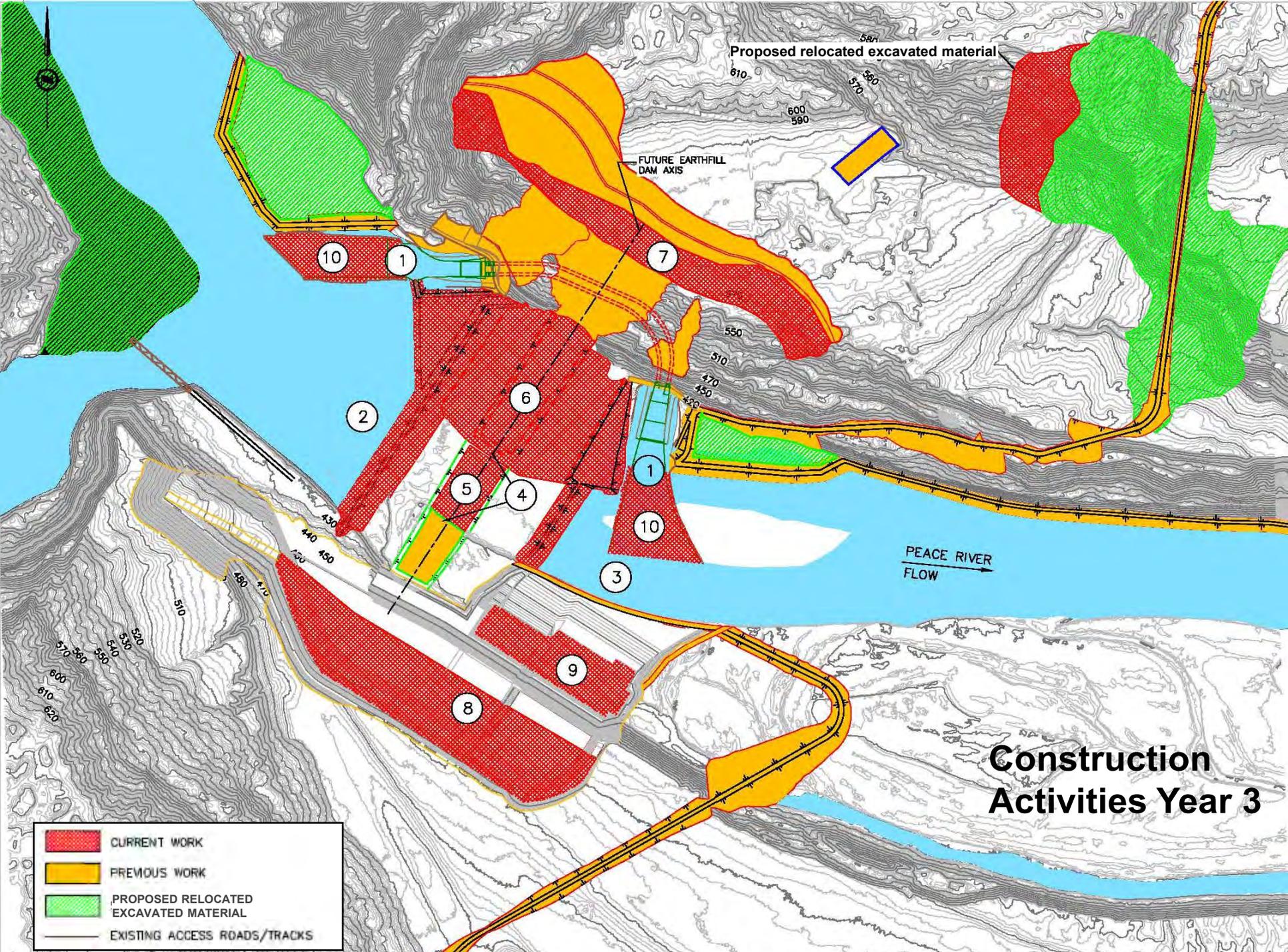
Proposed relocated excavated material

FUTURE EARTHFILL DAM AXIS

PEACE RIVER FLOW

Construction Activities Year 2

-  CURRENT WORK
-  PREVIOUS WORK
-  PROPOSED RELOCATED EXCAVATED MATERIAL
-  EXISTING ACCESS ROADS/TRACKS
-  EXTENT OF CLEARING



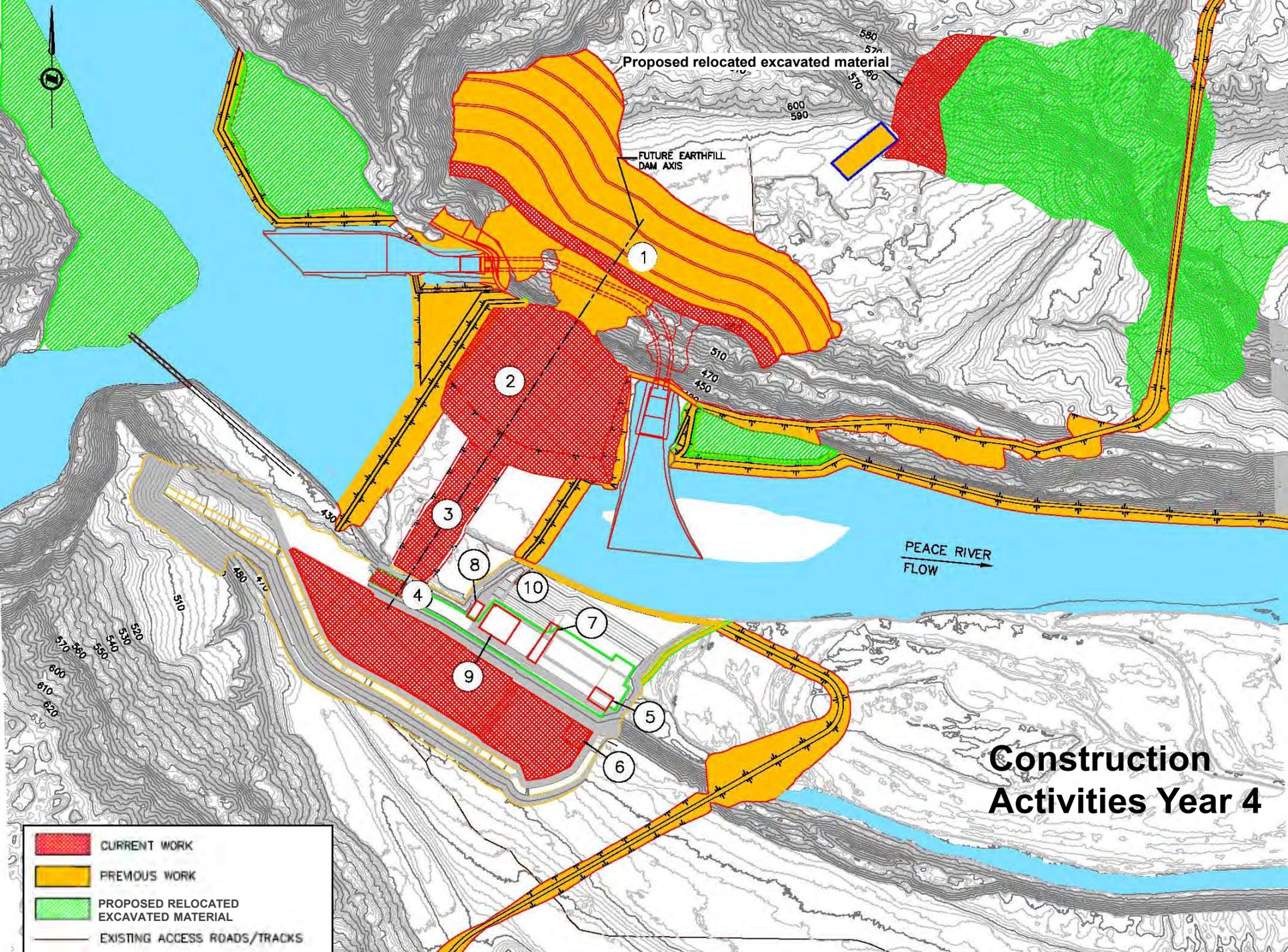
Proposed relocated excavated material

FUTURE EARTHFILL DAM AXIS

PEACE RIVER FLOW

Construction Activities Year 3

- CURRENT WORK
- PREVIOUS WORK
- PROPOSED RELOCATED EXCAVATED MATERIAL
- EXISTING ACCESS ROADS/TRACKS



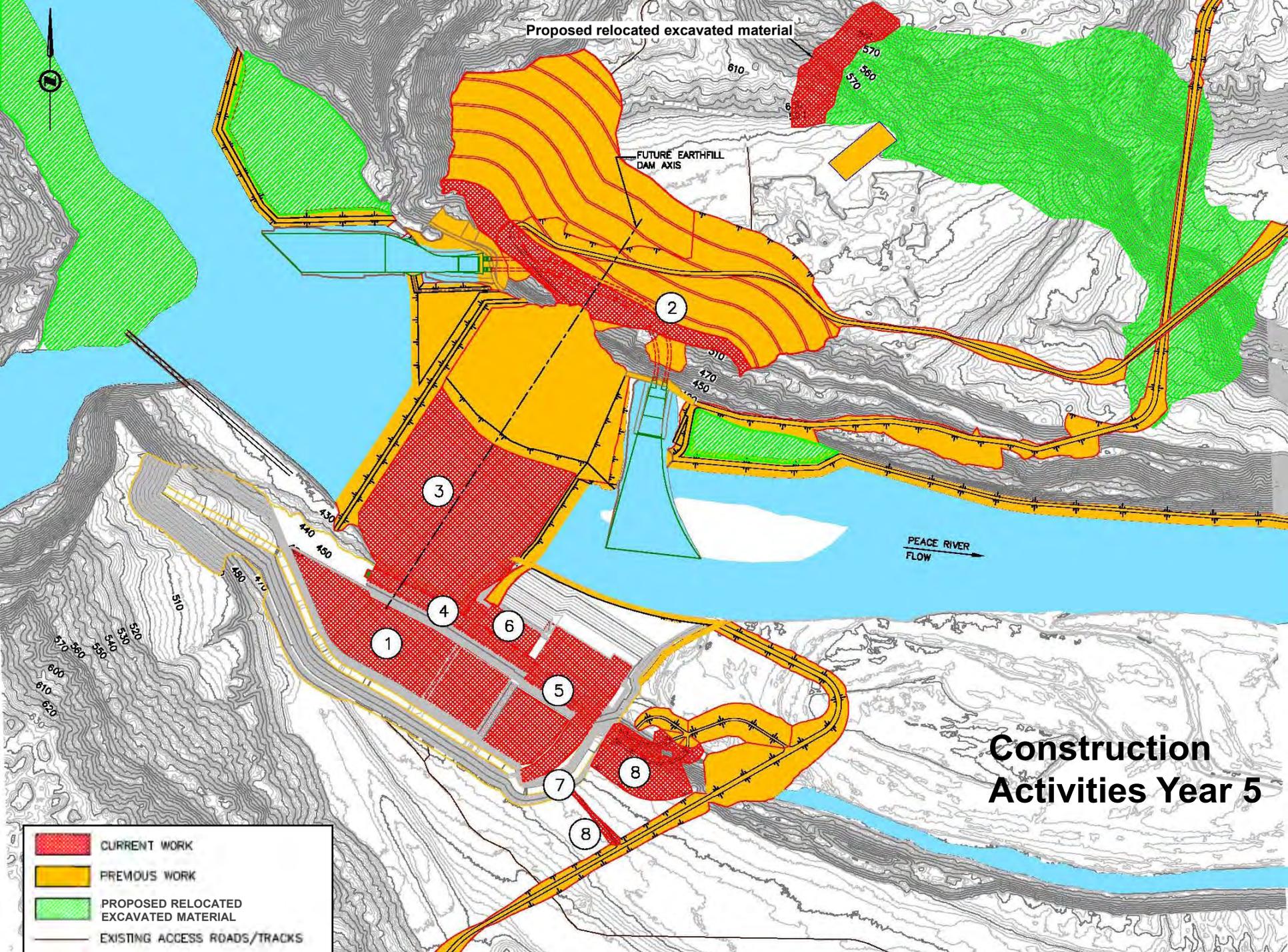
Proposed relocated excavated material

FUTURE EARTHFILL DAM AXIS

PEACE RIVER FLOW

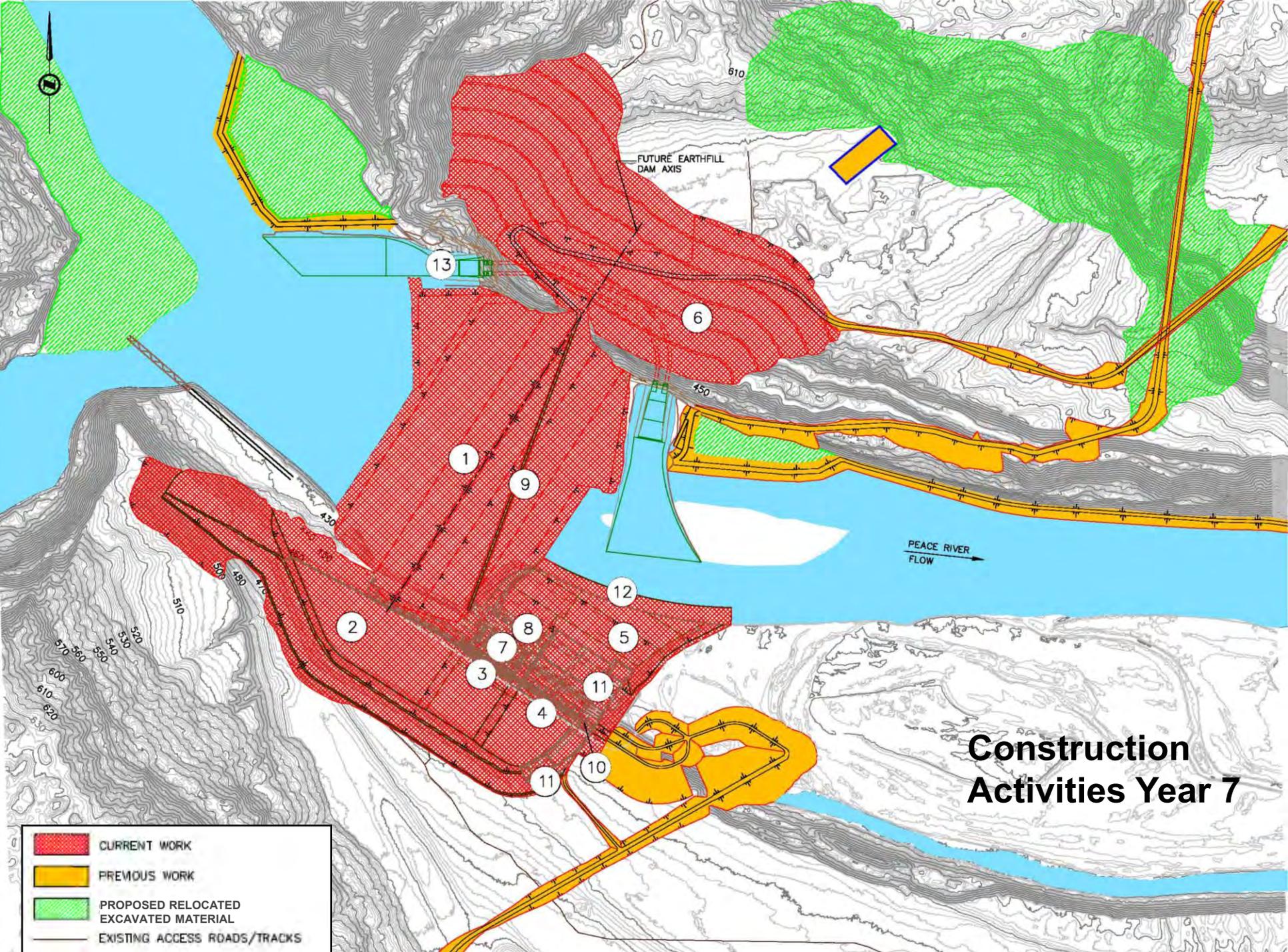
Construction Activities Year 4

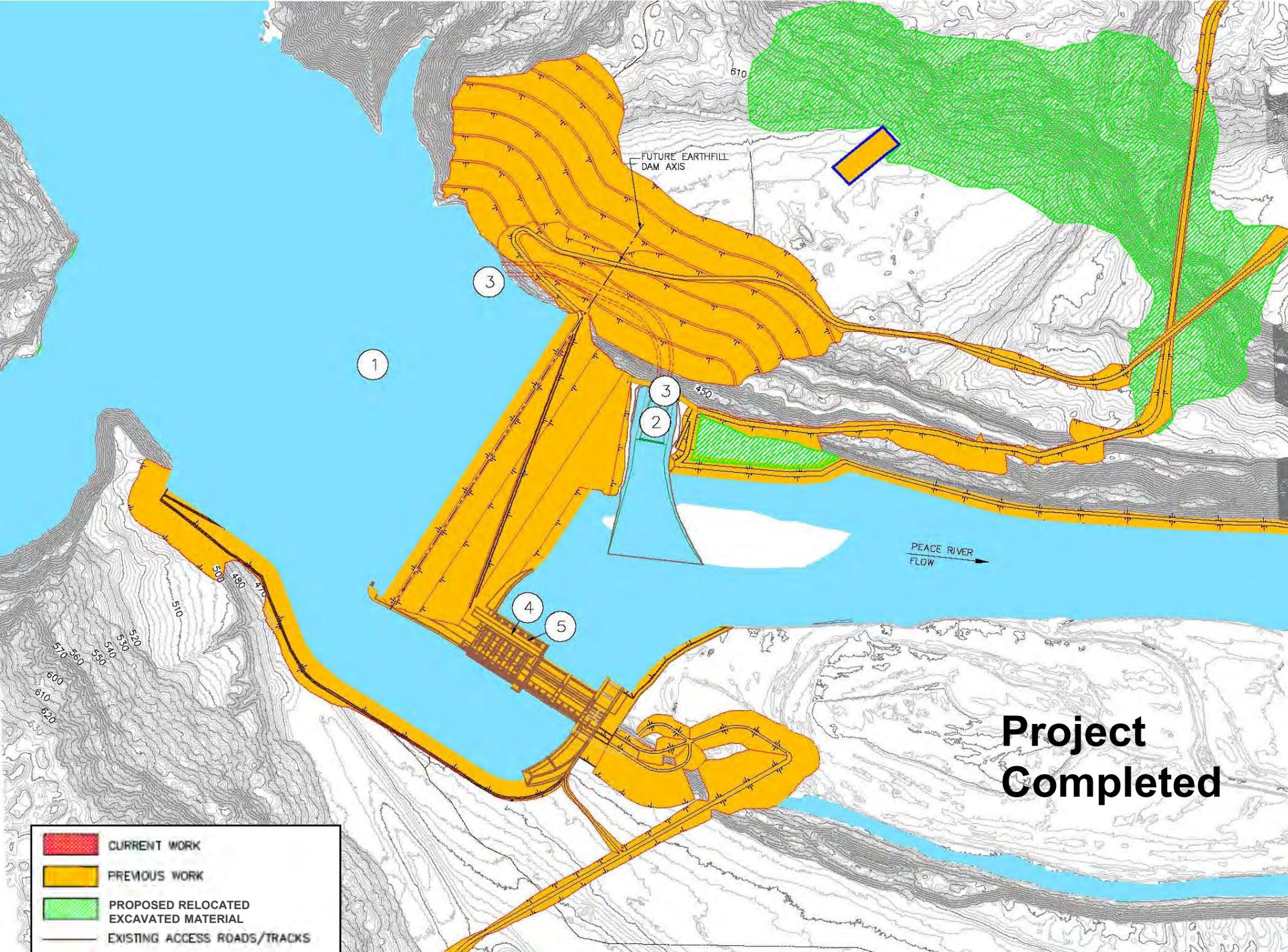
-  CURRENT WORK
-  PREVIOUS WORK
-  PROPOSED RELOCATED EXCAVATED MATERIAL
-  EXISTING ACCESS ROADS/TRACKS



Construction Activities Year 5

-  CURRENT WORK
-  PREVIOUS WORK
-  PROPOSED RELOCATED EXCAVATED MATERIAL
-  EXISTING ACCESS ROADS/TRACKS





FUTURE EARTHFILL
DAM AXIS

PEACE RIVER
FLOW

**Project
Completed**

-  CURRENT WORK
-  PREVIOUS WORK
-  PROPOSED RELOCATED
EXCAVATED MATERIAL
-  EXISTING ACCESS ROADS/TRACKS

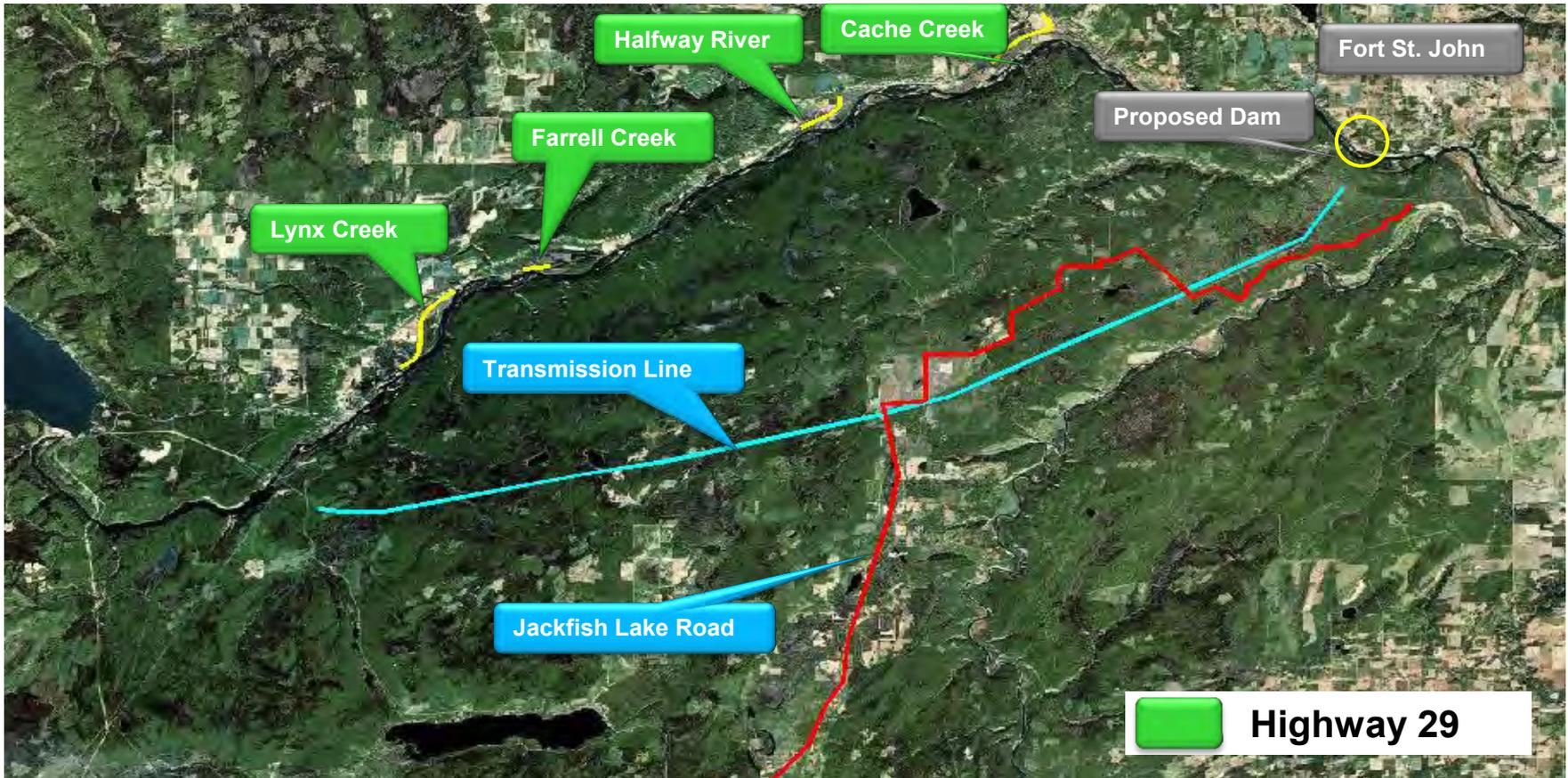
Temporary Facilities at Dam Site

- Offices, storage facilities & staging areas
- Workshops, labs & testing facilities
- Concrete batch plants & aggregate/filter processing plants
- Explosive & fuel storage facilities
- Fabrication shops
- Fully serviced worker housing
- Waste treatment & management facilities
- Truck washing & vehicle maintenance workshops
- Safety, first aid & security

Break for Q&A

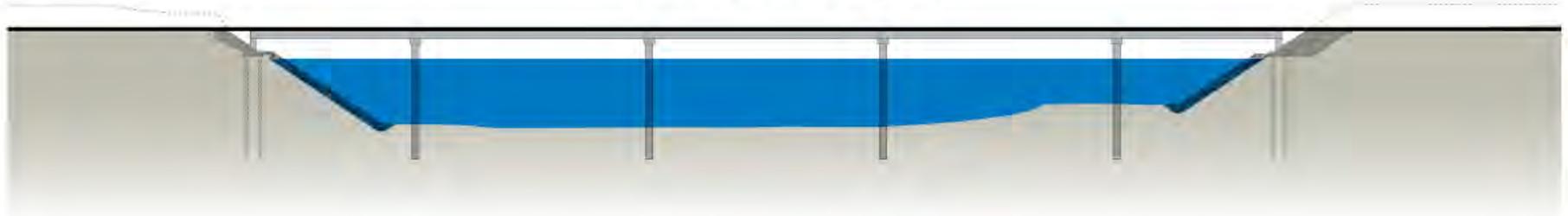
Highway 29 Realignment & Construction Access Roads

Highway 29 Realignment

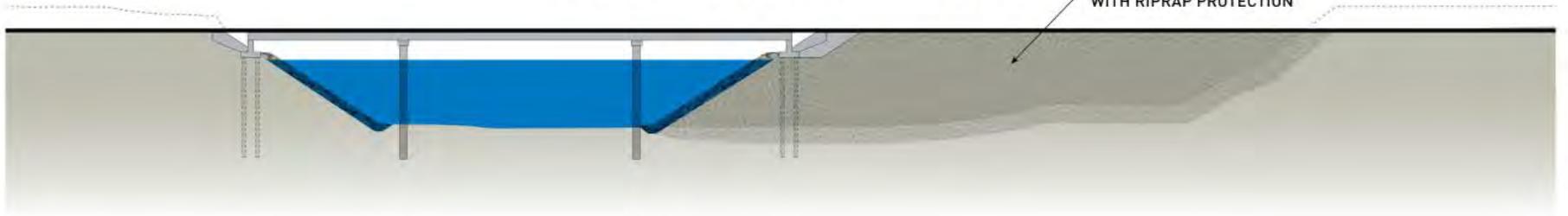


Highway 29 – River & Creek Crossing Options

BRIDGE SPAN ONLY OPTION



BRIDGE SPAN AND CAUSEWAY OPTION



EARTHFILL CAUSEWAY
WITH RIPRAP PROTECTION



Example of causeway construction
With riprap protection

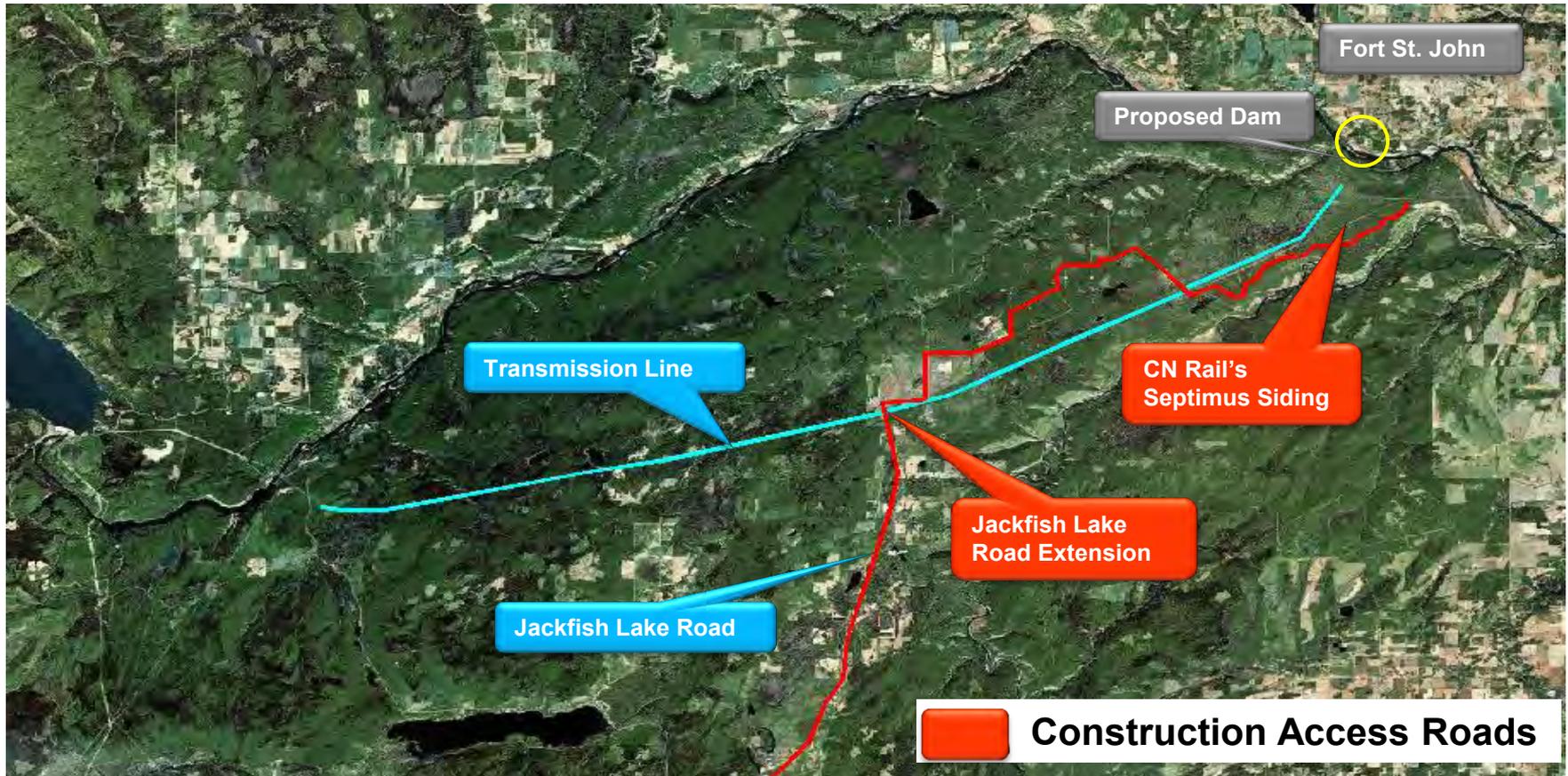


Example of an earthfill causeway
and bridge



Existing Halfway
River Bridge

Construction Access Roads



Transmission

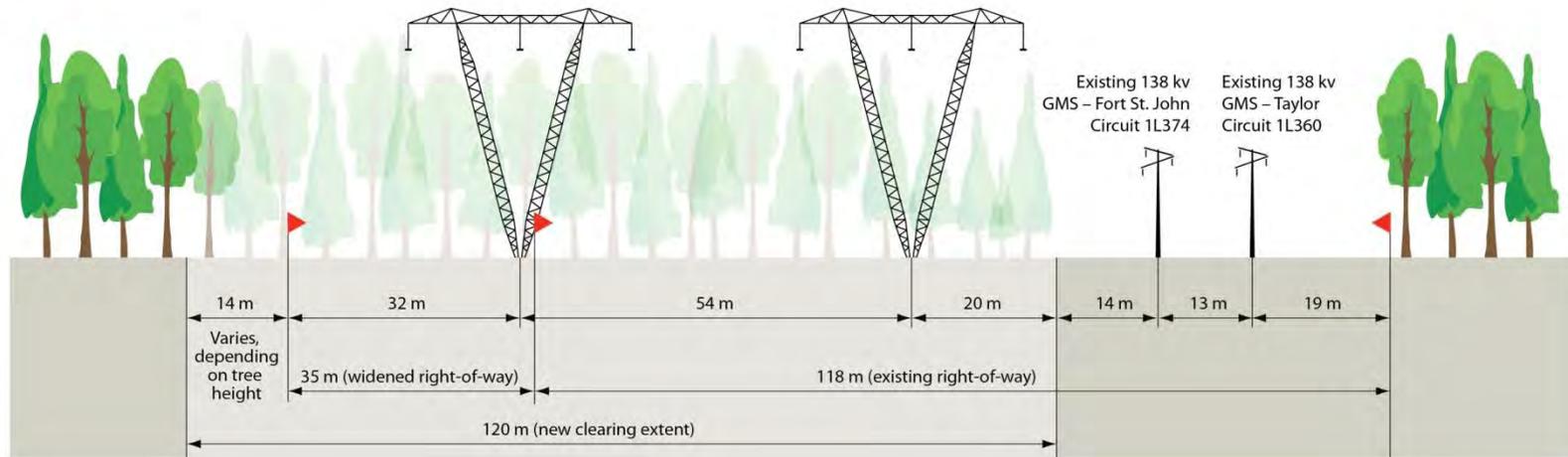
Transmission Line

- Existing transmission right-of-way corridor – Site C to Peace Canyon Substation; two 138 kV lines
- Current Transmission Planning /ROW
 - Three 500-kilovolt (kV) circuits connecting the generating station to the new 500 kV switchyard
 - Two 500 kV Alternating Current lines, approximately 77 km in length, along existing 138 kV right-of-way, connecting the switchyard to Peace Canyon Substation
 - Widening of the right-of-way by approximately 35 metres
 - Access roads



Transmission Right-of-Way Cross Section

View looking east from where 500kv circuits would parallel existing circuits 1L374 and 1L360



Reservoir Slopes

Reservoir Slopes

Historical Approach

- Residential safeline developed in 1978
- BCUC concerns re: land use impacts
- Best practice review - development of impact line approach

Stage 3 Work – Impact Line Approach

Objectives

- Ensure safety
- Maximize land use flexibility
- Minimize land required for the project
- Use international best practices to get better information about impacts of the reservoir

Reservoir Slopes

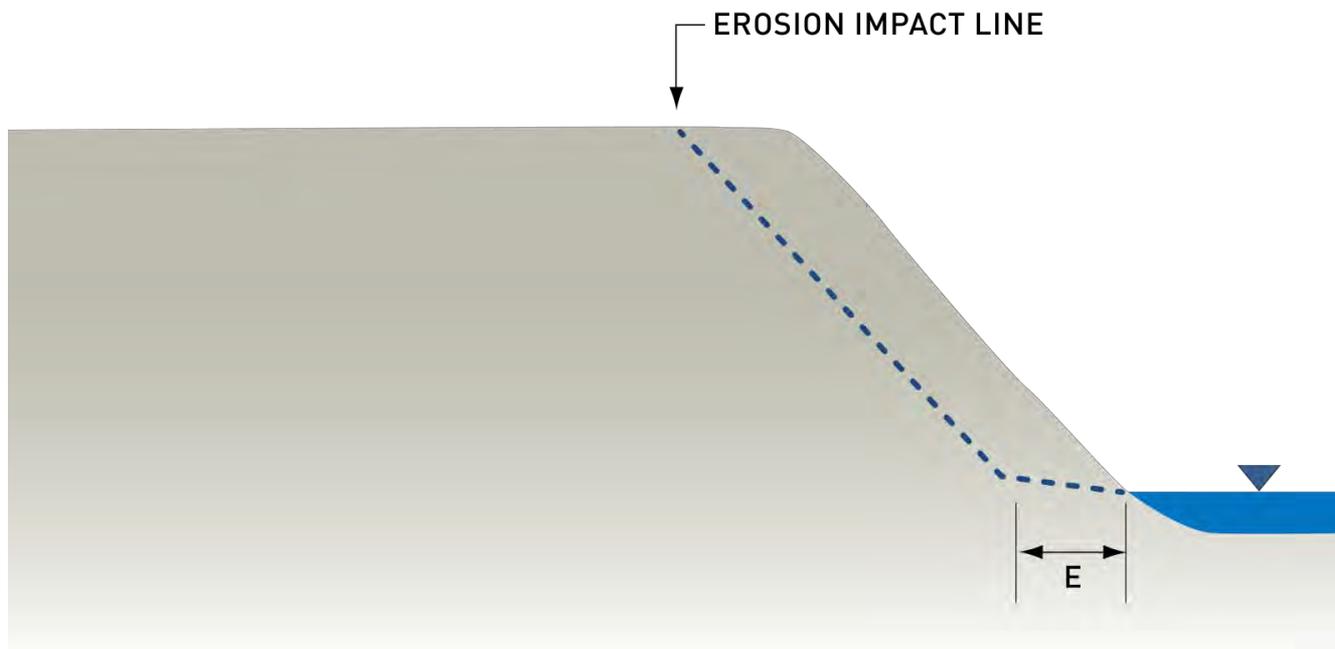
- Predict the geotechnical response of the reservoir shoreline and slopes to operation of the proposed reservoir and future public safety and land use considerations
- Types of Impact Lines
 - Flood Impact Lines
 - Erosion Impact Lines
 - Stability Impact Lines
 - Landslide Generated Wave Impact Lines

Flood Impact Line

- To be defined by a specified elevation above reservoir full supply level
- Includes allowance for floods, wind and waves
- Includes potential reservoir surcharge caused by spillway operations

Erosion Impact Line

- Predicts erosion and slope retreat over 100 years
- Current work: collection of wind data and refine understanding of shoreline geology

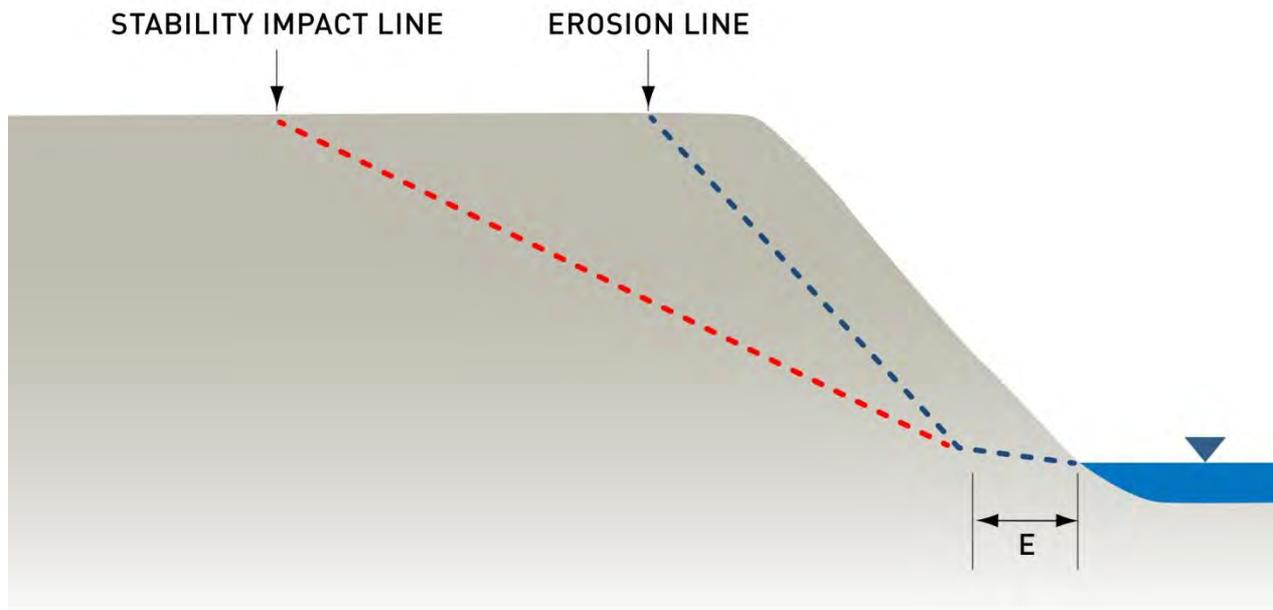


Hudson's Hope Berm



Stability Impact Line

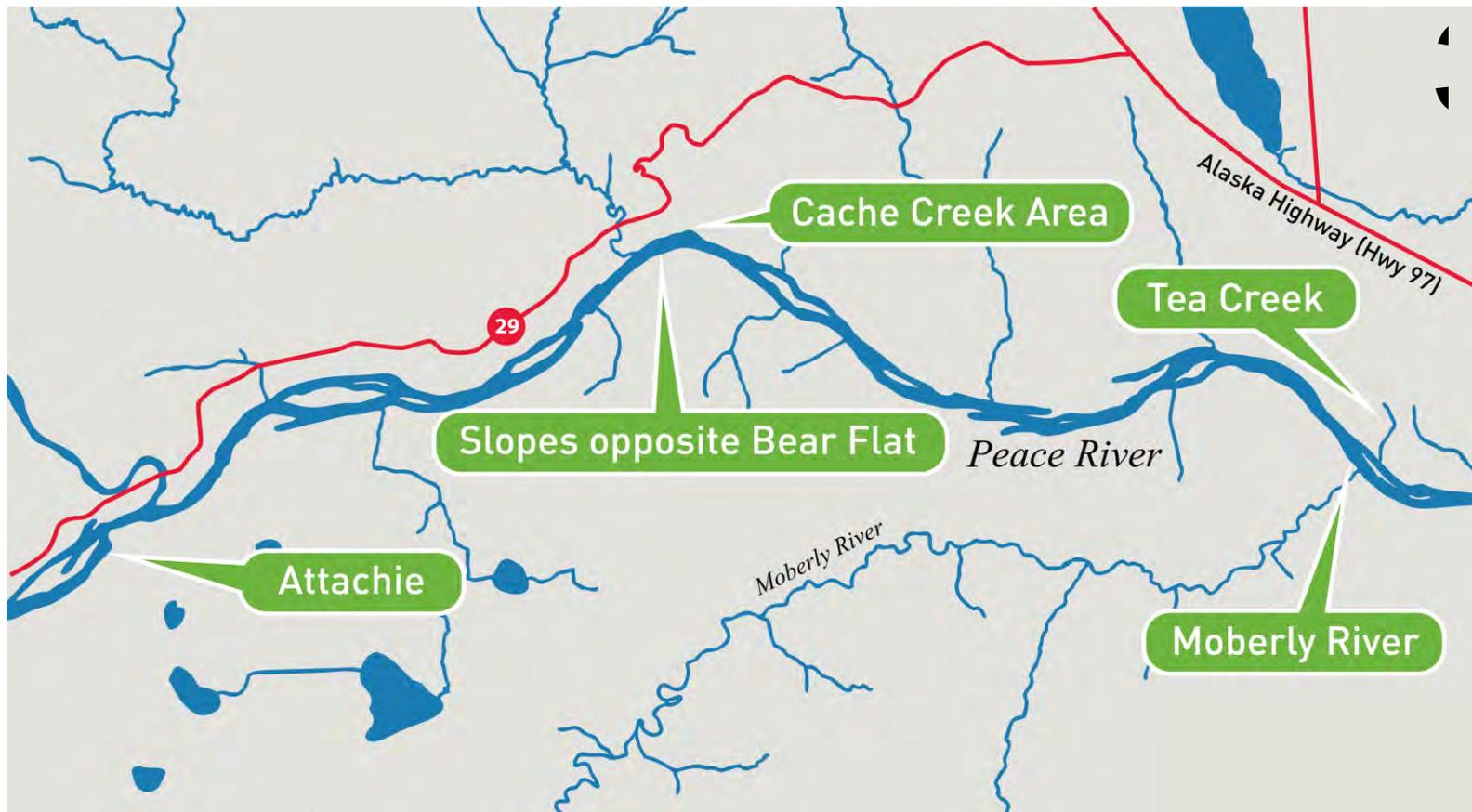
- Beach erosion, plus long term slope retrogression to a stable angle
- Current work: refine understanding of slope geology and ultimate slope angles



1973 Attachie Slide



Study Areas Regarding Potential Landslide Generated Wave



Field Investigation and Risk Assessment

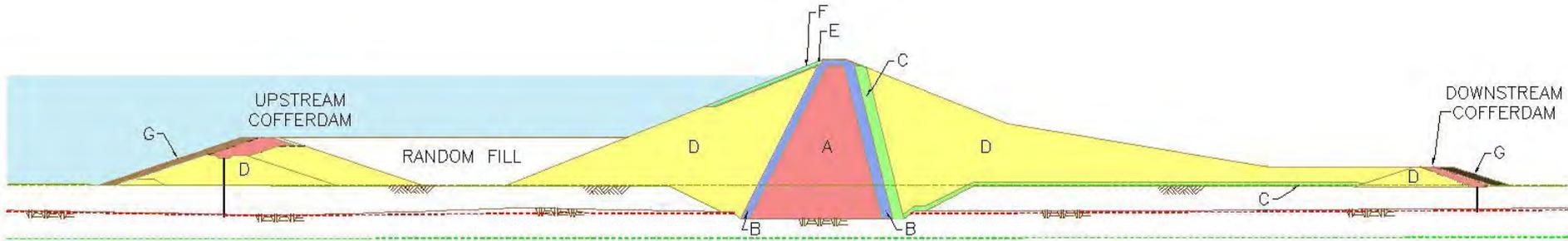
- Require confirmation of surface and subsurface conditions at select areas
 - Geology, groundwater, evidence of prior or ongoing ground movement
 - Access to property to conduct surface mapping, geotechnical drilling, installation of instrumentation
- Stability Analysis & Risk Assessment
 - Site Specific Slope stability modeling (current conditions and with reservoir)
 - Adjustment of location of the stability impact line based on site specific info and analysis
 - Hazard/risk zonation within the stability impact line

Construction Materials

Fill Material Requirements

- Components:
 - Dam
 - Highway 29 Re-alignment
 - Access Roads
 - Hudson's Hope Berm
- Materials:
 - Impervious till
 - Gravel and Aggregate
 - Temporary Rip Rap
 - Permanent Rip Rap

Materials Needed to Construct the Dam



LEGEND

- Ⓐ - IMPERVIOUS MATERIAL
- Ⓒ - FINE GRAVEL
- Ⓔ - FINE ROCK
- Ⓖ - TEMPORARY RIPRAP
- Ⓑ - SAND
- Ⓓ - GRAVEL
- Ⓕ - COARSE ROCK RIPRAP

Total amount of material needed = 13,900,000 m³

Gravel and sand materials

On-site sources

Impervious material
Permanent riprap
Temporary riprap

Off-site sources

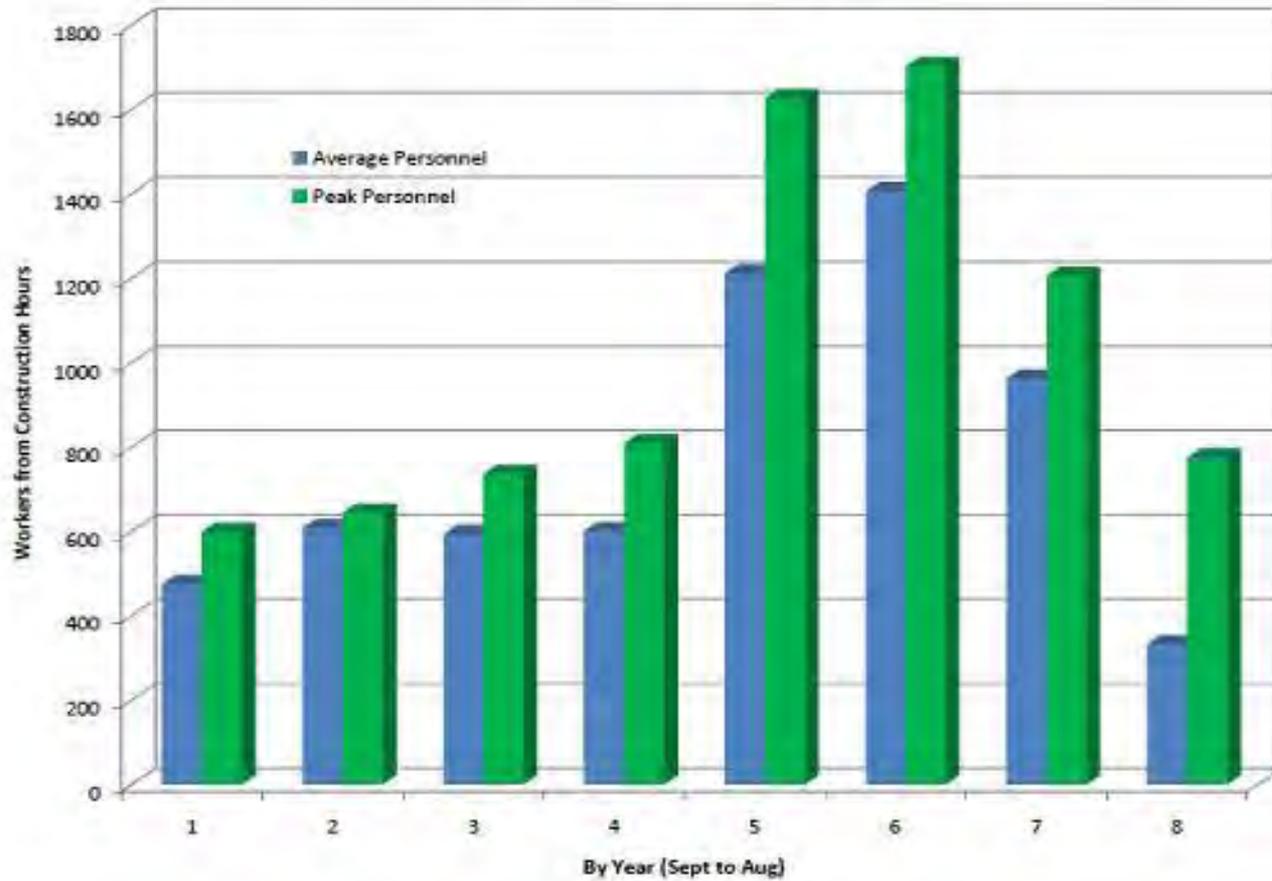
Reservoir Preparation and Clearing

Reservoir Preparation and Clearing

- Clearing for constructions sites, and preparing reservoir for flooding
- Reservoir Preparation considerations also include:
 - realignment of segments of Highway 29
 - reservoir impact line management (e.g. shoreline erosion and stability)
 - reservoir and shoreline property management (property and infrastructure)
 - potential contaminated site management
 - water management during river diversion and reservoir filling
 - construction of a berm for shoreline protection at Hudson's Hope
 - development of recreation and environmental mitigation sites

Workforce Requirements and Worker Housing

Site C - Clean Energy Project Construction Phase
Dam Site - Worker Requirements



Worker Housing

The plan is being developed in consultation with communities

- Dam site construction camps
 - north bank
 - south bank
- Regional camps
 - Highway 29
 - Jackfish Lake Road
- Local in-community housing
- Scenarios for local resident / employment

Socio-Economic & Environmental Setting

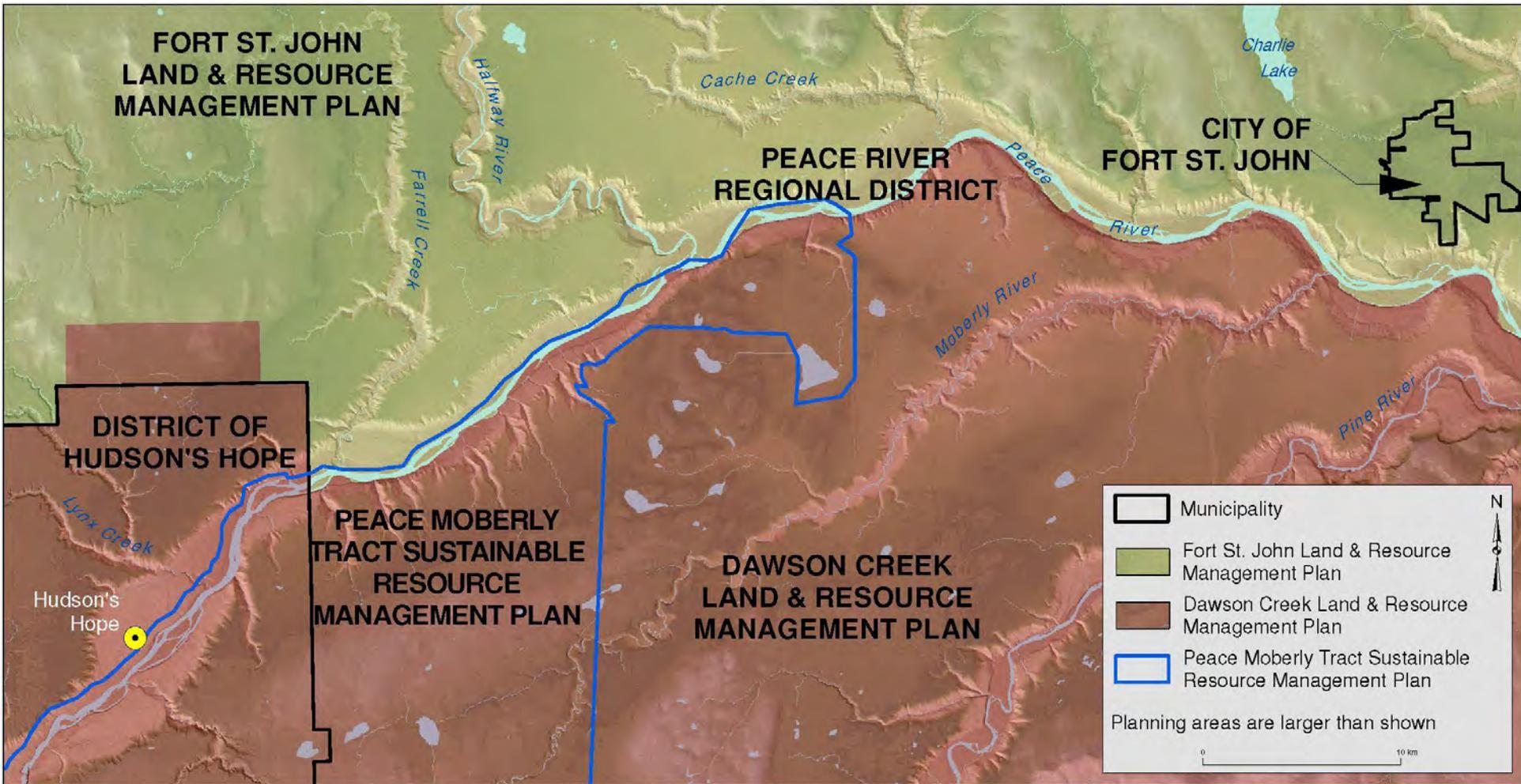
Socio-Economic & Environmental Setting

- Socio-Economic Setting
- Aboriginal Communities
- Land and Resource Use
- Human Health
- Heritage Resources
- Environmental (physical, aquatic, terrestrial)

Social and Economic Setting

Social and Economic Setting

- Social and Community – nearby communities:
 - Regional population of 63,000
- Economy:
 - Cyclical natural resource driven economy
 - Low unemployment rate (active economy)
 - Infrastructure and Services
- Transportation:
 - Developed urban service areas, and remote rural residential



Social and Economic Setting

Key Issues and Related Study Areas:

- Workforce during construction
- Economic and employment
- Government finances
- Transportation
- Direct impacts on infrastructure

Aboriginal Community Assessments

Focus on Communities in vicinity of the Project

Key Issues to be identified through Community-Specific Studies, may include:

- Traditional Land Use
- Social Setting
- Economic Setting, employment, business
- Community Housing and Infrastructure
- Health and Healthy Living

Land and Resource Use Setting

- Fort St. John and Dawson Creek land use planning area, Peace Moberly Tract
- Private land use (e.g. residential, commercial, agricultural)
- North bank dominated by private land uses, agricultural, rural residential
- South bank dominated by crown land uses



*Peace River at Halfway River,
looking upstream*

Land and Resource Use

Key Issues and Related Study Areas:

- General – baseline data collection to identify potential project interactions
- Forestry
- Oil, Gas and Energy
- Minerals
- Aggregate
- Hunting and Fishing
- Trapping and Guide Outfitting
- Outdoor Recreation

Land and Resource Use (cont'd)

Agricultural soil capability mapping:

- Updated agricultural capability maps
- Field inspections throughout reservoir area
- Review capability mapping in broader project area

Agricultural Resource Use:

- Interviews with farmers and ranchers (up to 19 farm operations in vicinity of project)



Completing a field inspection – a shovel test for agricultural soil sampling

Human Health

Potential Human Health Topics:

- Healthy Living: Workforce
- Healthy Living: Public considerations
- Air Quality, Noise & Vibration
- Methyl Mercury
- Electro Magnetic Fields

Heritage

Heritage Setting:

- Paleontological eras
- Archaeological evidence of ~10,000 years of human occupation
- Historic - fur trade (1793 – 1820's), farming settlements 1900's to current

Key Issues and Related Study Areas:

- Inventory for archaeological sites
- Inventory for historic sites
- Field reconnaissance for paleontological potential



Ammonite fossil found along the Peace River, August 2011

Physical, Aquatic and Terrestrial Environment



Location of
Proposed Site C Dam

Physical Environment – Water

Current Setting:

- Mainstem and downstream conditions in project area influenced by upstream flow regulation, existing water licenses
- Groundwater - domestic, agricultural, and industrial

Key Issues and Related Study Areas:

- Water quantity
- Water quality
- Groundwater conditions
- Ice Regime
- Water Management



Physical Environment – Land

Current Setting:

- Flow regulation has occurred for many decades and river is or has adjusted to changes

Key Issues and Related Study Areas:

- River morphology
- Sediment transport
- Contaminated Sites



Physical Environment - Atmosphere

Current Setting:

- Continental climate - seasonal Arctic (Cold) and western (moist, warm)
- Distinct valley bottom microclimate

Key Issues and Related Study Areas:

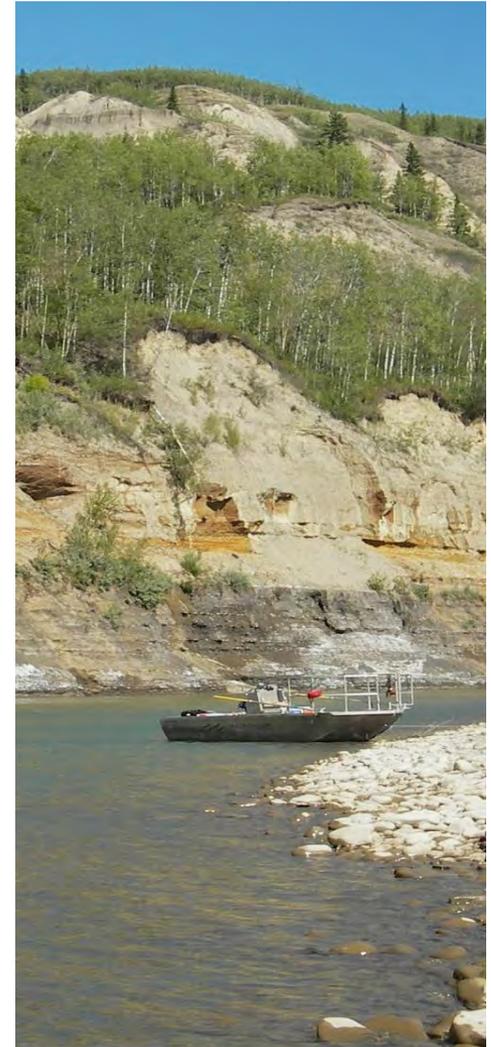
- Micro-climate change due to reservoir
- GHG Emissions
- Air Quality
- Noise and Vibration



Fish and Aquatics

Current Setting

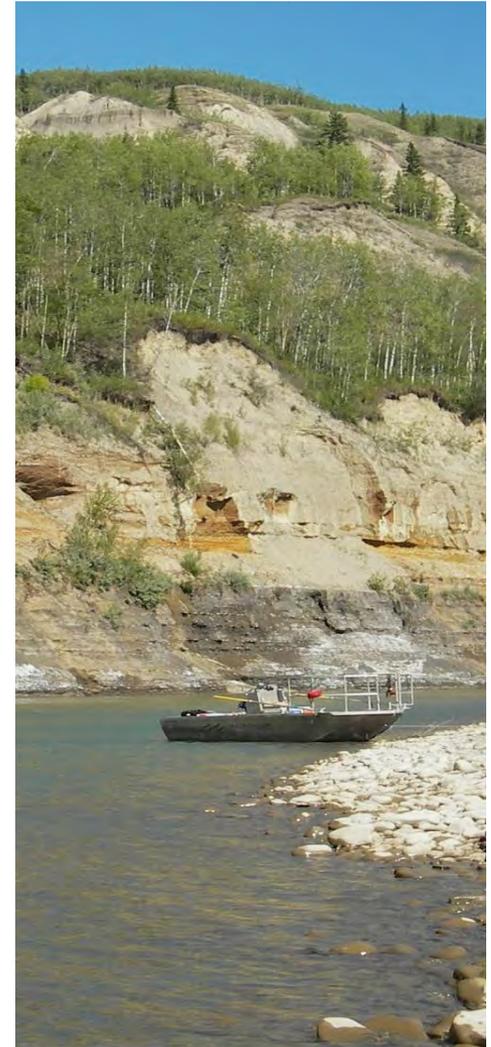
- Diverse resident fish community
- 31 species resident species
- Spatial distribution of fish follows habitat conditions



Fish and Aquatics

Key Issues and Related Study Areas:

- Fish habitat
- Fish populations
- Fish movement
- Aquatic Productivity
- Fish Passage
- Mercury



Wildlife and Vegetation

Current Setting:

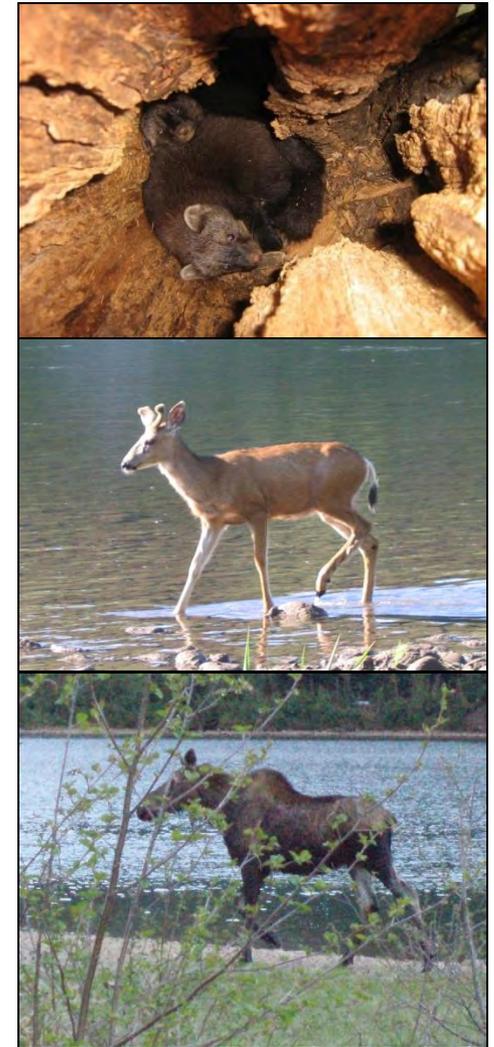
- Abundant and diverse wildlife populations
- Peace River Basin eco-region, Peace Lowlands (PEL) eco-section
- Biogeoclimatic zone: “Boreal White and Black Spruce “
- Valley bottom landscape modified by agricultural land use and upstream river regulation
- Ungulate winter range, high diversity of song birds



Wildlife

Key Issues and Related Study Areas:

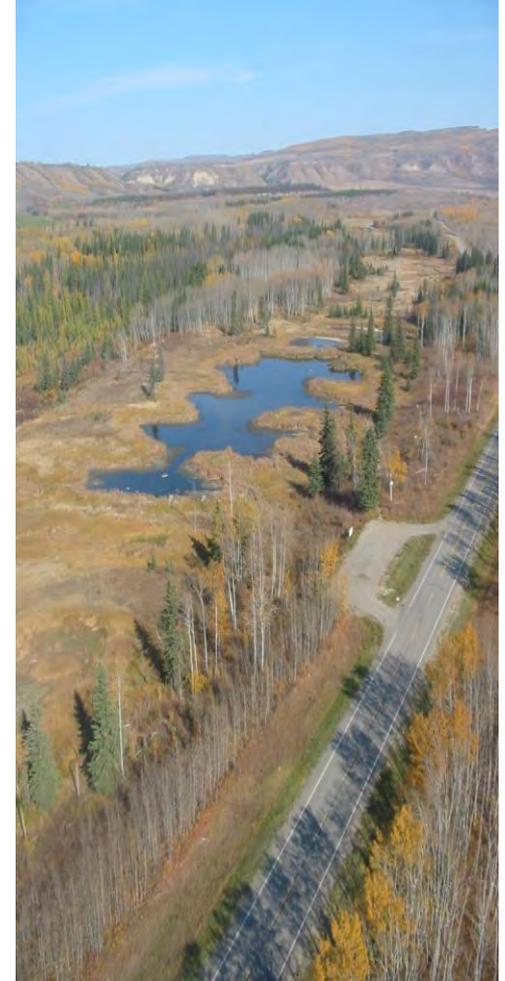
- Habitat
- Populations
- Habitat Use
- Migrations



Vegetation

Key Issues and Related Study Areas:

- Vegetation Community assessment
- Rare plant communities
- Invasive plant surveys
- Rare ecosystem features

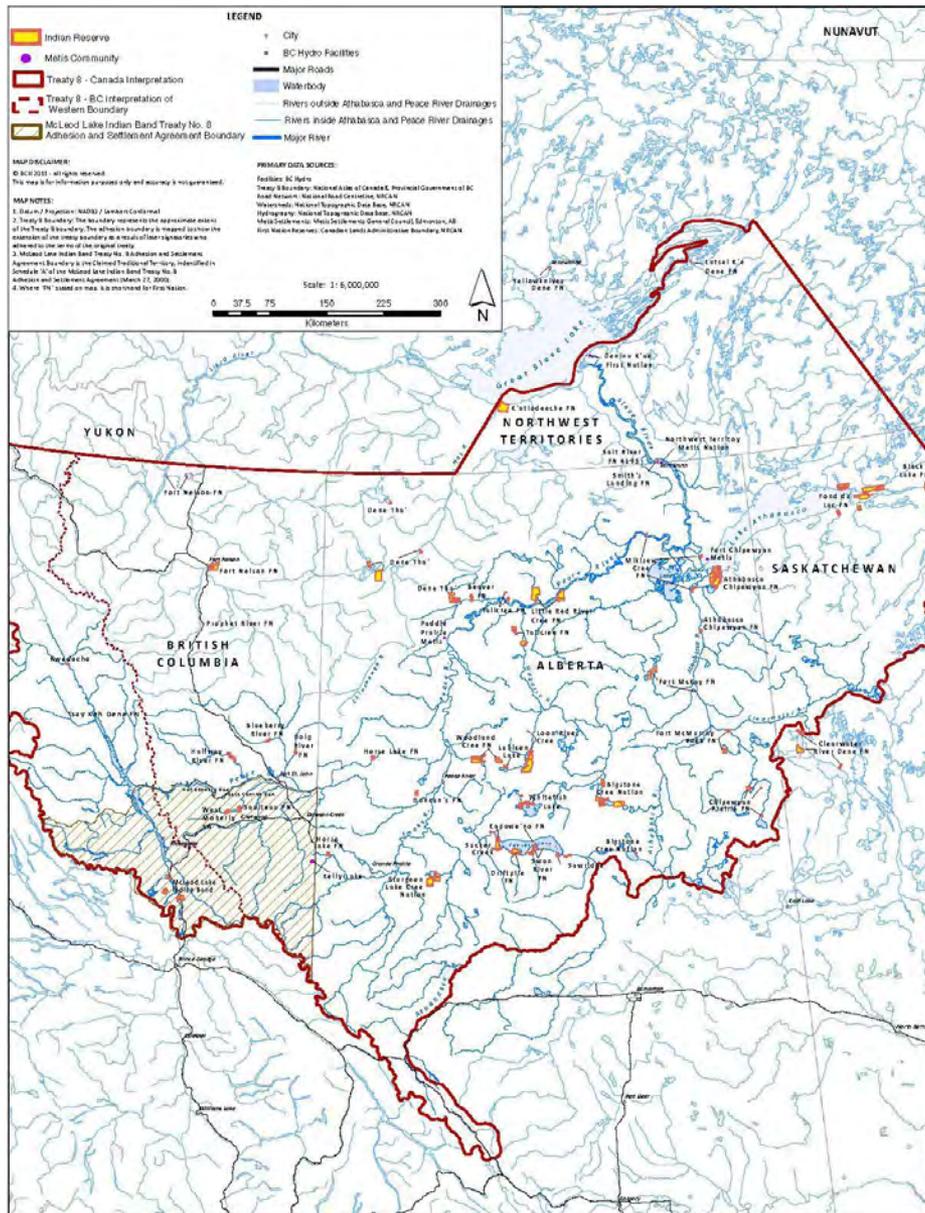


Consultation & Engagement

Aboriginal Groups
Public, Stakeholder and Property Owners
Government Agencies

Consultation and Engagement - Aboriginal

- Project lies within Treaty 8 territory
- Engagement ongoing with 51 Aboriginal groups
- Consultation with Aboriginal groups in the project area and downstream from the Project
- Project information provided to Treaty 8 First Nations located outside of the Peace or Slave River watersheds
- Objective of consultation: identify potential impacts of the project on section 35(1) rights and communities and work with Aboriginal groups to identify strategies to avoid, prevent, or mitigate impacts

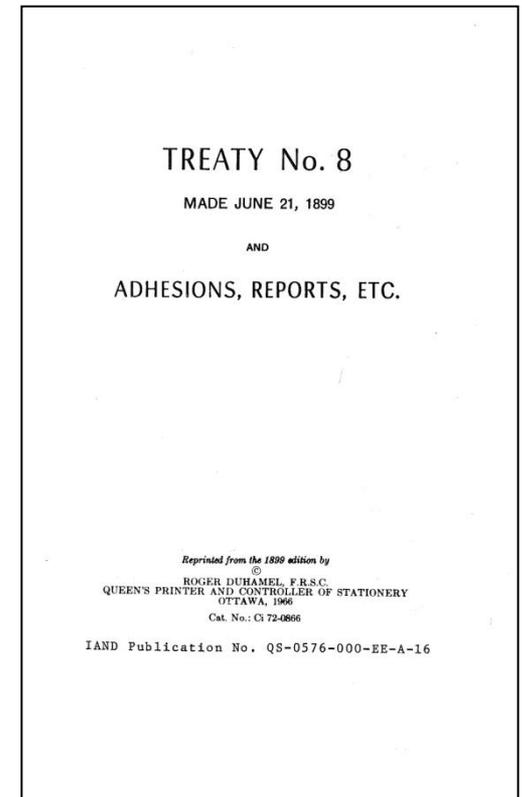


Consultation Agreements

- Under negotiation or concluded with First Nations located in and downstream of the project area and with two First Nations located at the north end of the Williston Reservoir
- Set out the agreed-upon funding, principles, processes and scope for Stage 3 consultations
- 8 agreements have been concluded, representing 11 First Nations
- Consultation topics may include:
 - Key project components
 - Development of the Draft Environmental Impact Statement (EIS) Guidelines
 - Ongoing baseline studies
 - Alternative site assessments
 - Development of the Environmental Impact Statement (EIS)

Traditional Studies

- BC Hydro has entered into a number of Traditional Land Use Study (TLUS) agreements with First Nations to carry out studies, to enable data sharing and to set out confidentiality
- TLUS data, where available, will be considered in effects assessment
- First Nations Opportunities Strategy has been developed with a focus on trades training, and procurement opportunities



Issues Identified during Stage 2:

- Potential impacts on section 35(1) rights and cultural and heritage resources
- Historic grievances
- Cumulative effects
- Short- and long-term employment and economic opportunities
- Effects on wildlife, fish, water quality and quantity
- Access to traditional hunting areas
- Energy conservation strategies, alternative energy sources
- Effect on existing infrastructure and local communities

Public and Stakeholder Consultation: Objectives

- To consult meaningfully with the public, stakeholders and property owners on impacts, benefits and features of the Site C project, consistent with BC Hydro's commitment to consultation
- To consider input – in combination with technical, environmental and economic analysis
- To keep communities, stakeholders and the public informed about the project and the many opportunities for public involvement

Stage 2: Consultation and Technical Review

- Three rounds of consultation
- Nearly 1,000 participants in each round
- 121 stakeholder meetings and open houses
- Consultation topics included:
 - Impact lines
 - Highway 29
 - Reservoir preparation
 - Energy resource options, and more
- Community Relations:
 - Consultation offices
 - Presentations, updates

CONTACT THE SITE C CLEAN ENERGY PROJECT

Your Name: _____

Date: _____

Your Comment or Inquiry: _____

Reply required: yes no

Your email and/or telephone#: _____



SITE C
CLEAN
ENERGY PROJECT



BC Hydro
FOR GENERATIONS

Stage 2 Consultation: Key Themes

- Consultation Summary Reports, all public meeting notes, available online
- Consideration Memos document consideration of input
- Key themes:
 - Avoiding or mitigating local impacts
 - Potential effects to air quality, water and agricultural land
 - Energy conservation and other alternatives to Site C including other renewable electricity sources (e.g., wind, solar, biomass and geothermal)
 - Potential benefits such as jobs, skills training, upgrades to local and regional infrastructure

Stage 3 Consultation

- Environmental Assessment Public Comment Periods (led by regulators)
- Additional BC Hydro-led consultations will include:
 - Regional and Local Government Liaison
 - Property Owner Consultation & Liaison
 - Local Area Consultations, i.e. Hudson's Hope Berm Options Fall 2011
 - Preliminary Design Consultation, 2012
 - Highway 29
 - Recreation
 - Reservoir preparation
 - Worker Housing
 - Construction Access Roads
 - Agriculture



Opportunities for Input

- Range of consultation methods will be used:
 - Community Consultation Offices
 - Website
 - Public enquiries
 - Stakeholder meetings
 - Open houses
 - Print and online feedback forms
 - Written submissions
- For more info:
www.bchydro.com/sitec

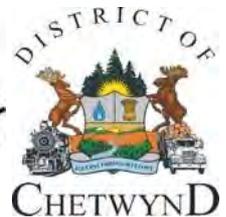


Regional and Local Government Engagement

- Regional and Local Government Liaison Committee
 - Committee, chaired by BC Hydro Executive Vice President, with representation from region's mayors and regional district directors
- Local Government Technical Engagement
 - Individual, staff-level committees with each regional, local government
 - Capacity funding provided
- Updates to councils



District of Taylor



PEACE RIVER REGIONAL DISTRICT

Ongoing Public Notification

- Monthly Field Studies Summary
- Field Studies Information Sheet
- Study updates
- Project updates
- Media relations

Available at:

- www.bchydro.com/sitec
- Community Consultation Offices - Hudson's Hope and Fort St. John
- Hudson's Hope Bulletin

SITE  CLEAN ENERGY PROJECT

MONTHLY FIELD STUDIES SUMMARY

September 2011

The Site C Clean Energy Project (Site C) is now in Stage 3, the environmental and regulatory review phase, which will include an independent environmental assessment. Stage 3 work includes conducting environmental and engineering field studies on and around the Peace River between the Williston Reservoir and the Alberta border.

An overview of studies that will be taking place in September 2011 is below. Additional study activities may occur; notice of these studies will be posted at www.bchydro.com/sitec.

Overview
Socio-Economic Studies
<ul style="list-style-type: none"> • Socio-Economic Assessment • Agricultural Assessment Study • Heritage Study Program • Reservoir Clearing Plan Investigations
Fish and Aquatic Studies
<ul style="list-style-type: none"> • Peace, Moberly and Halfway River Fish Movement • Peace, Moberly and Halfway River Fish Inventories • Peace River Aquatic Productivity and Modeling Study
Wildlife Studies
<ul style="list-style-type: none"> • Beaver Study • Small Mammal Study • Habitat and Mapping Ground Surveys • Fisher Study Program • Mule Deer, Moose and Elk Study Program • Garter Snake Hibernaculus Study
Vegetation Assessment
<ul style="list-style-type: none"> • Rare Plant Study
Physical Environment Studies
<ul style="list-style-type: none"> • Geomorphology, Bathymetry and Sediment Transport Studies • Climate and Air Quality Monitoring
Engineering Investigations
<ul style="list-style-type: none"> • Dam Site Investigations • Reservoir Shorelines and Highway 29 Investigations • Highway 29 Surveys • Construction Access Roads

BC Hydro will require the use of helicopters for some engineering and environment field studies this summer. Some field studies may require access to public and private land. BC Hydro will obtain permission before accessing private property and will notify property owners who may be directly impacted by helicopters. Ongoing regular BC Hydro work, in addition to the Site C field study activities outlined here, may be taking place on the Peace River and tributaries. This work is related to BC Hydro's Peace River water license requirements program or other operations work.

Field study updates 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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Next Steps

Next Steps

- Review and evaluate Draft BC Canada Agreement for EA process
- Prepare and file draft Environmental Impact Statement (EIS) Guidelines

www.bchydro.com/sitec