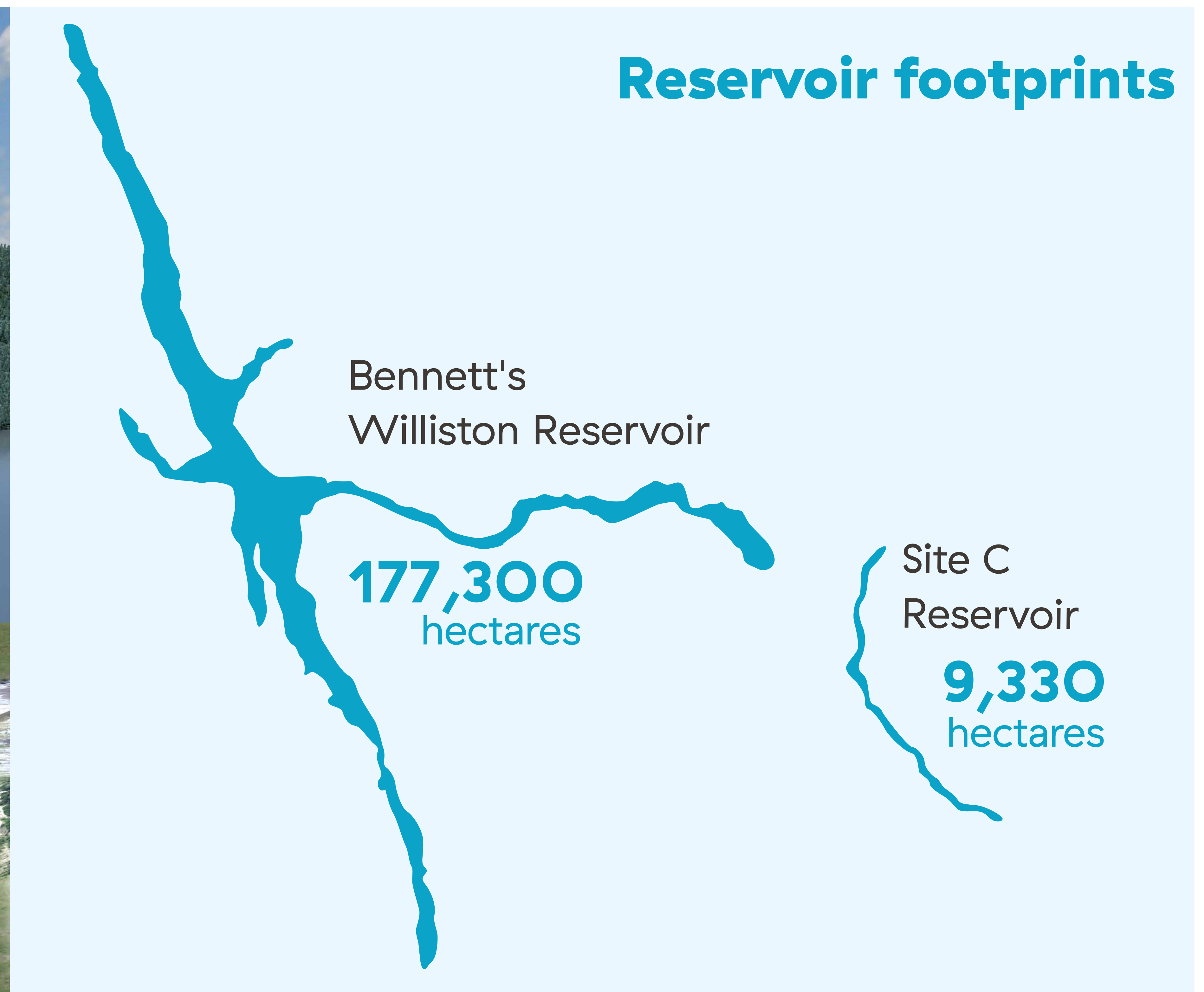
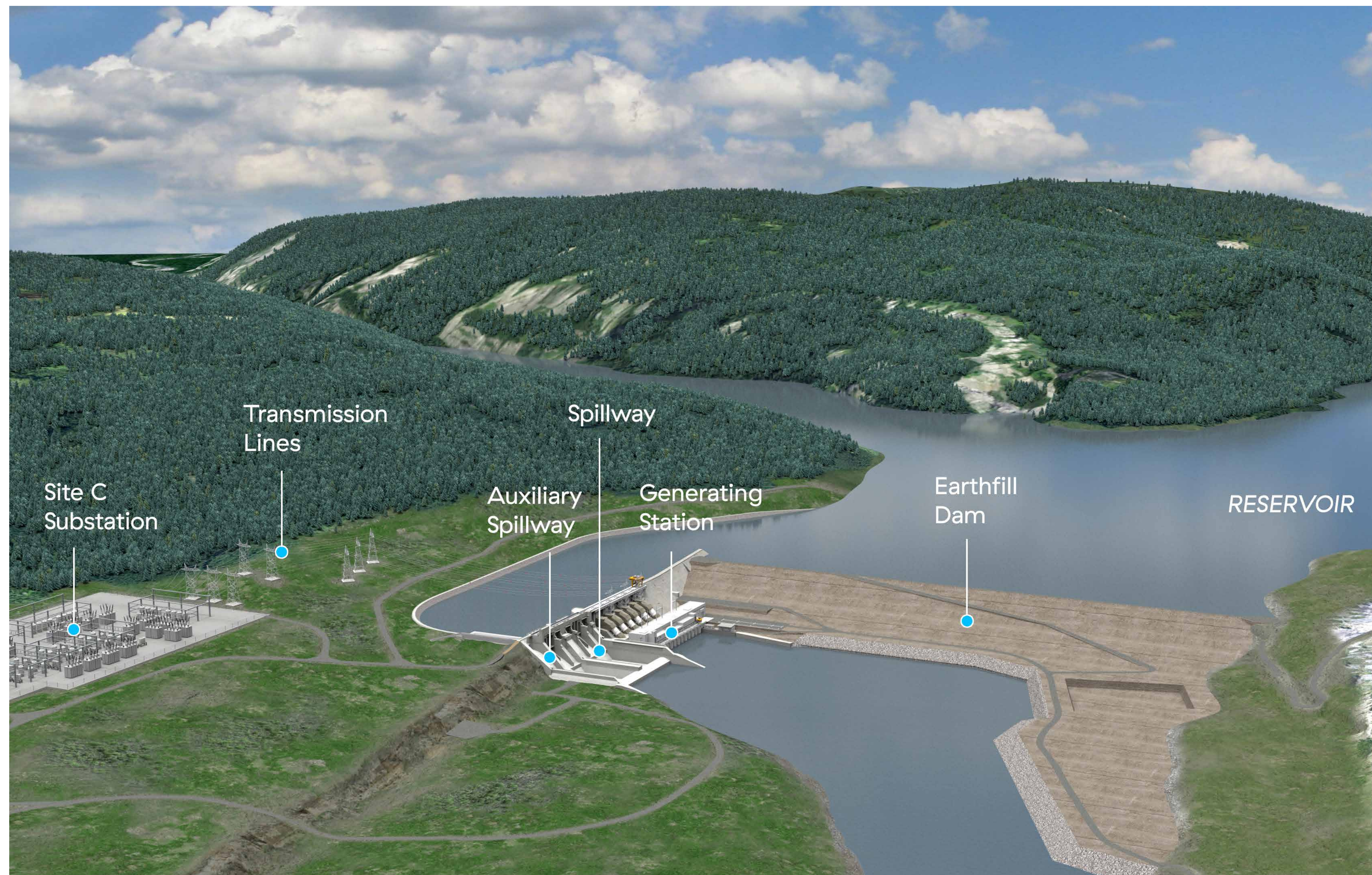


# Overview of the Site C project

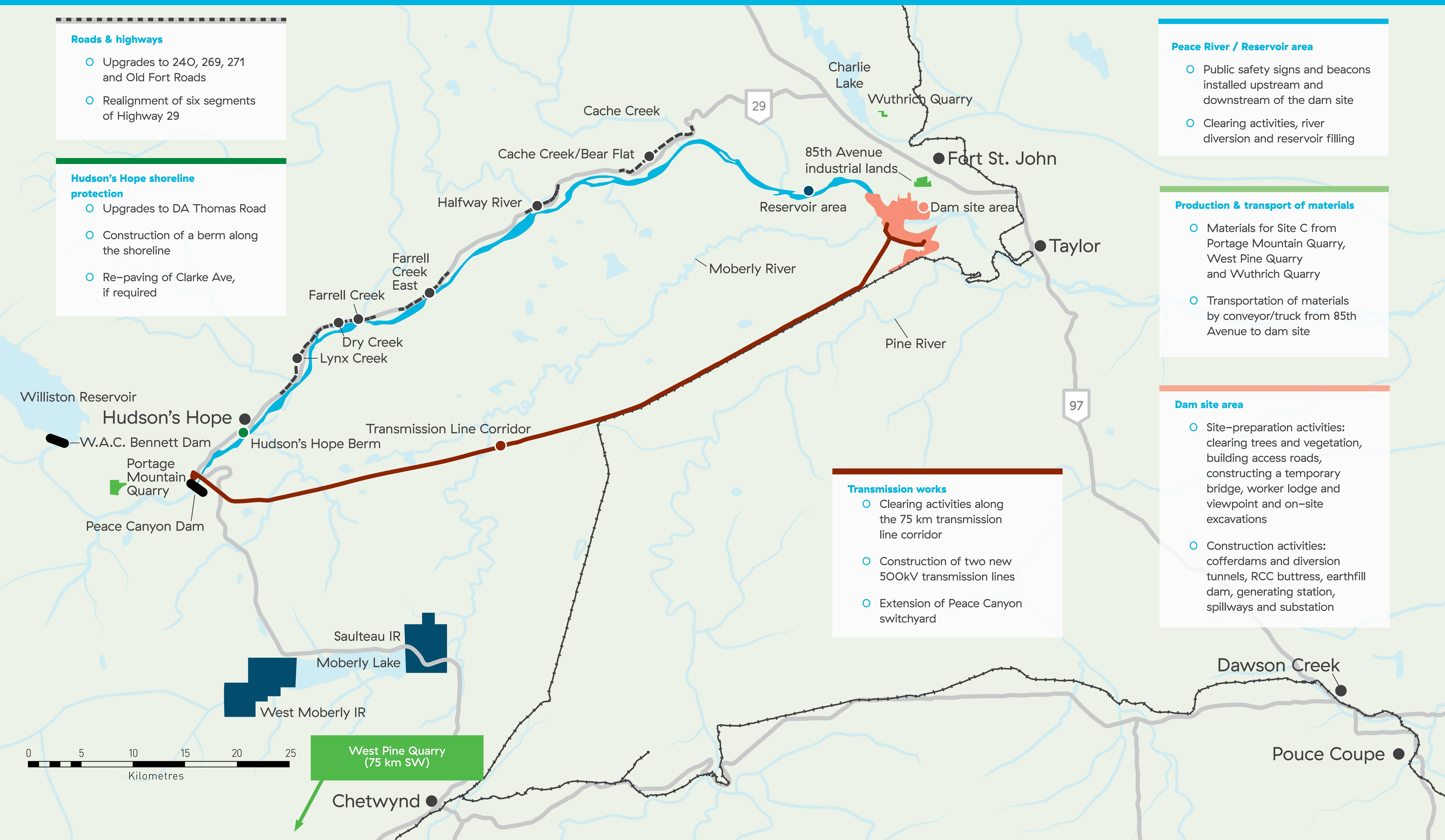
Site C is the third dam on the Peace River and, once complete, will be one of the many hydroelectric dams that BC Hydro owns and operates throughout the province. The project received approval after a rigorous three-year environmental assessment by the provincial and federal government, with an independent joint review panel. Construction started in July 2015 and the first unit will be in service in 2024.

The Site C project builds on BC Hydro's existing system. Because it uses water already in the Williston Reservoir, Site C will generate 35% of the electricity of the WAC Bennett Dam, using a reservoir only 5% of the size. Once it is built, the Site C generating station will produce 5,100 gigawatt hours of clean electricity every year, enough to power 450,000 homes in B.C.





# Building the Site C Clean Energy Project



## Roads & highways

- Upgrades to 240, 269, 271 and Old Fort Roads
- Realignment of six segments of Highway 29

## Hudson's Hope shoreline protection

- Upgrades to DA Thomas Road
- Construction of a berm along the shoreline
- Re-paving of Clarke Ave, if required

## Peace River / Reservoir area

- Public safety signs and beacons installed upstream and downstream of the dam site
- Clearing activities, river diversion and reservoir filling

## Production & transport of materials

- Materials for Site C from Portage Mountain Quarry, West Pine Quarry and Wuthrich Quarry
- Transportation of materials by conveyor/truck from 85th Avenue to dam site

## Dam site area

- Site-preparation activities: clearing trees and vegetation, building access roads, constructing a temporary bridge, worker lodge and viewpoint and on-site excavations
- Construction activities: cofferdams and diversion tunnels, RCC buttress, earthfill dam, generating station, spillways and substation

## Transmission works

- Clearing activities along the 75 km transmission line corridor
- Construction of two new 500kV transmission lines
- Extension of Peace Canyon switchyard



# Project Schedule

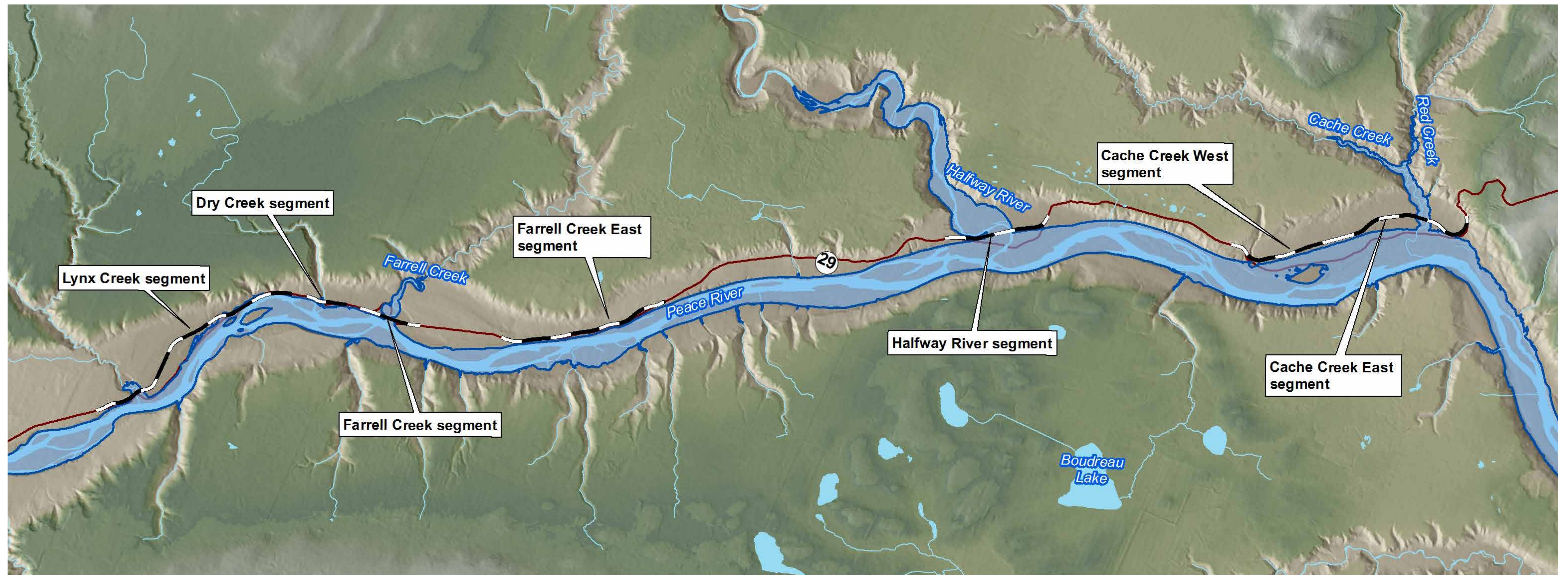
Construction Activity	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																
<b>Dam Site Area</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
Clearing: dam site	■																																																											
Access roads at the dam site	■				■																																																							
Worker accommodation	■																																																											
Peace River construction bridge	■																																																											
Excavation and material relocation	■				■				■				■				■				■				■				■				■				■				■				■				■											
Cofferdams and diversion tunnels					■				■				■				■				■				■				■				■				■				■				■				■											
Earthfill dam													■				■				■				■				■				■				■				■				■				■											
Roller-compacted-concrete buttress									■				■				■				■				■				■				■				■				■				■				■											
Generating station and spillways													■				■				■				■				■				■				■				■				■				■											
Turbines and generators									■				■				■				■				■				■				■				■				■				■				■											
Substation													■				■				■				■				■				■				■				■				■				■											
Powerhouse transmission lines																									■				■				■				■				■				■				■											
Viewpoint construction/landscaping					■				■																																																			
Demobilization and site reclamation																																	■				■				■				■				■											
<b>Roads and Highways*</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
Public road improvements																																																												
240 Road	■																																																											
269 Road	■				■																																																							
271 Road					■				■																																																			
Old Fort Road	■				■																																																							
Highway 29 realignment																																																												
Cache Creek West													■				■				■				■				■				■				■				■				■															
Cache Creek/Bear Flat																	■				■				■				■				■				■				■				■															
Halfway River																	■				■				■				■				■				■				■				■															
Dry Creek																	■				■				■				■				■				■				■				■															
Farrell Creek																					■				■				■				■				■				■				■															
Farrell Creek East																					■				■				■				■				■				■				■															
Lynx Creek																	■				■				■				■				■				■				■				■															
<b>Peace River / Reservoir Area*</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
Clearing: Lower reservoir and Moberly Drainage	■				■				■				■				■				■				■				■				■				■				■				■															
Clearing: Eastern reservoir													■				■				■				■				■				■				■				■				■															
Clearing: Middle reservoir													■				■				■				■				■				■				■				■				■															
Clearing: Western reservoir																	■				■				■				■				■				■				■				■															
River diversion																	■				■				■				■				■				■				■				■															
Reservoir filling and operations																																	■				■				■				■															
<b>Transmission Works*</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
Transmission line clearing													■				■				■				■				■				■				■				■																			
Transmission line construction													■				■				■				■				■				■				■				■																			
Extension of Peace Canyon switchyard									■				■				■				■				■				■				■				■				■																			
<b>Hudson's Hope Shoreline Protection</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
Hudson's Hope Berm/DA Thomas Road upgrades																					■				■				■				■				■				■																			
<b>Production &amp; Transport of Materials</b>	2015				2016				2017				2018				2019				2020				2021				2022				2023				2024				2025																			
85th Avenue Industrial Lands									■				■				■				■				■				■				■				■																							
Portage Mountain Quarry													■				■				■				■				■				■				■																							
West Pine Quarry					■				■				■				■				■				■				■				■				■																							
Wuthrich Quarry	■				■				■				■				■				■				■				■				■				■																							

The construction schedule is indicative only and subject to change. The purpose of the schedule is to illustrate the general sequence of construction activities, but the dates and schedule may change.

\* Timelines do not include site preparation or wood disposal.



# Highway 29 overview



Connecting the community of Hudson's Hope with the Alaska Highway and Fort St. John, Highway 29 winds along the north side of the Peace River in northeastern B.C.

When reservoir filling begins in September 2023, the Site C reservoir will widen the Peace River by two-to-three times, covering parts of the highway.

As a result, BC Hydro is partnering with the Ministry of Transportation and Infrastructure to realign six segments of Highway 29. This project will also improve safety for drivers by reducing the grades and curves on the highway. Construction started in 2018 and will continue until mid-2023.

The work involves designing and building 32 km of highway, including new bridges at Cache Creek, Dry Creek, Lynx Creek, and Halfway River.

During construction the highway will remain open with traffic control measures in place. Drivers may experience intermittent delays of up to 30 minutes.

Emergency vehicles will be prioritized.

Work on the highway alignments will occur 24 hours a day, 7 days a week.

Visit [drivebc.ca](https://drivebc.ca) for regular traffic updates.



# Cache Creek East

At Cache Creek East, the new reservoir will cover the existing highway, requiring us to build a new highway alignment and a new bridge across Cache Creek. Cache Creek will be temporarily redirected while we build the bridge.

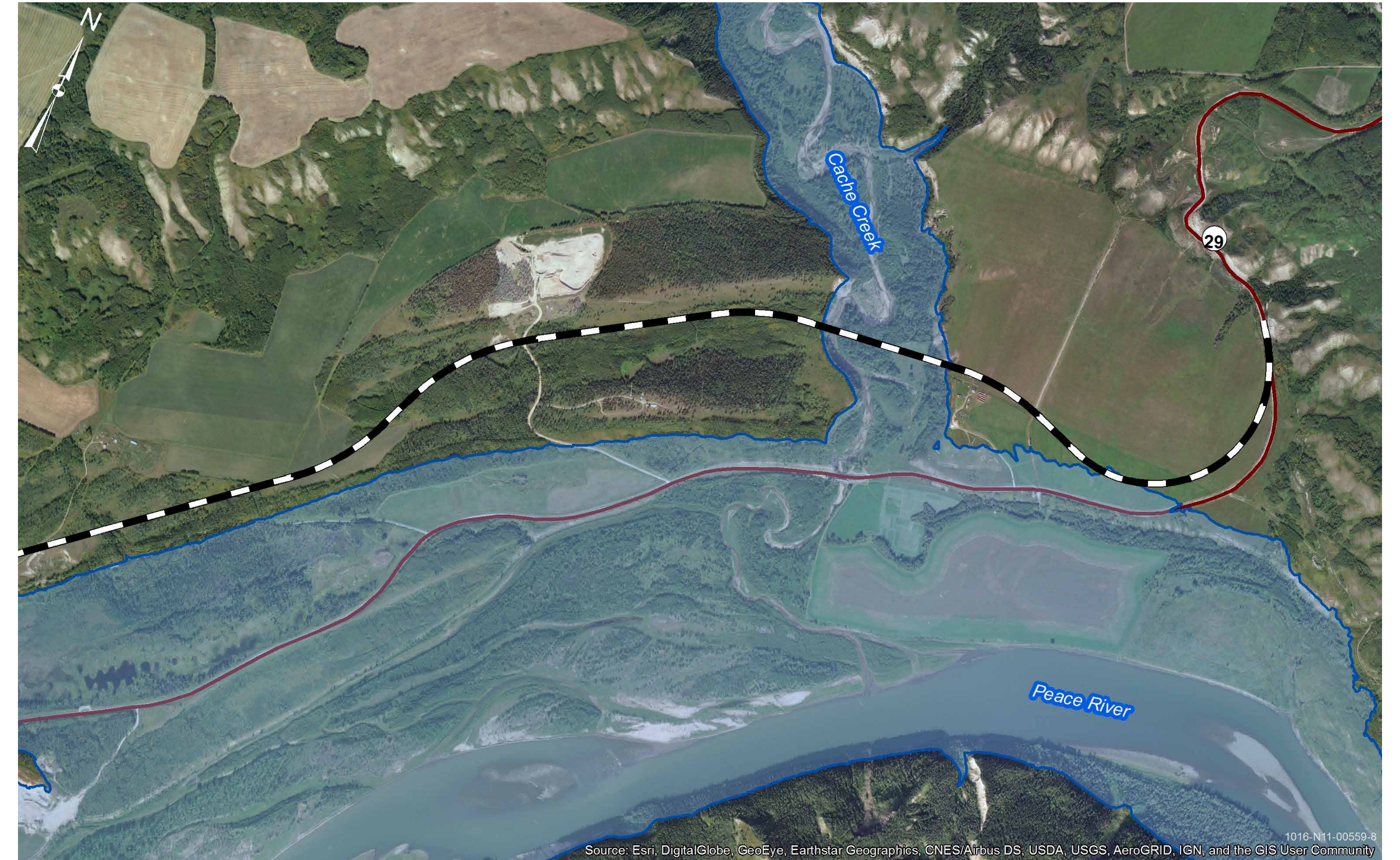
We began work on Cache Creek East in 2018 with archaeological studies and vegetation removal. We are currently building an embankment on the eastern portion of the segment.

Current activities

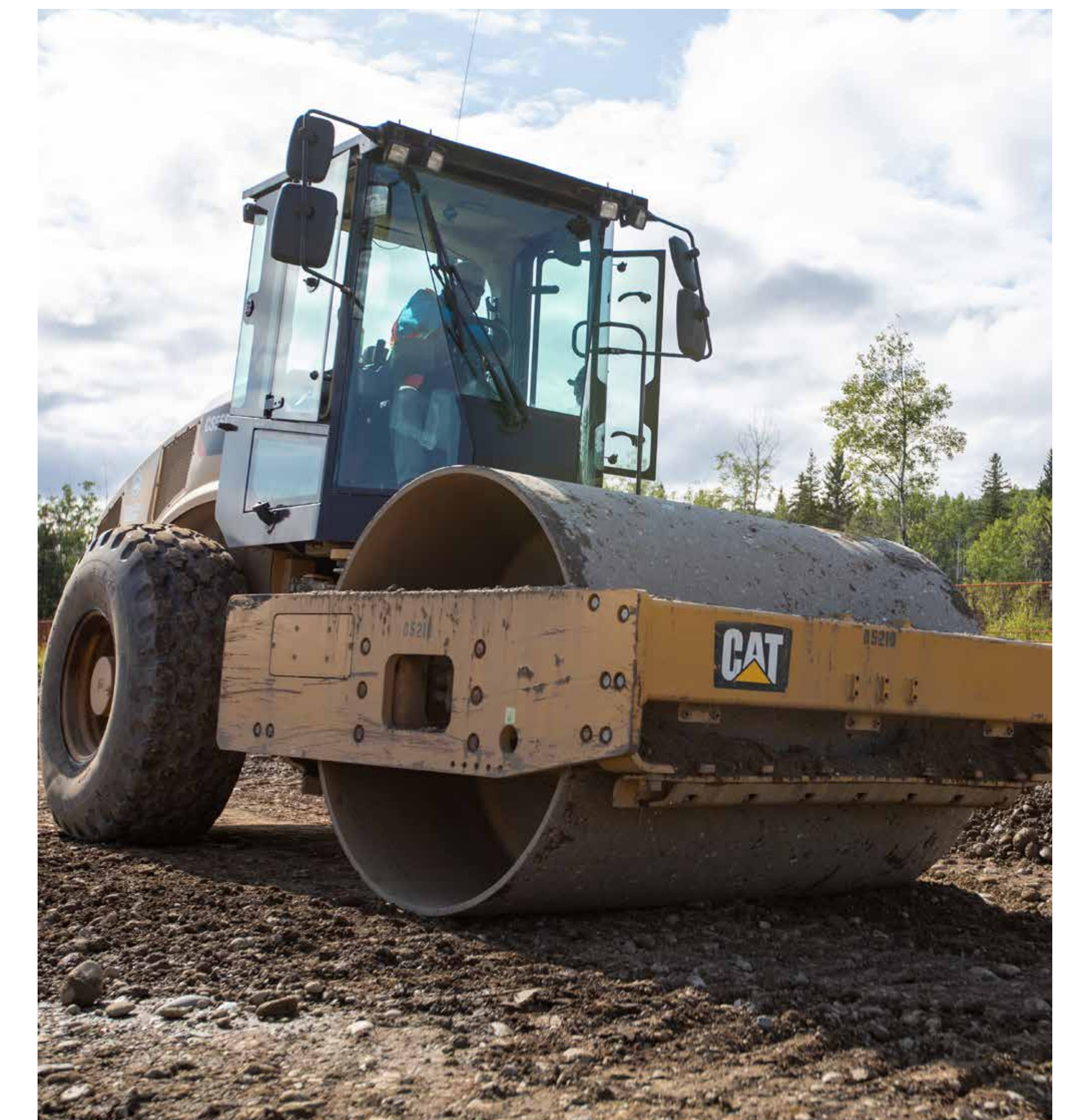
- Excavation, placing and grading granular materials
- Removing vegetation and debris

**Segment length:** 9 km

**Construction:** 2019 to 2023



Archaeologists take part in field studies.





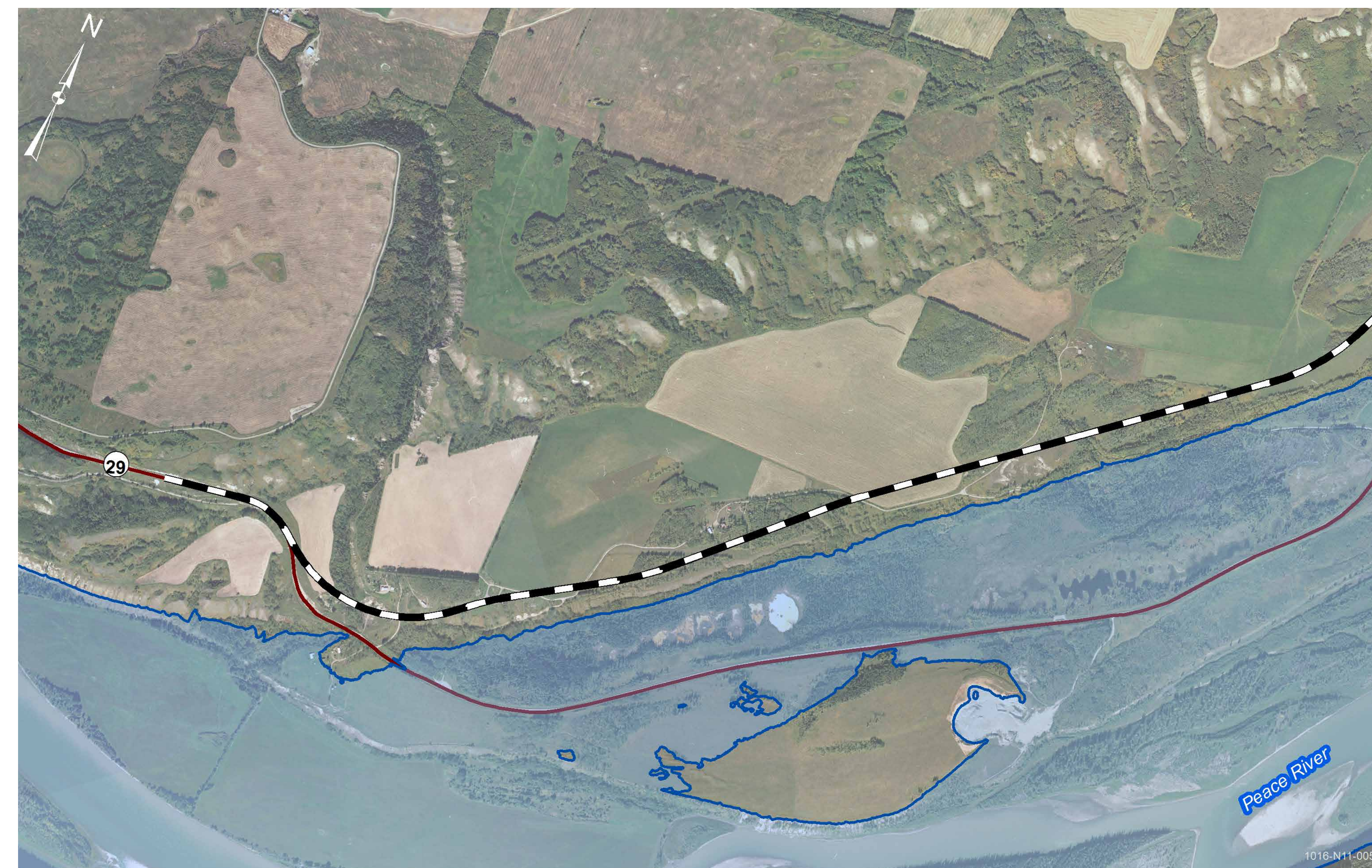
# Cache Creek West

Beginning in late 2018, Cache Creek West was the first segment of Highway 29 to start construction. This four-kilometre stretch of highway west of the Cache Creek Bridge is being moved north to prepare for reservoir filling in September 2023.

Currently, we are grading the new highway and installing drainage works in preparation for paving in the spring.

**Segment length:** 4 km

**Construction:** 2018 to 2020



A multi-plate culvert is being installed.





# Lynx Creek

**Segment length:** 8 km

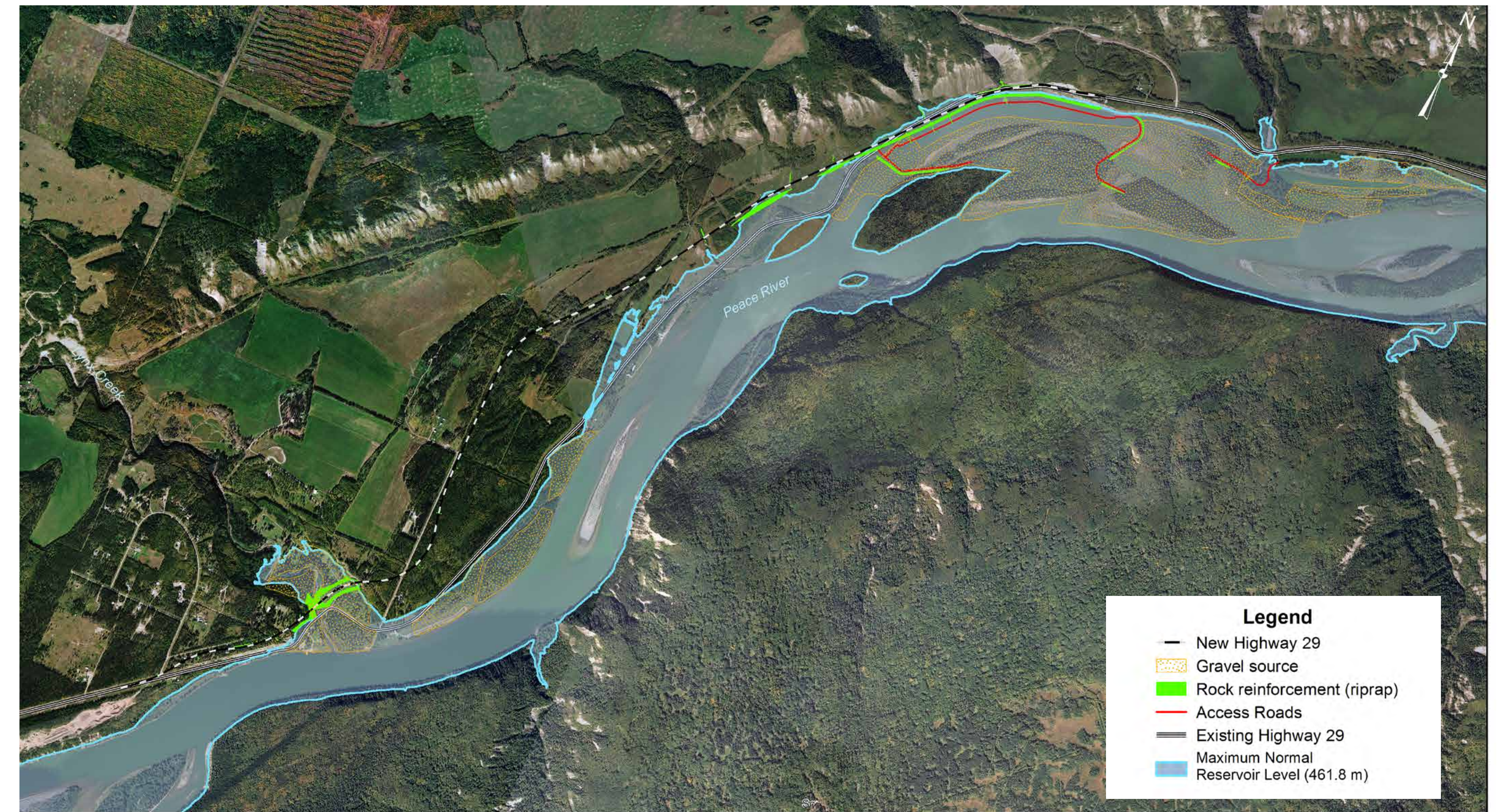
**Construction:** 2019 to 2023

As the longest section of highway to be realigned, it will take four years to build the Lynx Creek segment. These eight kilometres of highway include a new bridge, causeway, and embankment. Construction will start in December 2019.

Construction will start in December 2019.

Building this segment of highway is complex.

1. Construction begins by clearing vegetation from the work area.
2. Next, we'll need to build causeways from the existing highway on to several islands in the Peace River near Lynx Creek.
3. Then, we'll clear vegetation from the islands as part of our reservoir clearing program. These islands also provide a source of gravel, which we will excavate and use for building the nearby highway alignment. This gravel source will continue to be used for the duration of the Highway 29 project.
4. Last, we'll build fish habitat enhancements to encourage the growth of algae and plants, which provide shelter and nutrients for many aquatic animals.



Construction of similar causeway for clearing.



# Halfway River

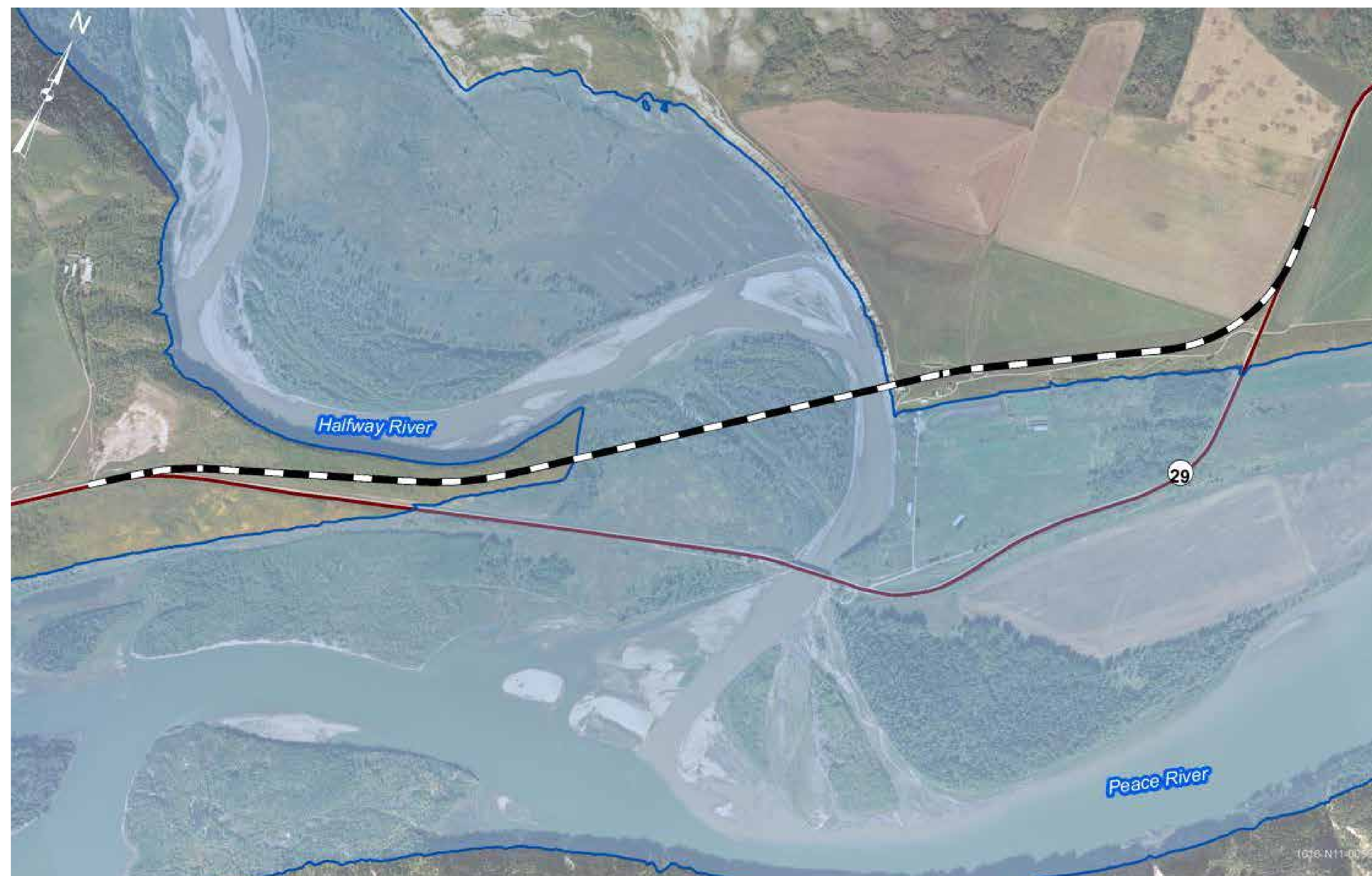
**Segment length:** 4 km

**Construction:** 2019 to 2022

In the Halfway River area, the reservoir will cover the existing highway and bridge, requiring re-alignment of the highway and construction of a new bridge. This new segment of highway will be three kilometres long, and the new bridge will be one kilometre long.

Construction at Halfway River begins in late 2019. This includes:

- The contractor bringing equipment and materials to site
- Riprap and gravel being hauled to site and stockpiled





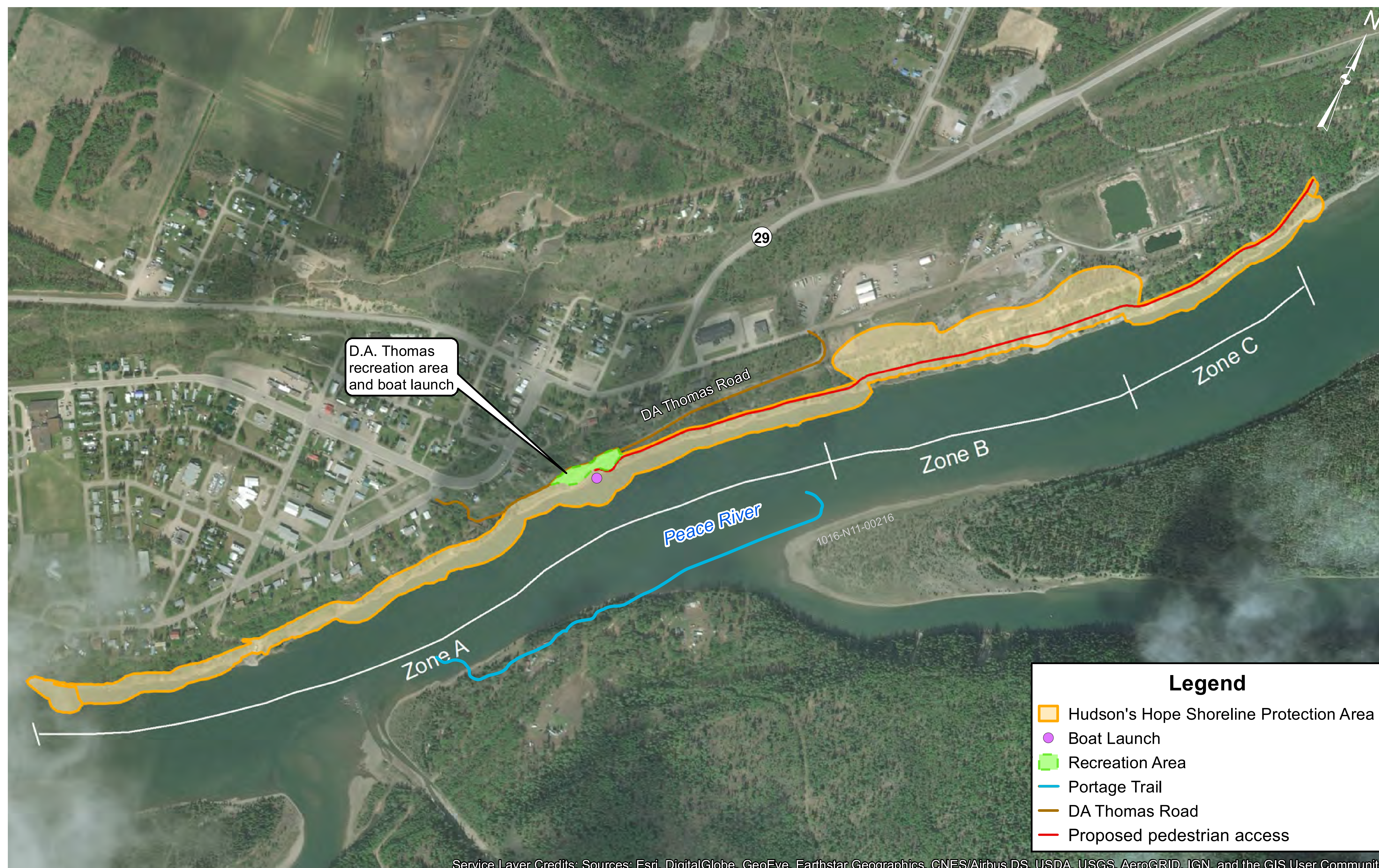
# Protecting the shoreline

The Site C project will create a new reservoir, which will result in changes to the shoreline at Hudson's Hope. Shoreline erosion, combined with changes in groundwater conditions, could cause the banks to recede in the lower slopes below the community.

To protect against this, we are building 2.5 kilometres of shoreline protection. This will consist of a berm, a large earth-and-rock-filled barrier.

It's important to note that while the berm will protect the shoreline from instability caused by the new reservoir, it cannot address pre-existing conditions in the upper slopes.

Shoreline protection will begin at the western end of Hudson's Hope, and extend downstream past the municipal sewage treatment facility. The typical height of the berm will be approximately 20 metres lower than the top of the slope, in most areas.

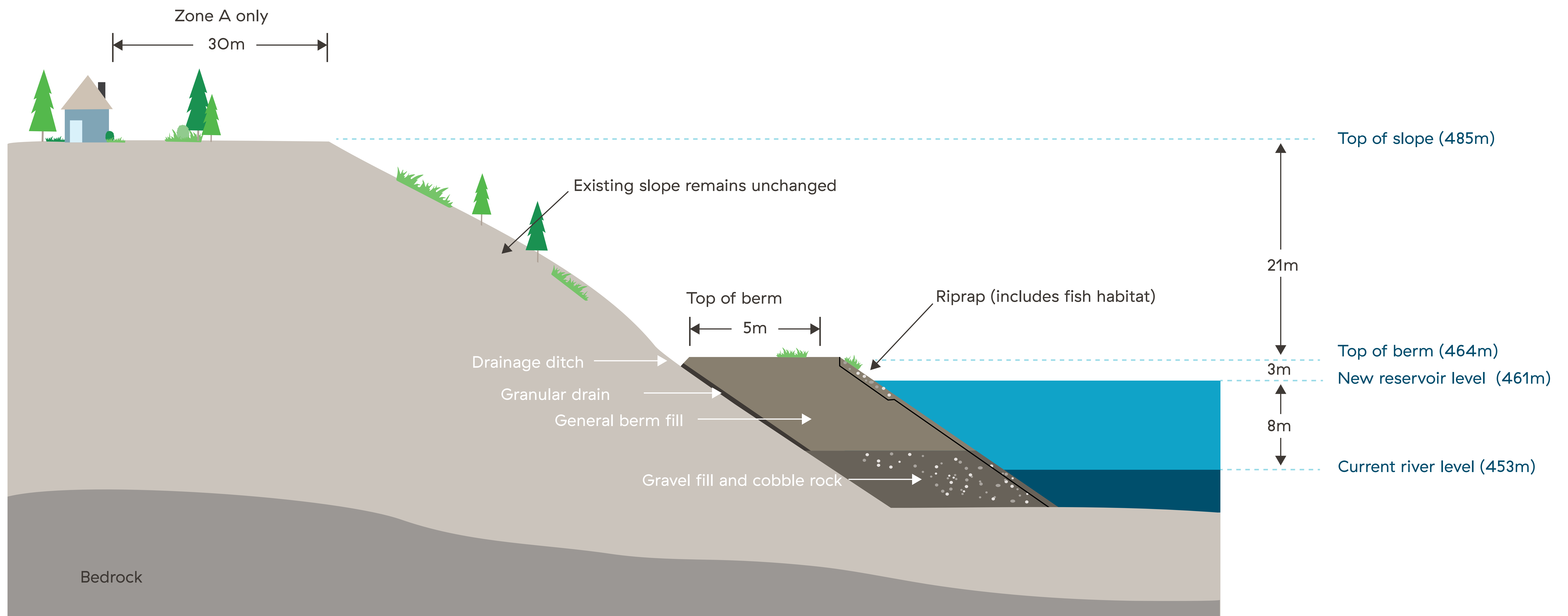


Service Layer Credits: Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Location	Type of shoreline protection
<b>Zone A:</b> Below the residential area and extends just downstream of the hotel on Clarke Ave	1,650 metre berm
<b>Zone B:</b> Below the light industrial land	550 metre berm and material removal
<b>Zone C:</b> Below the municipal sewage treatment lagoons	450 metre berm



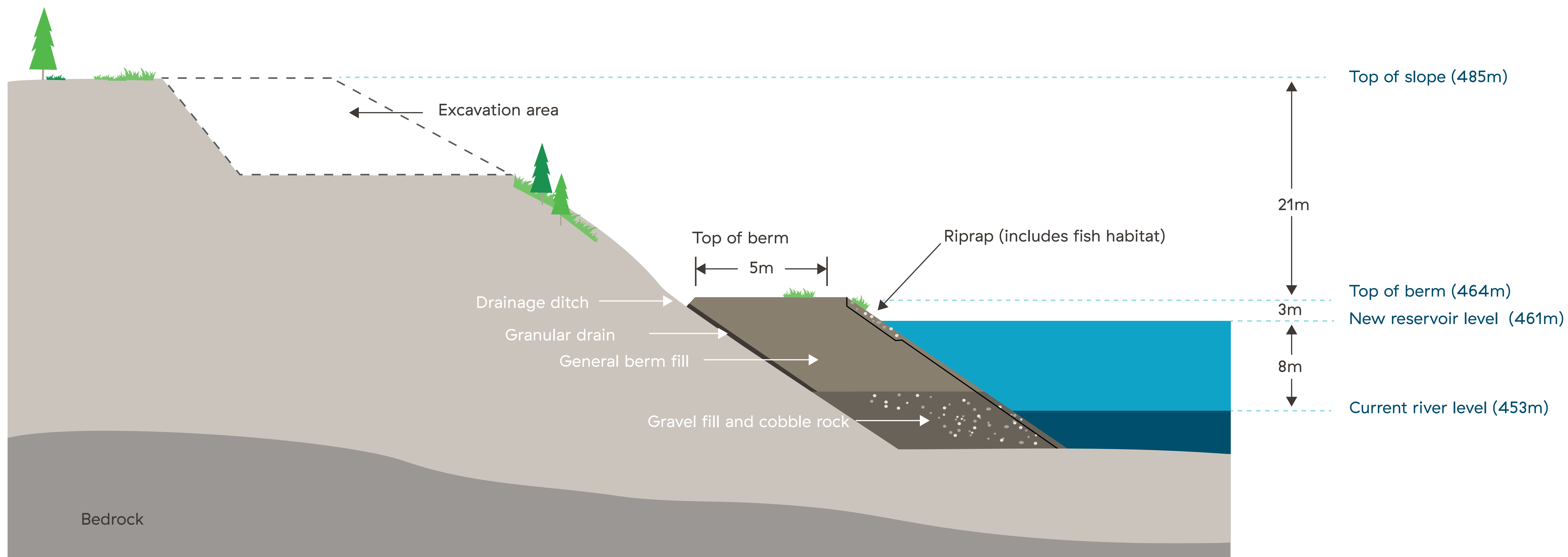
# Cross-section for Zone A and Zone C



\*Measurements are approximate



# Cross-section for Zone B



\*Measurements are approximate

The new design for Zone B uses surplus material from nearby Portage Mountain Quarry to build a continuous berm along the entire shoreline. This is a more efficient and cost-effective option, as it reduces the amount of material being excavated and processed on site.

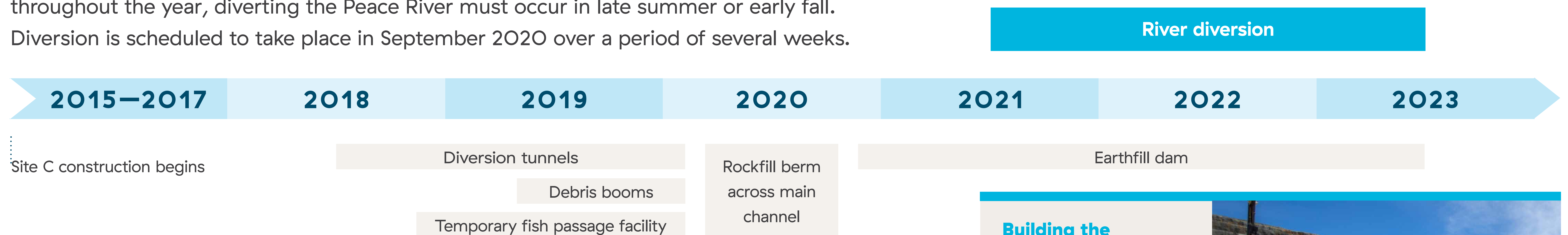


# River diversion

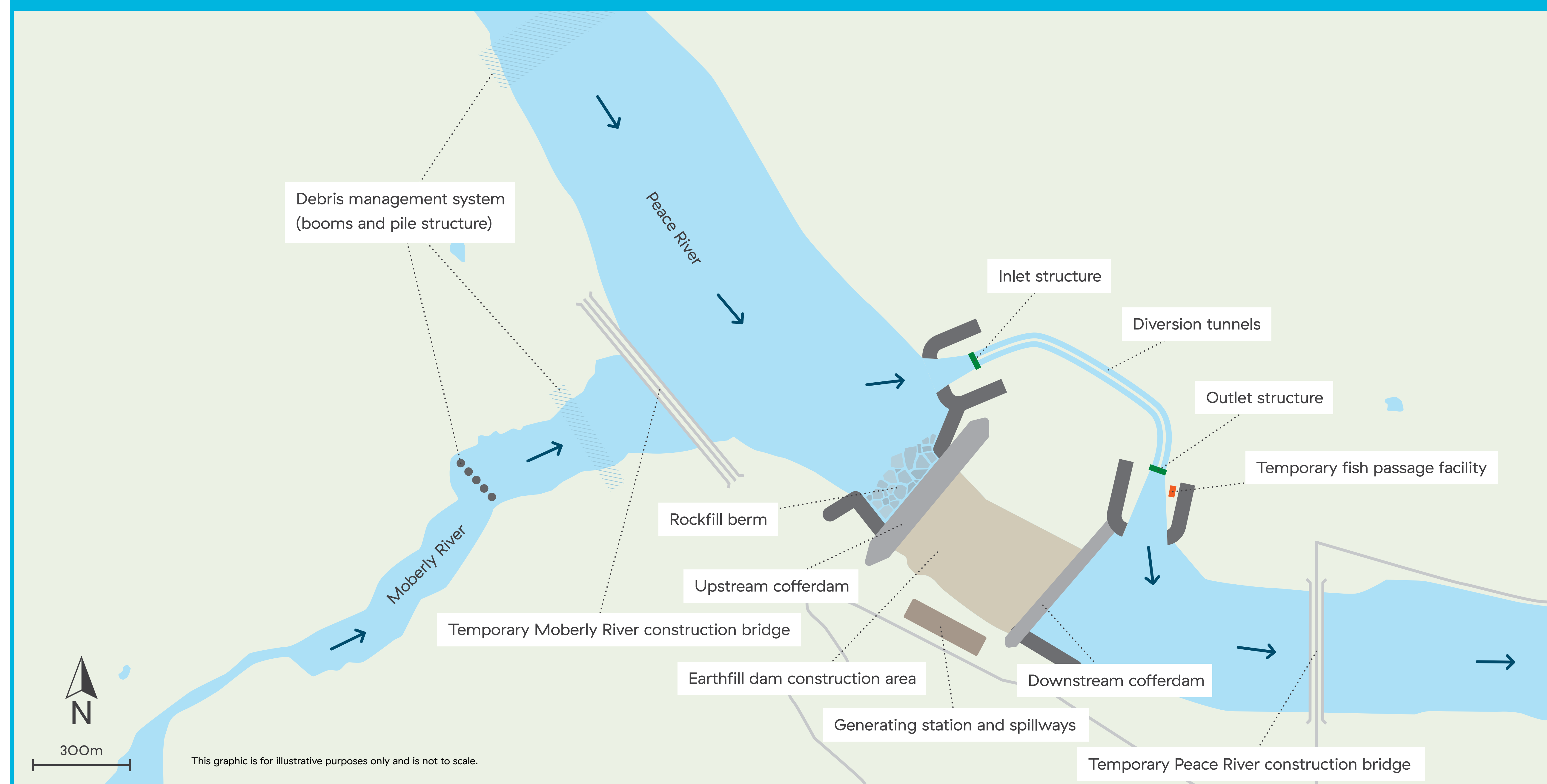
One of the most important steps in building Site C is to reroute a short section of the Peace River during construction. Diverting the river allows us to build the earthfill dam on dry land across the main river channel, while keeping the river flowing. Diverting the river may result in a small rise in water level between the dam site and Halfway River. This will only occur in rare situations when the river is particularly high. River diversion will not have any impacts on Hudson's Hope.

## Construction timeline

Due to fluctuating river flows and the changing needs of our upstream generating facilities throughout the year, diverting the Peace River must occur in late summer or early fall. Diversion is scheduled to take place in September 2020 over a period of several weeks.

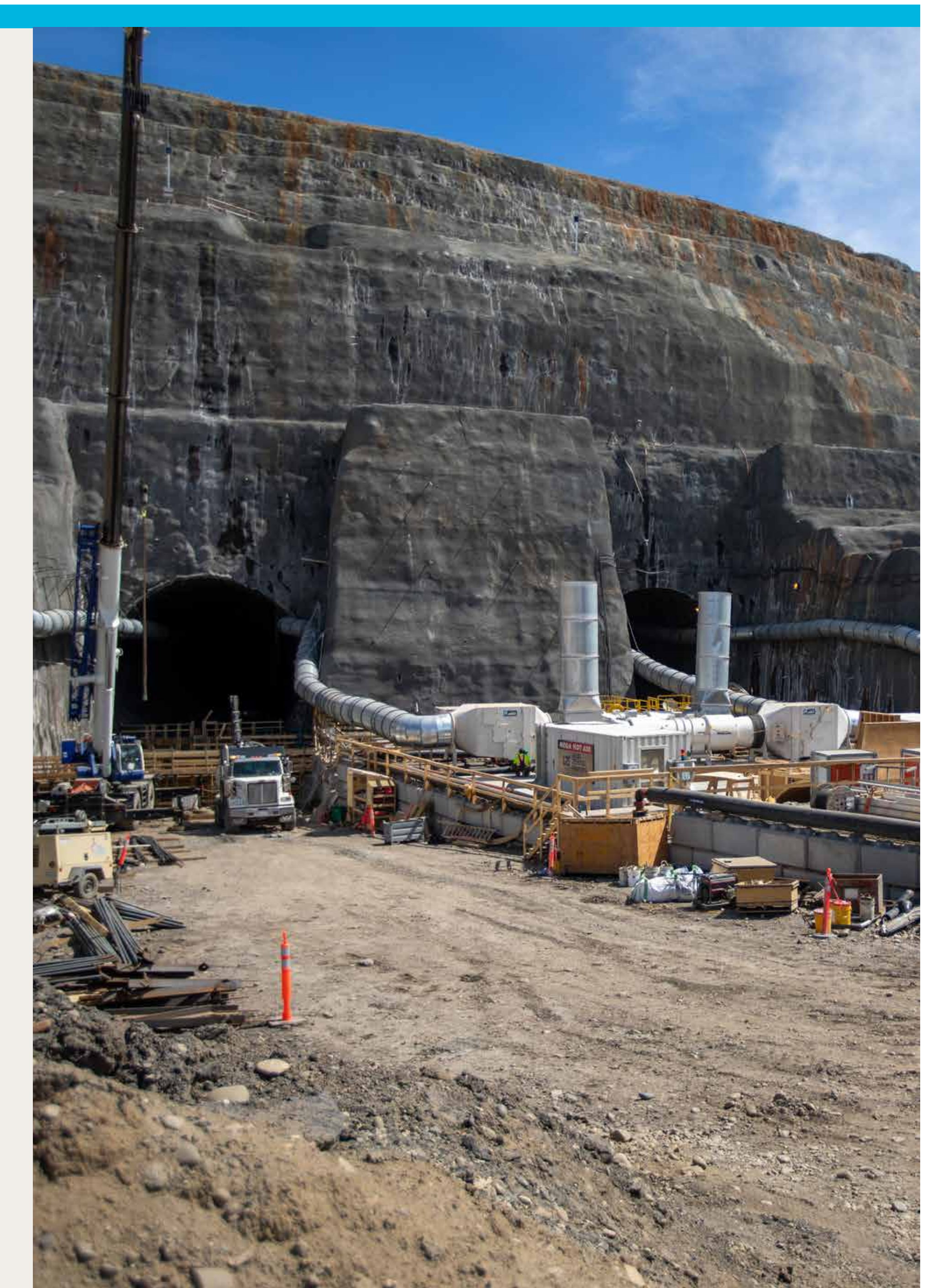


### Site C river diversion—Upstream and downstream cofferdam construction



### Building the diversion tunnels

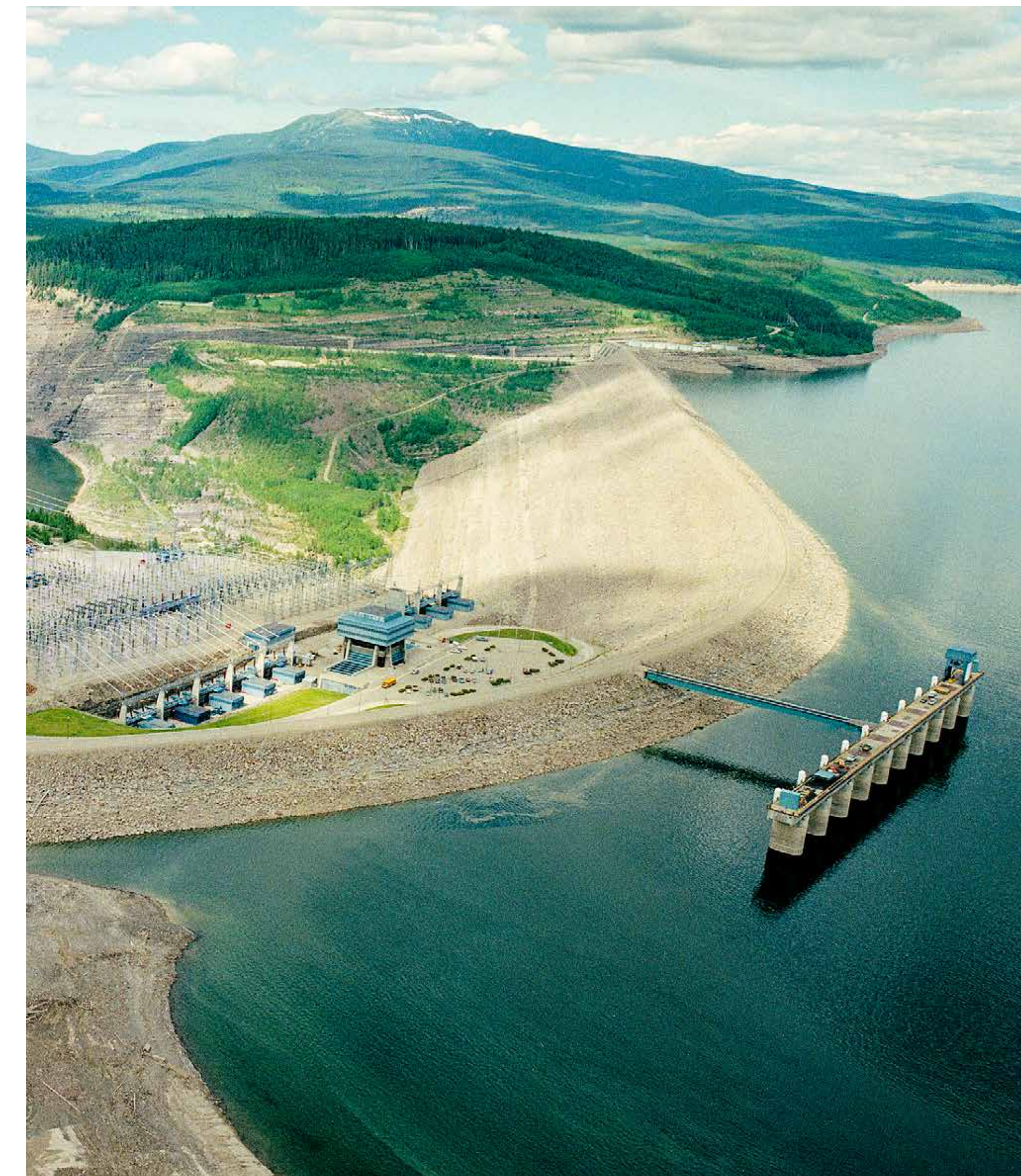
Preparations began in 2018 when we started excavating two diversion tunnels on the north bank of the Peace River. Measuring approximately 750 m long and 11 m wide, the tunnels will eventually be able to pass 3,000 m<sup>3</sup> of water a second. We expect to complete the diversion tunnels in early 2020.





# Williston Reservoir operations during Site C river diversion

- We manage our Williston and Dinosaur reservoirs under the Peace Water Use Plan, which balances water uses – including fish and wildlife, recreation, heritage, flood risk management, industry interests and power generation.
- Preparation for diversion of the Peace River for Site C dam construction will be a temporary additional consideration for Williston Reservoir operations and Peace Canyon discharges until 2023.
- BC Hydro is planning to manage these requirements within existing Peace Water use Plan operation limits.

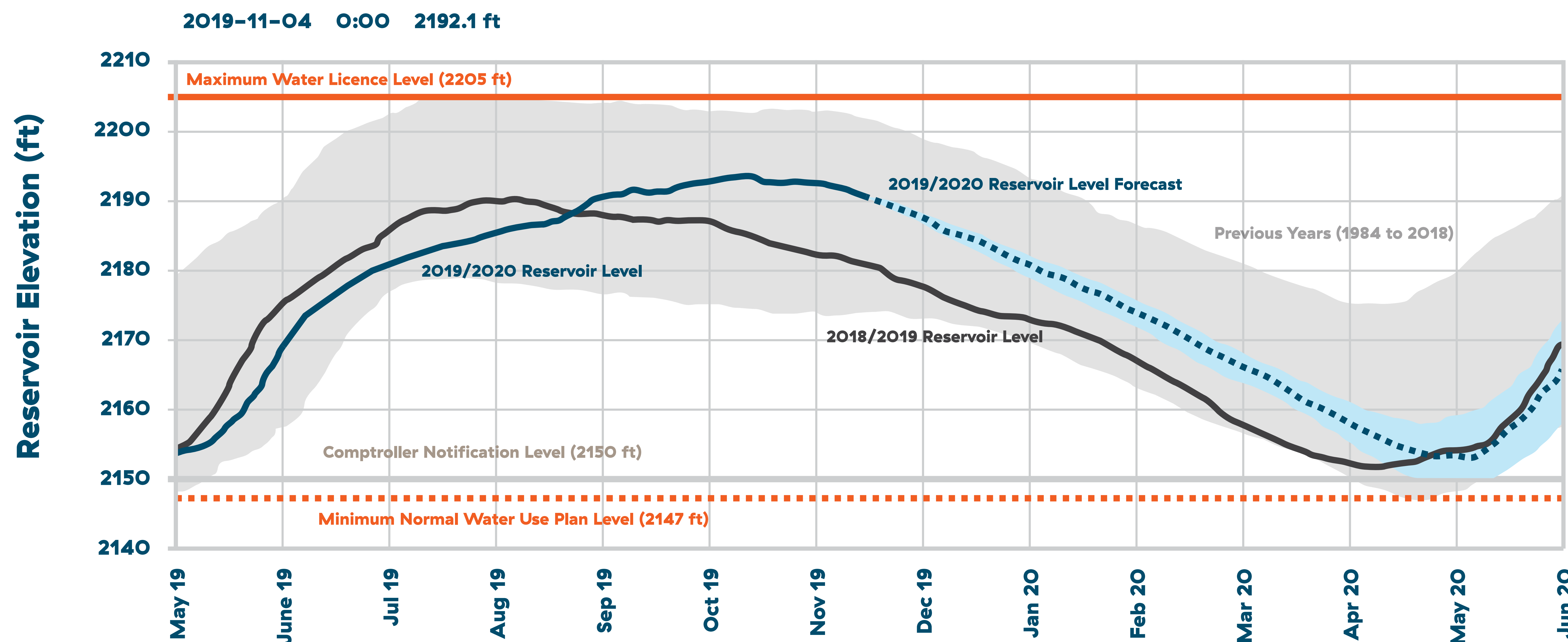


W.A.C. Bennett dam

## Williston Reservoir Operations Forecast Spring 2020

- Northern B.C. remains in its third consecutive year of below-average inflows.
- While overall annual volumes remain below normal, the reservoir is now about 10 feet higher than it was at this time last year, due to above-average rainfall in August and September.
- The final 2019 Williston Reservoir water supply volume (February to September) was 86 per cent of normal.
- From now until spring 2020, the Williston Reservoir is forecast to operate to levels near or above those observed during the winter of 2018/2019 and the spring of 2019. The likelihood of operating below 2,150 feet has now greatly diminished.

## Williston Reservoir Forecast (14 Nov 2019)





# Navigational changes

## Keeping boaters safe

For safety reasons, the area around Site C on the Peace River will be closed to boaters as early as spring 2020, when we start to install the debris booms across the main river channel.

We will be notifying neighbouring communities and users of the Peace River of safety hazards, including navigational restrictions and changes in boat access in advance of construction activities. Restricted areas will be marked with signage, beacons, and buoys.

Once navigation through the dam site is no longer possible, we will set up a portage system to transport non-motorized vessels by road past the dam, between the Halfway River boat launch and the Peace Island Park boat launch. The portage will be in operation during boating season, from May to September.



Photo: Creative Commons – by Samantha Forsberg is licensed under CC BY-NC-SA 2.0

## D. A. Thomas Recreation Area

As part of our community investment program in Hudson's Hope, we are developing a new small craft boat launch and day use site at the bottom of D. A. Thomas Rd. The boat launch will consist of a gangway and floating dock. This will allow the launch of car topper-type boats such as kayaks and canoes at regular reservoir operation levels. Boats on trailers will still need to be launched at the new boat launch and day use area at Lynx Creek.

There will be no public access to D. A. Thomas Road and the shoreline during berm construction, from 2020 to 2023.





# Lynx Creek boat launch

Due to the new reservoir, the Lynx Creek boat launch in Hudson's Hope will be rebuilt and upgraded at a site to the east of its current location. This will include:

- A day use area with picnic site, interpretive kiosk and pit toilet
- Safe road access for vehicles with trailers
- A double-wide concrete boat ramp with a 10–15% grade
- Safe turnaround area for trailered, motorized boats longer than five metres
- Parking for vehicles with trailers

The new boat launch at Lynx Creek will open after the reservoir is filled in 2023. We aim to maintain access to the existing boat launch during the Highway 29 realignment work and prior to reservoir filling. We will maintain emergency access to the river for the RCMP at Peace Canyon Dam.

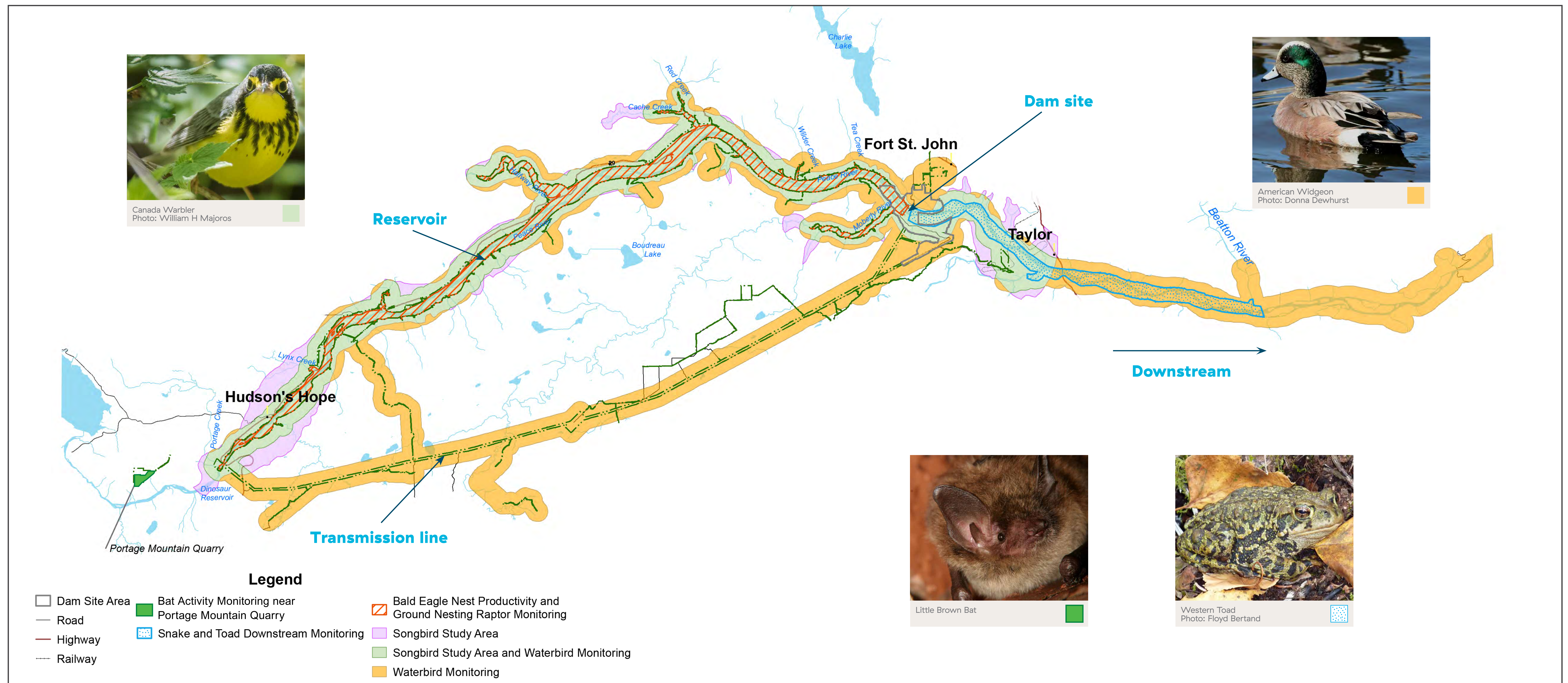




# Protecting wildlife and rare vegetation

We've developed a number of programs aimed at avoiding, reducing or off-setting the potential impacts of the Site C project on wildlife and rare vegetation. Our programs incorporate feedback from Indigenous groups, the public and over 200 requirements from the provincial and federal approvals.

Most environmental programs span the entire project construction phase and well beyond into dam operations. They involve mitigation measures during construction to avoid or reduce impacts, as well as species-specific monitoring programs. These monitoring programs offer insight into changes in the ways wildlife use the area before and after the dam is built.





# Monitoring fish and fish habitat

We've been working since the 1970's to establish long-term data on conditions in the Peace River. Decades of studies helped us form a baseline to better understand how fish and fish habitat may change as a result of the construction and operation of Site C.

Site C's Fisheries and Aquatic Habitat Monitoring and Follow-up Program focuses on monitoring fish and fish habitat in the Peace River and its tributaries during the construction of the project and for the first 30 years of operation. It consists of 18 unique programs that monitor the abundance and life history of fish, spawning, rearing and feeding.



Fish studies in a tributary of Halfway River

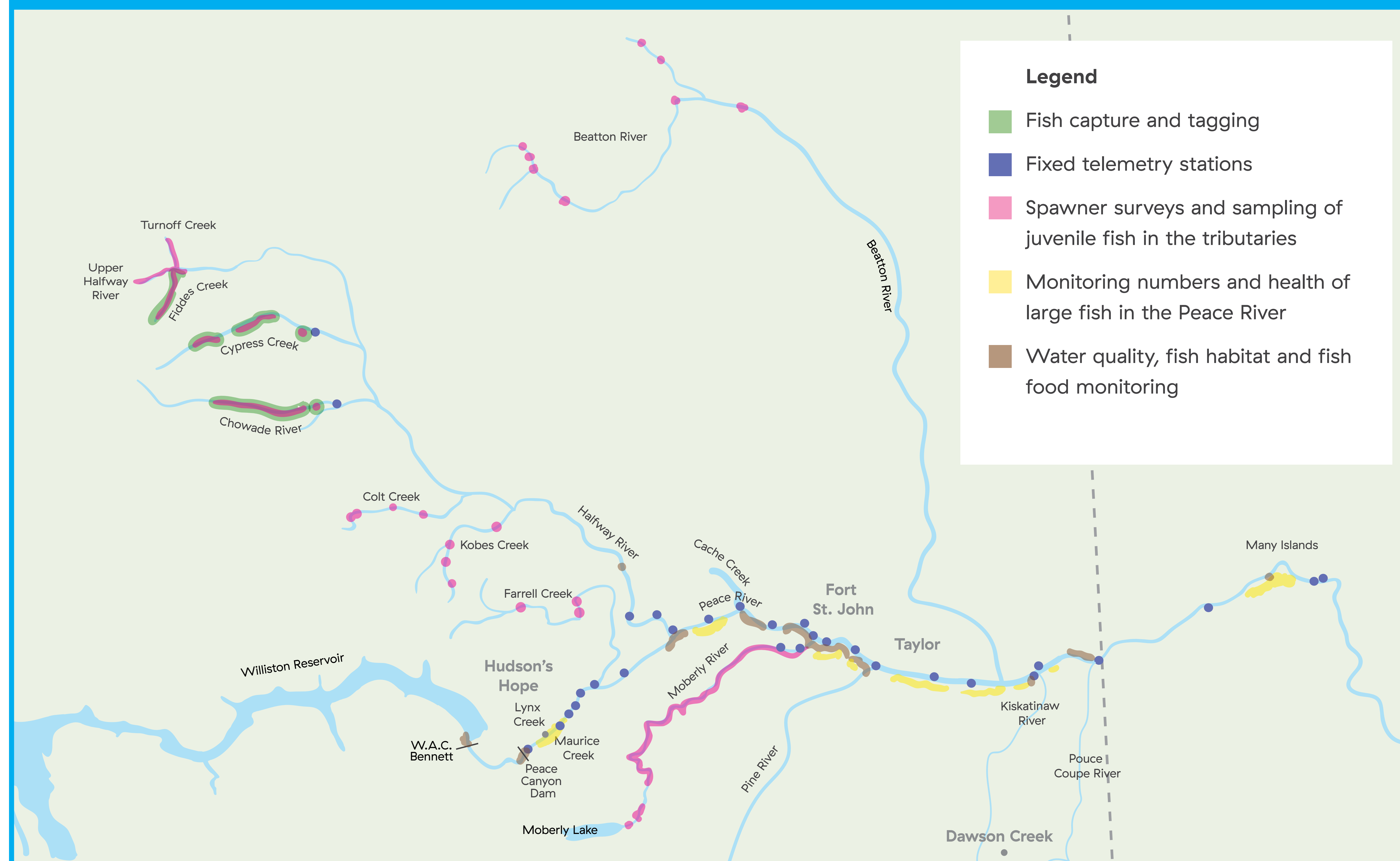


Rainbow trout



Bull trout

## Fish Sampling Locations



One of 30 new fixed telemetry stations placed on the river bank, which monitors the movement of radio-tagged fish.



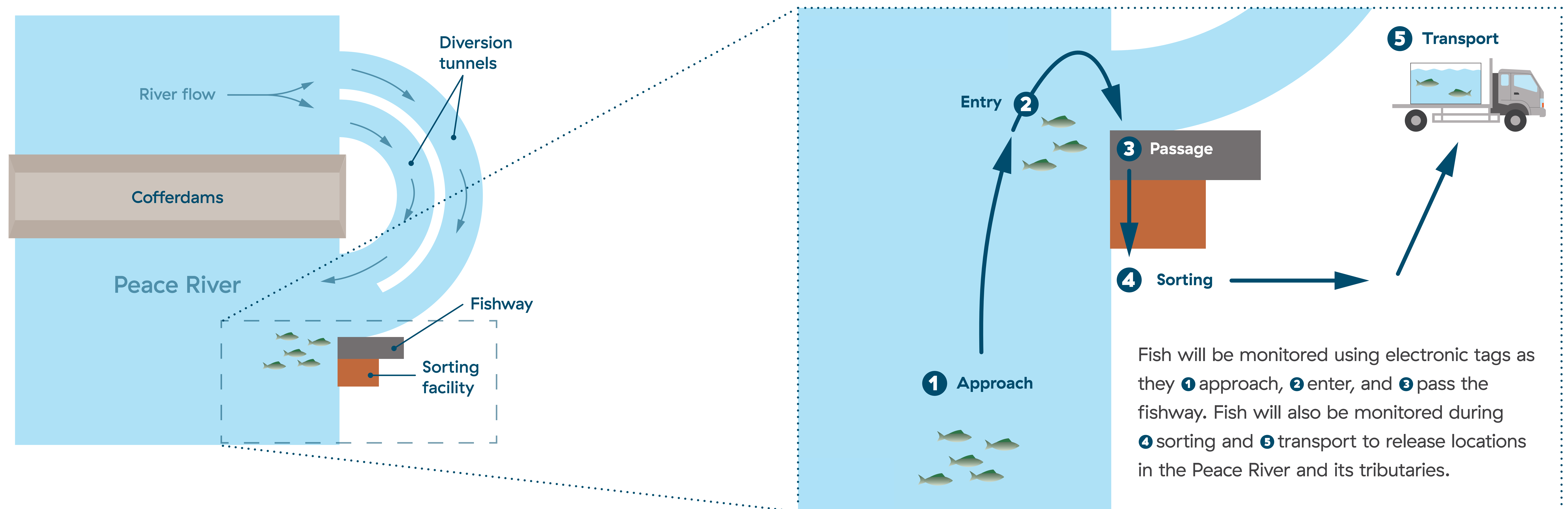
# Protecting fish and the aquatic environment

Although the Site C reservoir will support a new and productive fish community, the project will also result in changes to fish habitat and movement. That's why BC Hydro has developed a rigorous program to address these potential impacts.

## Temporary and permanent fish passage facilities

We're building a temporary upstream fish passage facility that will operate throughout river diversion. This is being put in place so that fish can continue to migrate upstream and fulfill portions of their lifecycles in the Peace River and its tributaries. A permanent facility will then be built once the dam is completed.

Migratory fish are naturally attracted to fast-flowing water. With this in mind, the facility is being constructed at the outlet of the diversion tunnels, where fish will be attracted to the high flows exiting the tunnels.



## Transporting fish by truck

We chose to move fish upstream using a fish passage with truck transport for a number of reasons. First, this option allows flexibility in transporting fish to the different upstream rivers where they would naturally migrate. It's important that we release fish into environments to which they're naturally adapted. Secondly, the alternative of building a fish ladder running the full height of the 60-metre dam is too high for many types of fish. That's why we chose the solution of a fish passage combined with truck transport.



# Habitat enhancement

## Aquatic habitat

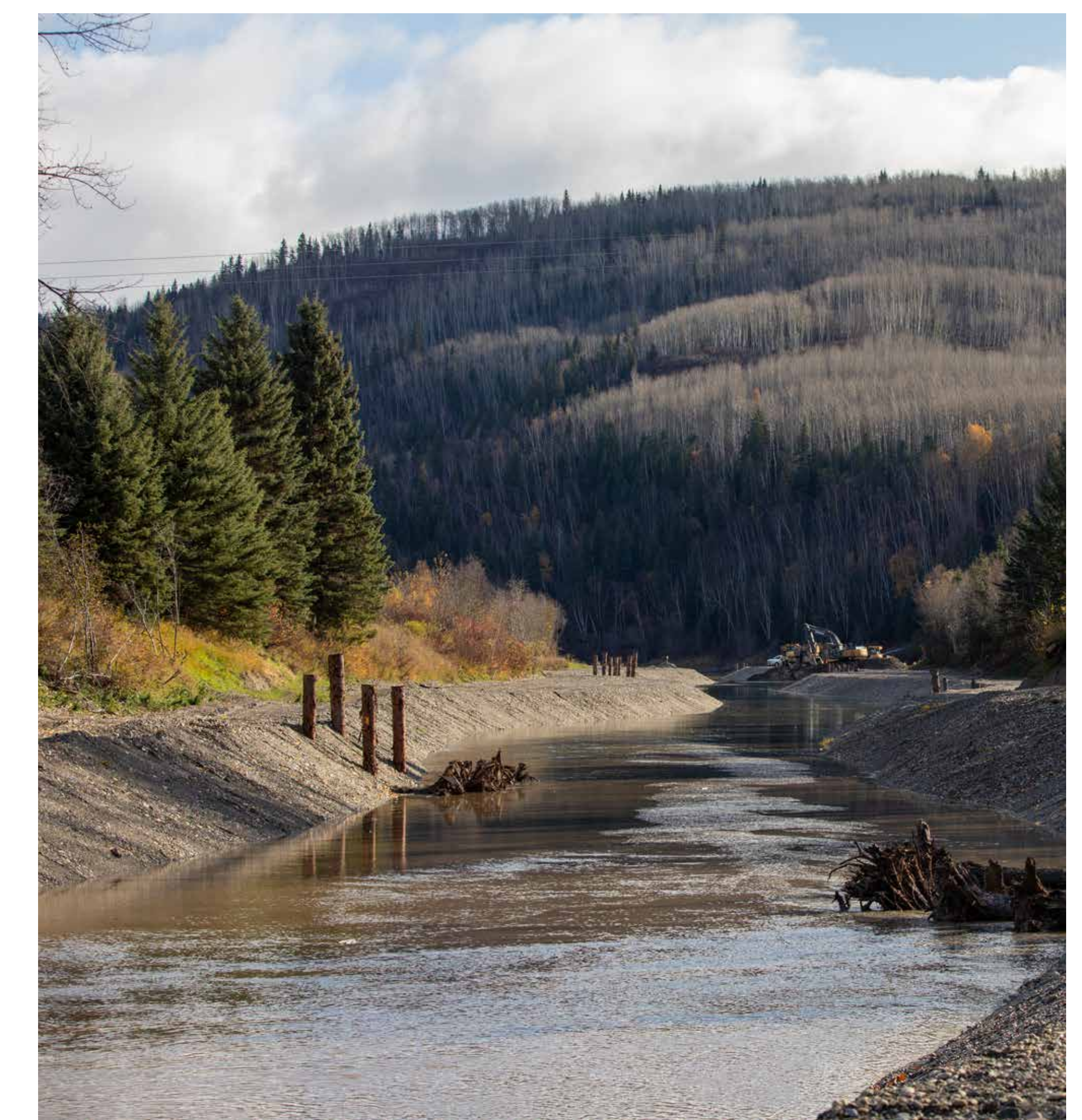
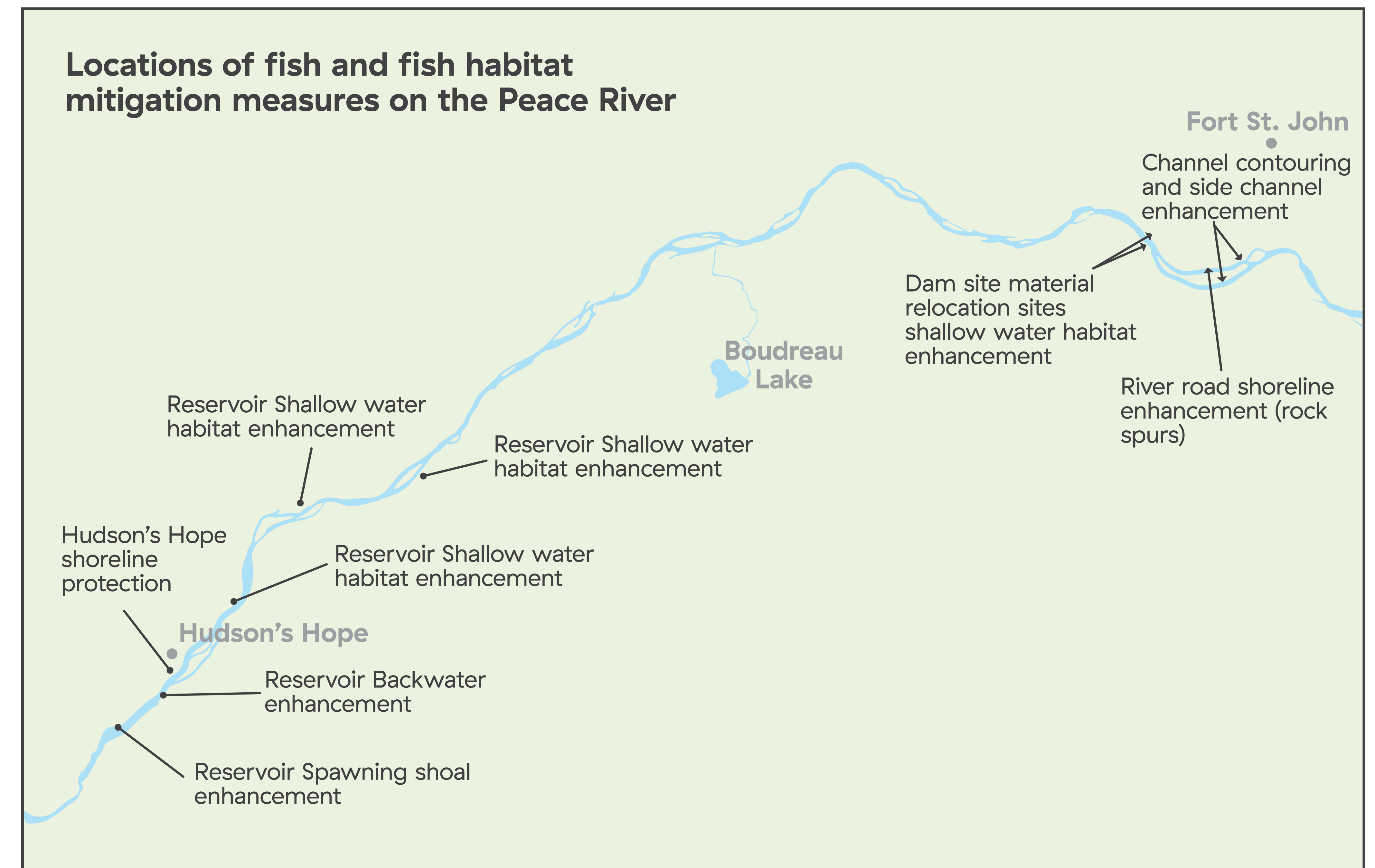
Throughout the reservoir area and in the Peace River downstream of the dam, we're enhancing fish habitat. These habitat enhancements support many fish species, such as mountain whitefish, bull trout, Arctic grayling and rainbow trout.

Habitat enhancements include:

- Creating habitat in side channels and the main river, downstream of the dam.
- Replanting vegetation in non-forested areas of the shoreline and creating new shallow water habitat in the reservoir.



Newly-built channels provide fish habitat enhancements





# Wetland creation

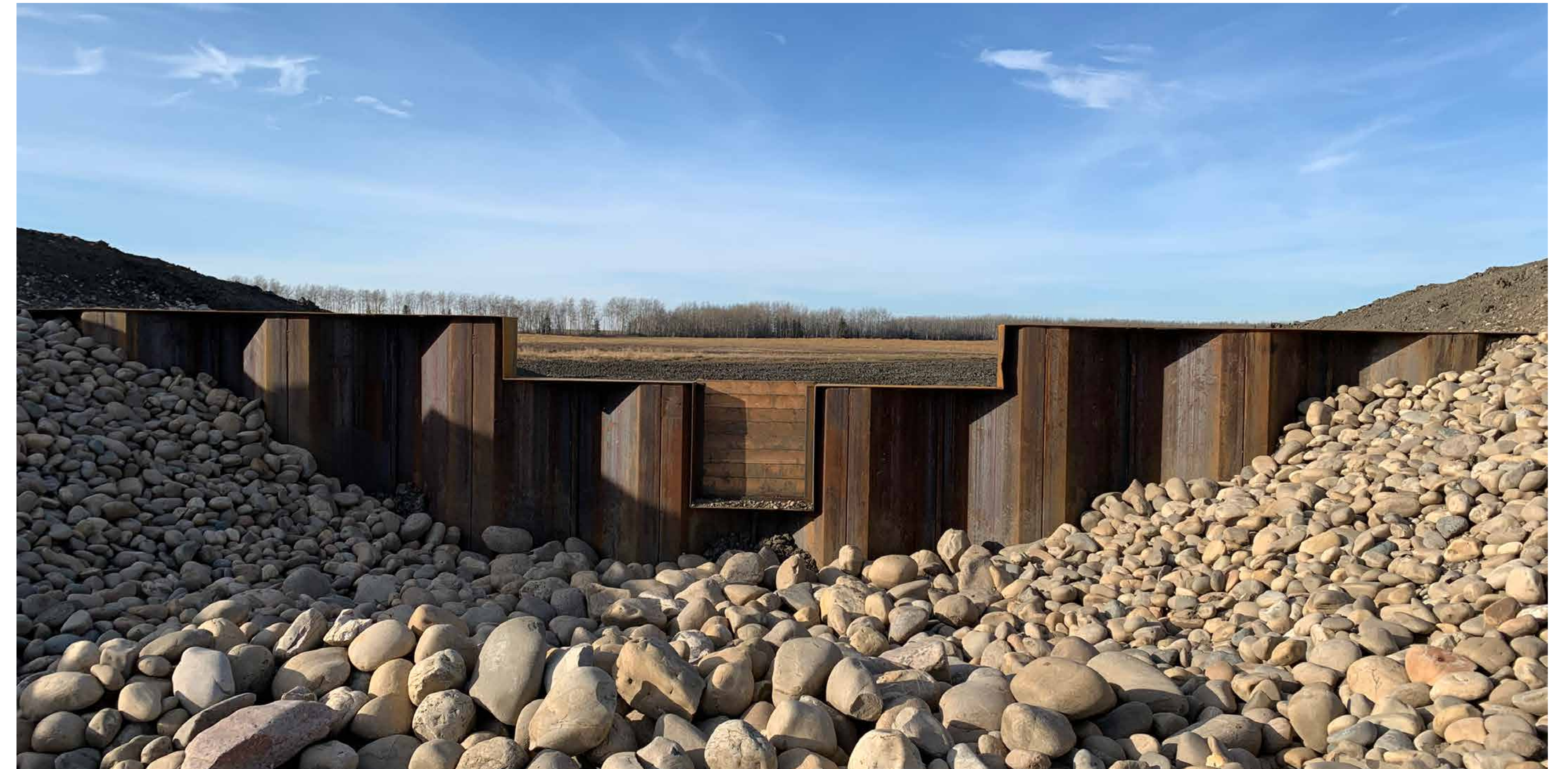
To compensate for the loss of wetland habitat resulting from Site C, we are working with Ducks Unlimited to construct and restore over 500 hectares of wetlands.

The first of these is at a 50-hectare wetland project at Golata Creek, a complex system of 15 ponds retained with a dam and berms.

Wetlands provide hundreds of species with safe spaces to eat, sleep and raise their young. They also help to remove pollution, as well as regulate and clean water in the ecosystem.



The land is contoured and excavated near Golata Creek to create new wetlands.



Water control structures such as this one will help to regulate the flow of water in the Golata wetlands.



A water control structure is built.



# Habitat structures

We worked with provincial government ministries and Environment Canada to develop mitigation programs for wildlife that will be impacted by Site C. This includes building habitat structures to help reduce the effects of habitat loss. This includes:

## Completed

- 96 nest boxes for cavity nesting birds installed
- Three bald eagle nest platforms installed
- 56 woody debris piles for fishers' foraging and winter rest areas
- 120 bat boxes
- 10 fisher den boxes

## Upcoming

- 164 additional nest boxes
- 35 additional eagle nest platforms
- Seven snake dens
- Woody debris piles for fishers along south bank of Peace River
- 78 fisher den boxes



Eagle nesting platform

## Did you know?

BC Hydro is also looking for a suitable site for a large bat “condo” structure near Hudson’s Hope to provide roosting habitat and an educational citizen science opportunity for schoolchildren and other community members.



Bat roost boxes



A moose examines a newly-installed fisher den box.

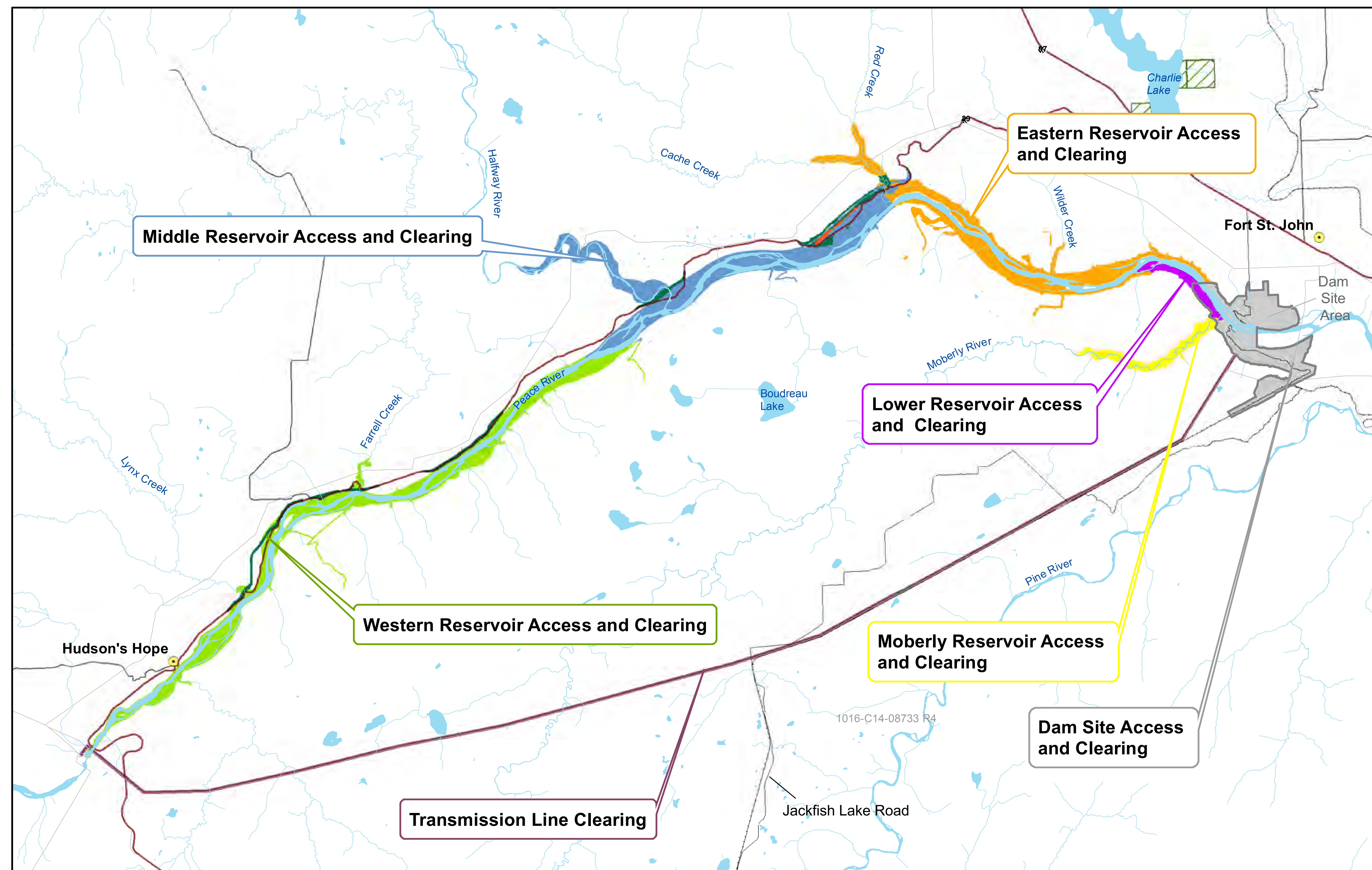


# Reservoir clearing

While filling the reservoir will be one of the last activities on the Site C project, clearing the area begins years in advance. Removing trees and vegetation helps to prepare for river diversion, ensure boater safety, and reduce impacts to dam construction and operations.

To reduce the amount of debris that may end up in the water and at the dam site, we're clearing about three-quarters of the vegetation within the reservoir footprint. However, we'll leave behind some trees in the lower areas and trees that are unsafe to remove.

Logging trucks will use Highway 29 and resource roads to haul logs to local mills, while avoiding local streets where practical. Most work around Hudson's Hope will involve clearing islands that are accessed from the south side of the Peace River. Some logging of valley slopes (possibly using helicopters) may be required in this area.



## Moberly reservoir access and clearing

- Season 1: winter 2016/2017
- Season 2: fall 2018 to spring 2019
- Waste wood removal: 2018 to 2020

## Eastern reservoir access and clearing

- Fall 2018 to spring 2020
- Waste wood removal: 2019 to 2020

## Transmission line clearing

- Season 1: winter 2017 to spring 2018
- Season 2: fall 2018 to spring 2019
- Waste wood removal: 2018 to 2019

## Lower reservoir access and clearing

- Season 1: fall 2015 to spring 2016
- Season 2: winter 2016 to winter 2017
- Season 3: fall 2018
- Waste wood removal: spring 2018 to spring 2019

## Middle reservoir access and clearing

- Summer 2019 to 2023
- Waste wood removal: 2020 to 2023

## Western reservoir access and clearing

- Summer 2020 to spring 2022
- Wood waste removal: 2022 to 2023

\*All schedules are approximate and subject to change



# Managing debris

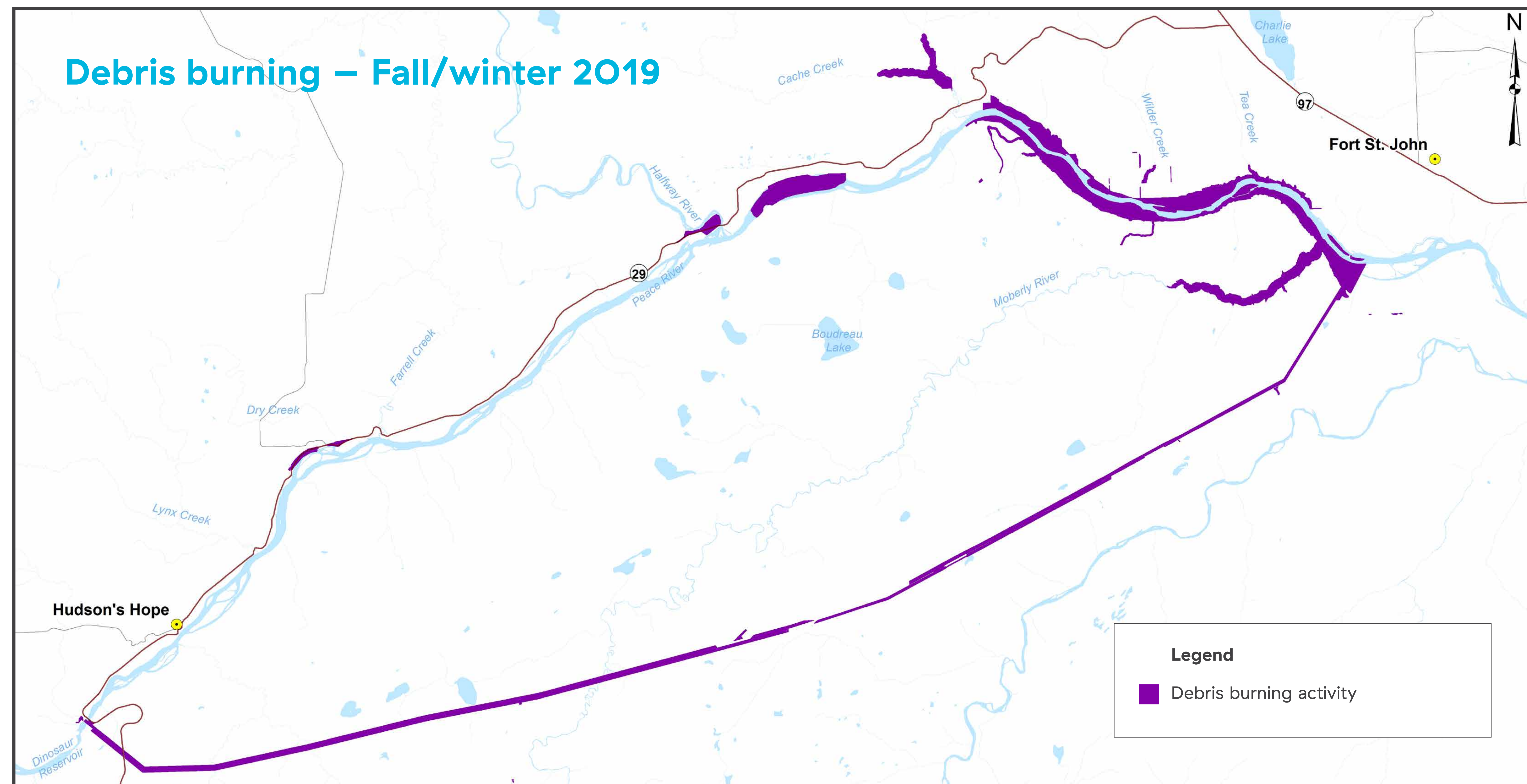
## Debris burning

We make every effort to haul merchantable trees to local mills. Our ability to sell these trees is based on factors such as size, species, and location. However, recent closures of local mills and limited road access to some clearing areas have reduced our ability to haul away some of the trees.

Debris that cannot be removed, mulched or chipped, needs to be burned. We carefully plan and monitor all burning. This includes the timing, size and location of the wood piles, and the amount of smoke emitted. We comply with regulatory requirements and the Site C Smoke Management Plan.

## Venting windows

Burning can only occur in the fall and winter months during a specific weather condition, known as a venting window. A venting window means that there is enough positive atmospheric pressure and air flow to disperse smoke. We burn during custom venting windows authorized under provincial regulations, specific to Site C.



## What to do if you see a wildfire or uncontrolled burning

Safety is our top priority. For the fastest response, any potential wildfire or uncontrolled burn should be immediately reported to the BC Wildfire Service at **1 800 663-5555** or **\*5555** on a cell phone.