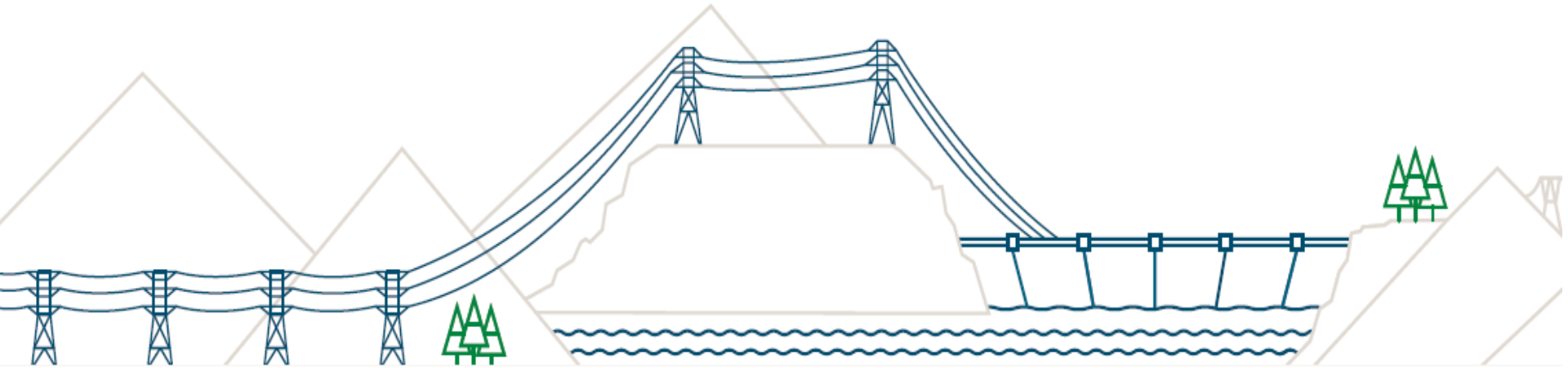
Alouette Tunnel Upgrade Project

January 27, 2021
Public Information Session



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Acknowledgement of Nations

The Alouette-Stave-Ruskin system is located on the unceded traditional territory of:

- Katzie First Nation
- Kwantlen First Nation
- Matsqui First Nation
- Musqueam Nation
- Leq'a:mel First Nation
- Peters First Nation
- Seabird Island Band
- Semiahmoo First Nation
- Shxw'ow'hamel First Nation
- Skawahlook First Nation
- Soowahlie First Nation
- Sto:lo Nation
- Sto:lo Tribal Council

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Welcome

Thank you for joining us.

Today we will:

- Provide an overview of the Alouette-Stave-Ruskin system & dam safety
- Describe the Tunnel Upgrade Project
- Outline options for reservoir management during construction and seek feedback on considerations
- Answer questions and comments related to the project

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Presenters

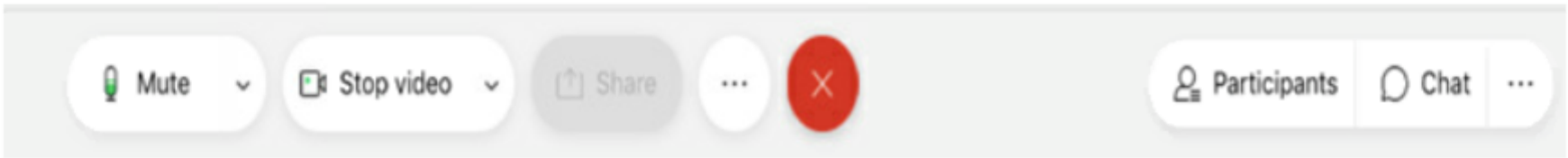
- Debra Lamash, Facilitator
- Bob Schubak, Director of Dam Safety
- Kunwarjit Khandpur, Project Manager
- Brian Siefken, Project Engineer
- Joanna Glawdel, Operation Planning Engineer
- Alexis Hall, Natural Resource Specialist

Cisco Webex reminders

We'll be using a few basic tools, which you can find if you hover your mouse over the bottom of the screen

Mute/unmute your mic & turn your video on/off

View the participant list



Audio connection trouble?
See the alternative options here

Open the chat panel:
- to ask questions
- to provide feedback

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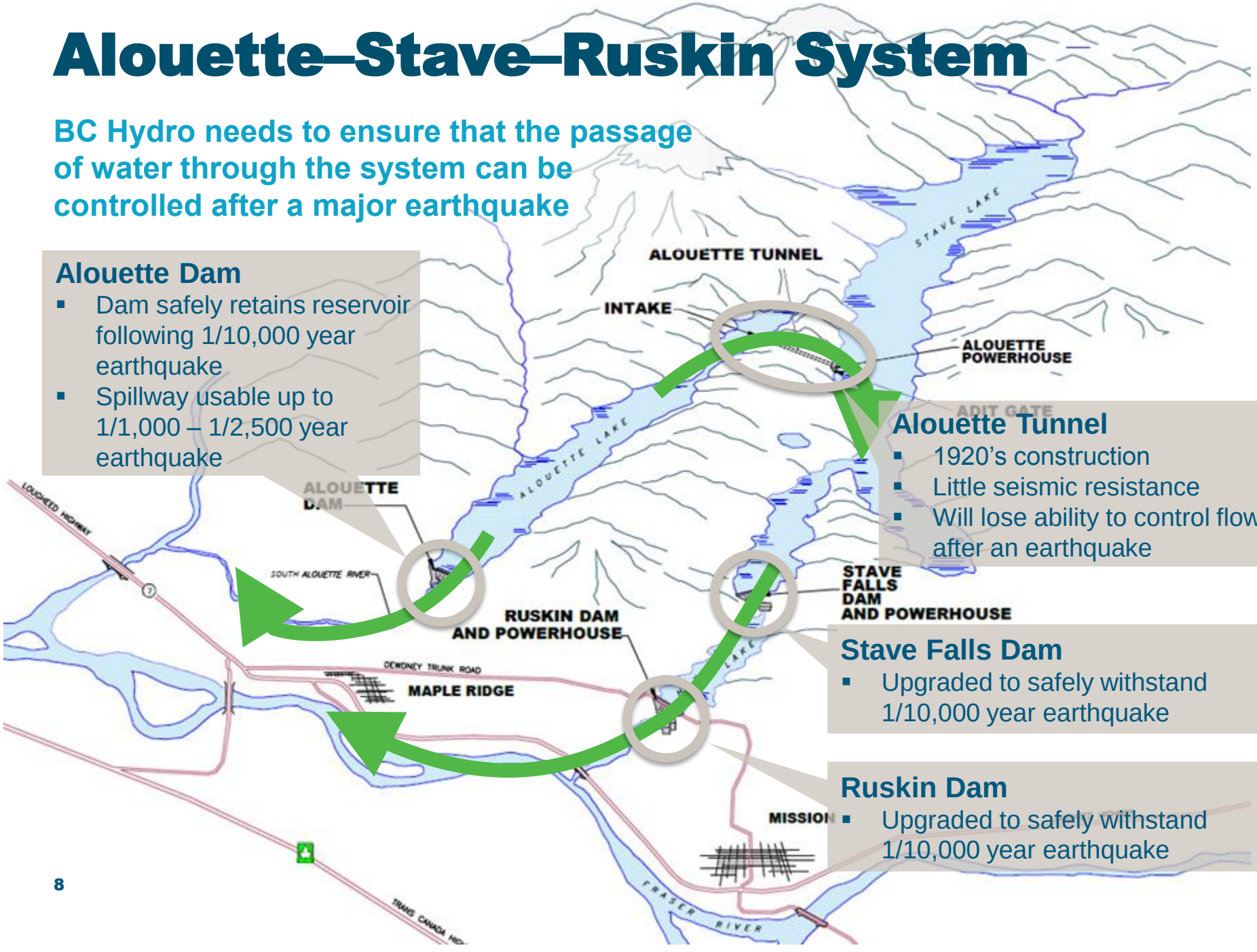
Virtual Meeting Etiquette

- Be respectful by listening to others and sharing time so that everyone is heard
- Minimize distractions by “muting” when not speaking
- **Use the chat function to seek input and ask questions**
- Due to the number of people attending this call, please turn off your video.
- If you want to keep your video on please avoid using virtual background feature to save bandwidth.
- We are not recording these sessions, and kindly ask that others do not record


Alouette-Stave-Ruskin
System and Dam Safety

Alouette–Stave–Ruskin System

BC Hydro needs to ensure that the passage of water through the system can be controlled after a major earthquake



Alouette Dam

- Dam safely retains reservoir following 1/10,000 year earthquake
- Spillway usable up to 1/1,000 – 1/2,500 year earthquake

Alouette Tunnel

- 1920's construction
- Little seismic resistance
- Will lose ability to control flows after an earthquake

Stave Falls Dam

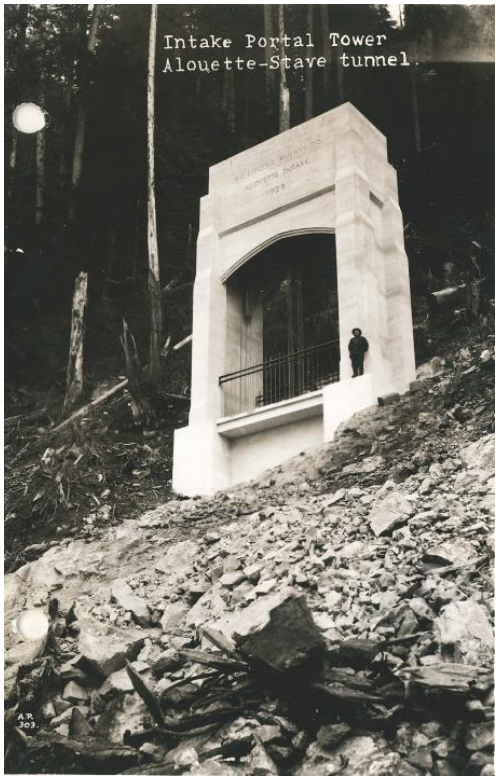
- Upgraded to safely withstand 1/10,000 year earthquake

Ruskin Dam

- Upgraded to safely withstand 1/10,000 year earthquake

Alouette Tunnel

Existing facilities date back to the 1920s



Headworks tower

Surge tower and Alouette Powerhouse

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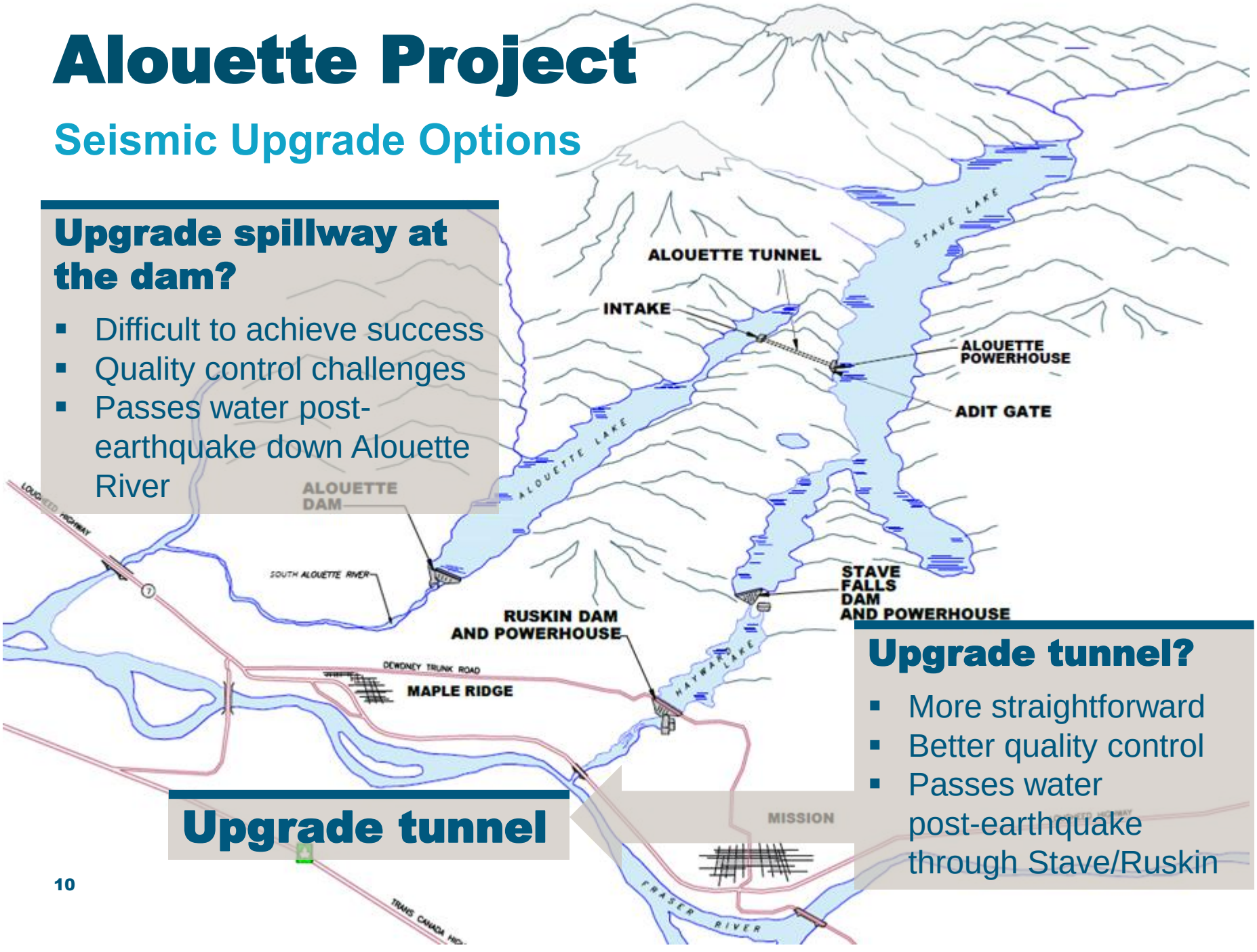
Alouette Project

Seismic Upgrade Options

Upgrade spillway at the dam?

- Difficult to achieve success
- Quality control challenges
- Passes water post-earthquake down Alouette River



Upgrade tunnel

Upgrade tunnel?

- More straightforward
- Better quality control
- Passes water post-earthquake through Stave/Ruskin

Tunnel Upgrade

- Dam Safety project that must proceed to ensure continued safe operation of the Alouette system
  - Upgrades to: tunnel structures on Alouette and Stave Lake reservoirs, parts of the tunnel, power supply, controls and communications
- When complete we'll meet our target performance at 1/10,000 year earthquake
- Alouette operations have been updated to deal with an earthquake before Project completion


Tunnel Upgrade Project

Tunnel Infrastructure

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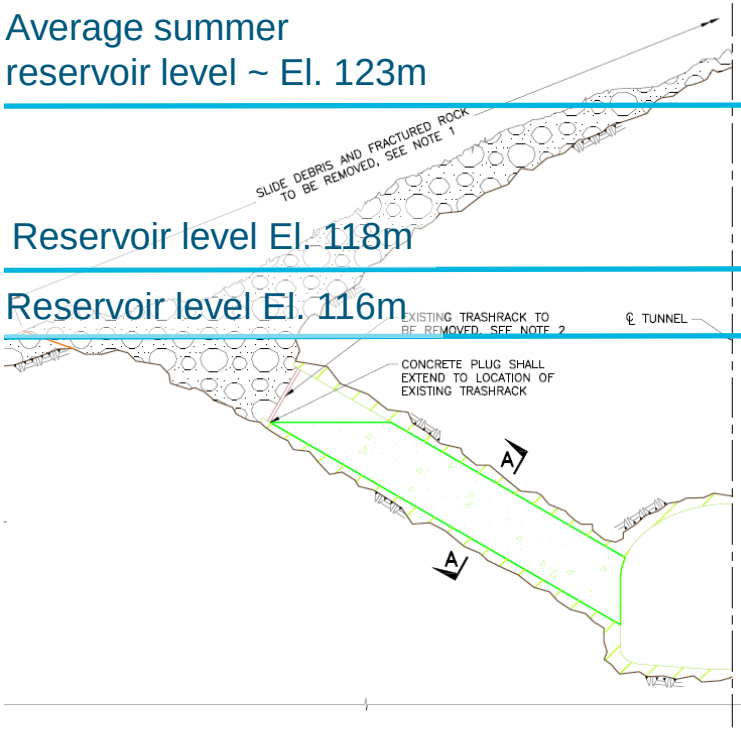
Intake Tunnel and Headworks

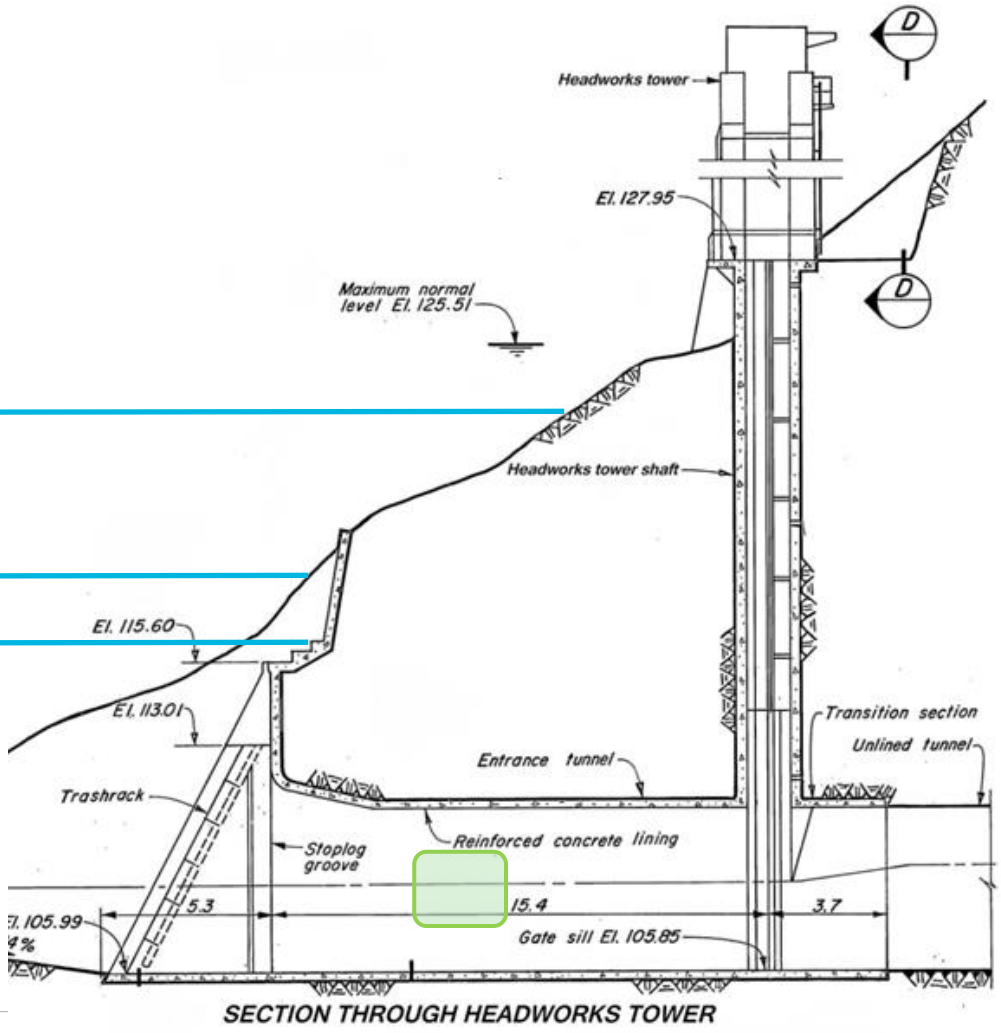
Average summer
reservoir level ~ El. 123m

Reservoir level El. 118m

Reservoir level El. 116m



Construction Adit



SECTION THROUGH HEADWORKS TOWER

Power Tunnel Intake

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Project Planning

- To safely complete construction, we have to close the tunnel in summer/fall for two or three years
- To manage inflows when the tunnel is closed, we need to change reservoir operations
- In 2019 we proposed lowering the reservoir to 116m during project construction
  - Concerns were expressed about potential effects on fish and aquatic resources, recreation, archaeology
- We paused and went back to consider alternative means of managing the reservoir during construction

Project Planning

- Constructability assessments were completed by two independent contractors and marine consultant
  - Findings helped us identify reservoir management options
- Key constraints for options:
  - Maximize work in months of lower precipitation
  - Avoid the smolt outmigration period
  - Start after the entrainment study period (spring 2021 to spring 2022)
  - Allow for tunnel recall to pass water from Alouette to Stave reservoir


Reservoir Management
Options During Construction

Reservoir Management Options

	Regular Operations	Option 1	Option 2	Option 3
Tunnel Operations June 15 to December 31	Open part of the time	Closed June 15 – Dec 31	Closed July 15 - Oct 31	Closed July1 - Oct 31
Summer Reservoir Elevation (June 15 to September 15)	121.25 m - 122.5 m	121.25 m - 122.5 m	116 m	118 m
Flows down the South Alouette River	~3 m^3/s	3 to 43 m^3/s	3 m^3/s	3 to 7 m^3/s

Other options, including conveying water through the tunnel during construction, were considered but were not feasible

Note: Tunnel closure dates have been updated since public meeting

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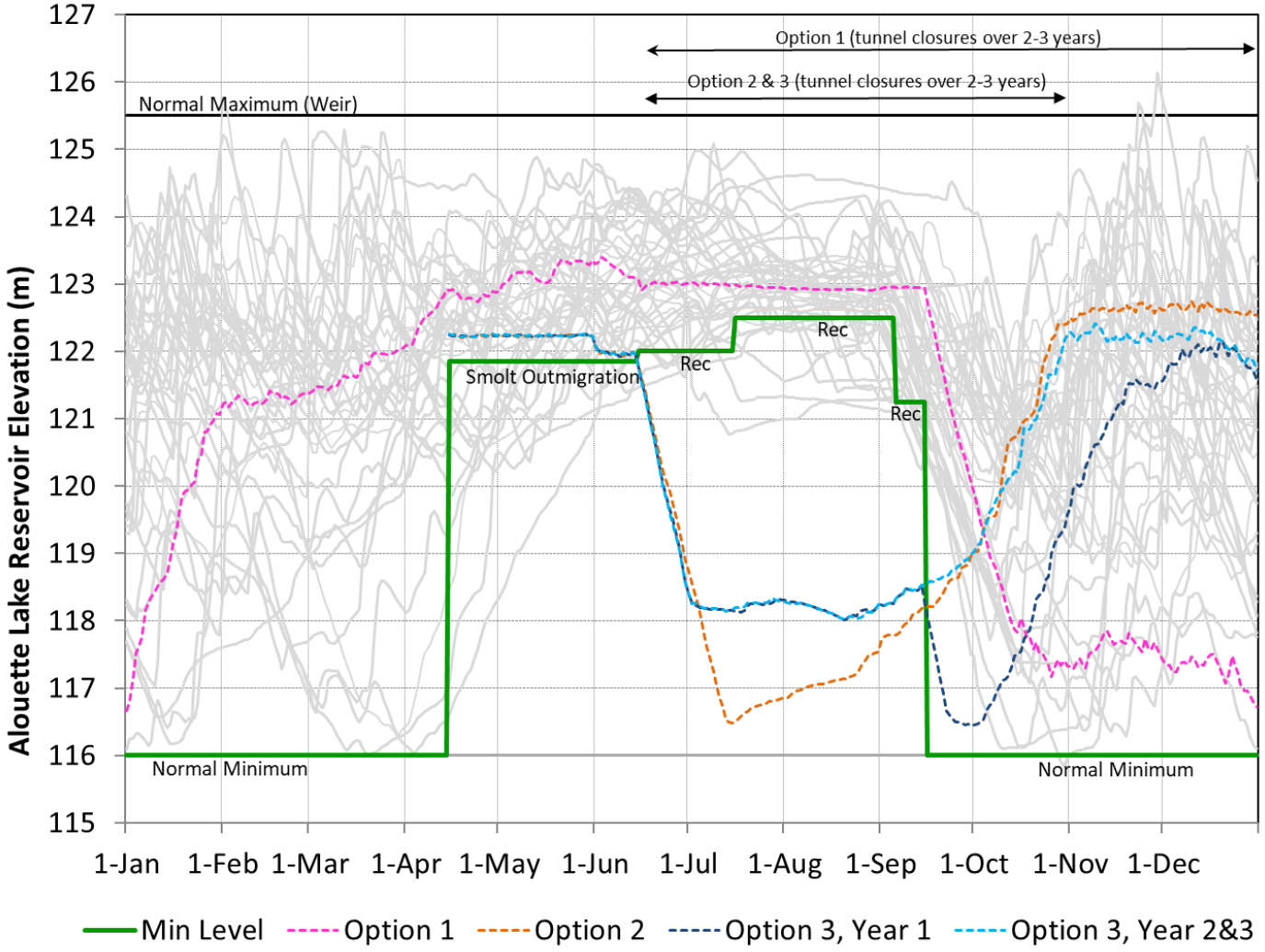
Observed and Expected Alouette Lake Reservoir Elevations



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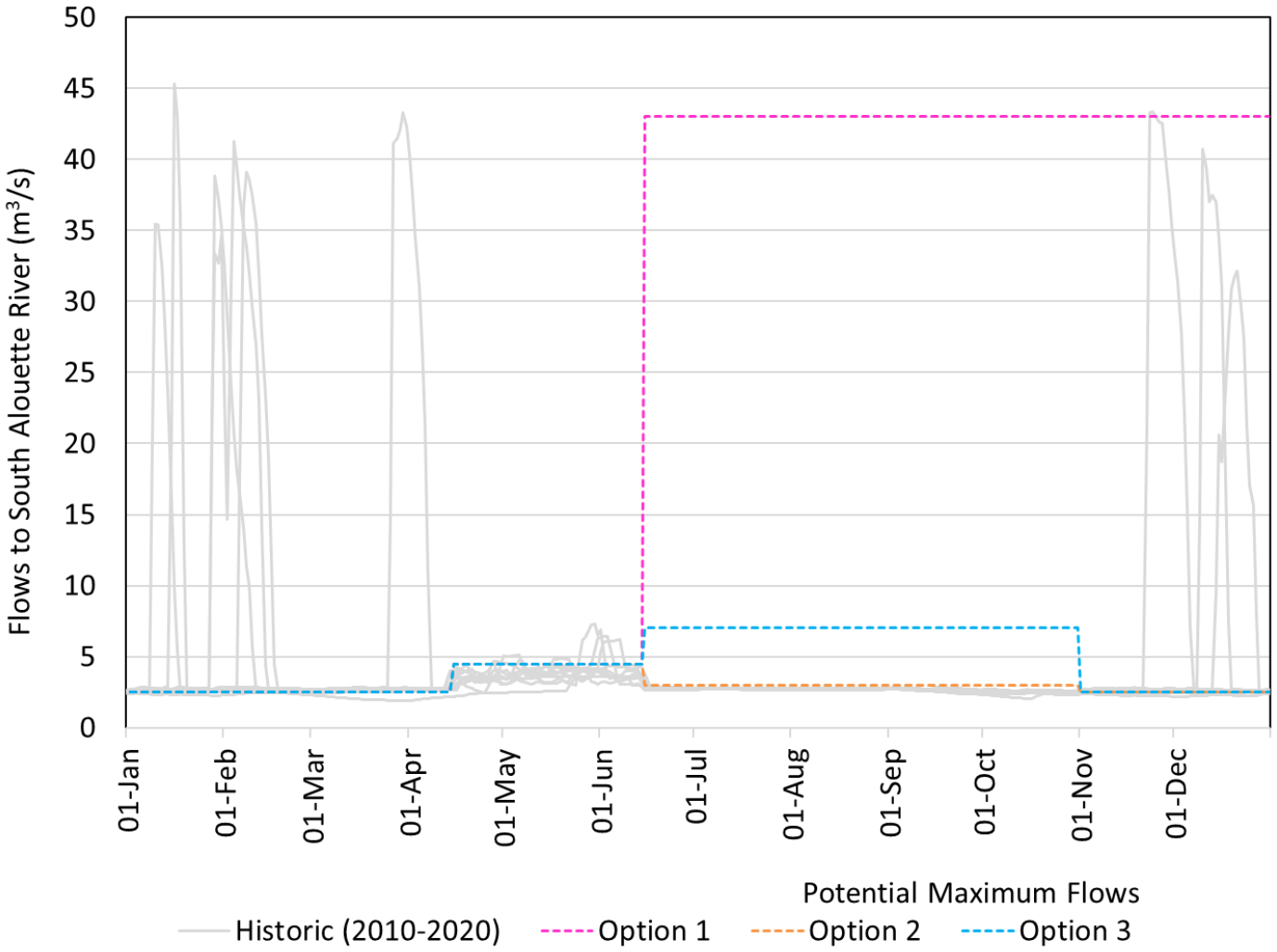
Potential Flows down the South Alouette River



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Option Selection Process

- Objective:
  - Select a preferred option by comparing the options (relative assessment) based on a range of considerations important to First Nations, agencies, stakeholders and BC Hydro
- Considerations include:
  - Archaeology
  - Environment
  - Recreation
  - Public Safety
  - Property
  - Schedule
  - Construction
  - Operations
  - Cost

Option Selection Process

- Work with First Nations, agencies, and stakeholders to confirm list of considerations and interests in the Project area
- Compare the options based on the items being considered (relative assessment) and feedback received
- Review the comparison table holistically
  - Compare options based on all considerations rather than individual items as each option will have pros and cons
- Select the leading option
  - Once a leading option is selected, an environmental assessment, environmental management plan and permit applications will be completed for that option

Objective of today's discussion

To discuss reservoir management options and gather input that will help inform selection of a preferred option

- The following slides provide more detail on the considerations
- Please let us know
  - What items you think should be prioritized
  - If there are any considerations that would help us choose between the options that we have not included in the tables

Construction, Schedule, Operations & Cost

Considerations
Likelihood of frequent recalls during construction
Likelihood of reducing construction schedule
Risk to underwater concrete quality
Specialized equipment/construction methods
Likelihood of changes to water management in Stave System
Project cost

Environment – Alouette Lake Reservoir

Considerations
Fertilization Program Implementation
Littoral Zone
Water Quality (e.g., temperature, turbidity)
Reservoir Spawning
Tributary Access for Spawning
Other?

Environment - South Alouette River

Considerations
Stranding
Trap and Truck Program
Spawning
Rearing
Smolt outmigration
Fish Fence, Hatchery
Water Quality (e.g., temperature, turbidity)
Erosion
Other?

Archaeology

Considerations
Archaeological sites in Alouette Lake Reservoir
Archaeological sites in South Alouette River
Other?

Recreation

Considerations
Quality of experience at Golden Ears Park
Golden Ears Park boat launch and dock access
Effects of increased or variable flows on river use
Other?

Public Safety and Property

Considerations
Public Safety related to higher and variable river levels
Public Safety related to reservoir levels (park users)
Erosion downstream of dam
Other?

Summary

Option	Summary of Considerations
Option 1	**Reservoir**: No change to normal reservoir levels **South Alouette River**: Potential impact to fish, recreation, public safety, archaeology and private property
Option 2	**Reservoir:** Potential impact to fish, recreation (including Park operations) and archaeology **South Alouette River:** No change to normal operations
Option 3	**Reservoir:** Potential impacts; less than Option 2 **South Alouette River:** Potential impacts; less than Option 1

Next Steps

- Consider First Nations, agency and stakeholder input
- Complete evaluation and identify preferred option
- Engineering, construction planning, and permitting 2021-2022
- Initiate construction 2023
- Project completion 2024/2025

Questions and Comments?

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Your Input is Important to Us

Please provide any additional input by e-mail or phone by February 5, 2021:

- E-mail: projects@bchydro.com
- Call: 1 866 647 3334

Thank you for participating!

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