

Prince George to Glenannan Transmission Project



Existing 500kV transmission line

Welcome

- We're proposing to expand our transmission system between Williston Substation near Prince George and Glenannan Substation near Fraser Lake as part of our North Coast Electrification initiative.
- Please review the storyboards to learn more about the proposed project, the routing options being considered, and other aspects of North Coast Electrification.
- Project team members are here to answer your questions.

Glenannan to Terrace Transmission Project



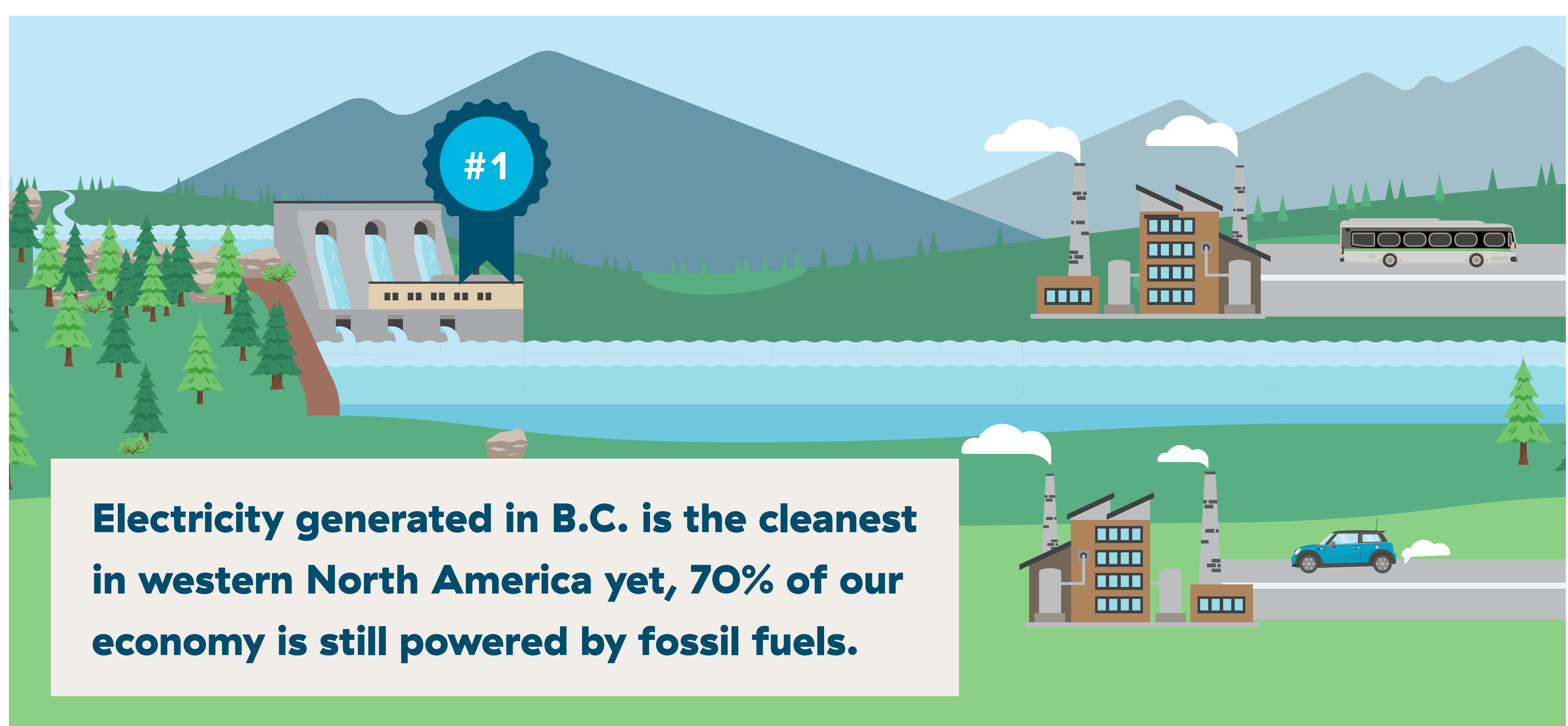
Existing 500kV transmission line

Welcome

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- Please review the storyboards to learn more about the proposed project, the routing options being considered, and other aspects of North Coast Electrification.
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Electrification overview

- We're proposing to bring more clean, reliable electricity to the North Coast to help our customers switch to using clean electricity from fossil fuels to power their operations.
- Electrification supports the BC Government's CleanBC Plan and economic development goals.
- We're proposing now to build new transmission lines and associated infrastructure so we will be ready to meet growing customer demand in the North Coast region.
 - We're currently building the Prince George to Terrace Capacitors project; however, the electricity from that project is already fully subscribed.
- Based on the level and location of customer demand, we may also need to build new transmission lines and associated infrastructure from:
 - Terrace to Kitimat
 - Terrace to Aiyansh
 - Terrace to Prince Rupert



Working in partnership with First Nations

We're working to implement the BC Government's commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

Transmission system expansion gives us a chance to take a different approach and work in partnership with First Nations:

- Building economic relations with Indigenous peoples, including:
 - Exploring Indigenous co-ownership of new transmission lines
 - Procurement opportunities
- Co-designing environmental review
- Shared decision making

We are thinking differently about how we do our business, and this new approach is an example of our work to advance reconciliation with First Nations.

Power lingo



What is a substation?

A substation brings together power lines of varying voltages. Substations contain equipment that can change the voltages of these lines and safely control the flow of power.



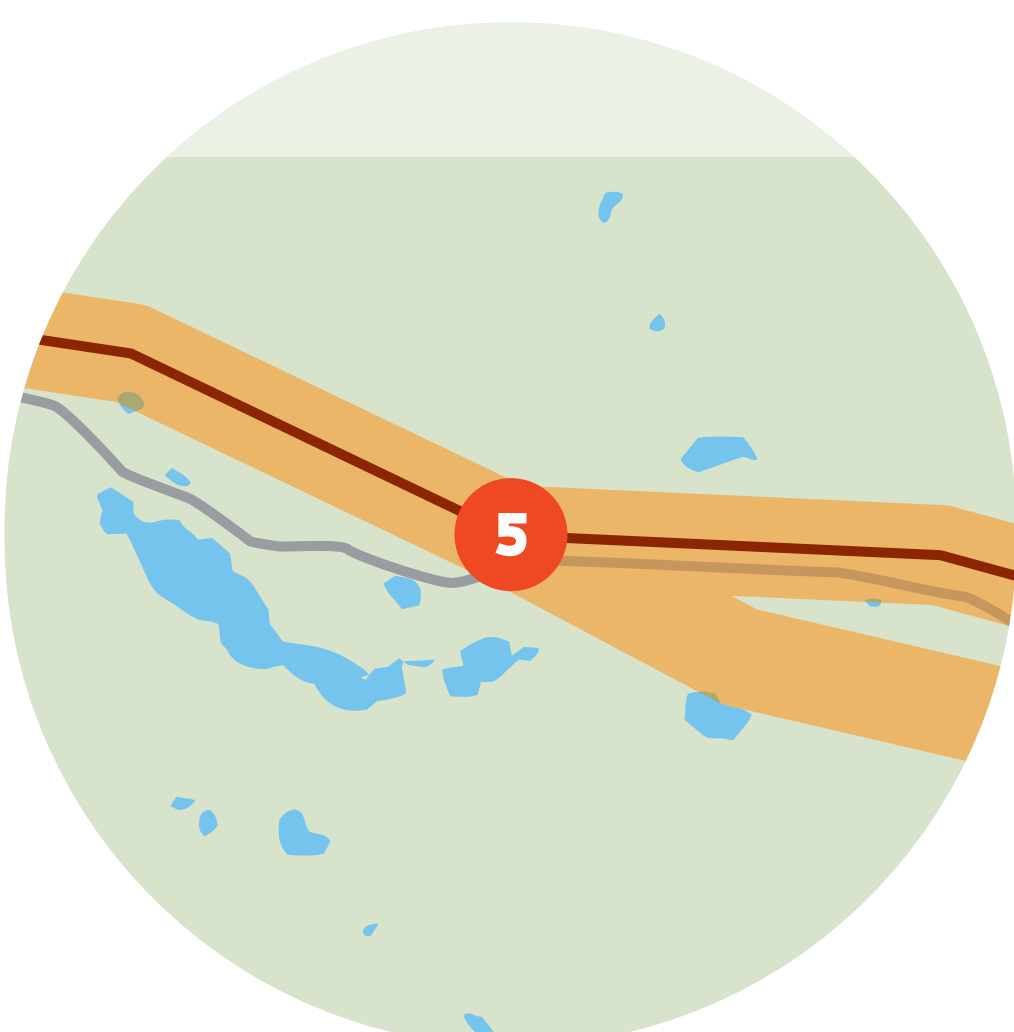
What is a capacitor station?

As electricity moves down a long transmission line, the voltage drops; this means less electricity can be carried. Capacitor stations contain equipment to boost the amount of electricity that a transmission line can carry.



What is a transmission line?

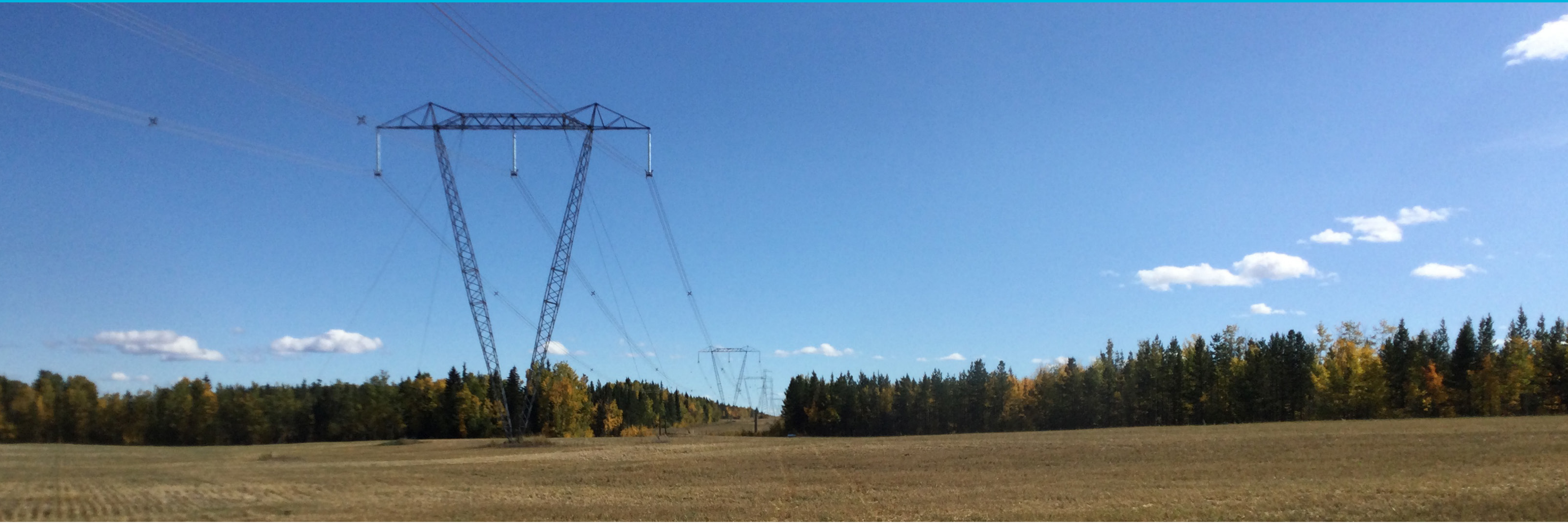
Transmission lines move electricity from one point to another via numerous towers in an electric power system. Transmission lines vary in size with those carrying more electricity requiring larger towers.



What is a node?

A node is used in transmission line route planning to identify where the transmission line connects with other infrastructure, such as a sub-station or capacitor station, or where a power line route can change direction. Nodes are generally numbered to make reference to them easier.

Transmission system expansion



To support electrification, we're proposing to build 500kV transmission infrastructure from Prince George to Terrace through two phases:

Prince George to Glenannan Transmission Project (PGGT)

- Approximately 170 km between Williston (near Prince George) and Glenannan (near Glenannan) substations

Glenannan to Terrace Transmission Project (GTTT)

- Approximately 130 km between Glenannan and Telkwa (near Telkwa) substations
- Approximately 145 km between Telkwa and Skeena (near Terrace) substations

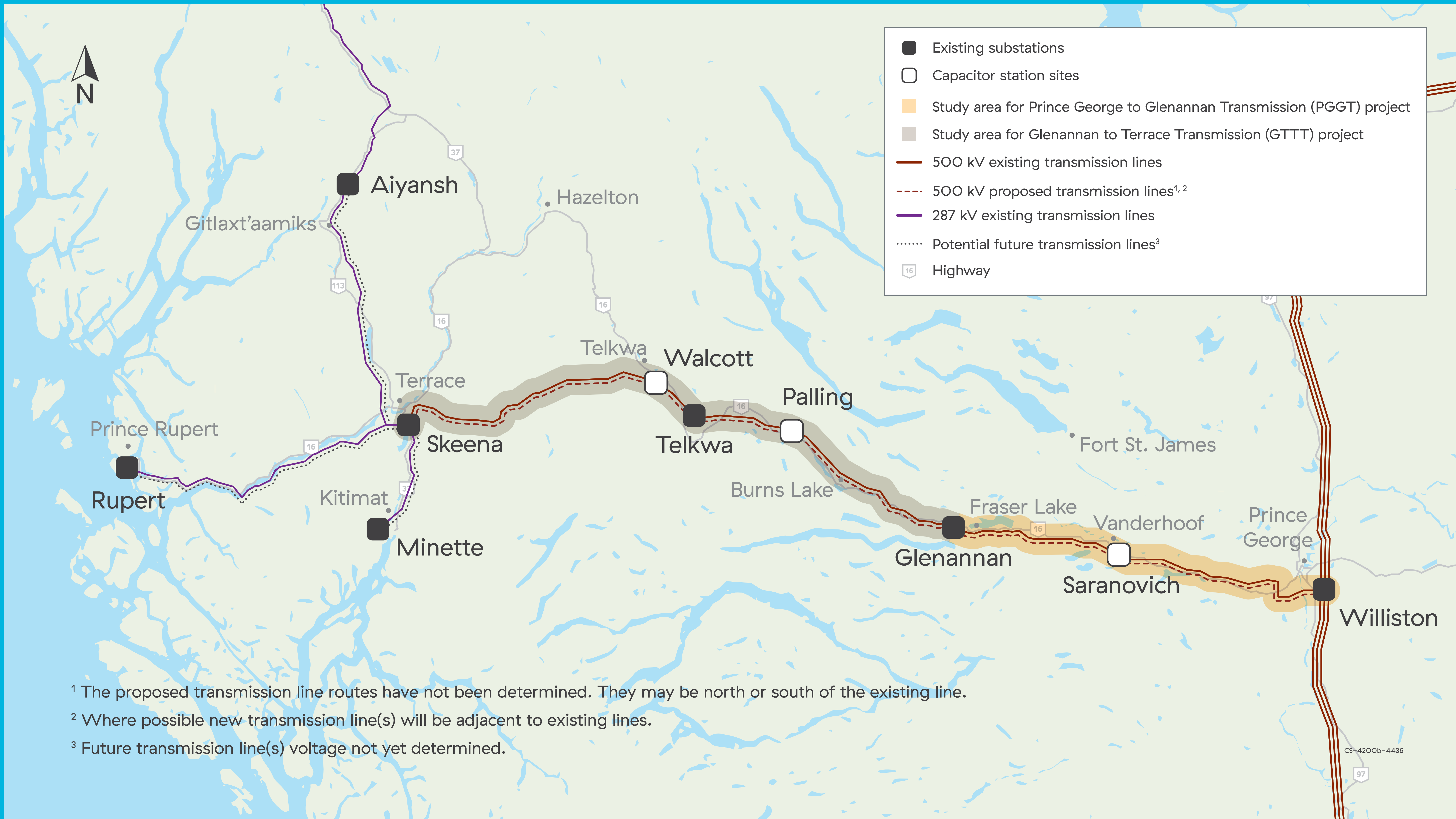
BOTH PROPOSED PROJECTS INCLUDE

- Substation and capacitor station expansions to accommodate new transmission lines
- Fibre optic cable on existing or new transmission structures

PGGT and GTTT are moving forward with route selection, field studies, and permitting applications for field studies.

Transmission system expansion

North Coast electrification



¹ The proposed transmission line routes have not been determined. They may be north or south of the existing line.

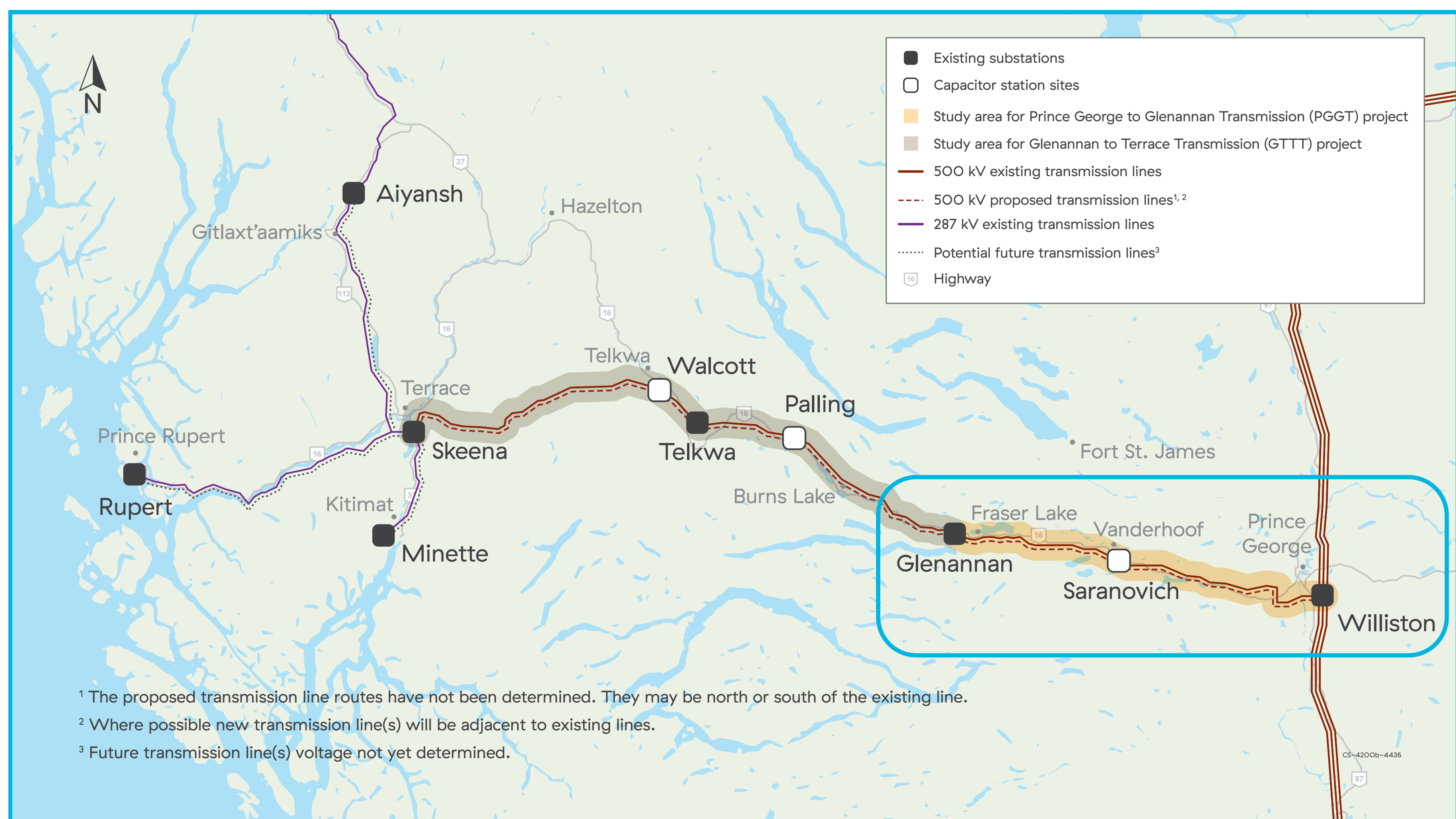
² Where possible new transmission line(s) will be adjacent to existing lines.

³ Future transmission line(s) voltage not yet determined.

Prince George to Glenannan Transmission (PGGT)

Key project components:

- New 500 kV transmission line from Williston Substation near Prince George to Glenannan Substation west of Fraser Lake
 - Approximately 170km long
 - Will generally follow existing transmission corridors
- Expansion of Saranovich Capacitor Station
- Expansion of Williston Substation to the east
- Expansion or upgrade of Glenannan Substation
- Fibre optic cable on new or existing transmission structures to provide additional communication between stations



Prince George to Glenannan Transmission (PGGT)

Current project activities

- Potential corridor and route options identified
 - Desktop environmental analysis to identify socio-environmental and archaeology features along the route corridor completed
- Preliminary access and clearing requirements being prepared
- Permits required to conduct studies being prepared
 - Environmental studies starting spring 2024
 - Geotechnical drilling starting March 2024
- Collaboration and consultation with First Nations is underway
- Stakeholder engagement is underway
 - Second round of Open Houses: Prince George (March 11), Vanderhoof (March 18), Fraser Lake (March 19) and online (March 21 and 26)
 - Discussions with property owners, authorization holders and other stakeholders
 - Meetings with government representatives and agencies
- Objective is to select a leading route for further study by mid-2024



Lattice Guyed Flat Tangent
(most PGGT towers)



Self Support Lattice Dead-End

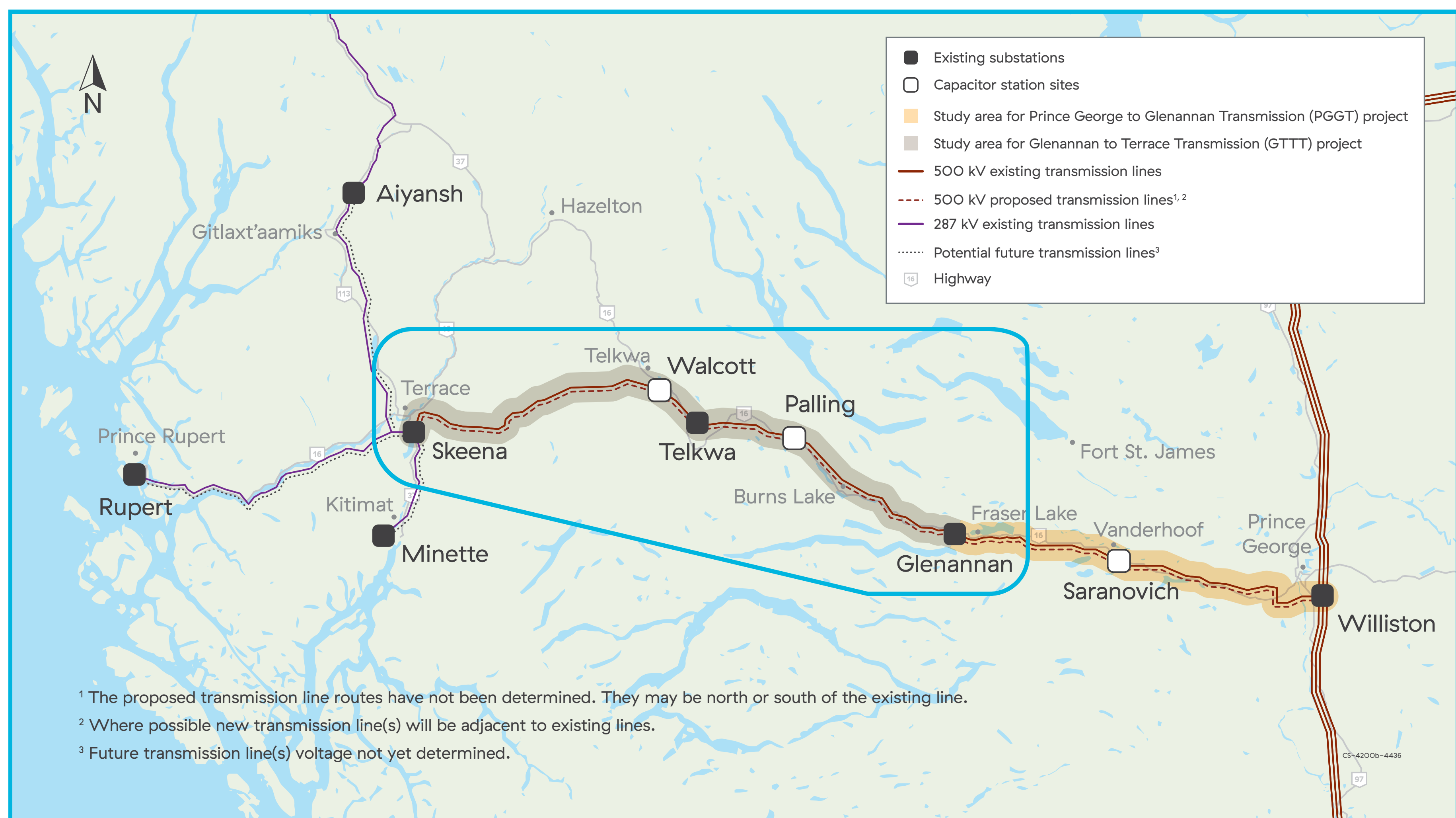


Self Support Delta
Lattice Tower

Glenannan to Terrace Transmission (GTTT)

Key project components

- Two new 500 kV transmission lines
 - Glenannan Substation to Telkwa Substation (approximately 130km long)
 - Telkwa Substation to Skeena Substation (approximately 145 km long)
 - Will generally follow existing transmission lines
 - Challenging terrain and access, conflicts with pipeline may result in the new line moving away from the existing line in some areas
- Upgrades or expansion of Glenannan, Telkwa and Skeena substations
- Expansion of Palling and Walcott capacitor stations
- Fibre optic cable on new or existing transmission structures to provide additional communication between stations



Glenannan to Terrace Transmission (GTTT)

Current project activities

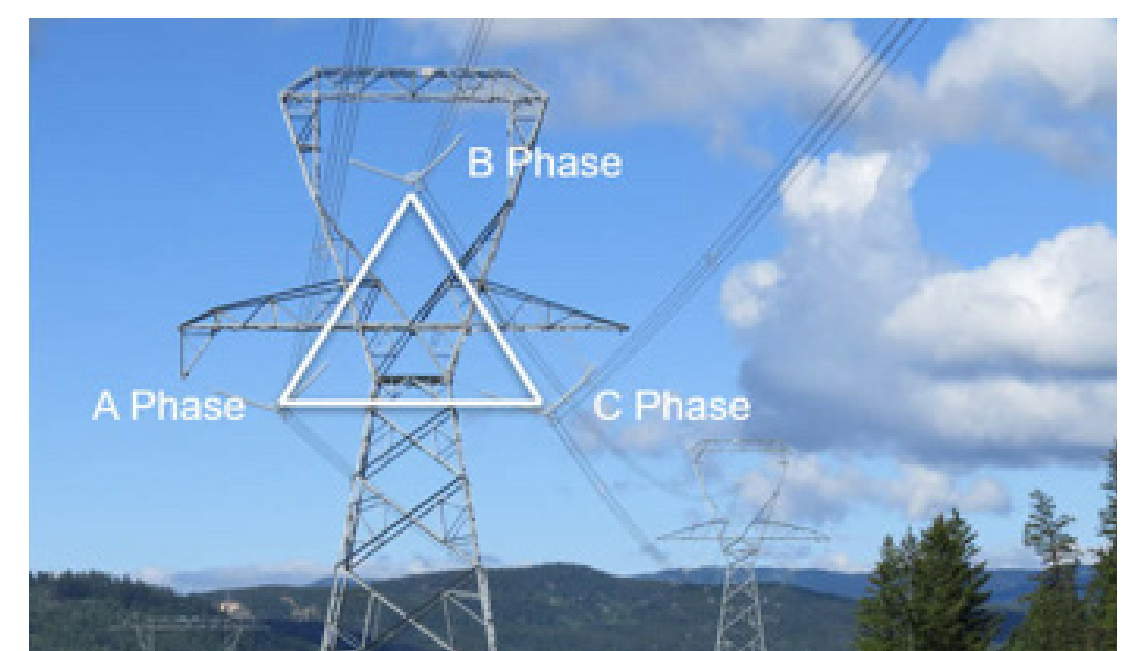
- GTTT is at an earlier stage of development than PGGT
- Corridor and route options
 - Desktop environmental analysis to identify socio-environmental and archaeology features along the route corridor completed
 - Work initiated to identify preliminary access and clearing requirements
 - Environmental field studies starting in summer/fall 2024
 - Geotechnical drilling planned to start fall 2024
- Access upgrades for studies (e.g., helipads and road work) starting summer/fall 2024
- Collaboration and consultation is underway with First Nations
- Stakeholder engagement underway:
 - Second round of Open Houses: Houston (March 12), Smithers (March 13), Terrace (March 14), Fraser Lake (March 19) and online (March 21 and 26)
 - Discussions with property owners, authorization holders and other stakeholders
 - Meetings with government representatives and agencies
- Objective is to select a leading route for further study in late 2024



Lattice Guyed Flat Tangent
(most towers from Glenannan to Telkwa, and in flatter areas from Telkwa to Skeena)



Self Support Lattice Dead-End
(most towers in steep terrain)



Self Support Delta Lattice Tower
(used in narrow corridors and to reduce clearing width)

Steps in building a transmission line

GTTT ↓	PGGT ↓		
Planning		Transmission line design	Pre-construction
<ul style="list-style-type: none"> ○ Identify route corridors ○ Identify route options ○ Identify right-of-way requirements ○ High-level environmental review ○ Initial engineering and environmental field studies to determine if lines can be built in an area ○ Route selection 		<ul style="list-style-type: none"> ○ Detailed engineering and environmental studies ○ Permit applications ○ Confirm placement of structures ○ Confirm new right-of-way ○ Acquire property rights including access 	<ul style="list-style-type: none"> ○ Clearing ○ Access ○ Prepare ROW so that foundations and towers can be installed ○ Purchase construction materials
			Construction
			<ul style="list-style-type: none"> ○ Foundations ○ Towers ○ Line stringing ○ Restoration

We're working in partnership with First Nations throughout all phases of the proposed projects.

Stakeholder engagement will be ongoing through all project phases.

Identifying route options

We've identified potential route options as a starting point based on:

- Minimizing impacts and costs
- Identifying the shortest, most direct route
- Minimizing land fragmentation by placing routes adjacent to existing corridors
- Generally using existing rights-of-way
- Ensuring safe construction and operation

We're working in partnership with First Nations to review and assess the route options in order to select a leading route option. We are considering:

First Nations interests	Stakeholder input
Environment	Constructability
Archaeology	Public safety
Social	Other technical factors
Economic	Others to be identified



PGGT route corridor and options

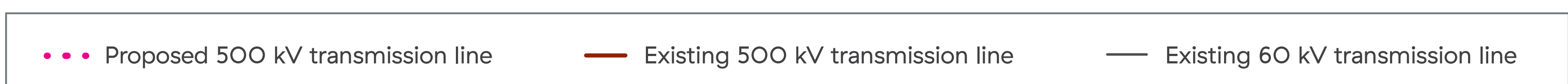
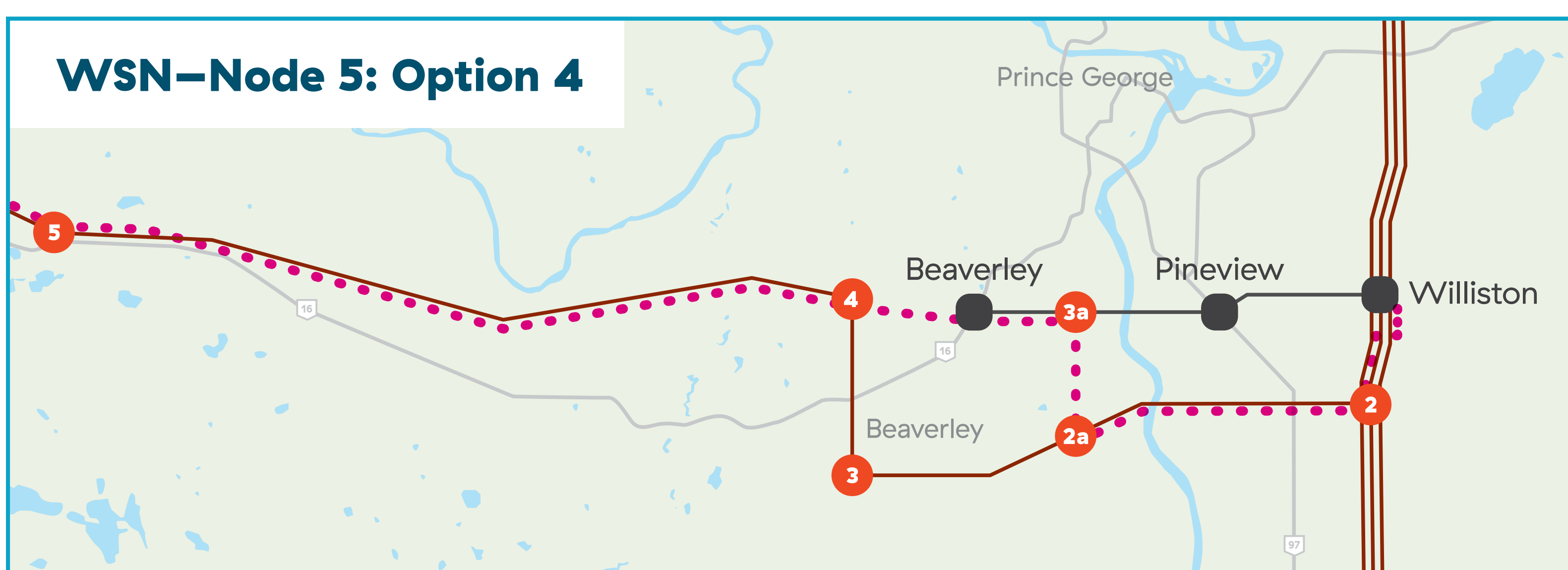
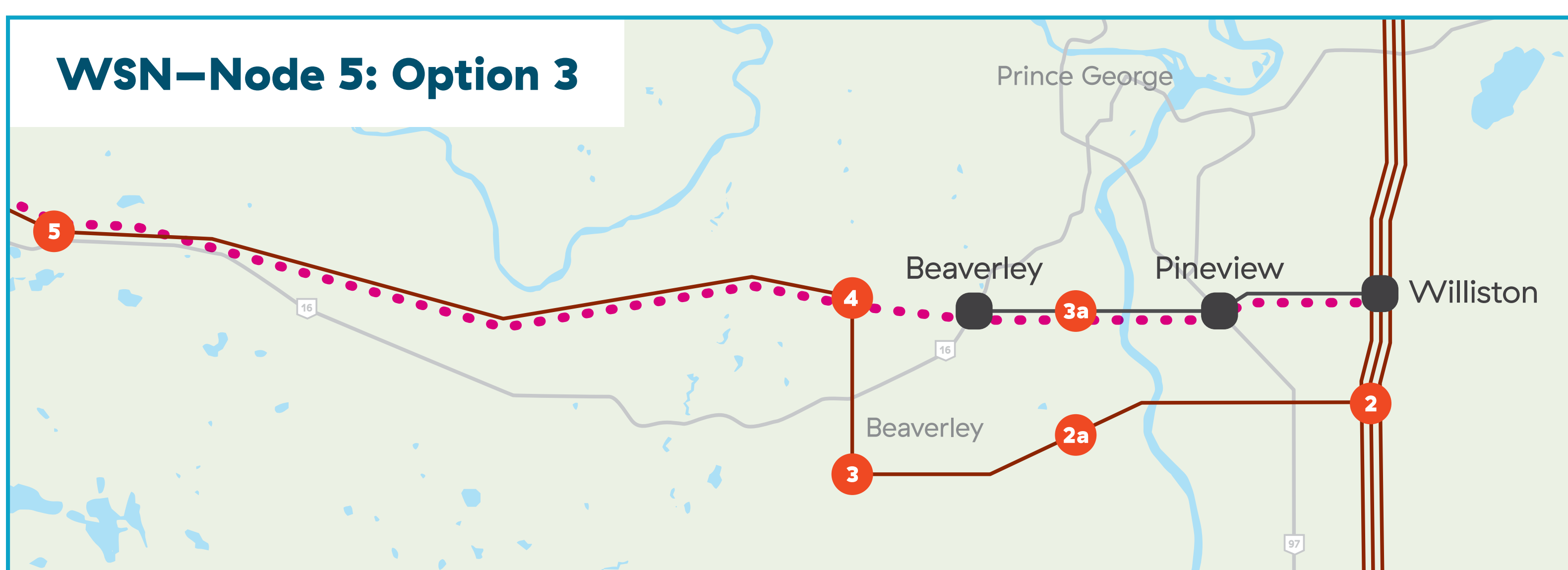
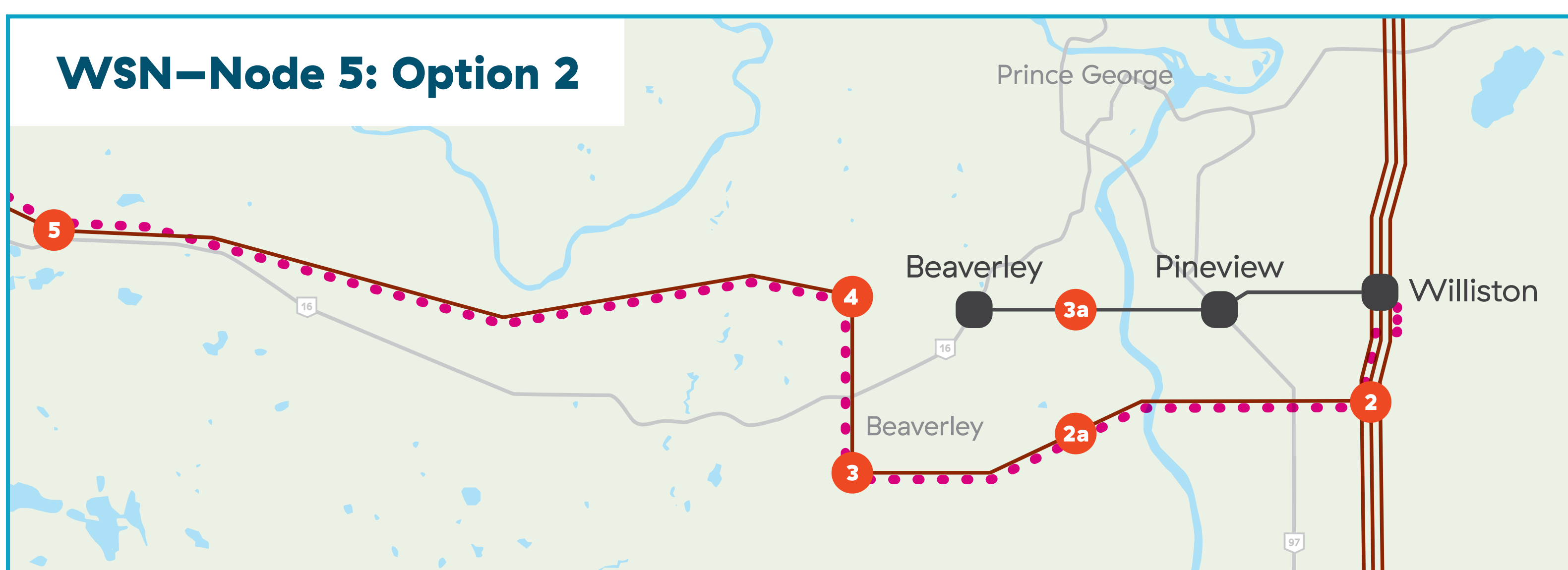
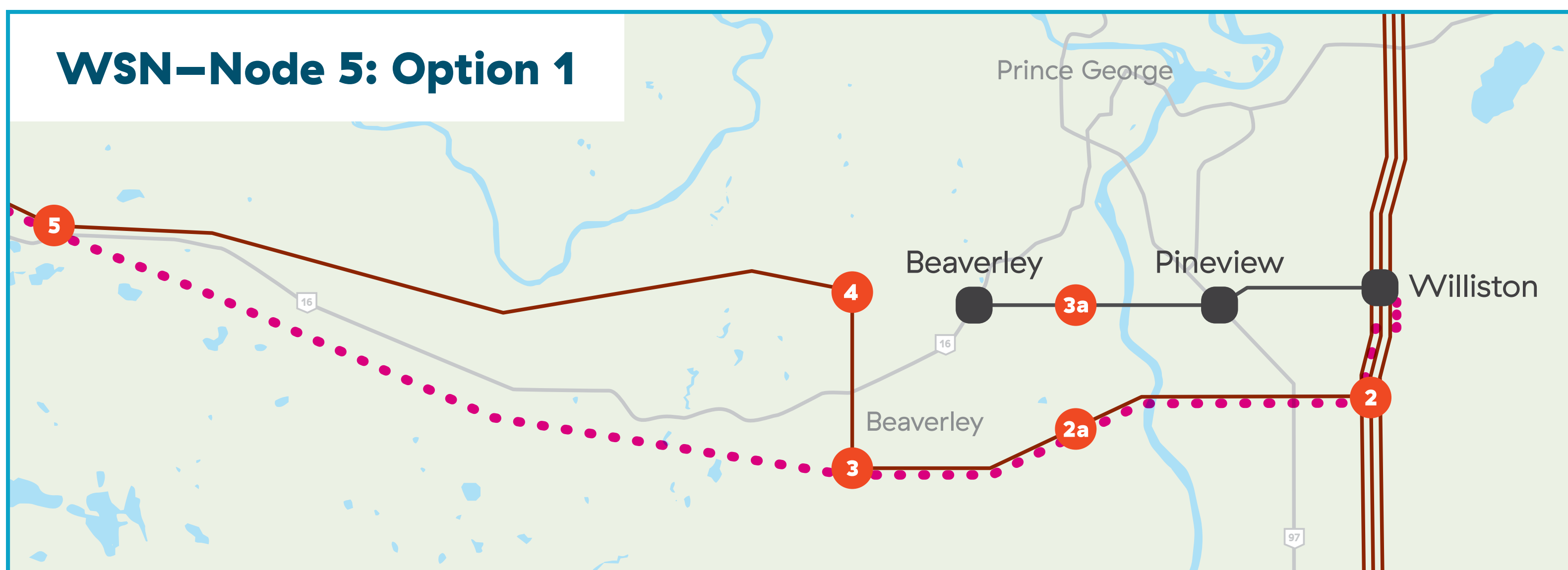


We have identified a route corridor as well as route options along certain parts of the corridor:

- Four route options from Williston Substation (Prince George) to Node 5
- One route option from Node 5 to Node 8
- Two route options from Node 8 to Node 9
- One route option from Node 9 to Glenannan Substation

Routing options

Williston Substation to Node 5



The proposed transmission line routes will be confirmed as planning advances.

Routing options

Williston Substation to Node 5

The following table provides an overview of differences between the options. Items that are similar between the options are identified below the table.

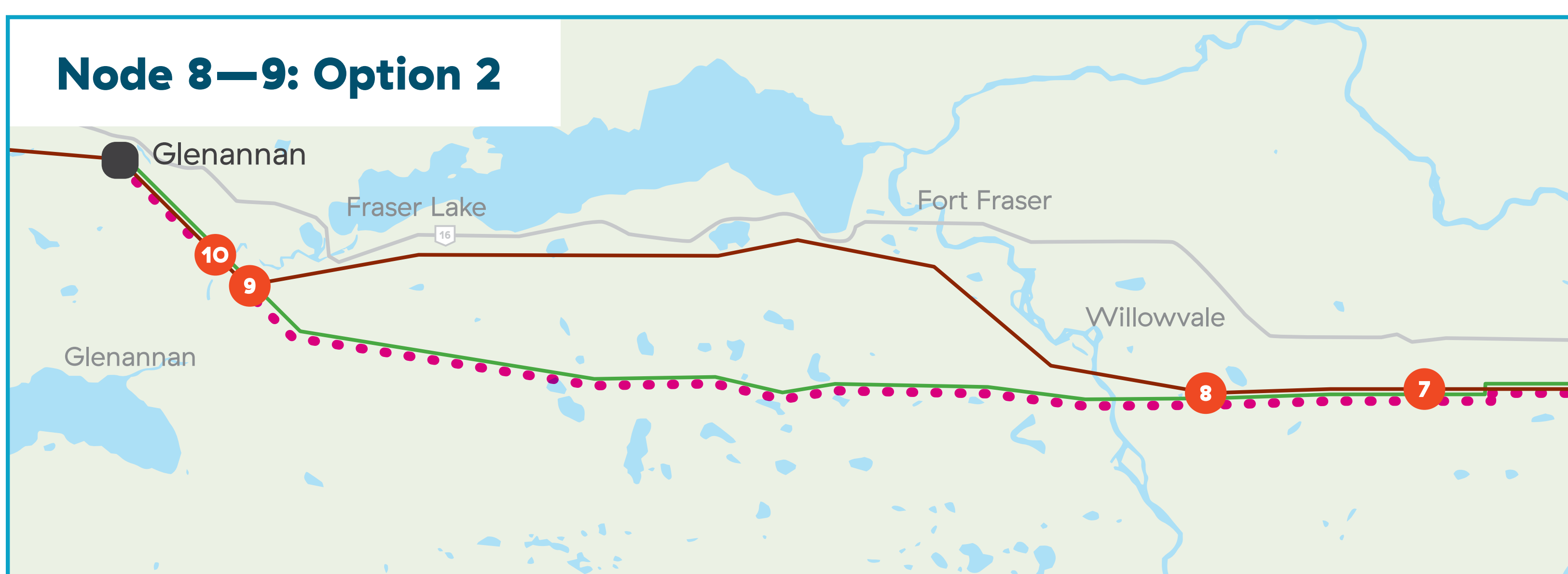
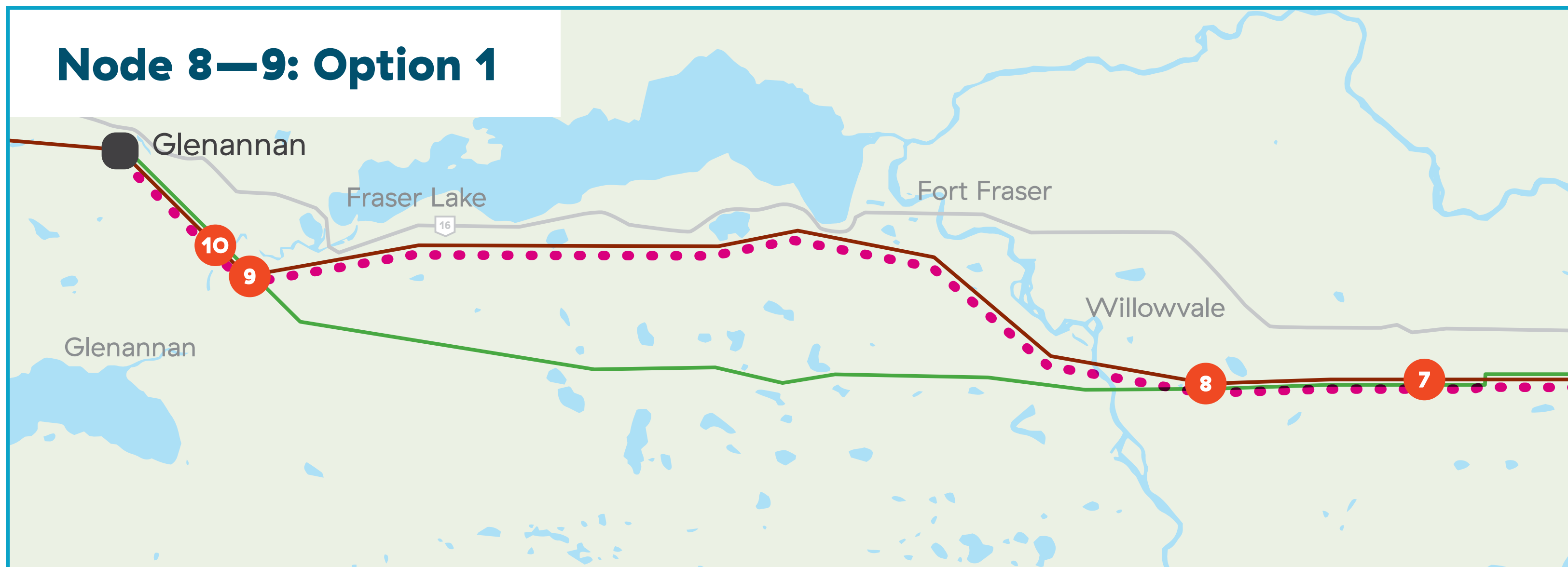
Consideration	Option 1	Option 2	Option 3	Option 4
Minimize impacts to Aboriginal Rights and Title	TBD	TBD	TBD	TBD
Route length (km)	53	58	50	53
New right of way not adjacent to existing lines (km)	30	0	4	8
Relative amount of habitat fragmentation	Higher	Medium	Lower	Medium
Vegetation clearing	<ul style="list-style-type: none"> <input type="radio"/> Clearing along existing right-of-way <input type="radio"/> Extensive clearing along new right-of-way 	Clearing along existing right-of-way	Clearing along new and existing right-of-way	<ul style="list-style-type: none"> <input type="radio"/> Clearing along new and existing right-of-way <input type="radio"/> Extensive clearing in Prince George on municipal property
Effects on other transmission lines	Crosses three 500 kV lines	Crosses three 500 kV lines	<ul style="list-style-type: none"> <input type="radio"/> Crosses five 500 kV lines <input type="radio"/> Operate existing line at 500 kV <input type="radio"/> Need to build a new 69 kV line 	<ul style="list-style-type: none"> <input type="radio"/> Crosses five 500 kV lines <input type="radio"/> Need to build a new 69 kV line
Private properties along the route corridor	86	101	87	88
Overlap with ungulate winter habitat	More	More	Less	Less
Birds	Critical habitat for bank swallow		Critical habitat for bank swallow	
Cost	Highest	Mid-range	Lowest	Mid-range

All options:

- Require upgrades to existing and creation of new access
- Interact with other land users including agricultural land, traplines, woodlots
- Cross wetlands
- Cross waterways, including waterways that are home to White sturgeon (listed species)
- Are within 200m of archaeology sites

Routing options

Node 8 to 9



The following table provides an overview of differences between the options. Items that are similar between the options are identified below the table.

Consideration	Option 1	Option 2
Minimize impacts to Aboriginal Rights and Title	TBD	TBD
Total length	35	34
New right-of-way required	35	34
Provincial parks	Crosses Beaumont Provincial Park	No provincial parks identified
Communities	Crosses First Nations Reserve close to Fraser Lake	Avoids First Nations Reserve, avoids Fraser Lake
Private properties	71	24
Vegetation clearing	Clearing along right-of-way, parallelling existing 500 kV line	Clearing along right-of-way, parallelling existing 230 kV line

Both options:

- Overlap archaeology sites
- Cross wetlands
- Cross waterways, including those home to White Sturgeon (listed species)
- Interact with other land use

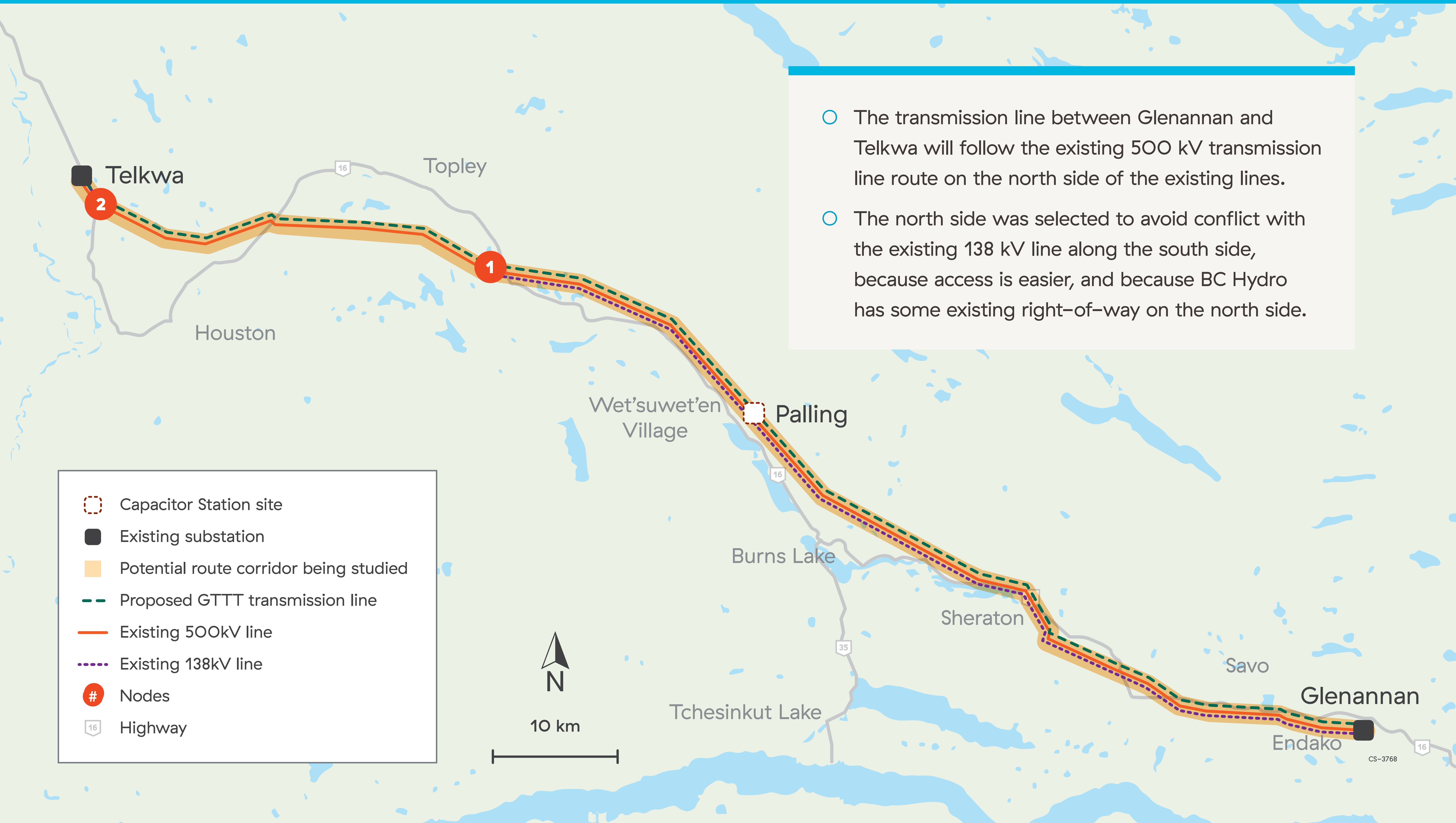
Proposed routing options from Williston Substation











- Going west, the existing 60kV line is proposed to be energized to 500 kV and a new 60 kV line is proposed to be built north of the existing line. The routing leaving Williston Substation is to be determined.
- Going south, the new line is proposed to be located east of the existing lines to Node 1A and will then cross the existing lines to Node 1B from where it is proposed to travel between existing lines on the west side of the right-of-way.

GTTT corridor and route

Glenannan to Telkwa



- The transmission line between Glenannan and Telkwa will follow the existing 500 kV transmission line route on the north side of the existing lines.
- The north side was selected to avoid conflict with the existing 138 kV line along the south side, because access is easier, and because BC Hydro has some existing right-of-way on the north side.

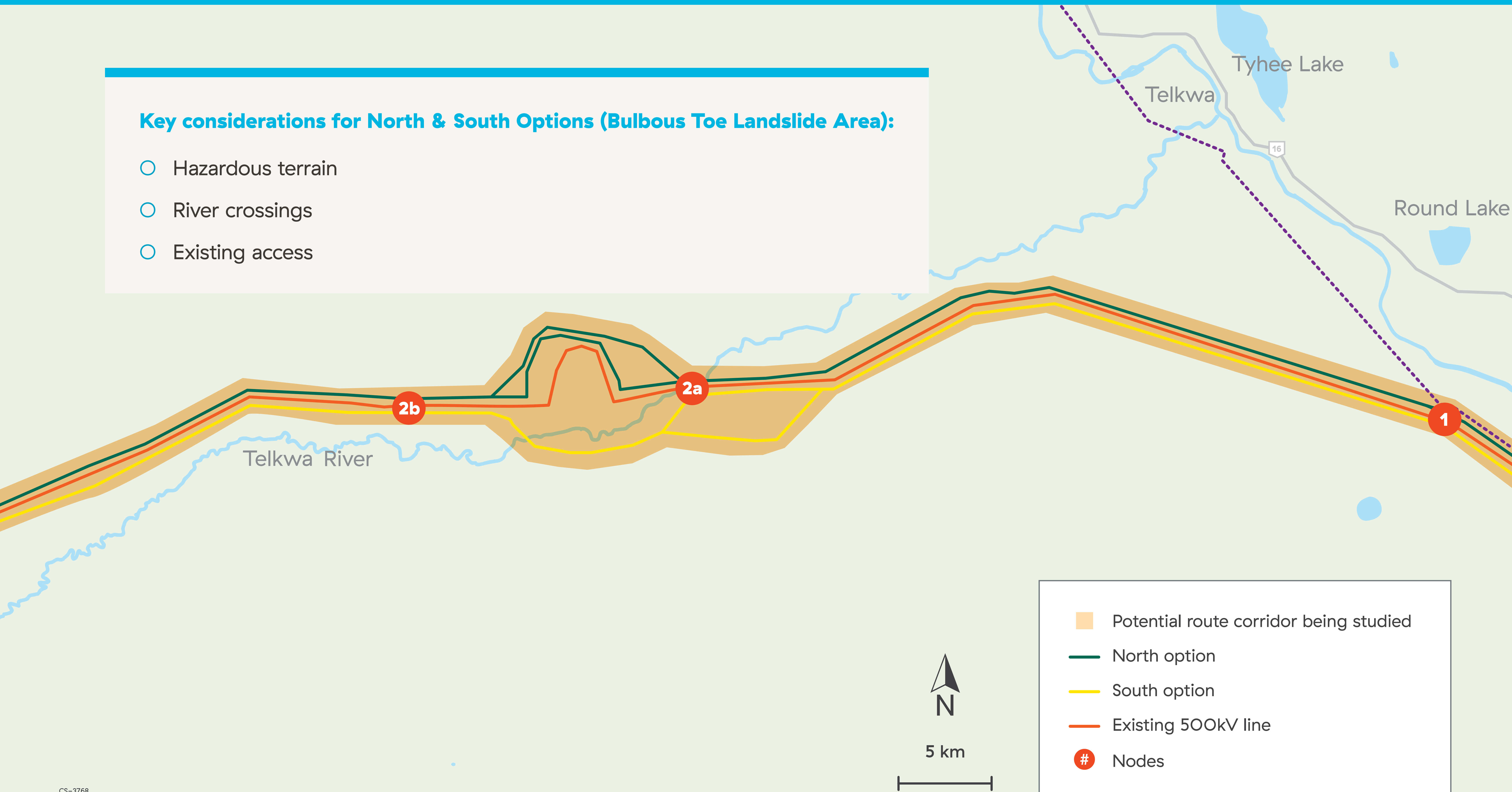
-  Capacitor Station site
-  Existing substation
-  Potential route corridor being studied
-  Proposed GTTT transmission line
-  Existing 500kV line
-  Existing 138kV line
-  Nodes
-  Highway

Telkwa to Skeena route options

Node 1 to 2b

Key considerations for North & South Options (Bulbous Toe Landslide Area):

- Hazardous terrain
- River crossings
- Existing access



GTTT corridor and route options

Telkwa to Skeena



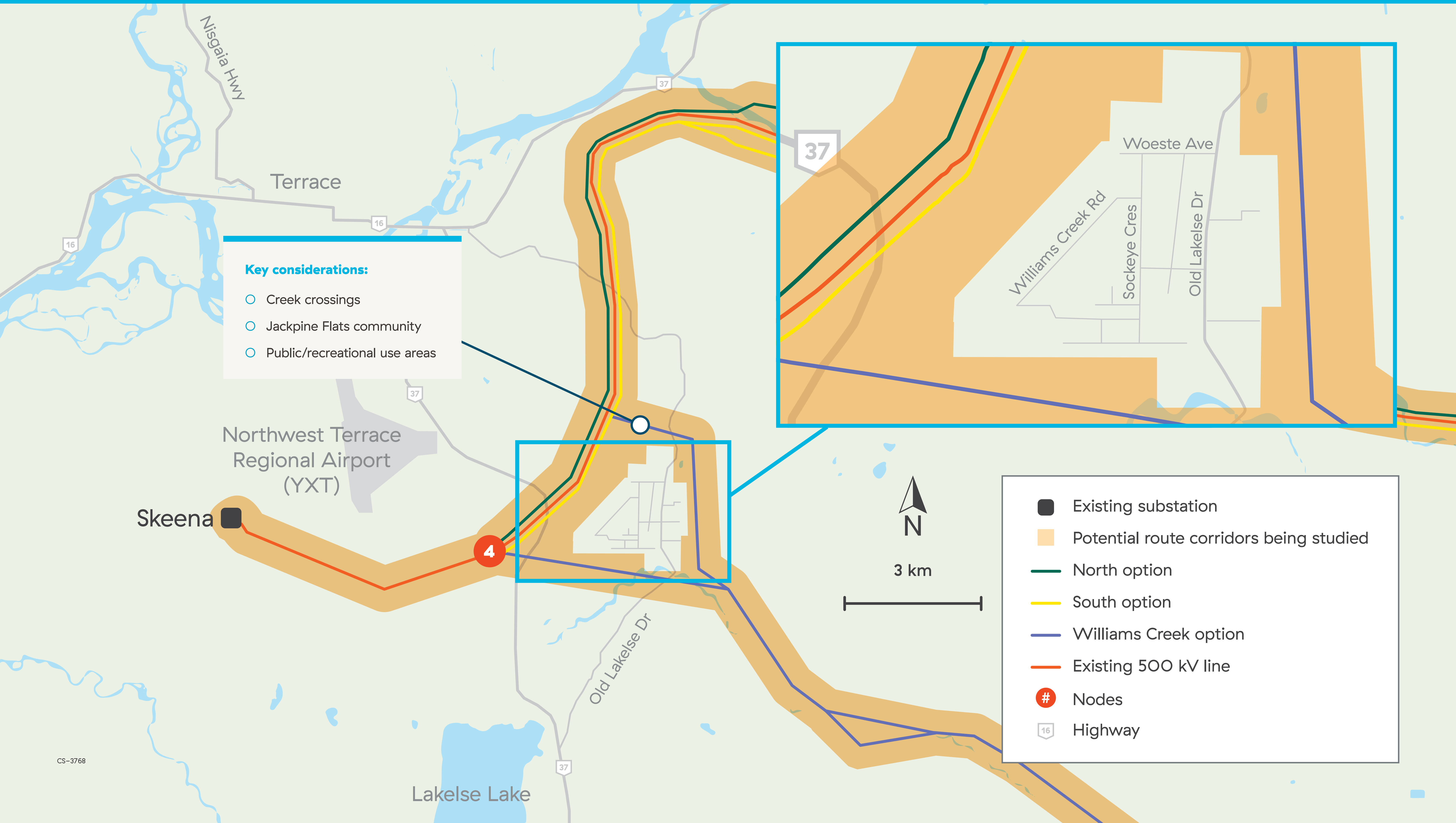
Telkwa to Skeena route options

Node 3 to 4



Telkwa to Skeena route options

Node 4



Key considerations:

- Creek crossings
- Jackpine Flats community
- Public/recreational use areas

- Existing substation
- Potential route corridors being studied
- North option
- South option
- Williams Creek option
- Existing 500 kV line
- Nodes
- Highway

Studies



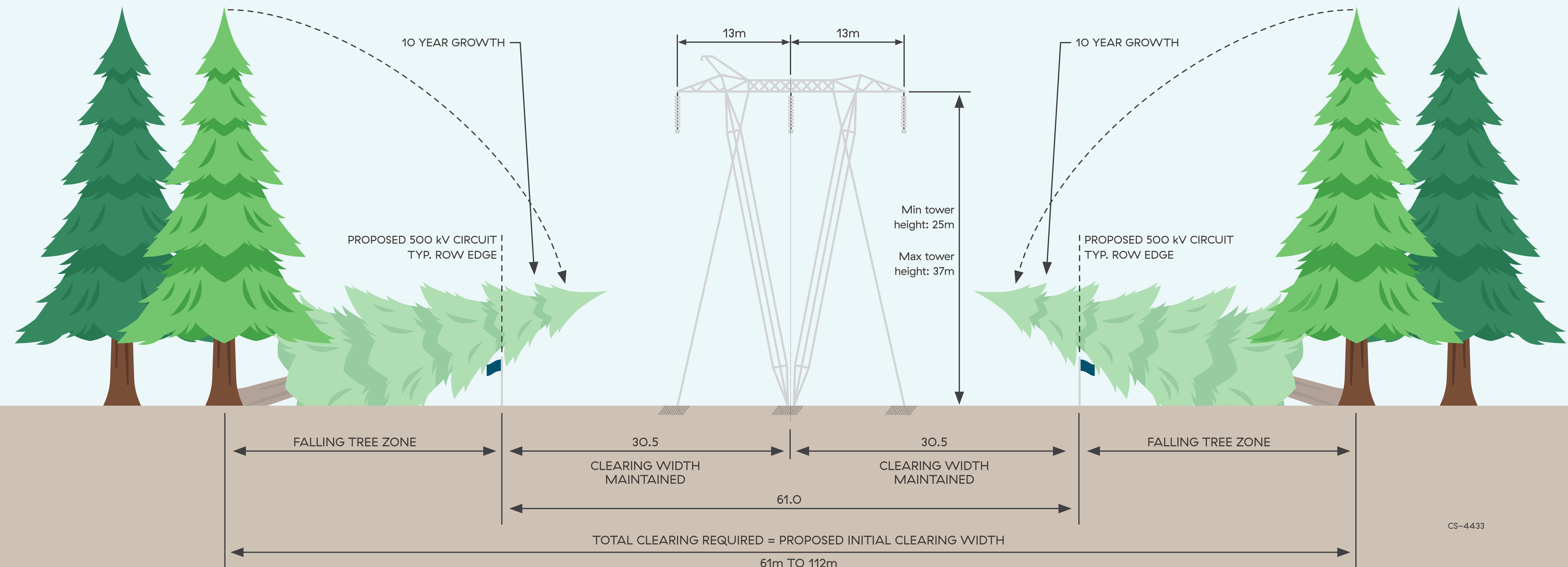
- We're planning to start environmental field studies during spring/summer 2024
 - Wildlife—amphibians, bats, birds, wildlife habitat, remote cameras
 - Fish—stream assessments
 - Vegetation—Terrestrial Ecosystem Mapping, rare plants
 - Archaeology
- First Nations Traditional Use Studies
- Study areas and locations will depend on type and subject of the study, and where clearing and/or ground disturbance will occur
- We will use the findings to complete the Environmental Overview Assessment and Archaeological Overview Assessment and to help us develop both strategies to deal with potential effects and monitoring programs
- Preliminary engineering and survey studies started spring 2023

Right-of-way with proposed new transmission lines

NOTES

1. Drawing not to scale.
2. Values shown (heights, widths, clearance) are typical values and may vary along the line based on items including distance between towers, types of towers, maintenance needs, adjacent infrastructure such as pipelines and railways, adjacent vegetation, and other land uses.
3. The falling tree zone cleared when the line is built varies with tree height and ground slope. In the area beyond the ROW most vegetation can re-grow to mature height. Trees may have to be removed if they become hazardous to the circuit.

CONCEPTUAL 5L64



Proposed schedule

Key dates	Activity
Fall 2022 to Fall 2024	<ul style="list-style-type: none"> ○ Start desktop and field studies ○ Assess route and site options ○ Select route and station locations
2023 to 2028	<ul style="list-style-type: none"> ○ Complete studies and design work ○ Seek required regulatory approvals ○ Acquire property rights
2026	Start construction on the Prince George to Glenannan Project
2028	Start construction on the Glenannan to Terrace Project
Fall 2030	Target in-service date for the Prince George to Glenannan Project
Fall 2032	Target in-service date for the Glenannan to Terrace Project

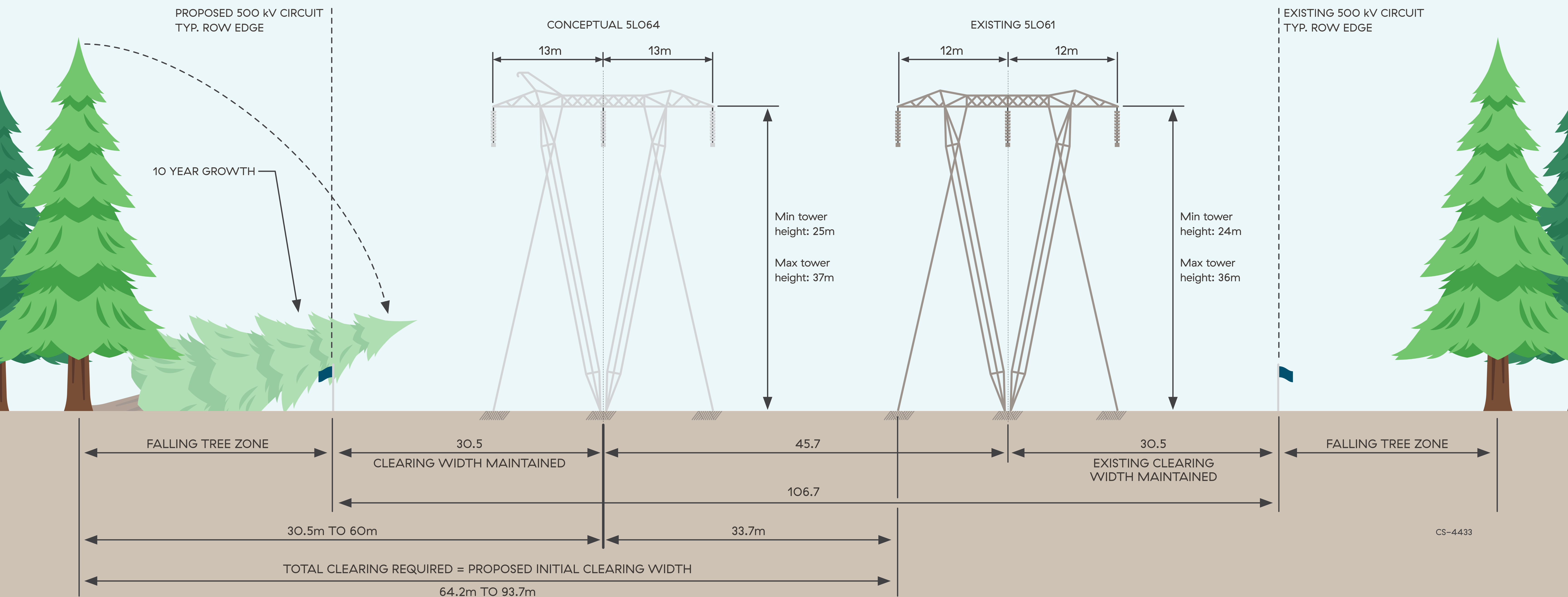
We are working to identify ways to shorten the schedule.

Collaboration with First Nations and engagement with stakeholders is underway and will be ongoing through all project phases.

Right-of-way with new transmission lines

NOTES

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2. Values shown (heights, widths, clearance) are typical values and may vary along the line based on items including distance between towers, types of towers, maintenance needs, adjacent infrastructure such as pipelines and railways, adjacent vegetation, and other land uses.
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Thermal upgrades

To make the most effective use of the existing 500 kV infrastructure from Prince George to Terrace, we're proposing to make thermal upgrades along the lines. Thermal upgrades will enable the existing lines to carry the same amount of electricity as the new lines and this will enable us to deliver electricity to the North Coast even if one line is out of service.

Transmission lines heat up and sag when they carry current and there are areas where there won't be enough clearance between the lines and the ground to operate safely when the lines are carrying more current.

We can increase the clearance by:

- raising the lines by “tightening” them or adding mid-span towers
- removing high spots on the ground
- moving infrastructure (e.g., roads) to areas with more clearance,
- raising the towers, or
- rebuilding the towers.

Once we've identified where more clearance is needed, we'll determine the best way to address each site.

Some of the proposed upgrades may take place as part of regular transmission line maintenance over the coming years.

Most work would occur after the proposed transmission lines are in service.

Transmission infrastructure expansion beyond Terrace

The level and location of potential demand and studies to understand what the existing infrastructure can handle indicate that the following new infrastructure is needed; however, the specific requirements will depend on which customer projects advance:

- South: a new line to Kitimat built to 500 kV standards but initially operated at 287 kV and a new substation.
- North: a new 500 kV line to Gitlaxt'aamiks (formerly New Aiyansh) and a new substation.
- West: a new 287 kV substation and new line extended from Prince Rupert to the port.

We're still in the early stages of this work and the process for how to advance any infrastructure beyond Terrace needs further discussion with governments, First Nations, and stakeholders.

Thank you for attending

- Please complete a comment form to share your feedback and leave it with us
 - Alternatively, email us at projects@bchydro.com with your comments and questions.
- We'll continue to keep you informed as the proposed projects advance
- For more information, please visit bchydro.com/ncelectrification
- Please contact us toll free at **1 866 647 3334** or at projects@bchydro.com if you have any additional questions or comments

