BC Hydro

Peace Region Electricity Supply Project

Overview and Feasible Alternatives

Revision 4

Document Version Control

Revision 1	Initial issue	August 2013
Revision 2	Removal of alternative 3 and addition of alternative 3A to the feasible alternatives.	*January 13, 2014*
Revision 3	Removal of alternative 2B Revisions to alternatives 1, 2A, 3A. Addition of alternative 3B	May 21, 2014
Revision 4	Nomenclature clarification Addition of alternatives 4 and 5	April 27, 2015

Background

The Peace Region of B.C. contains one of North America's most competitive natural gas areas - the Montney basin. Unconventional gas production is expected to dramatically increase over the next 10 years in all parts of the Peace Region, particularly in the Dawson Creek and Groundbirch areas. Gas producers have submitted requests to interconnect to BC Hydro's electrical grid in order for them to use electrical rather than gas fired equipment for their compression requirements. This has resulted in BC Hydro needing to serve some of the most dramatic, single industry load (demand for electricity) growth in a discrete area that it has experienced over the past 50 years.

The Dawson Creek/Chetwynd Area Transmission (DCAT) project, currently under construction, will resolve the downstream (i.e. close to customers) constraints in the transmission system supplying the Dawson Creek and Groundbirch areas. Another project is required to resolve the upstream (i.e. close to BC Hydro generating stations) constraints in the transmission system supplying these areas and the rest of the Peace Region. This additional project is being studied as the Peace Region Electricity Supply (PRES) project.

The Peace Region is supplied by a network of 138kV and 230kV transmission lines feeding from the GM Shrum (GMS) generating facility. The load growth in the Peace Region (particularly in the Dawson Creek and Groundbirch areas) is expected to increase so rapidly that soon after the DCAT project goes into service, the ability of the transmission system to maintain supply to all customers in the event of any system issues will be exceeded. In addition to this, the ability of the system to supply the growing load under normal conditions is expected to be exceeded, meaning that the transmission system must be reinforced in order for BC Hydro to meet its obligation to serve customers. BC Hydro forecasts that the ability of the system to supply the growing load under normal conditions will be exceeded sometime in the 2017 timeframe.

The PRES project alternatives described in this document are designed to meet the forecasted load growth in the Dawson Creek and Groundbirch areas.

Alternatives

BC Hydro has identified a number of alternatives for serious consideration which are capable of addressing the forecast load growth.

Since the previous revision of this Overview, two new alternatives are now considered viable and have been added to this overview document and one previously considered alternative (known in previous versions of this Overview as Alternative 2B-1) is no longer being seriously contemplated.

The first new alternative is called “Alternative 4”. By way of background, BC Hydro identified a similar alternative in 2013, known at the time as “Alternative 3”. It involved a new 500/230kV substation, Pine Valley (PIV), connecting to the existing 500kV transmission line southwest of the Dokie Terminal station (DKT) and a transmission line from the proposed PIV to Sundance Lakes substation (SLS). Upon preliminary investigation it was deemed at the time to not be viable because of the significant amount of civil work needed to construct the PIV substation in such a mountainous area, and the amount of new transmission right-of-way required.

As part of the consultation process on the PRES project with potentially affected First Nations, First Nations raised concerns about potential impacts in the PRES study area between the Peace and Pine rivers. In particular, First Nations have expressed to BC Hydro that this area is part of a significant cultural and spiritual area, which is of great importance to some First Nations’ cultures.

In response to these concerns, BC Hydro has revisited the feasibility of an alternative that avoids this area. In so doing, BC Hydro has undertaken further engineering studies which have found that it may be possible to reduce the scope of PIV and that other sites with more favourable topography and ground conditions may exist locally. As a result of this new information, BC Hydro has developed “Alternative 4” and is now seriously contemplating it as a viable PRES alternative.

The second new alternative is called “Alternative 5”. It involves a connection to the planned Site C substation. A transmission connection to the Site C substation was not previously considered viable because of uncertainty in timing of the Site C project. BC Hydro is seriously contemplating this connection as a viable PRES alternative now that the Site C project has been approved.
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The alternatives are grouped in five categories:

- Alternative 1: 230 kV transmission line from GM Shrum Generating station (GMS) to SLS via Sukunka substation (SNK)
- Alternative 2: 230 kV transmission line from GMS to SLS via Dokie Terminal substation (DKT), passing north of SNK
- Alternative 3: 230 kV transmission line from a new 500/230 kV substation (DKT500) to SLS
- **NEW!** Alternative 4: 230 kV transmission line from a new 500/230 kV substation (PIV) to SLS
- **NEW!** Alternative 5: 230 kV transmission line from the planned Site C substation to Shell Groundbirch (SGB) substation

BC Hydro is no longer seriously contemplating the alternative previously identified as Alternative 2B-1. As discussed in earlier versions of this Overview document, this route option passed north of Chetwynd. Upon evaluation, which included consultation with First Nations, feedback from stakeholders and assessment of the significant amount of new right-of-way that would be required including new right-of-way through the Little Prairie Community Forest, it was considered to not be viable. Therefore BC Hydro is no longer seriously contemplating this alternative and it has been removed from the Overview.

Including all routing options and line configurations, there are a total of 11 alternatives being seriously contemplated.

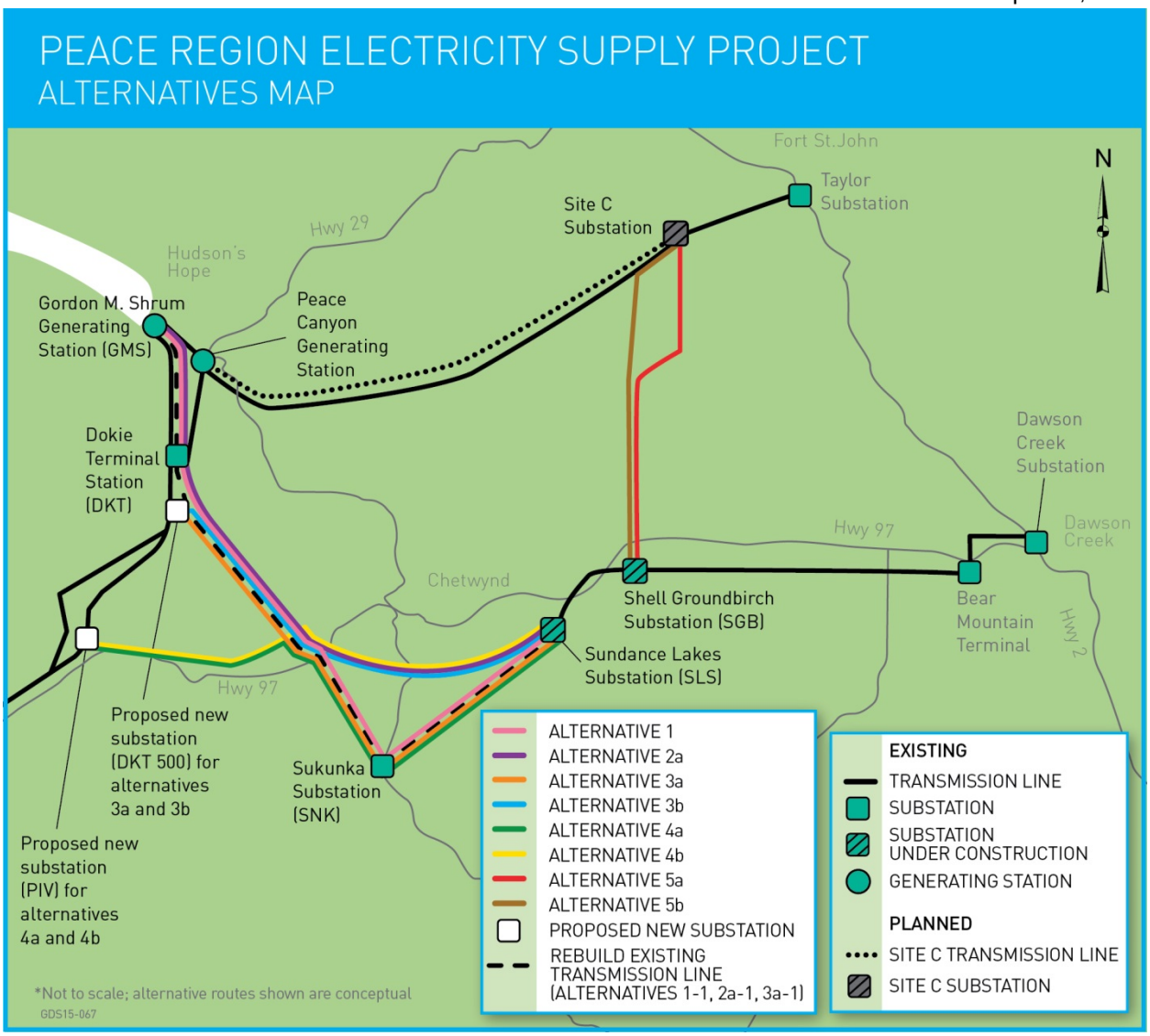
Nomenclature

To provide clarity around the large number of alternatives, BC Hydro is using the following nomenclature:

- Alternatives are grouped in five categories, numbered 1 through 5;
- Routing options of each alternative, if any, are denoted with a letter (A or B) after the alternative number;
- The suffix “1” describes a single circuit configuration and a rebuild of an existing circuit; and
- The suffix “2” describes a double circuit configuration.

For example, alternative 3 following route option “B” and with a double circuit configuration is named “Alternative 3B-2”.

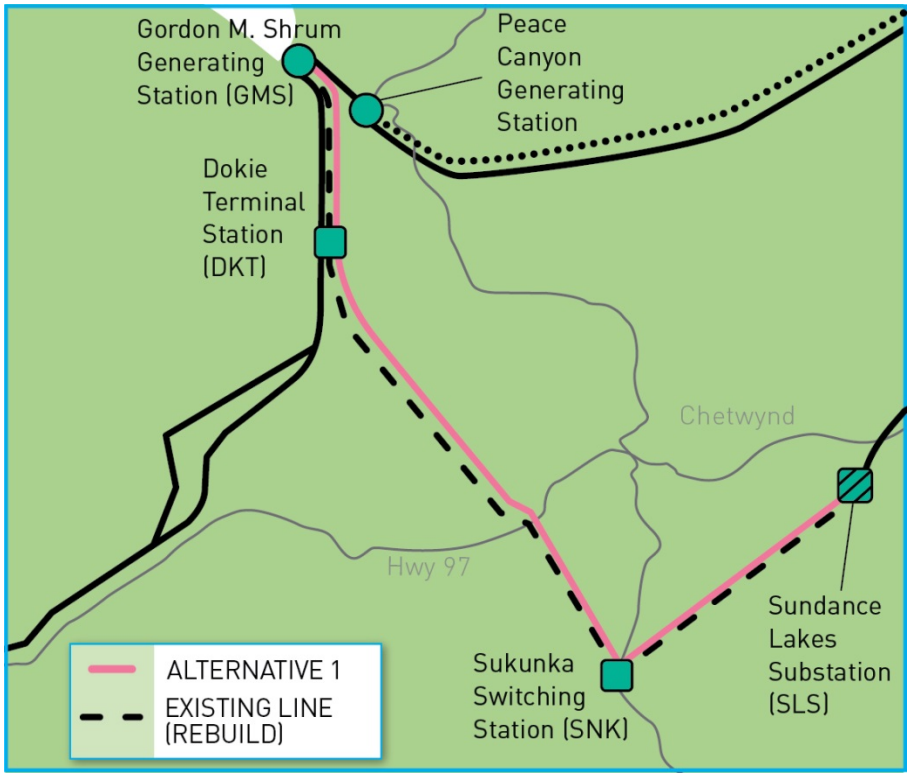
The map below shows the alternatives. Details of all 11 alternatives are discussed on the following pages.



Next Steps

BC Hydro will continue to review the alternatives, identifying a leading alternative in fall 2015 for further definition. Other Project alternatives may also be identified as BC Hydro continues to study available options. In so doing, BC Hydro will continue to consult with First Nations and consider input provided from stakeholders. Alternative evaluation and consultation on alternatives continues through to culmination of the regulatory process. In addition to this, BC Hydro will continue to monitor load growth in the area to ensure the proposed solution will meet identified needs. BC Hydro expects to place the project in service by approximately 2022, although this date depends on the alternative selected.

Alternative 1: 230 kV transmission line from GMS to SLS via SNK



There are two variations of alternative 1:

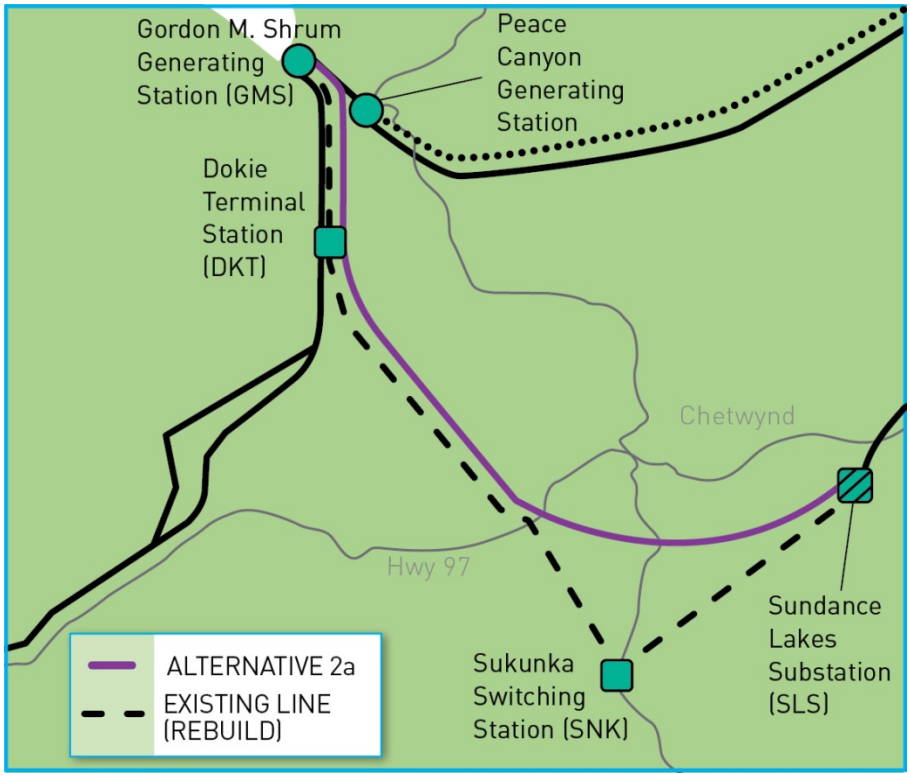
Alternative 1-1: New Single Circuit Line + Rebuild Existing Line

Alternative 1-1 involves building a new single circuit 230kV transmission line from GMS to SLS via SNK. It also involves rebuilding the existing 230kV line from GMS to SLS via SNK with higher-rated conductor (wire) and new pole structures. The approximate length of each of the new and the rebuilt lines would be 105km. The objective is to parallel the 105km existing line where possible. Upgrades would be required to three substations (GMS, SNK and SLS).

Alternative 1-2: New Double Circuit Line

Alternative 1-2 involves building a new double circuit 230kV transmission line from GMS to SLS via SNK. The approximate length would be 105km. The objective is to parallel the 105km existing line where possible. Upgrades would be required to two substations (GMS and SLS). No upgrade of SNK would be required. No change would be made to the existing transmission line.

Alternative 2: 230kV transmission line from GMS to SLS via DKT, passing north of SNK



There are two variations of alternative 2:

Alternative 2A-1[1]: New Single Circuit Line + Rebuild Existing Line

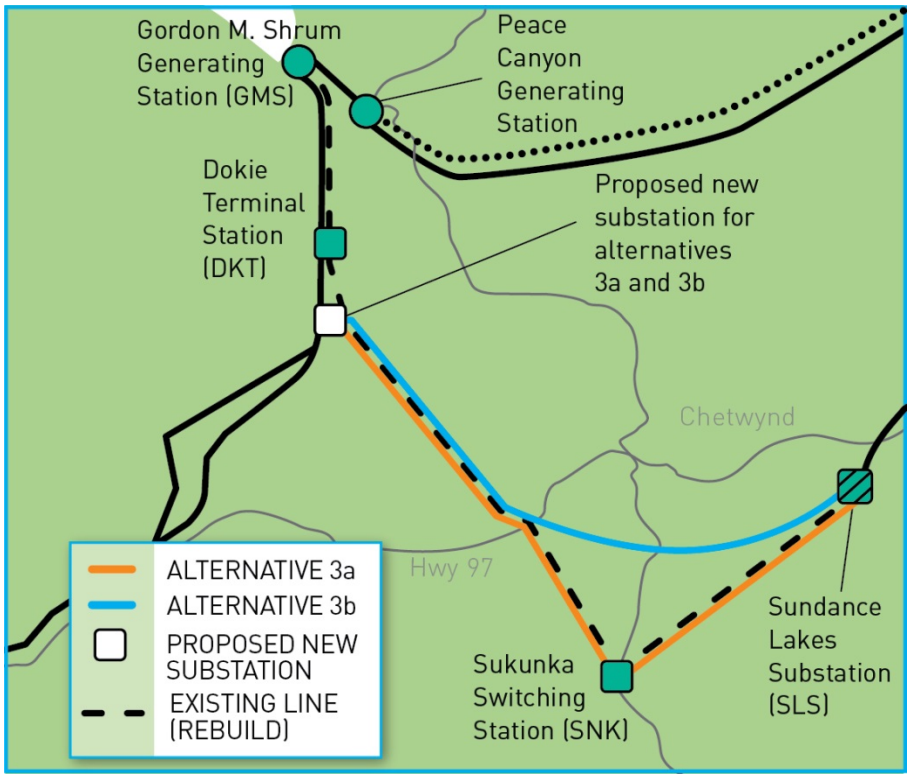
Alternative 2A-1 involves building a new single circuit 230kV transmission line from GMS to SLS via DKT. It also involves rebuilding the existing 230kV line from GMS to SLS via SNK with higher-rated conductor (wire) and new pole structures. The approximate length of the new line would be 85km. While the line is shorter than alternative 1, approximately 15 km of it would not parallel existing lines. The objective is to parallel the remaining 70km where possible. The approximate length of the rebuilt line would be 105km. Upgrades would be required to three substations (GMS, DKT, and SLS).

Alternative 2A-2: New Double Circuit Line

Alternative 2A-2 involves building a new double circuit 230kV transmission line from GMS to SLS via DKT, passing north of SNK. The approximate length of the new line would be 85km. Upgrades would be required to two substations (GMS and SLS). No upgrade of DKT would be required. No change would be made to the existing transmission line.

[1] As discussed at page 3 of this Overview, BC Hydro is no longer seriously contemplating the alternative identified in previous versions of this Overview as Alternative 2B-1.

Alternative 3: 230kV transmission line from DKT500 to SLS



There are three variations of alternative 3:

Alternative 3A-1: New Single Circuit Line Routed via SNK + Rebuild Existing Line

Alternative 3A-1 involves building a new 500/230kV substation (DKT500), connected to the existing 500kV transmission line and building a new single circuit 230kV transmission line from DKT500 to SLS via SNK. It also involves rebuilding the existing line from GMS to SLS via SNK with higher-rated conductor (wire) and new pole structures. The approximate length of the new line would be 82km. Connecting to the proposed DKT500 substation involves approximately 4km of line that would not parallel existing lines. The objective is to parallel the remaining 78km where possible. Upgrades would be required to three substations (GMS, SNK and SLS).

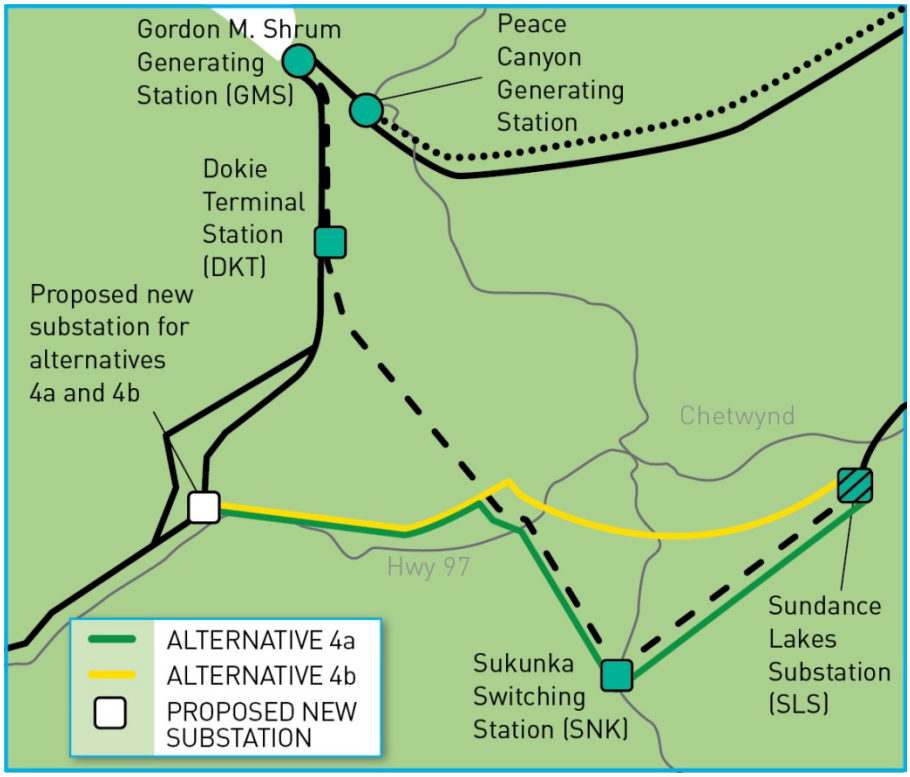
Alternative 3A-2: New Double Circuit Line Routed via SNK

Alternative 3A-2 involves building a new 500/230kV substation (DKT500) connected to the existing 500kV transmission line and a new double circuit 230kV transmission line from there to SLS via SNK. Upgrades would be required at SLS substation. No upgrade of SNK would be required. No change would be made to the existing transmission line.

Alternative 3B-2: New Double Circuit Line Routed North of SNK

Alternative 3B-2 is similar to 3A-2, except it passes north of SNK. It involves approximately 19km of line that would not parallel existing lines.

Alternative 4: 230kV transmission line from PIV to SLS



There are two[2] variations of alternative 4:

Alternative 4A-2: New Double Circuit Line Routed via SNK

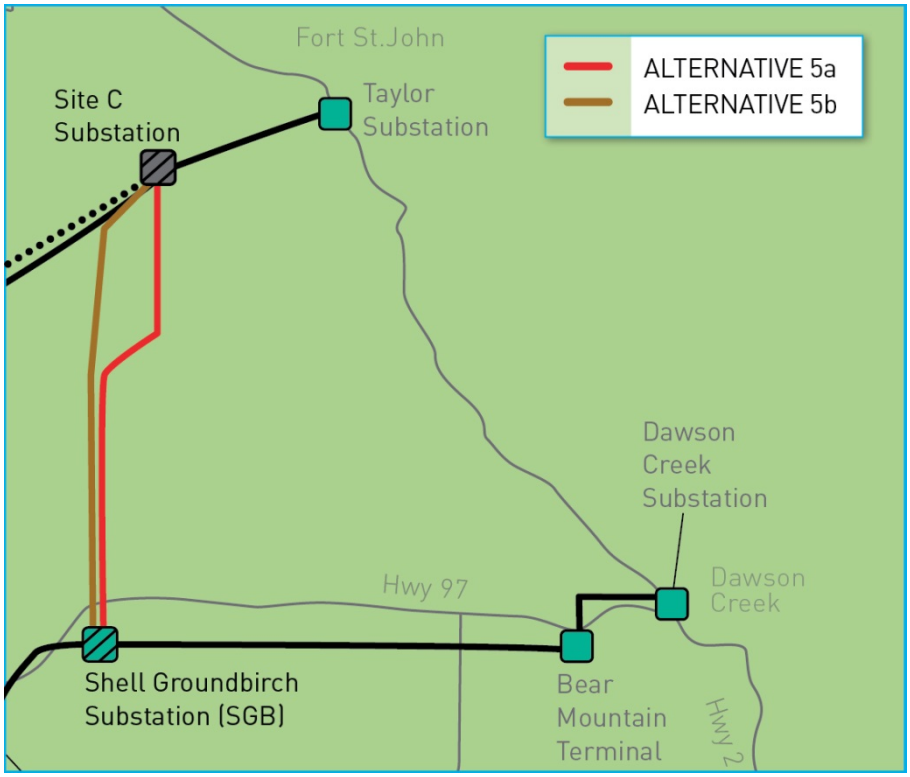
Alternative 4A-2 involves building a new 500/230kV substation (PIV) connected to the existing 500kV transmission line and a new double circuit 230kV transmission line from there to SLS, routed via SNK. The approximate length of the new line would be 82km, of which approximately 32km would not parallel existing lines. The objective is to parallel the remaining 52km where possible. Upgrades would be required at SLS substation. No upgrade of SNK would be required.

Alternative 4B-2: New Double Circuit Line Routed North of SNK

Alternative 4B-2 is similar to 4A-2, except it passes north of SNK. It involves approximately 48km of new line that would not parallel existing lines.

[2] BC Hydro's assessment to date has found that alternatives involving a new single circuit line plus a rebuild of an existing transmission line would be more expensive, take longer to implement and would not provide significantly smaller footprints than alternatives that involve a new double circuit transmission line. BC Hydro is therefore not seriously contemplating such variations of alternatives 4 or 5.

Alternative 5: 230kV transmission line from Site C Substation to SGB



There are two variations of alternative 5:

Alternative 5A-2: New Double Circuit Line, Eastern Route

Alternative 5A-2 involves building a new double circuit 230kV transmission line from the planned Site C substation to the Shell Groundbirch (SGB) substation. The approximate length of the line would be 55km.

Alternative 5B-2: New Double Circuit Line, Western Route

Alternative 5B-2 involves building a new double circuit 230kV transmission line from the planned Site C substation to the SGB substation. The approximate length of the line would be 55km. It differs from Option 5A-2 in that it runs parallel to the existing line for approximately 2.5km, and it crosses the Pine River at a different location.