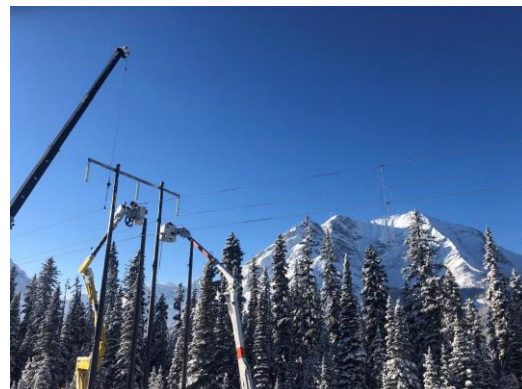


Elkford low-likelihood transmission outage risk

Technical information about transmission line 5L92 and the Natal Load Shedding Remedial Action Scheme

What this information sheet explains

BC Hydro has identified a **low-likelihood transmission scenario** that could temporarily interrupt electricity service to Elkford. It would require a rare combination of system conditions and an unexpected outage of transmission line 5L92 from Castlegar to Sparwood. Automatic protection would act to prevent a wider voltage collapse in the East Kootenay region.



Transmission infrastructure in the Elk Valley

The risk is low, but the potential impact matters.

BC Hydro is sharing the technical basis for the estimate, the expected community effects, and the work underway to remove the need to interrupt Elkford for this specific event.

**Once every
36-82 years**

estimated frequency of the identified event

~1,684

customer accounts potentially affected

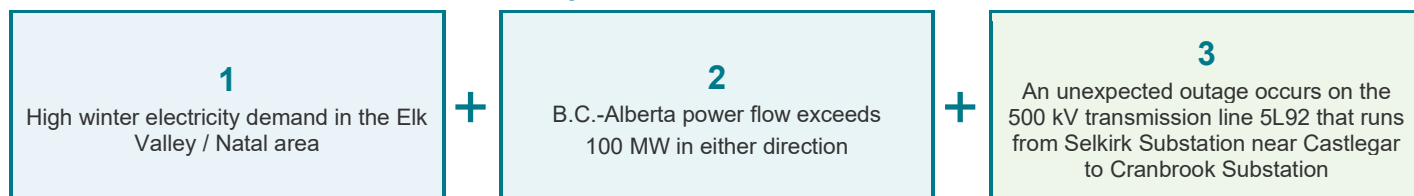
5.4 MW

estimated Elkford peak load in the assessment

**About 5 min
to 2 hours**

expected restoration range; actual time depends on conditions

The three conditions that must overlap



The Natal protection scheme operates to prevent a wider East Kootenay voltage collapse. Under the current arrangement, Elkford may be temporarily disconnected.

What an “Non-Consequential Load Loss (NCLL)” means

In the reliability standard¹, this term means customer load is intentionally disconnected by a protection or operating action even though the customer’s own supply equipment is not the equipment that failed. In this case, the action would protect the wider transmission system from unstable voltage.

This is a specific transmission risk

The 5L92 scenario is different from outages caused by local equipment failure, vegetation, weather damage or distribution-system issues. The planned modification described here addresses this specific transmission scenario; it does not eliminate every possible cause of outage.

¹ BC Mandatory Reliability Standard TPL-001-4 *Transmission Planning Performance Requirements*

When could it happen, and who could be affected?

Conditions, probability, customer impacts and expected restoration

Technical sequence following a 5L92 outage

A forced outage of 5L92 from Selkirk Substation near Castlegar to Cranbrook Substation can initiate the BC Hydro – Alberta Tie Remedial Action Scheme (RAS) automatic protection actions, including opening transmission circuit 5L94 from Cranbrook Substation to Bennett Substation southeast of Calgary, and other selected interconnection paths. The East Kootenay region is then supplied only through the remaining 230 kV transmission network. Under heavy load in the Elk Valley, that network may be unable to maintain acceptable voltage unless the Natal Substation RAS promptly reduces load.

Technical operating conditions

The Natal RAS is armed only when **B.C.-Alberta transfer exceeds 100 MW in either direction** and the combined **Elk Valley load exceeds the threshold** below.

Capacitor-bank availability	RAS arming threshold (combined area load)
All relevant banks in service	290 MW
One of the three banks unavailable	280 MW
Natal bank and one of the two Cranbrook banks unavailable	270 MW

How the likelihood was estimated

- **Exposure to high-load arming conditions:** approximately 163 to 365 hours per year (about 1.9% to 4.2% of the year).
- **Historical line performance:** the 10-year period reviewed included nine (9) forced outages of 5L92; none resulted in an Elkford NCLL event.
- **Planning estimate:** approximately 0.012 to 0.027 events per year, or about once every 36 to 82 years.

How to interpret the estimate

“Once every 36 to 82 years” is a statistical planning estimate, not a schedule or prediction. The event could occur sooner, much later, or not at all. The estimate depends on historical data and the assumption that the relevant conditions occur independently.

Customers potentially affected

The assessment used an estimated Elkford peak load of **5.4 MW** and approximately **1,684 customer accounts**.

Customer type	Estimated accounts	Share of peak demand
Residential	1,521	58.1%
Commercial	57	18.2%
Industrial	106	23.7%

Counts and load shares reflect the planning data used for this assessment and may change overtime.

Potential health, safety and community-welfare effects

A temporary outage could affect homes, businesses and community services, including health-care and emergency-response functions. Winter outages can be especially disruptive for heating, communications and vulnerable customers.

Expected restoration

After the automatic protection action, operators would isolate the large interruptible industrial loads and restore the Elkford supply as soon as system conditions allow. Restoration could be as quick as about five minutes and is unlikely to take longer than two hours, although actual time would depend on the event and field conditions.

Since the Natal RAS was installed in 2013, **this specific Elkford NCLL event has NOT occurred.**

Plain-language glossary

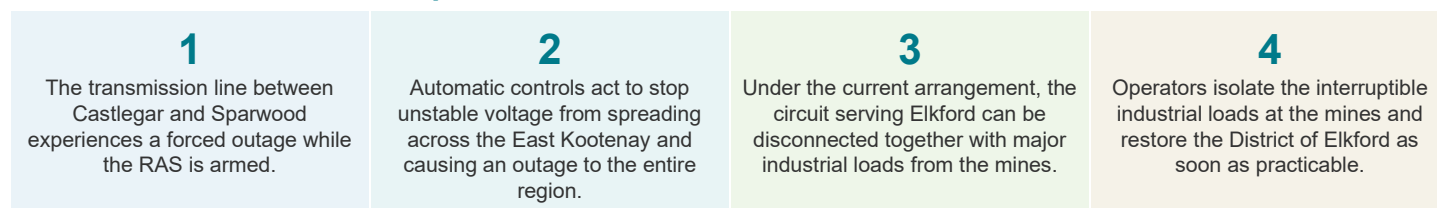
5L92: A 500 kV transmission line that runs from Selkirk Substation near Castlegar to Cranbrook Substation.
RAS: Remedial Action Scheme: automatic controls that protect the power system after a serious event.

NCLL: Non-Consequential Load Loss: intentional disconnection of customer load to protect the wider grid, where the customer load is not directly supplied by the failed facility.
CAP: Corrective Action Plan: work undertaken to address an identified planning-standard issue.

How BC Hydro is reducing the risk

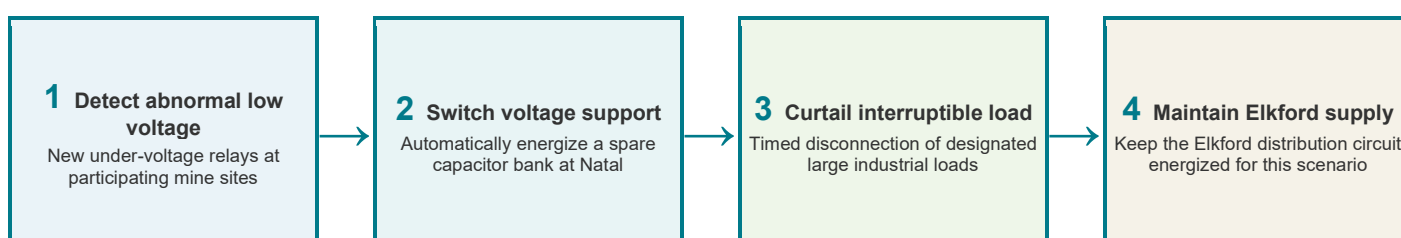
Current protection, planned modification, alternatives and longer-term work

How the current short-term protection scheme works



Natal Load Shed RAS Modification Project

Planned long-term modified protection scheme



Design objective: protect regional voltage stability without interrupting service to Elkford for the identified 5L92 event.

Planned new equipment and operation

- **Under-voltage load shedding (UVLS) relays** at participating mine sites along 1L274, including Fording River, Greenhills and Line Creek.
- **Automatic switching of Natal capacitor equipment** to provide additional voltage support after the contingency.
- **Timed curtailment of designated interruptible industrial loads** under BCUC-approved Tariff Supplement 110.
- **Continuous supply to Elkford** for the identified 5L92 scenario, while maintaining regional transmission-system performance.

Schedule

BC Hydro is working to implement the modification as early as practicable. BC Hydro expects to have the equipment installed by 2031.

Alternative CAP previously considered

BC Hydro previously advanced an Elkford switching-station upgrade proposal with a new circuit breaker and transfer-trip scheme in 2022. Detailed project development identified significant cost escalation, land requirements, telecommunications complexity, supply-chain constraints and a delayed in-service date for 2030.

The project was therefore discontinued in favour of a localized modification to the existing protection scheme that can address the specific risk with less new infrastructure.

Longer-term planning

BC Hydro is also evaluating a separate long-term transmission solution that could provide dynamic voltage support and improve reliability for large industrial customers in the area. That work is separate from the near-term RAS modification.

Reliability standard, technical assurance and engagement

How this information supports the TPL-001-4 Attachment 1 stakeholder process

Why BC Hydro is consulting

Mandatory Reliability Standard TPL-001-4, as adopted in B.C., requires a stakeholder process when planned Non-Consequential Load Loss is used in limited circumstances to meet bulk-electric-system performance requirements. BC Hydro is providing the required technical information, inviting questions and concerns, and considering community impacts while the corrective project is completed.

Technical assurance and coordination

- **System performance:** BC Hydro planning studies verify that the current Natal RAS action prevents the identified voltage-collapse condition and meets the applicable transmission performance requirements after the protective action operates.
- **Applicable contingency:** 5L92 is the only identified contingency that can produce this specific Elkford NCLL event under the assessed conditions.
- **Adjacent-system coordination:** BC Hydro coordinated the planning assessment with the Alberta Electric System Operator. No overlapping use of the same TPL-001-4 provision was identified for this event.

Provide your feedback



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Attachment 1 information checklist

Required topic	Information provided in this sheet	Location
1. Conditions requiring NCLL	Transfer, area-load thresholds, exposure hours and the 5L92 contingency	pp. 1-2
2. Amount and customers affected	5.4 MW; estimated account counts and customer types; community effects	p. 2
3. Estimated frequency	Historical basis and estimated once-in-36-to-82-year range	p. 2
4. Expected duration	Restoration process and approximately five minutes to two hours	pp. 1-2
5. Future plans	Natal RAS modification and longer-term voltage-support planning	p. 3
6. Performance requirements	Planning-study verification that the RAS prevents voltage collapse	p. 4
7. Alternatives considered	Prior switching-station solution and reasons for changing approach	p. 3
8. Potential overlapping use	Coordination with AESO and no overlap identified	p. 4

Standard TPL-001-4 — Transmission System Planning Performance Requirements

Attachment 1I. Stakeholder Process

During each Planning Assessment before the use of Non-Consequential Load Loss under footnote 12 is allowed as an element of a Corrective Action Plan in the Near-Term Transmission Planning Horizon of the Planning Assessment, the Transmission Planner or Planning Coordinator shall ensure that the utilization of footnote 12 is reviewed through an open and transparent stakeholder process. The responsible entity can utilize an existing process or develop a new process. The process must include the following:

1. Meetings must be open to affected stakeholders including applicable regulatory authorities or governing bodies responsible for retail electric service issues
2. Notice must be provided in advance of meetings to affected stakeholders including applicable regulatory authorities or governing bodies responsible for retail electric service issues and include an agenda with:
 - a. Date, time, and location for the meeting
 - b. Specific location(s) of the planned Non-Consequential Load Loss under footnote 12
 - c. Provisions for a stakeholder comment period
3. Information regarding the intended purpose and scope of the proposed Non-Consequential Load Loss under footnote 12 (as shown in Section II below) must be made available to meeting participants
4. A procedure for stakeholders to submit written questions or concerns and to receive written responses to the submitted questions and concerns
5. A dispute resolution process for any question or concern raised in #4 above that is not resolved to the stakeholder's satisfaction

An entity does not have to repeat the stakeholder process for a specific application of footnote 12 utilization with respect to subsequent Planning Assessments unless conditions spelled out in Section II below have materially changed for that specific application.