CI C0044172

Canso Crossing Vibration Mitigation

REDACTED

May 4, 2026

Nova Scotia POWER
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NSEB APPROVAL SHEET

Project Title: L7005 Canso Crossing Vibration Mitigation

CI Number: C0044172 **Date:** May 4, 2026

Expenditure Profile

Year	Budget Amount	Project Estimate
2023		93,386
2024		273,790
2025		2,105,997
2026		(42,079)
Total	$0	$2,431,095

Type of Filing

- [X] Capital Project Authorization
  - [ ] Unforeseen and Unbudgeted (U&U)
  - [X] Planned & Advanced (P&A)
  - [ ] Subsequent Approval Item
- [ ] Authorization to Overspend (ATO)
- [ ] Scope Change
- [ ] Final Cost (FIN)

COMMENTS

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Authorized Signatory
Dave Pickles
Chief Operating Officer

DATE
May 4, 2026

Approved on behalf of NOVA SCOTIA ENERGY BOARD

DATE

CI Number: C0044172

Title: L7005 Canso Crossing Vibration Mitigation

Start Date: 2023/07
In-Service Date: 2025/06
Final Cost Date: 2026/05
Function Class: Transmission
Forecast Amount: 2,431,095

DESCRIPTION:

This project is for the investigation, custom hardware development, testing, and installation of a new vibration dampening solution for the L-7005 transmission line across the Canso Strait. The new vibration mitigation system involves installing 288 custom Preformed Line Products (PLP) dampers and 1,164 PLP airflow spoilers on the L-7005 Canso Crossing spanning structures 729 to 732.

As part of CI 43678 - Separate L8004/L7005 on Canso Crossing Double Circuit Tower (DCT), a new 1.4 km L-7005 transmission line crossing was constructed at the Canso Causeway and went into service in July 2018. During a routine inspection of the crossing towers in 2021, fatigue-related failures were identified in the installed vibration dampers. The increased vibrations also resulted in localized damage to the conductor and loss of structural fasteners from the steel towers. The primary cause of damage to this crossing has been identified as Aeolian vibration and galloping—phenomena typically occurring under low-to-moderate wind speeds combined with ice accumulation. While the original design accounted for the estimated dynamic effects of wind and ice, it has become evident that actual site conditions have introduced variations beyond those original engineering considerations. These conditions have led to the observed fatigue and damage to the original dampers and the conductor. The impact of these dynamic forces is further exacerbated by the crossing's higher elevation and extended span lengths.

The sequence of events is as follows:

- Q4 2021: Unexpected conductor damage was observed during an inspection at the L-7005 Canso crossing. The damage prompted an engineering assessment completed by a third-party conductor expert. Please refer to Confidential Attachment 1. Due to the significant dynamic effects on conductors and towers resulting from Aeolian vibration and galloping, the expert recommended the development and installation of a more robust system of revised dampers, air flow spoilers, and monitoring devices.

- Q3 2022: Repairs to the conductor were completed and the original dampening system was repaired where there were damages to help mitigate vibration issues on an interim basis while a more permanent solution was developed. Due to long lead times associated with the vendor's manufacturing and testing requirements as well as subsequent testing by NS Power via a third-party lab, it was not possible to install the new dampening system at this time.

- Q4 2024: Procurement and final testing was completed for the new dampening system and project installation planning was initiated.

- Q3 2025: Installation of custom PLP dampers and PLP airflow spoilers was completed.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission projects include "work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- No other projects in 2023, 2024, 2025, 2026, or 2027

Depreciation Class: Transmission Plant – Overhead Conductor and Devices

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.11%

Estimated Life of the Asset: 45 years

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

Damage to the original set of dampers as a result of the higher than anticipated aeolian vibrations means the equipment can no longer provide sufficient protection against ongoing conductor vibrations. A third-party engineering assessment indicated that, in the absence of corrective action, the conductor will continue to degrade (please refer to Confidential Attachment 1). This could potentially lead to a conductor failure at the Strait of Canso, presenting a safety risk, compromising the reliable operation of the transmission line, and requiring emergency unplanned repairs in a difficult to access span. The undampened vibrations could also result in additional damage to the steel towers carrying the line, potentially requiring costly structural interventions.

Why do this project now?

The original damper system that was repaired where there were damages on an interim basis in Q3 2022 has reached its end-of-life, and without mitigation the conductor is at risk of damage from ongoing aeolian vibration. Without introducing a new dampening solution, the conductor will continue to degrade and would likely require replacement in the near future. If this conductor failed, not only would it present a public safety risk as the line crosses over highways 104 and 19, but the line also plays a critical role in overall system operation as part of the Cape Breton Export Corridor transporting energy from Cape Breton to the Nova Scotia Mainland.

This project was originally planned to be executed in 2026, but during a routine inspection in Q1 2025, there was additional conductor damage discovered, requiring immediate remediation to avoid further damage to the crossing. Please refer to Attachment 2 for photos of the damage discovered.

Why do this project this way?

Installation of the new dampening system provides a long-term solution to conductor vibration compared with further interventions using the originally installed dampening system which is now at end-of-life. Installing the new dampening system and repairing the broken conductor strands was more cost effective than replacing the entire section of conductor in the future. The cost of replacing the entire span of conductor is estimated at approximately $2.5 million and would still require installation of the new dampening system to protect from future vibration-induced damage.

Contingency Statement

This project is complete; as such, no contingency has been included in the detailed cost estimate.

Location: Transmission
CI#: C0044172
Title: L7005 Canso Crossing Vibration Mitigation
Execution Year: 2023-2025

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Engineering - Design	PD	49	$ 452	$ 21,979		
Project Management	PD	52	$ 452	$ 23,591		
Technologist	PD	1	$ 404	$ 303		
Field Project Lead	PD	40	$ 461	$ 18,347		
			Sub-Total	$ 64,219		
Term Labour						
Term Labour	PD	24	$ 443	$ 10,831		
			Sub-Total	$ 10,831		
Overtime Labour						
Overtime Regular Labour	PD	15	$ 905	$ 13,299		
Overtime Term Labour	PD	1	$ 887	$ 489		
			Sub-Total	$ 13,788		
Other Income - Salvage						
Salvage	Lot	1	$ (359)	$ (359)		
			Sub-Total	$ (359)		
Travel Expense						
Travel Expense	Lot	1	$ 6,699	$ 6,699		
			Sub-Total	$ 6,699		
Meals						
Meals	Lot	1	$ 674	$ 674		
			Sub-Total	$ 674		
Materials						
Air flow Spoilers, Patch Rods and Dampers	Lot	1	$ 145,405	$ 145,405		
			Sub-Total	$ 145,405		
Contracts						
Kinectrics Line Monitoring, Design and Testing	Lot	1	$ 148,318	$ 148,318		
Installation of New Vibration Mitigation System	Lot	1	$ 1,670,755	$ 1,670,755		
			Sub-Total	$ 1,819,073		
Freight Postage Delivery						
Freight Postage Delivery	Lot	1	$ 1,463	$ 1,463		
			Sub-Total	$ 1,463		
Interest Capitalized						
AFUDC				$ 25,097		
			Sub-Total	$ 25,097		
Vehicle Overhead						
Vehicle AO				$ 33,023		
			Sub-Total	$ 33,023		
Administrative Overhead						
Labour AO				$ 46,627		
Contract AO				$ 264,557		
			Sub-Total	$ 311,184		
			SUB-TOTAL (no AO, AFUDC)	$ 2,061,792		
			TOTAL (AO, AFUDC included)	$ 2,431,095		
Original Cost				$ 211,480		

Note 1: The labour figures noted above are an average of salaries across a variety of jobs within similar classifications including fringe, and are used solely for budgeting purposes.
Note 2: Small differences in totals are attributable to rounding.

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Instructions: Select option in Column B. Columns C through G will auto-populate.

Document No: XXX-XX-XXXX-XXXX

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
Project Name: L7005 Canso Crossing Vibration Mitigation	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete					
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)	P	P	D	D	D
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)	NR	P	D	D	D
B. Capacity						
Voltage (kV) and Circuits	Defined (D)	P	P	D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Environmental Monitoring	Defined (D)	NR	NR	P	P	D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)	P	P	D	D	D
Contracting/Sourcing	Defined (D)	NR	P	D	D	D
Escalation	Defined (D)	NR	P	D	D	D
G. Planning						
System/Grid Planning (including substation and interconnect locations)	Defined (D)	P	P	D	D	D
Logistics Plan	Defined (D)	P	P	P	D	D
Integrated Project Plan	Defined (D)	NR	P	D	D	D
Project Code of Accounts	Defined (D)	NR	P	D	D	D
Project Schedule	Defined (D)	NR	P	D	D	D
Regulatory Approval & Permitting	Defined (D)	NR	P	D	D	D
Risk Register	Defined (D)	NR	P	D	D	D
Stakeholder Consultation/Engagement/Management Plan	Not Applicable (NA)	NR				
Work Breakdown Structure (WBS)	Not Applicable (NA)	NR				
Start-up & Commissioning Plan	Not Applicable (NA)	NR				
H. Studies						
Routing Options	Defined (D)	P	P	D	D	D
Topography & Bathymetry	Defined (D)	P	P	P/D	D	D
Environmental Impact/Sustainability Assessment	Not Applicable (NA)	NR				
Environment/Existing Conditions	Defined (D)	NR	P	D	D	D
Meteorology and/or Oceanographic/Subsea	Not Applicable (NA)	NR				
Soils & Hydrology	Not Applicable (NA)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)	S	P	C	C	C
Foundation/Structure (Tower) Design	Complete (C)	S	P	C	C	C
Route Mapping/Survey	Complete (C)	S/P	P/C	C	C	C
Design Specifications	Complete (C)	NR	S/P	C	C	C
Instrument List	Not Applicable (NA)	NR				
Construction Permits	Complete (C)	NR	S/P	P/C	C	C
Geometric Layout, Alignment, Profile, Cross Section	Complete (C)	NR	S/P	P/C	C	C
Land/ROW Title Negotiation	Not Applicable (NA)	NR				
Civil/ Site/Structural/Architectural Discipline Drawings	Not Applicable (NA)	NR				
Crossings and Borings Designs and Drawings	Complete (C)	NR	S/P	P	C	C
Demolition Plans and Drawings	Not Applicable (NA)	NR				
Erosion Control Plan & Drawings	Not Applicable (NA)	NR				
Foundation/Structure (Tower) Discipline Drawings	Complete (C)	NR	S/P	P	C	C
Tower/Structure Location/Spotting	Complete (C)	NR	S/P	P	C	C
Instrument Datasheets	Not Applicable (NA)	NR	NR/S			
Electrical Discipline Drawings	Not Applicable (NA)	NR	NR			
Instrumentation/Control System Discipline Drawings	Not Applicable (NA)	NR	NR			
	Total # Deliverables for this Project	10	26	27	27	27
	% Defined/Complete towards Class Estimate	100%	100%	100%	100%	100%

Comments:

This project is complete so no contingency is required.

Legend:

The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following descriptors:

General Project Data:

- Not Required (NR): May not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Preliminary (P): Project definition has begun and progressed to at least an intermediate level of completion. Review and approvals for its current status has occurred.
- Defined (D): Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

- Not Required (NR): Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Started (S): Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): The deliverable has been reviewed and approved as appropriate.

Inclusions:

For the purposes of this document, the term *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI C0044172 Attachment 1 has been removed due to confidentiality.