Riverport Electric Light Commission
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Nova Scotia Energy Board
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June 13, 2025

RE: A COMPLAINT by MARTIN AND WENDY TANNER (M12104)

Dear Mr. Singh,

Further to my prior letter dated May 30, 2025, Riverport Electric Light Commission (RELC) staff and Strum Engineering visited [redacted] on June 3, 2025.

I have attached the report in this regard, prepared by Strum Engineering following their June 3rd visit to the property. The attached report details Strum's findings, recommendations, and the work undertaken by RELC based on these findings and recommendations. The costs of the report and work undertaken will be borne by RELC.

With this, the Commission considers the Board's information requests dated May 9th to be addressed, and the issue raised in the complaint by Martin and Wendy Tanner (referenced as M12104 by the Board) to be resolved.

If the complainants have any concerns or would like to discuss anything herein, they are invited to reach out to me directly at dylan.heide@townofmahonebay.ca.

Thank you,

Dylan Heide, Town of Mahone Bay CAO
On Behalf of the Riverport Electric Light Commission

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054-003

June 11, 2025

Mr. Dylan Heide
Riverport Electric Light Commission
3808 Highway 332
Riverport, Nova Scotia
B0J 2W0

Dear Dylan:

Tanner Residence at [redacted], Nova Scotia
Review of Site Conditions and Remedial Work to Achieve Horizontal and Vertical Clearances per Applicable Electrical Codes and Standards

1. Introduction:

In response to the Nova Scotia Utility and Review Board's document, NSUARB #320899 - V1 - M12104 dated 9 May 2025, Strum Engineering was requested to accompany the Riverport Electric Light Commission (RELC) to confirm the existing horizontal and vertical clearances from the Tanner Residence at [redacted], Nova Scotia to the RELC 7.2kV, single phase open/bare conductor, which serves the residences along [redacted], and, if required, to recommend remedial changes to the overhead circuit which would bring it into compliance with the applicable Codes and Standards.

2. Applicable Codes and Standards:

We referenced the following applicable Canadian Standards Association (CSA) and Utility Standards:

1. CSA Standard C22.3 No. 1:20, "Overhead Systems"
2. CSA Standard C22.1:21, "Canadian Electrical Code (25th Edition)"
3. Nova Scotia Power Inc., "Overhead Distribution Standard"

The following excerpts from each of the applicable Standards are provided for reference and further discussion:

Table 9 from CSA Standard C22.3 No. 1:20, "Overhead Systems" provides the minimum vertical and horizontal clearances for energized medium voltage conductors:

Table 9
Minimum design clearances from wires and conductors not attached to buildings, signs, and similar plant
(See Clauses 5.7.3.1 to 5.7.3.3.)

		Minimum clearance, m			
		To buildings*† and above-ground pipelines		To signs, billboards, lamp, and traffic sign standards, and similar plant	
Wire or conductor		Horizontal to surface‡	Vertical to surface	Horizontal to object‡	Vertical to object
Guys, communication cables, and drop wires		0	0.08	0	0.08
Supply conductors					
0–750 V	Insulated or grounded	1.0	2.5§	0.3	0.5
	Enclosed in effectively grounded metallic sheath	0	0	0	0.08
	Not insulated, grounded, or enclosed in effectively grounded metallic sheath	1.0	2.5§	1.0	0.5
> 0.75kV	Enclosed in effectively grounded metallic sheath	0	0	0	0.08
≤ 22 kV	Not enclosed in effectively grounded metallic sheath	2.0‡‡	3.0**	2.0	2.5
> 22 k-V**††	—	2.0 + 0.01 m/kV over 22 kV	3.6 + 0.01 m/kV over 22 kV	2.0 + 0.01 m/kV over 22 kV	3.6 + 0.01 m/kV over 22 kV

* *Clearances over or adjacent to portions of a building normally traversed by persons or vehicles are specified in Tables 2 and 4.*
† *Clearances are applicable to non-metallic buildings or buildings whose metallic parts are effectively grounded. For other buildings, an assessment might be needed to determine additional clearances for electrostatic induction (see Clause 5.7.3.3).*
‡ *Conductor swing shall be added to these values in accordance with Clause 5.7.3.1.*
§ *This clearance may be reduced to 1 m for portions of the building or above-ground pipeline considered normally inaccessible.*
** *Conductors of these voltage classes should not be carried over buildings where other suitable construction can be used.*
†† *Where it is necessary to carry conductors of these voltage classes over buildings, it should be determined whether additional measures, including increased clearances, are needed to ensure that the crossed-over buildings can be used safely and effectively.*
‡‡ *This value may be reduced to 1.5 m where the building does not have fire escapes, balconies, and windows that can be opened adjacent to the conductor.*

Note: *Voltages are rms line-to-ground.*

CSA Standard C22.3 No. 1:20, "Overhead Systems", indicates that the minimum horizontal clearance to any part of a building from an energized 7.2kV conductor shall be 2.0m (6'-7") and the minimum vertical clearance shall be 3.0m (9'-10").

Section 5.7.3 of the "Overhead Systems" Standard specifies:

5.7.3 Clearances of wires and conductors passing by or over buildings, above-ground pipelines, signs, billboards, lamps, traffic signs, standards, and antennas (not attached)

5.7.3.1 Basic clearances

The minimum horizontal and vertical clearances from wires and conductors to buildings, above-ground pipelines, signs, and similar plant specified in Table 9 shall apply under the following conditions:

a) clearances shall apply to any part of a building, including balconies, fire escapes, antennas and their supporting structures, and other permanent fixtures;
b) vertical clearances shall apply under conditions of maximum sag of the wire or conductor;
c) horizontal clearances shall apply when the wire or conductor is in the position of swing, as determined in accordance with Clause 5.2.8; and
d) guy wires, communication cables, and drop wires shall not be allowed to rub against buildings or other plant.

Canadian Electrical Code Rule 36-110 specifies the requirements for the guarding of live parts and exposed conductors, with reference to Tables 32, 33 and 34.

36-110 Guarding of live parts and exposed conductors

1) Bare conductors, insulated conductors unless enclosed in or in contact with grounded metal, and other bare live parts shall be
   a) accessible only to authorized persons; and
   b) isolated by elevation or by barriers.
2) Where the conductors or live parts mentioned in Subrule 1) are isolated by elevation, the elevations and clearances maintained shall be as specified in Tables 32, 33, and 34, except that
   a) for voltages in excess of those specified in Tables 32, 33, and 34, the elevations and clearances maintained shall be in accordance with the requirements of CSA C22.3 No. 1; and
   b) for conductors crossing highways, railways, communication lines, and other locations not covered in this Code, the elevations and clearances maintained shall be in accordance with the requirements of CSA C22.3 No. 1 or the applicable standard, whichever are greater.
3) For a given span, the clearances specified in Table 34 shall be increased by 1% of the amount by which the span exceeds 50 m.

Table 32 defines the minimum vertical distance required to separate exposed live parts from assessable areas; considering factors such as vehicular traffic, pedestrian access and snow load.

Table 33 defines the minimum horizontal separation required between live parts and nearby structures, such as buildings and other electrical equipment.

Table 34 defines the required vertical ground clearances for open line conductors based on maximum system voltage.

Table 32
Vertical isolation of unguarded live parts
(See Rule 36-110 and Appendix B.)

Maximum system voltage*, kV	Minimum separation from ground, m			
	Areas accessible to pedestrians only			
	Indoors	Outdoors		Areas likely to be travelled by vehicles
		Light snow area†	Heavy snow area†	
Not exceeding 15	2.9	3.4	4.0	4.7
25	3.2	3.7	4.3	5.2
34.5	3.2	3.7	4.3	5.2
46	3.2	3.7	4.3	5.2
69	3.5	4.0	4.6	5.5
120	4.0	4.5	5.1	6.0
161	4.4	4.9	5.5	6.4
230	4.8	5.3	5.9	6.8

** For ungrounded systems, the maximum system voltage is the phase-to-phase voltage, and for grounded systems, it is the phase-to-ground voltage.*
† See Appendix B.
Note: *Radial clearances from live parts shall be maintained in accordance with this Table where conductors overhang the edge of a building or structure, including any protuberances.*

Table 33
Horizontal clearances from adjacent structures (including protuberances)*
(See Rules 26-302, 36-110, and Appendix B.)

Maximum system voltage†, kV	Clearance, m
Not exceeding 46.0	3
69	3.7

** See Appendix B.*
† For ungrounded systems, the maximum system voltage is the phase-to-phase voltage, and for grounded systems, it is the phase-to-ground voltage.

CSA C22.1:24 *Tables*

Table 34
Vertical ground clearances for open line conductors*
(See Rules 36-110 and Appendix B.)

Maximum system voltage†, kV	Minimum vertical clearances above ground, m
Not exceeding 25.0	6.1
34.5	6.7
46	7
69	7.6

** See Appendix B.*
† For ungrounded systems, the maximum system voltage is the phase-to-phase voltage, and for grounded systems, it is the phase-to-ground voltage.

The NSPI "Overhead Distribution Standard" indicates that the required minimum horizontal clearance from a bare 7.2kV conductor to any accessible part of a building shall be 1.5m (4'-11") + 1.5m (4'-11") to account for conductor swing; for an overall minimum horizontal clearance of 3.0m (9'-10"). The minimum vertical clearance shall be 3.0m (9'-10").

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SECTION - V
VOLTAGES AND CLEARANCES

The difference between maximum conductor final sag and initial sag at the time of construction shall be added to the minimum vertical clearances shown in the chart. Sag tables are included in Section 'C' of this manual, maximum sag whether loaded or thermal shall be added in calculating clearances.

Line clearances through farm land must take into account the likelihood of large farm machinery being moved about. Also additional clearances may be required near industrial and dumping areas where large machinery and dump trucks move about.

4.02 **Height of Supply Equipment from Ground**

The minimum vertical height of electrical equipment shall be in accordance with chart V-5M.

The heights of wires, supporting structures and equipment on land adjacent to, surrounding or near airports are subject to the regulations of Transport Canada and are not covered by this standard.

4.03 **Clearances to Building**

Minimum conductor clearances from buildings shall be in accordance with chart V-4M.

Where buildings exceed three storeys (or 15 m) in height, a clear space at least 2 m wide shall be left either adjacent to the building or beginning not over 2.5 m from the building to permit the raising of ladders for fire fighting.

Clearances apply to any part of a building, including balconies, fire escapes, antennas and their supporting structures, and other permanent fixtures.

Any wires, communication cables and drop wires shall not be allowed to rub buildings or other plant.

The minimum required vertical clearance to any given point on the building applies when the wire or conductor is above that point and closer horizontally than the specified minimum clearance. The vertical clearance from a wire

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V-4M
REV. FEB 1990

MINIMUM CONDUCTOR CLEARANCES FROM BUILDINGS (IN METRES)

	MINIMUM CLEARANCE IN METRES FROM CONDUCTOR TO:							
	BUILDINGS				SIGNS, BILLBOARDS, LAMP AND TRAFFIC SIGN STANDARDS, AND SIMILAR PLANT			
	HORIZONTAL			VERTICAL *(A)	HORIZONTAL			VERTICAL *(A)
GUYS, COMMUNICATION CABLES, AND DROP WIRES	1	2	3		1	2	3	
	0	0.3	0.3	.08	0	0.3	0.3	.08
SUPPLY CONDUCTORS 0 - 750 V	1.0	1.5	2.5	2.5	0	1.5	1.5	0.5
OVER 0.75 TO 22 kV	1.5	1.5	3.0	3.0	0.6	1.5	2.1	2.5
OVER 22 TO 50 kV	1.8	1.5	3.3	3.6	1.0	1.5	2.6	3.6

COLUMN 1: MINIMUM HORIZONTAL CLEARANCE TO READILY ACCESSIBLE SURFACE, AS PER CSA C22.3, NO. 1-M1979, TABLE 8.
COLUMN 2: CONDUCTOR SWING BASED ON 75 m NON-SHELTERED SPAN.
COLUMN 3: DESIGN HORIZONTAL CLEARANCE - TOTAL OF COLUMNS 1 AND 2.

NOTES:
A. THE VERTICAL CLEARANCES APPLY UNDER CONDITIONS OF MAXIMUM SAG.
B. THE HORIZONTAL CLEARANCES ARE FROM THE INITIAL SAG POSITION AND APPLY FOR A MAXIMUM SPAN OF 75 METRES.
C. CONDUCTORS HAVING A VOLTAGE OVER 750 V ABOVE BUILDINGS SHOULD BE AVOIDED IF OTHER CONSTRUCTION CAN BE CARRIED OUT.
D. THERE ARE NO HORIZONTAL CLEARANCES REQUIRED FOR GUYS, COMMUNICATION CABLES, DROP WIRES, AND CABLES ENCLOSED IN EFFECTIVELY GROUNDED METALLIC SHEATHING. HOWEVER, THEY SHOULD NOT ABRAID AGAINST THE BUILDING.
E. IF THE BUILDING IS FLAT-ROOFED AND WILL ACCUMULATE SNOW, THE VERTICAL CLEARANCE SHOULD BE INCREASED ACCORDINGLY.
F. FROM INACCESSIBLE SURFACES OF THE BUILDING THE HORIZONTAL CLEARANCE OF THE SECONDARY CONDUCTORS (0 - 750 V) MAY BE REDUCED TO 1.8 METRES AND THE VERTICAL CLEARANCE TO 900 MILLIMETRES.
G. CLEARANCES APPLY TO ANY PART OF A BUILDING INCLUDING BALCONIES, FIRE ESCAPES, ANTENNAS AND THEIR SUPPORTING STRUCTURES, AND OTHER PERMANENT FIXTURES.
H. ALL VOLTAGES ARE RMS TO GROUND.
I. THE CLEARANCES ARE APPLICABLE TO NON-METALLIC BUILDINGS WHOSE METALLIC PARTS ARE EFFECTIVELY GROUNDED, OTHERWISE A 0.1 m/kV INCREMENT MUST BE ADDED.
J. ALL CLEARANCES ARE IN METRES.

The following Table summarizes the horizontal and vertical clearance distances specified in each of the applicable Codes and Standards to an open/bare conductor operating at 7.2kV rms, as referenced to ground:

Clearance Distance Reference	Per CSA Standard C22.3 No. 1:20, "Overhead Systems"	Per CSA Standard C22.1:21, "Canadian Electrical Code (25th Edition)"	Per Nova Scotia Power Inc., "Overhead Distribution Standard"
Minimum Horizontal Clearance from Bare Conductor to Building, including Protuberances	2.0m (6'-7")	3.0m (9'-10")	3.0m (9'-10")
Minimum Vertical Clearance from Bare Conductor to Ground	3.0m (9'-10")	6.1m (20'-0")	3.0m (9'-10")

It is noted that the vertical and horizontal clearance distances presented in the referenced Standards are measured in a straight line extending at ninety degrees (90°) horizontally and at ninety degrees (90°) vertically from the conductor toward the building and ground.

3. Field Measurements and Remedial Work:

With the assistance of the Riverport Electric Light Commission (RELC) the original horizontal and vertical clearance distances were measured from the Tanner Residence to the RELC 7.2kV, single phase open/bare conductor:

From the 7.2kV Conductor to:	Measured Horizontal Distance
1. Front/Roadside Face of Front Steps/Landing Railing:	0.610m (2'-0")
2. Front/Roadside Face of the Bay Window Exterior Wall:	2.337m (7'-8")
3. Front/Roadside Face of the Porch Exterior Wall:	2.743m (9'-0")
4. Front/Roadside Face of the Upper Balcony Railing:	2.946m (9'-8")
5. Front/Roadside Face of the Main House:	4.801m (15'-9")
	Measured Vertical Distance
6. Ground Directly below Conductor (Center of House):	9.19m (30'-2")

With reference to each of the applicable Codes and Standards, the horizontal distance from the 7.2kV conductor to the Front/Roadside Face of all exterior walls and protuberances, except the Main House exterior wall, are less than the minimum horizontal clearance distance required.

To increase the horizontal clearance distance from the 7.2kV conductor to the residence and its protuberances, we recommended that a 32" long epoxy insulator arm be installed on the roadside of the two (2) utility poles closest to the residence. A facsimile photo of the epoxy arm insulator is provided in Appendix A.

The installation of the 32" epoxy arm insulator and relocation of the primary conductor significantly increased the horizontal clearance from the Tanner Residence to the RELC 7.2kV, single phase, open/bare conductor. The following horizontal and vertical distances were recorded:

From the 7.2kV Conductor to:	Measured Horizontal Distance
1. Front/Roadside Face of Front Steps/Landing Railing:	1.727m (5'-8")
2. Front/Roadside Face of the Bay Window Exterior Wall:	3.454m (11'-4")
3. Front/Roadside Face of the Porch Exterior Wall:	3.860m (12'-8")
4. Front/Roadside Face of the Upper Balcony Railing:	4.063m (13'-4")
5. Front/Roadside Face of the Main House:	5.918m (19'-5")
	Measured Vertical Distance
6. Ground Directly below Conductor (Center of House):	8.99m (29'-6")

Following the remedial upgrades the horizontal distance from the 7.2kV conductor to the Front/Roadside Face of all exterior walls and protuberances, except the Front Steps/Landing, are greater than the minimum horizontal clearance distance required to meet the applicable Codes and Standards.

The vertical clearance was reduced slightly with the installation of the 32" epoxy arms, however the vertical clearance distance remains greater than the minimum clearance specified in the applicable Codes and Standards.

4. Consideration for the Front Steps/Landing:

The horizontal clearance distance from the RELC 7.2kV open/bare conductor to the railing on the Front Steps/Landing was measured to be 1.727m (5'-8") following the remedial work to relocate the overhead line further from the house. Based on the location of the existing utility poles on either side of the Tanner property, a minimum horizontal clearance of 3.0m (9'-10") cannot be achieved without the relocation of the 7.2kV distribution circuit, both downstream and upstream of the residence.

The RELC was created in 1920 and the electrification of the residences along Highway 332 followed over the next 10-15 years. It is generally accepted that the location of the existing 7.2kV overhead line at [redacted] has not changed since its original installation.

The "transition" of the Tanner residence from circa 1960 to present can be seen in the following photos. The photo from circa 1960 is from an email sent by the residence owner, Martin Tanner, to the NSUARB with copy to the RELC, dated 29 May 2025.



Residence at [redacted] – Circa 1960



[redacted] No. 3 – 3 June 2025

As can be seen from the photos, the Front Steps/Landing, the enclosed Porch and the Bay Window were modifications/additions made to the residence since circa 1960 and therefore were made, probably inadvertently, in contravention of the applicable Codes and Standards.

5. Photo Record Before and After the Remedial Work to Install the Epoxy Arm Insulators:

Appendix A provides photos taken before and after the remedial work to relocate the line further from the residence by the installation of the 32" long epoxy arm insulators on the roadside of the two (2) existing utility poles.

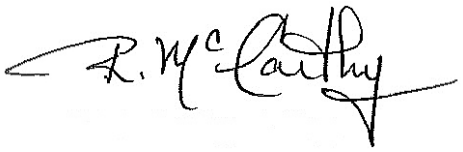
6. Conclusions:

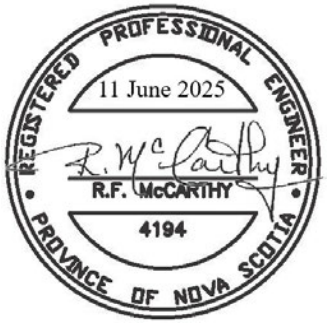
Although not ideal, the RELC 7.2kV open/bare conductor, as well as the open/bare system neutral and 240/120V secondary service conductors, have a minimum horizontal and vertical clearance that exceeds the requirements of the three (3) applicable Standards; CSA Standard C22.3 No. 1:20, "Overhead Systems", CSA Standard C22.1:21, "Canadian Electrical Code (25th Edition)" and the Nova Scotia Power Inc., "Overhead Distribution Standards", from any part of the residence or protuberance, except for the Front Steps/Landing which was added to the residence some time after circa 1960.

We trust that this review of the site conditions is satisfactory. If you have any questions, please do not hesitate to contact our office at your convenience.

Yours truly,

STRUM ENGINEERING ASSOCIATES LTD.





Rick McCarthy, P. Eng.
Senior Electrical Engineer
Email: r.mccarthy@strumengineering.ca

Encl: Appendix A – Photo Record - Before and After the Remedial Work

APPENDIX A

PHOTO RECORD - BEFORE AND AFTER THE REMEDIAL WORK
















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