All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

Hand Del 2:27pm MLA

August 6, 2020

Island Regulatory and Appeals Commission
PO Box 577
Charlottetown PE C1A 7L1

Dear Commissioners:

2021 Capital Budget Application

Please find enclosed six copies of the Company's 2021 Capital Budget Application. An electronic version copy will follow shortly.

If you have any questions, please do not hesitate to contact me at 902-629-3641.

Yours truly,

MARITIME ELECTRIC

Gloria Crockett

Gloria Crockett, CPA, CA
Manager, Regulatory & Financial Planning

GCC13
Enclosure

180 Kent Street • PO Box 1328 • Charlottetown, PE C1A 7N2
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C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY

AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2021 Annual Capital Budget and for certain approvals incidental to such an order.

APPLICATION AND EVIDENCE

OF

MARITIME ELECTRIC COMPANY, LIMITED

August 6, 2020

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C A N A D A

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Introduction

1. Maritime Electric Company, Limited ("Maritime Electric" or the "Company") is a Corporation incorporated under the laws of Canada with its head or registered office at Charlottetown and carries on a business as a public utility subject to the Electric Power Act ("EPA" or the "Act") engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

Application

2. Maritime Electric hereby applies for an order of the Island Regulatory and Appeals Commission ("IRAC" or the "Commission") approving the Annual Capital Budget ("the Budget") for the year 2021 as outlined in the attached evidence.

3. The proposals contained in this Application represent a just and reasonable balance of the interests of Maritime Electric and those of its customers and will, if approved, allow the Company to perform necessary capital additions and improvements at a cost that is, in all circumstances, reasonable.

Procedure

4. Filed hereto is the Affidavit of Jason C. Roberts, Angus S. Orford and Enrique A. Riveroll which contains the evidence in which Maritime Electric relies in this Application.

Dated at Charlottetown, Province of Prince Edward Island, this 6th day of August, 2020.

D. Spencer Campbell, Q. C.

STEWART MCKELVEY
65 Grafton Street, PO Box 2140
Charlottetown PE C1A 8B9
Telephone: (902) 629-4549
Facsimile: (902) 892-2485
Solicitors for Maritime Electric Company, Limited

2.0 AFFIDAVIT

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2021 Annual Capital Budget and for certain approvals incidental to such an order.

AFFIDAVIT

We, Jason Christopher Roberts of Suffolk, Angus Sumner Orford of Charlottetown and Enrique Alfonso Riveroll of New Dominion, in Queens County, Province of Prince Edward Island, MAKE OATH AND SAY AS FOLLOWS:

1. We are the President and Chief Executive Officer, Vice-President, Corporate Planning and Energy Supply and Vice-President, Customer Service of Maritime Electric respectively and, as such, have personal knowledge of the matters deposed to herein, except where noted, in which case we rely upon the information of others and in which case we verily believe such information to be true.

2. Maritime Electric is a public utility subject to the provisions of the Electric Power Act engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

3. We prepared or supervised the preparation of the evidence and to the best of our knowledge and belief the evidence is true in substance and in fact. A copy of the evidence

is attached to this, our Affidavit, and is collectively known as Exhibit "A", contained in Sections 3 through 9 inclusive and Appendices A through L inclusive.

4. Section 10 contains a proposed Order of the Commission based on the Company's Application.

SWORN TO SEVERALLY at
Charlottetown, Province of Prince Edward Island,
the 6th day of August, 2020.
Before me:

Jason C. Roberts

Angus S. Orford

Enrique A. Riveroll

A Commissioner for taking Affidavits
in the Supreme Court of Prince Edward Island.

3.0 INTRODUCTION

3.1 Corporate Profile

Maritime Electric owns and operates a fully integrated system providing for the purchase, generation, transmission, distribution and sale of electricity throughout Prince Edward Island. The Company's head office is located in Charlottetown with generating facilities in Charlottetown and Borden-Carleton. The Company has contractual entitlement to capacity and energy from NB Power's Point Lepreau Nuclear Generating Station ("Point Lepreau") and an agreement for the purchase of capacity and system energy from NB Power delivered via four submarine cables owned by the Province of Prince Edward Island. Through various contracts with the PEI Energy Corporation, the Company purchases the capacity and energy from 92.5 MW of wind generation on PEI.

3.2 Overview of Evidence

Under Section 17 (1) of the Electric Power Act, Maritime Electric is required to submit to the Island Regulatory and Appeals Commission, for its approval, an annual Capital Budget of proposed improvements or additions to the property of the public utility. This is the evidence in support of the Company's proposed 2021 Annual Capital Budget. In preparing this evidence, Maritime Electric used the draft Capital Expenditure Justification Criteria filed on April 10, 2018 and updated on November 22, 2019. Accordingly, for each proposed Capital Budget Project, the evidence will indicate whether the project is considered mandatory, recurring, justifiable or work support services.

Appendix A outlines the Company's actual and proposed capital expenditures between 2012-2021.

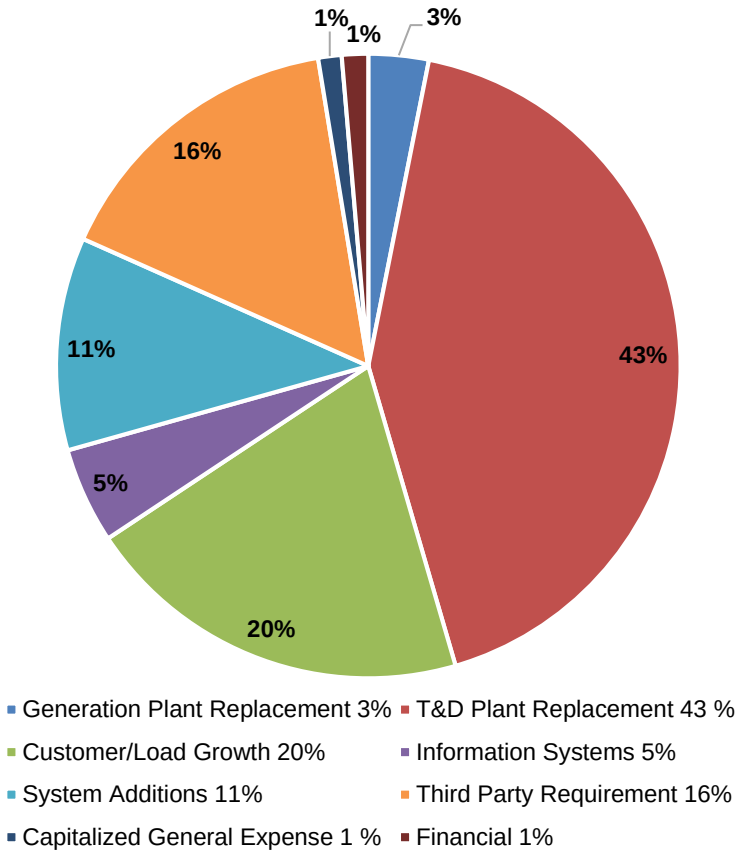
Table 1 below outlines the proposed capital expenditures for 2021.

Table 1
Proposed 2021 Capital Expenditures

4.0	**Generation**		
	4.1	Charlottetown Plant Buildings and Services Projects	$ 125,000
	4.2	Charlottetown Plant Turbine-Generator Projects	900,000
	4.3	Borden Plant Projects	305,000
			1,330,000
5.0	**Distribution**		
	5.1	Replacements due to Storms, Collisions, Fire and Road Alterations	1,446,000
	5.2	Distribution Transformers	5,192,000
	5.3	Services and Street Lighting	5,301,000
	5.4	Line Extensions	2,232,000
	5.5	Line Rebuilds	12,846,000
	5.6	System Meters	620,000
	5.7	Distribution Equipment	2,035,000
	5.8	Transportation Equipment	1,864,000
			31,536,000
6.0	**Transmission**		
	6.1	Substation Projects	6,043,000
	6.2	Transmission Projects	3,010,000
			9,053,000
7.0	**Corporate**		
	7.1	Corporate Services	411,000
	7.2	Information Technology	2,116,000
			2,527,000
Sub-total			$ 44,446,000
8.0	**Capitalized General Expense**		518,000
9.0	**Interest During Construction**		581,000
Less:	Customer Contributions		(3,107,000)
TOTAL			**$ 42,438,000**

Figure 1 shows the proposed 2021 capital expenditures by origin.

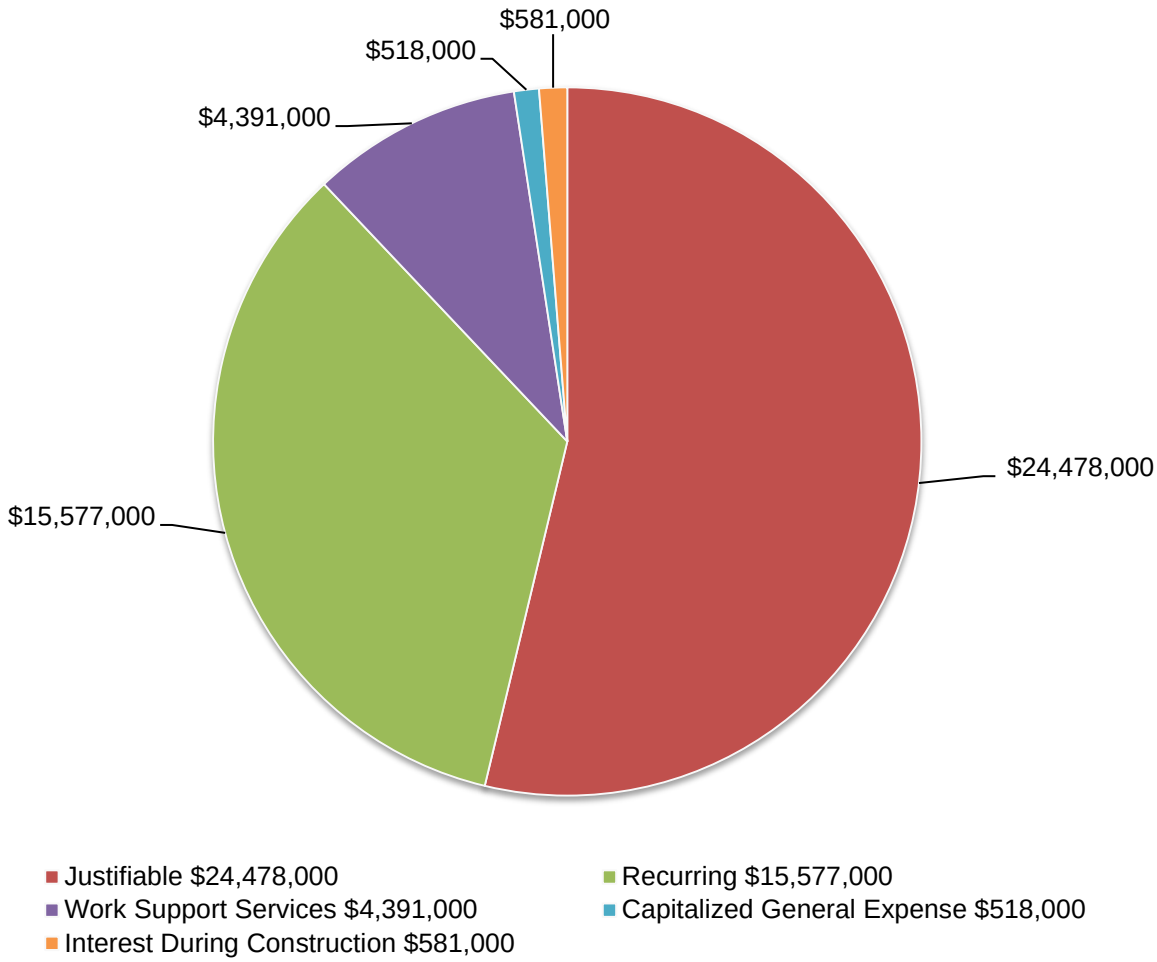
Figure 1
Proposed 2021 Capital Expenditures by Origin



Included in the above category labelled Third Party Requirement is the 2021 Budget for the PEI Broadband Project. Net of contributions, this multi-year, customer driven Project accounts for 92 per cent of the Third Party Requirement represented in Figure 1 above and 15 per cent of the total proposed capital budget for 2021.

Figure 2 shows the proposed 2021 capital expenditures by classification.

Figure 2
Proposed 2021 Capital Expenditures by Capital Expenditure Classification



An expanded table of Figure 2, Projects by CEJC Classification, is provided in Appendix B.

3.3 Estimated Impact on Rate Base, Revenue Requirement and Customer Rates

In accordance with Section 4.0 of the updated CEJC filed on November 22, 2019, the following section provides an estimate of the impact of the proposed 2021 Capital Budget on Rate Base and Revenue Requirement.

In its Update Filing for Rates effective March 1, 2020 and March 1, 2021 filed earlier this year, the Company had forecast 2021 capital expenditures of approximately $41.0 million. The proposed capital expenditures for 2021 set out in this Application is $42.4 million. The primary reason for the increase of $1.4 million is due to the timing of certain expenditures related to the PEI Broadband Project as set out in Section 5.5b and Appendix G of this Application. The increase in the forecast 2021 capital expenditures will not materially impact the 2021 forecast rate base and revenue requirement proposed in the Update Filing for Rates effective March 1, 2020 and March 1, 2021 nor will it impact the customer rates proposed therein.

The following table provides an estimate of the impact of the proposed 2021 Capital Budget on the Company's forecast 2021 Rate Base:

Table 2
Estimated Impact of Proposed 2021 Capital Budget on 2021 Year End Rate Base

Estimated Impact on Rate Base (000s)	A	$33,046
Forecast 2021 Year End Rate Base (000s)	B	$425,042
% of 2021 Forecast Year End Rate Base	C = A/B	7.77%

The supporting calculations for the above table can be found on Page 3 of Appendix C.

The proposed 2021 Capital Budget will increase the revenue requirement of the Company by the incremental depreciation charges, cost of capital and income tax charges associated with the projects. The following table provides an estimate of the impact of the proposed 2021 Capital Budget on the Company's forecast 2021 revenue requirement:

Table 3 **Estimated Impact of Proposed 2021 Capital Budget on 2021 Revenue Requirement**		
Estimated Impact on Annual Revenue Requirement (000s)	A	$3,614
Forecast 2021 Revenue Requirement (000s)	B	$231,003
% of 2021 Forecast Revenue Requirement	C = A/B	1.56%

The supporting calculations for the above table can be found on Page 4 of Appendix C.

If approved, the estimated revenue requirement would be recovered from customers through the proposed rates, tolls and charges for electric service. The following table shows the estimated impact on revenue requirement expressed as a rate per kWh:

Table 4 **Estimated Revenue Requirement of Proposed 2021 Capital Budget** **Expressed as a Rate per kWh**		
Estimated Impact on Revenue Requirement (000s)	A	$3,614
Forecast 2021 kWh Sales (000s)	B	1,391,437
Revenue Requirement Expressed as a Rate per kWh	C = A/B	$0.00260

The supporting calculations for the above table can be found on Page 5 of Appendix C.

Using the rate per kWh calculated above, the following table provides an estimate of the annual cost for electric service for the typical customer in each of Maritime Electric's rate classes that would result from the proposed 2021 Capital Budget.

Table 5 **Estimated Cost for Typical Customer of Proposed 2021 Capital Budget**	
Annual Cost for a Typical Residential Customer (650 kWh per month) before tax	$ 20.26
Annual Cost for a Typical General Service Customer (10,000 kWh per month) before tax	$ 311.64
% of 2021 Annual Cost for Typical Rural Residential Customer	1.37%
% of 2021 Annual Cost for Typical Urban Residential Customer	1.40%
% of 2021 Annual Cost for Typical General Service Customer	1.34%

The supporting calculations for the above table can be found on Page 5 of Appendix C.

4.0 GENERATION

Maritime Electric's three on-Island generating stations are primarily backup supply sources. These generating stations are:

Charlottetown Thermal Generating Station ("CTGS" or "Charlottetown Plant")	2 Generators	40 MW
Borden Generating Station ("CT1 and CT2")	2 Generators	40 MW
Charlottetown Combustion Turbine No. 3 ("CT3")	1 Generator	50 MW

The primary role of Maritime Electric's on-island generation is to supply energy in times of curtailment from off-Island energy suppliers or during transmission line outages or curtailments, on either PEI or the mainland. Other benefits to on-Island generation include reduced purchased energy costs and the ability to provide backup for the four submarine cables connecting PEI to the mainland.

The CTGS is approaching the end of its useful life; there are numerous risks and costs associated with extending the operation of the CTGS generating units. Maritime Electric prepared a plan to decommission the CTGS, which was filed with the Commission on June 28, 2018. The Commission approved the plan (with the exception of the construction of a new CT3 Balance of Plant Equipment Building and the demolition of the Steam Plant Building structure) in IRAC Order UE19-08, dated September 27, 2019. Maritime Electric has placed the Steam Plant's two largest units (Unit 9 and Unit 10) into long-term layup and they are available to generate as required until December 31, 2021.

The Generation Capital Budget is comprised of projects required to maintain the generating stations in a state of readiness to operate and to meet reliability and safety requirements. These requirements are specified in the Company's Energy Purchase Agreement with NB Power, health and safety regulations, provincial boiler inspection office recommendations, insurance requirements and contingency plans.

4.1 Charlottetown Plant Buildings and Services Projects ***$ 125,000***

This category includes expenditures required for buildings and support systems for the Charlottetown Plant facilities.

a. Energy Control Centre Upgrades (Justifiable) $ 62,000

Maritime Electric's Energy Control Centre ("ECC") provides 24-hour operation of Maritime Electric's electrical system by performing functions such as energy purchases, load and wind forecasting, generation dispatch and line crew dispatch. The Energy Control Centre building, located on Cumberland Street in Charlottetown, was constructed in 1976. The proposed upgrades to the Energy Control Centre building include the replacement of electric duct heaters, the installation of an automatic external defibrillator, the replacement of the front door and office ergonomic upgrades. An engineering review of the building's original hydronic heating system will also be completed.

b. Replace Vehicle Gate and Controllers (Justifiable) $ 63,000

The Charlottetown Plant site, located on Cumberland Street, has three automatic security gates at vehicle entry points, which have been in service for approximately 25 years. Two automatic security gates are located at the entrance and exit of the fuel tanker truck offloading roadway, which is used for deliveries of fuel to the storage tanks on site. The third gate is used by employees and third parties to access the secure compound on Cumberland Street. The automatic security gates allow the compound to operate without security personnel. This project allows for the replacement of the industrial automatic gate, which have reached the end of their service life. The project also includes the replacement of the gate controllers, which integrate with Maritime Electric's security access system.

4.2 Charlottetown Plant Turbine-Generator Projects ***$ 900,000***

This category includes expenditures associated with Maritime Electric's 50 MW Combustion Turbine 3 ("CT3"), located on Cumberland Street in Charlottetown. The combustion turbine and generator include systems such as: ventilation and combustion air system, lube oil system, instrument air system, liquid fuel system, fire protection system, generator excitation system and vibration monitoring system. No expenditures

are planned for the steam turbine-generators at the CTGS, which is planned for decommissioning in 2022/2023.

a. **CT3 Electrical Generator Overhaul (Justifiable)** **$ 448,000**

CT3 has been in service for 15 years and is comprised of a General Electric turbine and a Meidensha generator. An overhaul of the General Electric turbine portion of CT3 was approved in the 2019 Capital Budget and will be completed in 2020. The 2021 project includes an overhaul of the Meidensha generator portion of the unit. Additional project details and justification is provided in Appendix D.

b. **CT3 Generator Breaker (Justifiable)** **$ 160,000**

This project includes the purchase of a generator breaker for the 50 MW CT3, which is currently a single point of failure for the unit. With the planned decommissioning of the CTGS, the importance of this generating unit to the reliability of the electrical grid will increase. The Company was recently quoted a delivery time of eight weeks for a replacement breaker. This expenditure is justified due to the unacceptable lead-time to procure a replacement should a failure of the existing CT3 Generator Breaker occur.

c. **5,000 Amp Siemens Switchgear Breaker (Justifiable)** **$ 60,000**

This project includes the purchase of a 5,000 Amp breaker for the Siemens Switchgear Building located at the Charlottetown Plant site. This breaker is currently a single point of failure for CT3 and the X4 Transformer. The X4 Transformer currently feeds five distribution feeders (Confederation Street; Prince Street; Riverside Drive; King Street; and Euston Street Circuits) which supply electricity to most of downtown and eastern Charlottetown. With the planned decommissioning of the CTGS, the importance of the CT3 unit to the reliability of the electrical grid and the importance of the X4 Transformer to the reliability of the five distribution feeders will increase. The Company was recently quoted a delivery time of 18 weeks for a replacement breaker. This expenditure is justified due to the unacceptable lead-time to procure a replacement should a failure of the existing 5,000 Amp Switchgear Breaker occur.

d. Combustion Turbine Improvements, Parts and Tools

(Recurring) $ 232,000

This is a provisional amount for the replacement and installation of equipment, parts and tools as required for the continued safe and reliable operation of the CT3 Unit. Historical spending for this project category is shown in Table 6 below:

Table 6
Combustion Turbine Improvements, Parts and Tools

	2016	2017	2018	2019	2020F*
Expenditure	$113,862	$161,994	$86,741	$181,823	$100,000

* The 2020 proposed budget was reduced from historical levels due to the proposed CT3 Balance of Plant Building Project which was denied for 2020 under Order UE19-08.

4.3 Borden Plant Projects ***$ 305,000***

This category includes expenditures associated with Maritime Electric's Borden Generating Station ("BGS"), which is a stand-by and peaking generating station. The generating station also supplies ancillary services needed for reliability purposes. The Borden Generating Station houses two diesel-fueled combustion turbines ("CT1" and "CT2"), which have a combined rated output of 40 MW. The generating station also includes three diesel fuel storage tanks, a fuel tanker truck offloading facility, a maintenance building, two control rooms, a lube oil storage building, two storage buildings for spare lengths of submarine cable, a 69 kV substation with two step-up transformers, and the adjacent 138 kV Borden Riser Station for submarine cables 3 and 4.

a. Backup Power Supply for CT1 and CT2 (Justifiable) $ 76,000

This project includes the purchase and fabrication of a trailer-mounted backup power supply, which can be connected to CT1 or CT2 to provide backup power during blackout situations or other planned maintenance scenarios.

b. Replace CT2 Radiator Core and Oil Cooler Foundation

(Justifiable) $ 73,000

This project includes the replacement of the 10 radiator cores on the glycol cooling system and the concrete foundation for the off-base lube oil cooler for CT2.

c. **CT1 Generator Breaker (Justifiable)** **$ 43,000**

This project includes the purchase of a generator breaker for the 15 MW CT1, which is currently a single point of failure for the unit. With the planned decommissioning of the CTGS, the importance of this generating unit to the reliability of the electrical grid will increase. The Company was recently quoted a delivery time of four weeks for a replacement breaker. This expenditure is justified due to the unacceptable lead-time to procure a replacement should a failure of the existing CT1 Generator Breaker occur.

d. **Miscellaneous Combustion Turbine, Building and Services Improvements (Recurring)** **$ 113,000**

Provisional amounts have been included in this budget to acquire parts and complete turbine improvement work identified during the year as well as building refurbishments required to ensure the safe and reliable operation of the BGS.

5.0 DISTRIBUTION

Maritime Electric's proposed 2021 capital expenditures for distribution were developed using the Company's Integrated System Plan and is focused on the replacement of aged infrastructure to maintain system reliability, improve energy efficiency and ensure continued compliance with all safety and environmental requirements. In addition, distribution assets will be installed to service new customers, modify existing service connections, address system load growth impacts and facilitate joint use of utility poles with communication providers. The Company's asset database, field inspection results, and reliability data continues to be used to identify facilities and equipment for priority replacement.

5.1 Replacements Due to Storms, Collisions, Fire and Road Alterations *$ 1,446,000*

The provisional amount for distribution asset replacements required due to storms, fire, motor vehicle accidents and road alterations was determined based on historical expenditures as shown in Table 7 below. This amount is lower than the historical average because severe storms in 2016, 2018 and 2019 resulted in higher than normal annual expenditures.

Table 7
Replacements Due to Storms, Collisions, Fire and Road Alterations

	2016	2017	2018	2019	2020F
Expenditure	$1,997,881*	$1,276,552	$2,782,221**	$2,119,728***	$1,457,000

* Includes expenditures due to successive severe snow, ice and wind storms between November 27, 2016 and December 1, 2016 resulting in replacement of 165 poles, 15 damaged transformers and 5 kilometres of conductor.

** Includes expenditures due to severe and successive wind, snow and/or ice storms that occurred in mid-October, early November and late November 2018 resulting the replacement of 225 poles, 13 damaged polemount transformers, a stepdown transformer, a metering tank and 4 kilometres of conductor.

*** Includes expenditures due to Post Tropical Storm Dorian in September 2019.

a. Replacements due to Storms, Fire and Collisions (Recurring) $ 970,000

The scope and severity of damage caused by storms and other adverse events can be highly variable from year to year. For this reason, the budgeted amount is a provisional cost estimate for labour and material that will be required in 2021 to replace distribution equipment (predominantly poles, transformers and wire) damaged as a result of events that are beyond the control of the Company.

b. Replacements due to Road Alterations (Recurring) $ 476,000

Each year, the Company relocates or replaces distribution assets to accommodate provincial and municipal government infrastructure projects such as sidewalk installations, sewer and water line extensions, road widening, road construction and bridge replacements. At the time that the 2021 Capital Budget was developed, government plans for infrastructure work in 2021 were not yet confirmed and a provisional amount has been proposed based on historical spending.

5.2 Distribution Transformers (Recurring) *$ 5,192,000*

The purchase and installation of new distribution transformers and other related equipment is an annual recurring capital budget expenditure that is necessary to serve new customers, accommodate changes for existing customers and replace deteriorated or damaged units.

Maritime Electric has transitioned to more efficient amorphous core transformers for polemount and padmount units. There are two types of losses associated with each transformer in the system; no-load losses and load losses. The no-load loss on a transformer is the energy used to keep the transformer energized with little or no load and the load loss is the energy required when the transformer is under load. Typically, a transformer is not fully loaded 100 per cent of the time so both of these factors affect the amount of energy required to operate a transformer. The amorphous core transformers have a core made of amorphous metal which significantly reduces the no-load losses. With this improved efficiency, the system's power factor will improve and less current flow is required to energize the transformer resulting in lower demand and energy costs. Amorphous core transformers are more expensive than traditional crystalline core transformers; however, the increased cost is more than offset by the savings received from lower system losses over the life of the transformer.

In addition, the Canada Mortgage and Housing Corporation ("CMHC") forecasts 2020 housing starts will be down slightly from 2019 due to COVID-19; however, CMHC projects starts in 2021 and 2022 will meet or exceed 2019 levels. The residential housing starts in 2019 were 93 per cent higher than the previous four year average. For polemount transformers, installations are expected to be similar to 2019. This requirement has steadily grown largely due to the increase in the number of new services related to housing

starts. The budget also includes a provisional amount for the Spill Prevention Program which involves the replacement of approximately 200 deteriorated polemount transformers on an annual basis that are at risk of spill.

Padmount installations in 2019 were 141 per cent higher than the previous five year average mainly due to higher housing starts for multi-family dwellings. Padmount transformer installations are expected to be similar to 2019 and include three units associated with the Transclosure Removal Program. This Program, initiated in 2017, involves the removal of existing transclosures and replacement with equivalent padmount transformers to align with current standards. The Company originally identified twelve transclosures for replacement over a four year period. Since then, an additional seven have been identified for replacement. Transclosures in Souris, Rocky Point and Green Park will be changed to padmount transformers in 2021.

5.3 Services and Street Lighting — *$ 5,301,000*

The proposed budget allows for the construction of service lines to connect new customers, refurbishment of aged service lines, and installation of new street lights and replacement of existing street lights with new energy efficient LED fixtures. The service line expenditures are expected to be partially offset by customer contributions for construction charges as set by the General Rules and Regulations.

The proposed provisional budget is based upon historical spending as shown in Table 8 and reflects a sustained level of activity since 2016.

Table 8
Services and Street Lighting

	2016	2017	2018	2019	2020F
Expenditures	$4,289,762	$4,882,276	$5,112,198	$4,917,056	$4,996,000

a. New Overhead and Underground Services (Recurring) — $ 4,486,000

The number of overhead and underground new services fluctuates from year to year. As such, the budgeted amount for labour and material to install or replace overhead and underground services is a provisional estimate based on historical customer requests.

b. Street and Area Lighting (Justifiable) $ 815,000

The Company continues to replace existing high-pressure sodium ("HPS") and mercury vapour ("MV") light fixtures with energy efficient light emitting diode ("LED") fixtures under the Commission approved Conversion Program which began in 2015. 2021 represents the seventh year of the planned ten year Program.

The budget amount allows for the replacement of approximately 750 LED street lights in 2021 through the Conversion Program. The budget amount also includes the installation of approximately 150 LED street and yard lights based on the historical level of customer requests and light replacements due to fixtures reaching the end of their useful life.

5.4 Line Extensions *$ 2,232,000*

Line extension projects are often customer driven but can also provide a way to cost effectively redistribute system loads by reconfiguring circuits or establishing new circuits for overall improvements in system reliability and operability. The proposed budget for line extensions was established based on historical expenditures for customer driven work and are expected to be partially offset by customer contributions.

a. Customer Driven Line Extensions (Recurring) $ 1,417,000

Line extension work will involve both upgrades to existing infrastructure and new construction of single phase and three phase distribution lines to serve all types of customers and customer driven supply requirements.

b. Reliability Driven Line Extensions (Justifiable) $ 815,000

To improve system reliability, the Company is proposing a single to three phase conversion in the Smallman Road and Howlan Road area. Details and justification of this project are provided in Appendix E.

5.5 Line Rebuilds *$ 12,846,000*

The projects and programs proposed in the Line Rebuilds budget category enable the Company to address the timely replacement of aged infrastructure, improve reliability and voltage levels, reduce electrical losses and improve safety for workers by upgrading the system to meet current construction standards. The Company's asset database, field

inspection results and reliability data serve as the primary tools for prioritizing single and three phase rebuilds, pole and component replacements and other reliability improvement activities. Projects for telecommunication companies requesting to convert power lines to accommodate communication equipment are also included in this Capital Budget category. Customer driven capital expenditures are often partially offset by a contribution from these third parties.

a. <u>Single Phase and Three Phase Rebuilds</u> (Justifiable) $ 2,879,000

The budget provides for the rebuilding of single phase and three phase distribution lines including joint use lines. Projects are prioritized for rebuild based on the condition of poles and wire, length of spans, historical reliability issues associated with the line and historical and projected load growth in this area.

The planned rebuilds will improve both reliability and voltage stability, allow for future load growth and reduce losses. The rebuilds will also improve safety for Company employees by implementing modern construction standards with increased line clearances and updated equipment. The majority of the rebuilds planned for 2021 are in areas that contain eastern cedar poles that are more than 40 years old and have damaged or deteriorated conductor.

The following single phase and three phase line rebuilds are planned for 2021:

i. Kinkora - Rte 225 - Single Phase Rebuild (4.8 kilometres)
ii. Lot 16 - Rte 12 - Single Phase Rebuild (8 kilometres)
iii. Rocky Point (North Side) - Voltage Conversion (9.8 kilometres)
iv. Cable Head East - Reconductoring Single Phase (1.9 kilometres)
v. Route 10 – Searletown to Seven Mile Bay Road - Three Phase Rebuild (5 kilometres)

Additional project details and justifications are provided in Appendix F.

b. PEI Broadband Project (Multi-Year, Justifiable) $ 8,912,000

The PEI Broadband Project is a four year customer driven initiative that involves the installation of approximately 1,150 kilometres of communication fibre on new and existing utility poles across the Island. In December 2019, Maritime Electric filed a Supplemental Capital Budget Request and subsequently received IRAC approval under Order UE20-02 to proceed with work on the PEI Broadband Project for the year 2020.

In July of this year, the Company provided an update to the Commission on the timelines for each of the respective customers involved with this project based on new information that has become available now that construction on the project has begun. The proposed 2021 budget reflects these new timelines.

Additional project details and justifications for the proposed 2021 budget are provided in Appendix G. The Company will also be filing a written report to the Commission in August of this year as required under Order UE20-02 which will provide an update on costs including any forecast variations and work performed since the project commenced on May 11, 2020.

c. Distribution Line Refurbishment (Justifiable) $ 775,000

The Company owns and operates in excess of 5,200 kilometres of mainline distribution infrastructure in both rural and urban environments. In 2017, the Company initiated a Distribution Inspection Program as a proactive way to improve reliability by identifying components of the distribution system that are unsafe or at risk of failure. The Program was designed to ensure that all overhead primary distribution lines are subject to a detailed ground inspection every six years.

The timely refurbishment of distribution lines plays a critical role in extending and/or maintaining their lifespan, enhancing employee and public safety, and improving system reliability by reducing the probability of component failure. Photographs of deficiencies identified through the Program are shown in Appendix H.

The budget will allow for inspection of feeders identified in Table 9 below and prioritization of replacement of deteriorated assets such as poles, cross-arms, conductor and hardware. The locations of the feeders are provided in Figure 3.

Table 9
Distribution Feeder Inspections Planned

Feeders	Kilometres	Number of Customers
New Haven [WR02228]	214	2,659
Kinlock [CR44428]	44	1,886
Pine Drive [PD65000]	17	1,057
Charlottetown Mall [CM63000]	1	73
Belvedere [BL64000]	74	3,119
Brackley [AP52600]	1	7
Greek River [DV19000]	80	612
Wood Islands [DV19005]	145	1,363
St. Peters [DM00594]	75	562
Irishtown [KN80400]	182	2,177
Augustine Cove [AB33124]	57	895
TOTAL	**890**	**14,410**

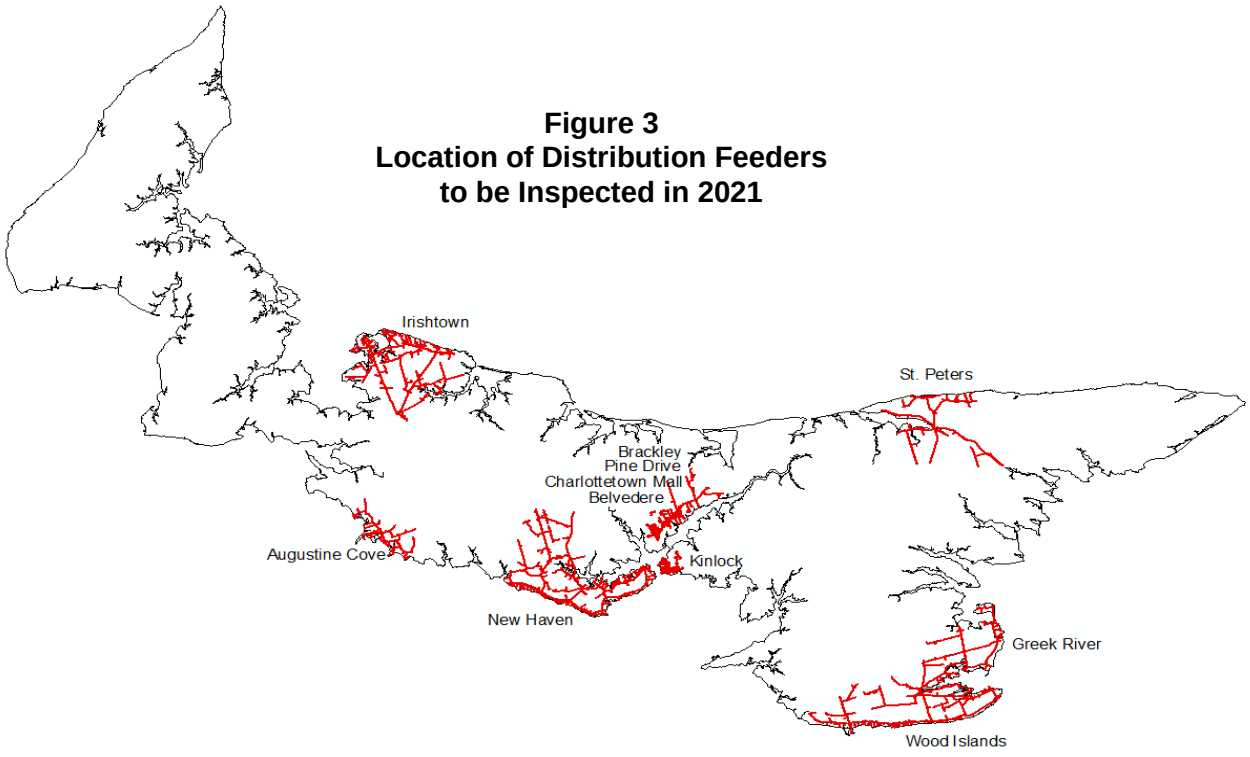


Figure 3
Location of Distribution Feeders
to be Inspected in 2021

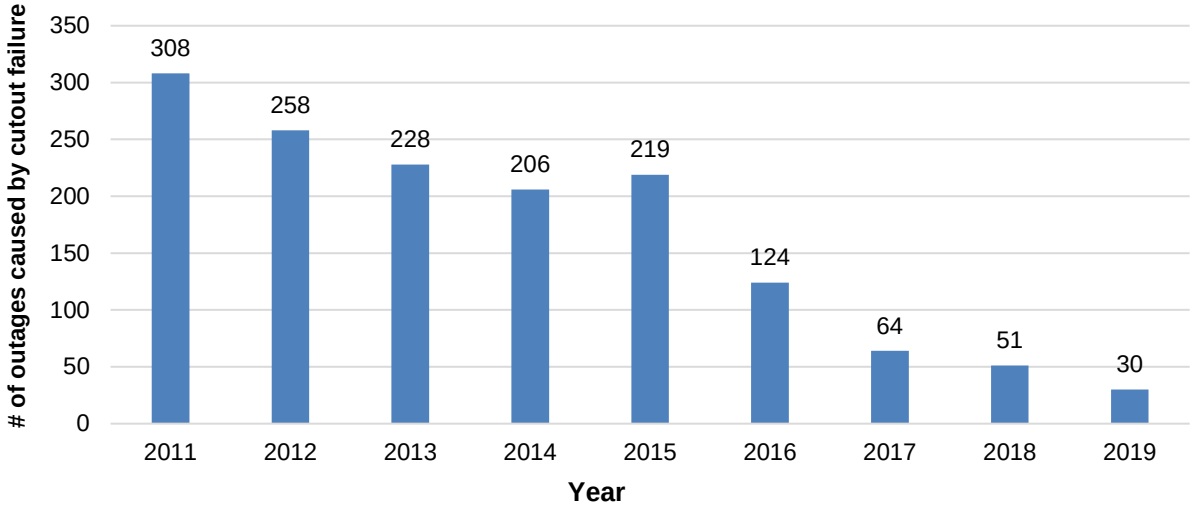
d. **Accelerated Distribution Component Replacement (Justifiable)$ 280,000**

The proposed budget for Accelerated Distribution Component Replacement, encompasses the accelerated replacement of porcelain cutouts and eastern cedar poles. Justification for the Accelerated Distribution Component Replacement programs is provided below.

i. ***Porcelain Cutout Replacement Program*** ***$ 100,000***

The Porcelain Cutout Replacement Program began in 2008. Before the program was implemented, the frequent failure of porcelain cutouts was negatively impacting system reliability and was a concern for employee safety. As a result of this program, there has not been a safety incident reported as a result of a cutout failure in recent years. As well, there has been a significant reduction in outages attributed to cutout failures as a result of the program as shown in Figure 4.

Figure 4
Annual Number of Outages Caused by Cutout Failure



The reduction in the number of outages and safety incidents caused by cutout failures reflects the effectiveness of these types of replacement programs. In 2019, the Porcelain Cutout Replacement Program was scaled back from historical levels of approximately 2,500 porcelain cutout replacements per year to approximately 500 replacements per year, then

to approximately 300 in 2020. A further reduction to replace approximately 150 cutouts in 2021 is planned.

The Porcelain Cutout Replacement Program is justified based on the need to maintain safe working conditions for employees and the public and the need to maintain reliable electrical service.

ii. Eastern Cedar Pole Replacement Program $ 180,000

The vast majority of eastern cedar poles in the Company's distribution system are around 40 years of age. In the past, these poles were being replaced through a combination of rebuild projects and storms at a combined rate of approximately 900 per year. At this rate of replacement, it was estimated in 2018 that it would take up to 20 years to replace the 16,000 eastern cedar poles remaining in the system.

With the addition of the Eastern Cedar Pole Replacement Program in 2019, the target replacement rate was increased to approximately 1,500 poles per year. This improved the timeframe for substantial removal of all eastern cedar distribution poles to approximately ten years.

In 2021, the Company plans to replace approximately 100 poles under the Eastern Cedar Replacement Program and expects to replace the remaining annual compliment through rebuild projects and the PEI Broadband Project.

The Program is justifiable based on the need to replace aged end-of-life poles as well as the need to maintain safe, reliable electrical service.

5.6 System Meters *$ 620,000*

This amount provides for the purchase and installation of revenue metering and associated equipment. The proposed budget is based on recent historical expenditures as outlined in Table 10 below.

Table 10 System Meters					
	2016	**2017**	**2018**	**2019**	**2020F***
Expenditures	$466,266	$441,884	$532,047	$645,367	$900,000

* The 2020 approved capital budget includes a $300,000 Advanced Metering Infrastructure ("AMI") project.

a. <u>Watt-hour Meters</u> (Recurring) $ 280,000

The 2021 budget for radio frequency ("RF") remote interrogation watt-hour meters includes a provision for new service installations during the year, an allowance for the replacement of damaged or failed units and new replacement RF watt-hour meters to permit annual sample testing of approximately 925 meters to ensure compliance with Industry Canada/Measurement Canada Standards.

The following forecast for meter installs for 2021 is based upon the anticipated rate of customer growth, historical equipment damage and failure rates as well as the requirement to conduct annual compliance testing.

Single phase – customer growth, replacements and annual testing	1,075
Network and three phase meters	<u>475</u>
Total Watt-Hour Meters	**1,550**

Earlier this year, Measurement Canada recertified 700 of Maritime Electric's existing meters submitted for testing. These meters will be reintroduced into the system in 2021. As a result, the budget reflects a lower number of new meter unit purchases in 2021. However, the budget does include the cost to install these recertified meters in 2021.

b. <u>Combination Meters</u> (Recurring) $ 164,000

The budget amount for 2021 provides for the purchase and installation of new combination meters that measure both demand and energy consumption. The proposed budget amount for new meters is required to meet forecast customer growth levels and to replace combination meters due to damage, failure and customer service size upgrades.

In addition, the budget amount provides for in-situ meter installation tests (potential transformers and current transformers) to confirm accuracy. Measurement Canada recommends the testing of meter installations on an eight year cycle.

The number of units is based upon the following:

Customer Growth	45
Replacements due to upgrades, damage and failure	40
Total Combination Meters	**85**

c. Miscellaneous Metering Equipment (Recurring) $ 34,000

This provides for the purchase of metering equipment such as potential transformers, current transformers, cabinets, security bands, sealing rings, locks, meter covers, load limiters, cable connectors, meter adapters, test blocks, phase indicators, neutral isolators, communication cables and media converters for interval meters, DC breakers and disconnect sleeves.

d. Outdoor Metering Tanks (Recurring) $ 142,000

Metering tanks are used in both the Company's substations and in specific customer applications where customers are metered at either transmission or primary voltage levels. The budget amount provides for the purchase of four metering tanks and is based on historical expenditures.

5.7 Distribution Equipment (Recurring) *$ 2,035,000*

This provides for the replacement of aged system equipment used to provide voltage support, communications and for protection and control of the Company's assets as well as replacement of line tools and equipment as shown in Table 11. The investment in system equipment is essential to provide ongoing reliable service to customers. Unplanned failures due to aged equipment can result in incremental costs to the Company and reduce reliability of service to customers. Some of these assets will only require replacement parts to extend their life while others will require a complete replacement. The budget is based on past experience, engineering professional judgement and historical expenditures. Equipment procurement is obtained through a competitive tendering process to ensure the best possible pricing is achieved.

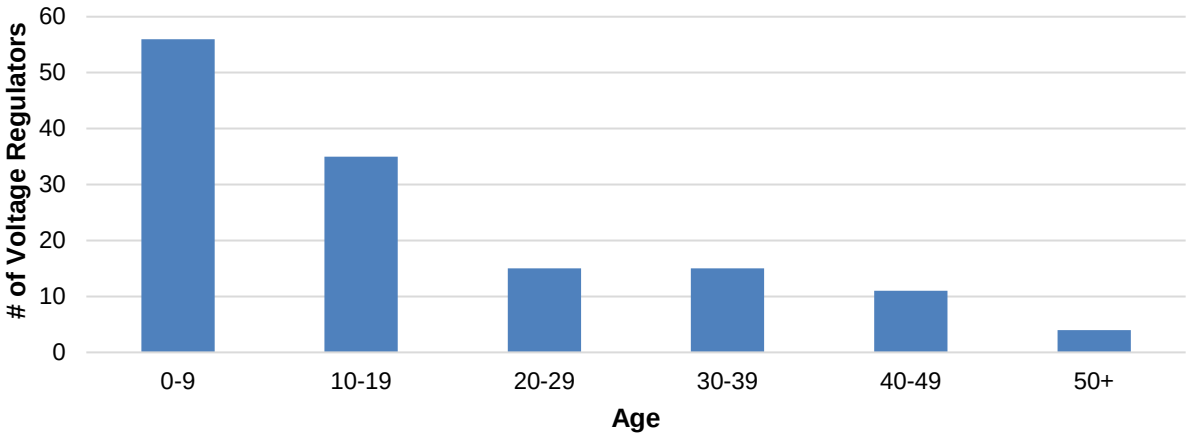
Table 11 Proposed System Equipment Replacement 2021			
System Equipment 2021	**Material**	**Labor**	**Total**
i. Voltage Regulators, Reclosers, Controllers, Transformer Upgrades and Miscellaneous Equipment	**$ 727,000**	**$ 347,000**	**$ 1,074,000**
Electronic Reclosers	100,000		
Recloser Controllers to replace obsolete FXB Controllers	13,000		
Voltage Regulator Controls Replacement	22,000		
Voltage Regulators	160,000		
Capacitor Bank Controllers	11,000		
Capacitor Banks and Parts	22,000		
Voltage Regulator and Recloser Parts - Preventative Upgrades	11,000		
Power Transformer Parts (Pressure Relief Devices/Fall Arrest Mounts)	7,000		
Transformer Oil	30,000		
Transformer Oil Reconditioning	11,000		
69 kV and 138 kV Breaker Contacts - Preventative Upgrades	27,000		
Annual Dissolved Gas Analysis	27,000		
Tap Changer Contacts - Auto transformer Preventative Upgrades	27,000		
SCADA RTU Retro-fit Parts	11,000		
SCADA RTU Scout and Willowglen Replacement Program (2 year)	135,000		
Fault Indicators	22,000		
Vehicle Antenna (Radio and RF Meters)	3,000		
Doble Power Factor Test Equipment	33,000		
Fall Arrest Mobile Trailer	55,000		
ii. Relay Replacement	**$ 130,000**	**$ 62,000**	**$ 192,000**
Teleprotection/Relay Replacement Equipment	130,000		
iii. Communication Equipment	**$ 82,000**	**$ 39,000**	**$ 121,000**
Aging Battery Bank Replacement	22,000		
Communication Equipment New Substations	16,000		
Replacement of LEDR Radios	22,000		
Communication Equipment Replacements	22,000		
iv. Distribution	**$ 153,000**	**$ 73,000**	**$ 226,000**
Recloser By-Pass Switch	21,000		
13.8 kV City Circuits Switches	116,000		
Voltage Regulator By-Pass Switch	16,000		
v. Line Tools and Equipment	**$ 391,000**		**$ 391,000**
vi. Meter Shop Equipment	**$ 31,000**		**$ 31,000**
TOTAL	**$ 1,514,000**	**$ 521,000**	**$ 2,035,000**

Table 11 i. **Voltage Regulators, Reclosers, Circuit Breakers and Power Transformer Upgrades and Miscellaneous Equipment $ 1,074,000**

The Company has 31 substations and over 5,200 kilometres of main line distribution infrastructure with equipment such as reclosers, voltage regulators, capacitor banks, power transformers and circuit breakers. The need to replace equipment is determined on the basis of equipment condition, age, test results and operational history. The budget is based on past experience, engineering professional judgement and historical expenditure. Equipment procurement is obtained through a competitive tendering process to ensure the best possible pricing is achieved.

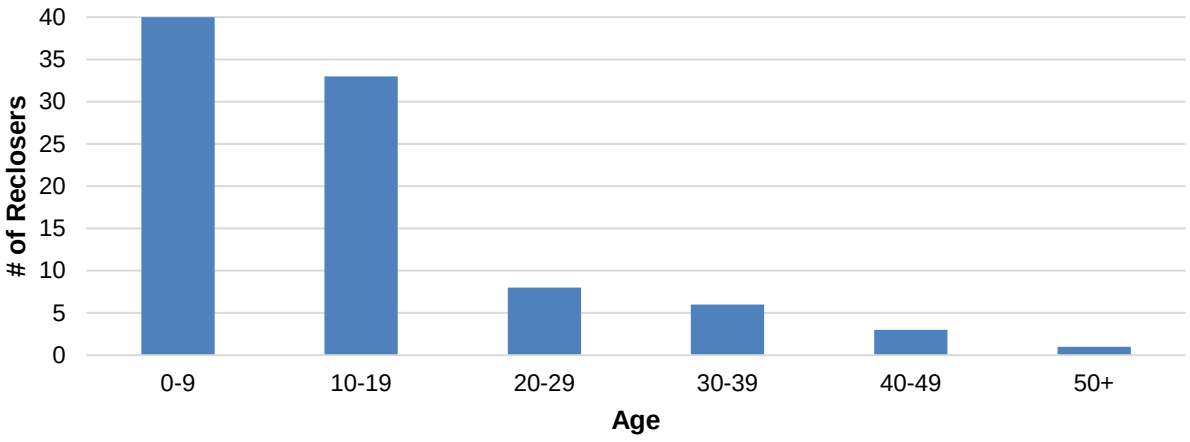
As Figure 5 indicates, the average age of the voltage regulators in the system is approximately 17 years. However, approximately 11 per cent are over 40 years old and are at the end of their useful life.

Figure 5
Voltage Regulators Installed in the System



As Figure 6 indicates, the average age of the reclosers in the system is approximately 15 years. However, approximately 4 per cent are over 40 years old and are at the end of their useful life.

Figure 6
Reclosers Installed in the System



As Figure 7 indicates, the average age of the capacitors in the system is approximately 13 years. Approximately 3 per cent are over 40 years old and are at the end of their useful life.

Figure 7
Capacitors Installed in the System

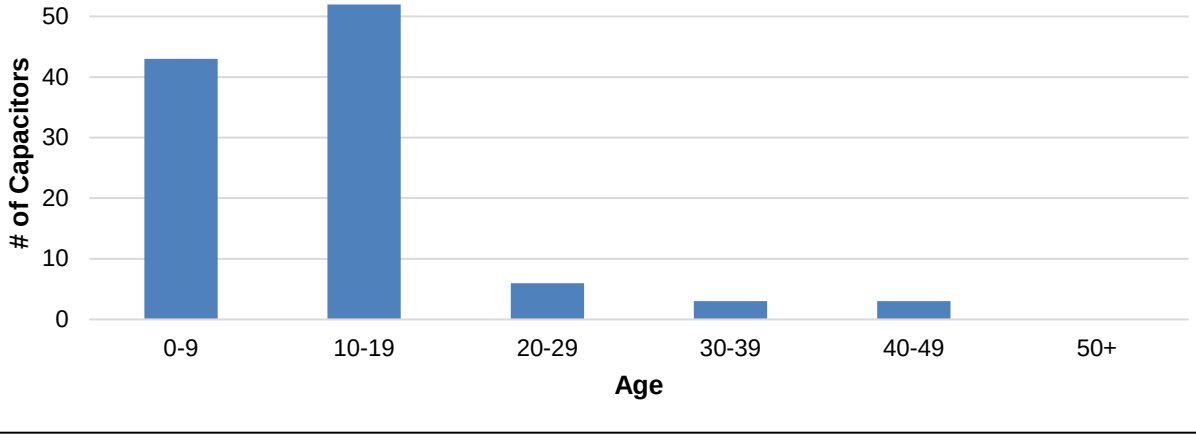


Table 11 ii. Relay Replacement **$ 192,000**

New generation, microprocessor-based relays offer a host of advantages compared to electromechanical relays because of enhanced capabilities and programming versatility. One microprocessor-based relay replaces several electromechanical relays resulting in cost and efficiency advantages. This budget item is a provision for the replacement and upgrade of the electromechanical relays in West Royalty Substation.

Table 11 iii. Communication Equipment **$ 121,000**

The Company has 43 communication sites comprised of a 7 GHz microwave and fibre backbone system. A spur system is comprised of microwave radios, towers, fibre, IP based multiplexer equipment, spur radio system, SCADA system and battery backup system. This provision is to replace equipment based on condition and reliability.

Table 11 iv. Distribution **$ 226,000**

This budget item is for the replacement of distribution switches based on findings of an ongoing switch inspection program. The budget also includes a provision for switches used for bypassing recloser and voltage regulators when performing equipment upgrades.

Table 11 v. Line Tools and Equipment **$ 391,000**

This budget amount provides for the replacement of line test equipment such as hotline sticks, phasing sticks, potential indicators, ground mats, hard and rubber cover-up, fall arrest equipment, survey equipment and material handling equipment such as presses and dies, running blocks and chain hoists. Table 12 shows historical spending over the past five years. An increase of approximately $180,000 in 2021 over the 2020 forecast is proposed to allow for the purchase of equipment to wash insulators at substations and other facilities where salt contamination is being experienced.

Table 12 Line Tools and Equipment					
	2016	**2017**	**2018**	**2019**	**2020F**
Expenditures	$169,448	$160,469	$171,542	$262,017	$207,000

Table 11 vi. Meter Shop Equipment **$ 31,000**

This budget amount provides for the purchase of power quality test equipment, voltmeters and meter test equipment.

5.8 Transportation Equipment (Work Support Services) ***$ 1,864,000***

The Company's transportation fleet consists of large line vehicles with aerial and/or digger attachments, cars, small trucks, vans, pole and wire trailers and other related equipment. Large line vehicle replacements are planned based on the age and condition of the unit. The life span of these average from ten to twelve years with the aerial units lasting longer than the digger units. Small vehicle replacements depend on age, mileage and type of service; however, the life span is typically five to ten years. Table 13 outlines the proposed expenditure for 2021. The transportation equipment justification report is included in Appendix I.

Table 13 Proposed Transportation Equipment - 2021						
	Description	**Location**	**Age (Yrs)***	**Current Mileage (km)**	**2019 Maintenance Cost**	**Replacement Cost**
1.	Aerial Bucket	Central Line Dept.	11	199,000	$ 84,000	$ 485,000
2.	Digger Derrick	Eastern Line Dept.	10	192,000	23,600	588,000
3.	CSUP	Eastern Line Dept.	6	263,000	27,200	240,000
4.	GMC Van	Meter Dept.	10	248,000	4,800	90,000
5.	1/2 ton Truck	Survey Dept.	12	272,000	2,100	51,000
6.	Ford F-150 4x4	Central Area Rep.	9	201,000	4,300	51,000
7.	1/2 ton Truck	Eastern Line Dept.	-	N/A	N/A	51,000
8.	1/2 ton Truck	Central Line Dept.	-	N/A	N/A	51,000
9.	1/2 ton Truck	Central Line Dept.	-	N/A	N/A	51,000
10.	1/2 ton Truck	Central Line Dept.	-	N/A	N/A	51,000
11.	CRV	Meter Reader	12	279,000	3,700	43,000
12.	1-Pole Trailer	Line Dept.		N/A	N/A	37,000
13.	Allowance for unforeseen capital expenditures					75,000
TOTAL						**$ 1,864,000**

* Age at time of replacement.

6.0 TRANSMISSION

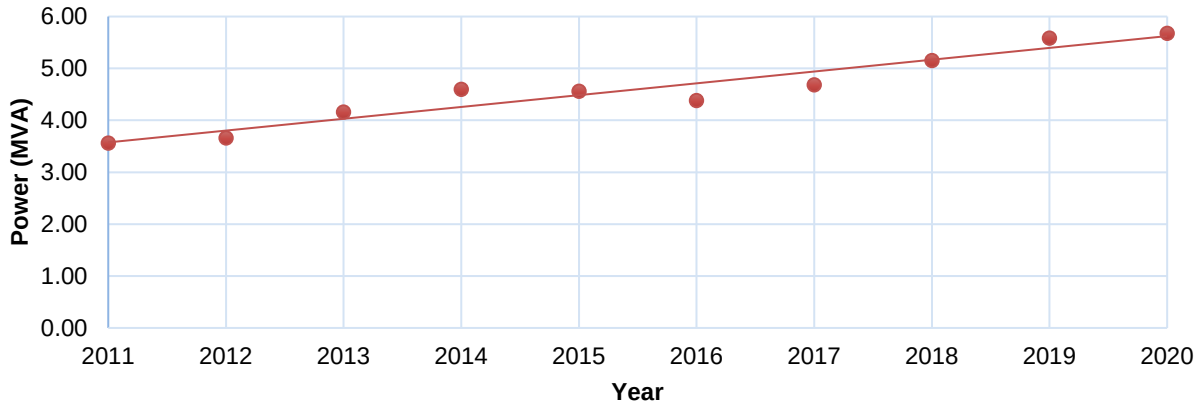
The Transmission category reflects the Company's proposed activities for the expansion and replacement of the 69 kV and 138 kV transmission system using the Company's Integrated System Plan as a guideline. This includes transmission lines, substations, power transformers and protection devices such as circuit breakers.

6.1 Substation Projects *$ 6,043,000*

a. East Royalty Substation (Multi-Year, Justifiable) *$ 2,890,000*

The peak load in the East Royalty area has grown by 59 per cent over the past ten years, as seen in Figure 8 below.

Figure 8
East Royalty Peak Load



A single feeder from the UPEI Substation currently supplies the East Royalty/Suffolk/York area and its 1,438 customers as well as 1,681 customers in the City of Charlottetown. This feeder configuration lends itself to higher operating costs due to increased losses and decreased reliability to customers in the area from wider reaching outages.

The East Royalty Substation will supply power to customers in the East Royalty, Suffolk, York and Bedford areas. The estimated reduction in losses with the East Royalty Substation in service is approximately $2,760,000 over the expected 40 year life of the Substation.

Customer outage hours in this area have increased over the last five years under the existing configuration. As shown in Figure 9 below, with the addition of the East Royalty Substation, the five-year average outage hours would decrease in the area by 22 per cent, from 11,000 customer outage hours to 8,500 customer outage hours, by reducing the number of customers on each feeder and the length of the feeders.

Figure 9
Customer Outage Hours Comparison

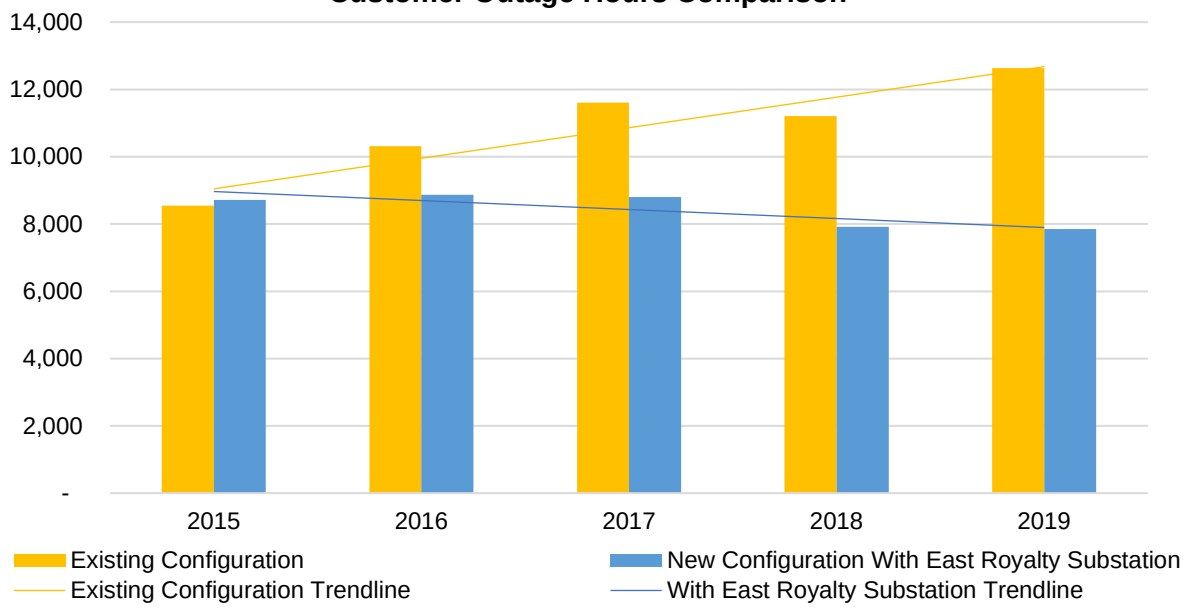


Table 14 below provides a comparison of the existing feeder configuration for East Royalty to the proposed configuration when the new substation is energized.

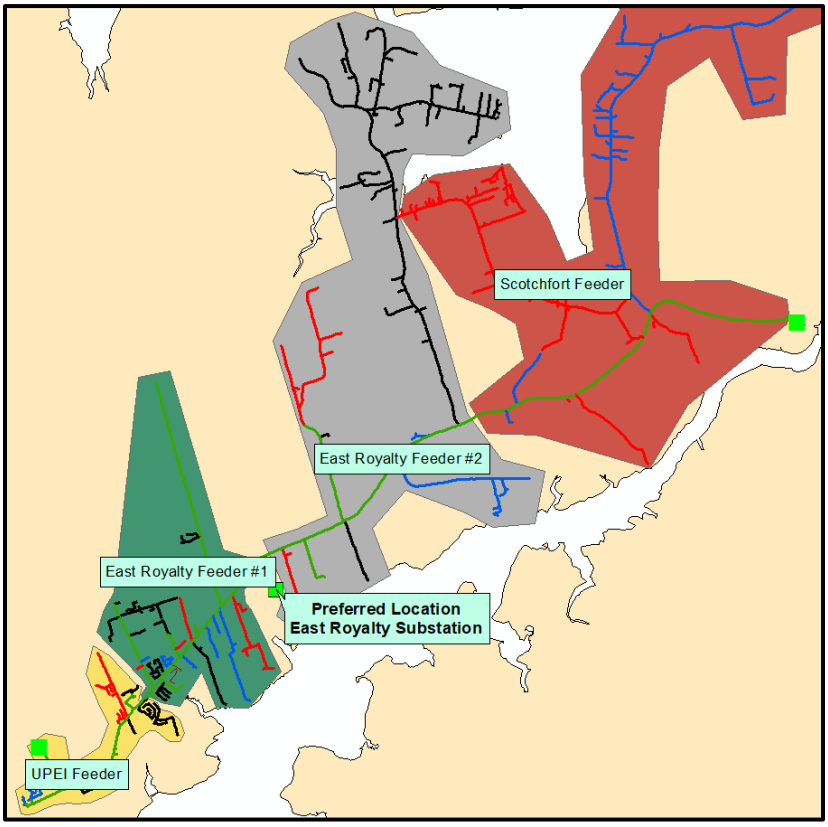
Table 14
Current and Proposed System Configuration for East Royalty

Current System Configuration		
Name	**Customers**	**Length (km)**
UPEI Feeder	3,119	77
Scotchfort Feeder	884	90
New System Configuration		
Name	**Customers**	**Length (km)**
UPEI Feeder	1,681	16
Scotchfort Feeder	541	58
East Royalty Feeder #1	1,104	36
East Royalty Feeder #2	677	57

The 138 kV/12.5 kV East Royalty Substation construction is scheduled to begin in 2021 and completed in 2022 adding 10 MVA of capacity to the area with room for additional capacity if required in the future. The timeline for the addition of the second transformer will be determined by load growth in the area. The Substation will also include an oil containment system, grounding, fencing, civil work, steel structures, protection, control, and communication equipment and will be connected to existing transmission line Y-104 via a short tap line.

This project is justified based on the need to provide reliable power to the East Royalty/Suffolk/York/Bedford areas in a cost effective matter. Below is the proposed feeder configuration which is subject to substation location.

Figure 10
Proposed Feeder Configuration



The project cost of $4,016,000 over two years is based on a planned tender design of the substation. The project will be completed over two years with $2,890,000 budgeted for 2021 and $1,126,000 budgeted for 2022.

The estimated construction costs shown below in Table 15 are based on the planned tender design.

Table 15 **East Royalty Substation Multi-Year Construction Costs**			
Description (includes material and labour)	**2021 Proposed Budget**	**2022 Proposed Budget**	**TOTAL**
Civil Works	$ 390,000	$ -	$ 390,000
Foundations	239,000	-	239,000
Ground Grid and Fencing	115,000	-	115,000
Equipment	852,000	-	852,000
Control Building and Station Service Equipment	222,000	85,000	307,000
Transformer	219,000	876,000	1,095,000
Land Purchase and Engineering	122,000	-	122,000
Protection and Control	-	75,000	75,000
Steel/Bus Works	499,000	-	499,000
Design	184,000	-	184,000
Contingency	48,000	90,000	132,000
TOTAL (includes material and labour)	**$ 2,890,000**	**$ 1,126,000**	**$ 4,016,000**

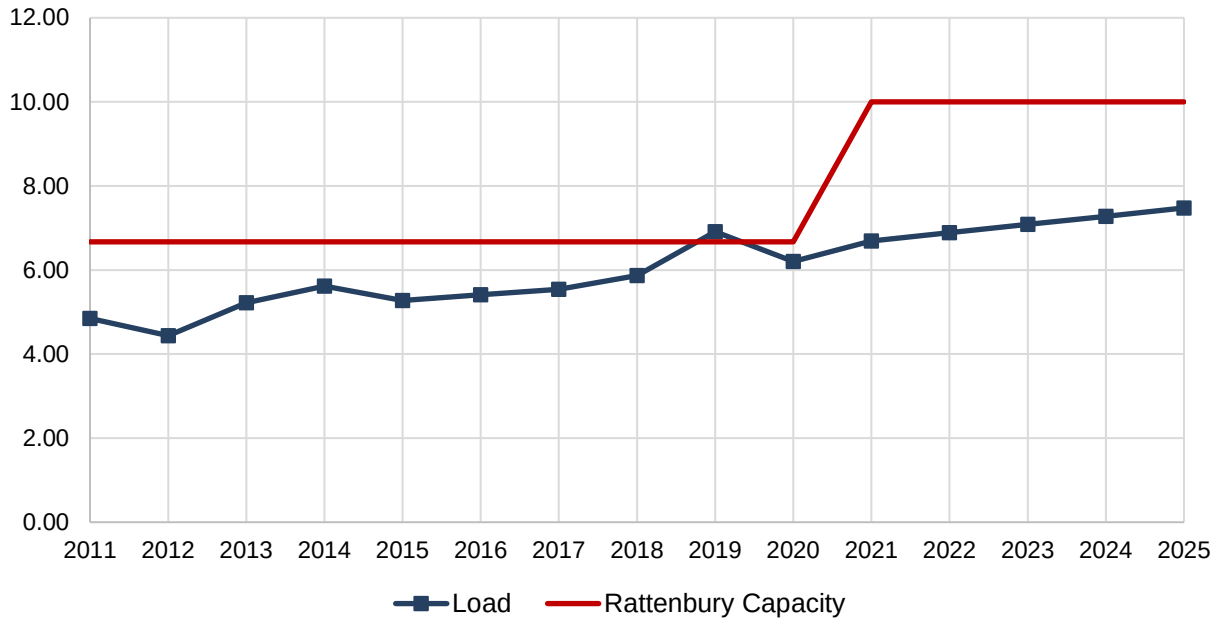
b. **Crossroads Substation Modifications (Justifiable)** ***$ 208,000***

The Crossroads Substation, built in 1978, is aging and requires an upgrade to the bus work to reduce the outage duration times during system outages in the Crossroads Substation and to provide more flexibility for required maintenance work without a complete substation shutdown.

c. **Rattenbury Transformer Upgrade (Justifiable)** ***$ 946,000***

The Rattenbury Substation currently has a 5.0/6.7 MVA transformer. The electrical demand on the substation has increased by 39 per cent over a ten year period and is forecast to reach the 6.7 MVA limit in 2021 which is the capacity of the transformer as shown in Figure 11.

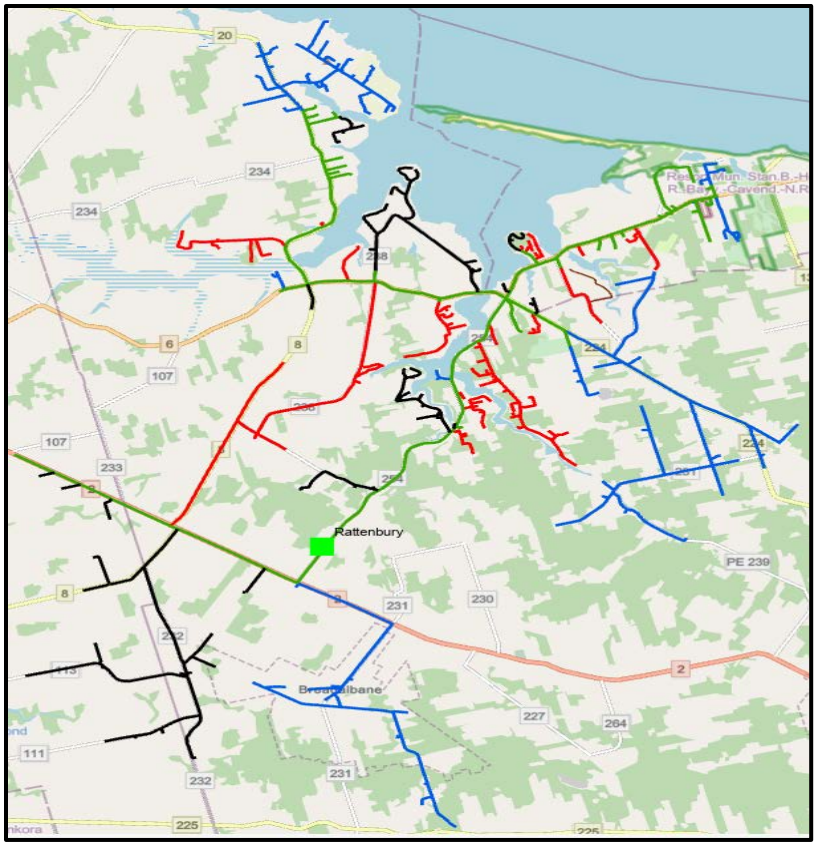
Figure 11
Rattenbury Transformer Loading



There are approximately 2,000 customers fed from the Rattenbury Substation. The service area of the substation is shown in Figure 12 and includes the majority of the load in Stanley Bridge, New London and Cavendish areas.

The Cavendish area will be fed from the Bagnall Road Substation starting in 2020; however, adequate capacity should be available from both Rattenbury and Bagnall Road Substations in order to maintain reliability to this area in the event of feeder outages from either of the substations.

Figure 12
Rattenbury Substation Service Area



d. **<u>Substation Oil Containment Program</u> (Justifiable)** ***$ 111,000***

Older substations were not designed with oil containment systems in place, however, oil containment systems are currently being installed in all new substations. The risk of oil being released to the environment is reduced considerably with an oil containment system in place for each transformer in a substation.

In 2021, a new program is proposed to install oil containment systems in older substations. The budget is a provision to add oil containment systems for two transformers in Kensington Substation in 2021.

The proposed Substation Oil Containment Program is justified based on the need to maintain safe, reliable electrical service and to protect against the environmental

risk of transformer oil spills in existing substations that do not currently have oil containment systems in place.

e. <u>Substation Modernization Program</u> (Justifiable) *$ 352,000*

The items identified for the Substation Modernization Program in 2021 are shown in Table 16.

Table 16
Substation Modernization Program for 2021

Proposed Work	Materials	Labor*	Total
i. Ground Grid Modernization	$ -	$ 67,000	$ 67,000
ii. Substation Security – Camera Installation	56,000	5,000	61,000
iii. Fence Upgrades	26,000	2,000	28,000
iv. Substation and Distribution Automation	50,000	2,000	52,000
v. Substation Backup Generator System	76,000	12,000	88,000
vi. Mobile Transformer Accommodation	52,000	4,000	56,000
TOTAL	**$ 321,000**	**$ 31,000**	**$ 352,000**

* Includes cost of consultant to perform Ground Grid Modernization study and design.

i. To deter copper theft, the Company is proposing to replace all exposed copper grounding leads in existing substations with theft-deterrent Erico cable. Erico cable consists of outer galvanized steel strands, with inner tinned copper strands. The cable provides the functionality of copper conductor, but appears to be a non-copper conductor and is difficult to cut with hand tools. This program requires a study and design plan for each substation by a consultant. The 2021 budget is a provision to complete the study and design plans for Bedeque and Sherbrooke Substations. The replacement of the copper grounding with Erico cable in these two substations will be completed in 2022 as part of the Substation Modernization Program in that year.

ii. This is a provision for the addition of security cameras to existing substations as an additional measure to improve substation security and deter copper theft.

iii. The Company is proposing to complete substation fence upgrades in order to improve the safety and security of the substations.

iv. The Company will complete distribution automation between the West Royalty Substation and the new Clyde River Substation to allow for automated switching during system outages.

v. The Company started a Backup Generator Program in 2020 to install new or replace aging backup generators at critical substations. These generators are an important part of the substation's reliability as they supply the required power to charge the station batteries and keep systems online in the event of a power outage. The budget will allow the Company to install a backup generator at the West Royalty Substation.

vi. The Company has two 10 MVA mobile transformers. One 10 MVA mobile transformer has a high voltage rating of 69 kV and the second mobile transformer, which is physically larger, has a dual 138/69 kV high voltage rating. The mobile bays in older substations require expansion to be able to accommodate the large dual voltage mobile transformer. The 2021 budget will allow the Company to upgrade the mobile transformer bay in the Kensington Substation.

These projects identified as part of the Substation Modernization program are justified based on the need to maintain safe, reliable electrical service and ensuring workplace safety by improving security at the substations to improve reliability and outage response times.

f. <u>138 kV Breaker Replacement Program</u> (Justifiable) *$ 137,000*

There are seven breakers in the Bedeque Switching Station. Four of these breakers are over 40 years old. This budget is a provision to replace the 138 kV Breaker for Y-113 in the Bedeque Switching Station installed in 1976. The breaker replacement is based on test results, age and the severity of the impact on the system in the event of failure. The Company continuously monitors the condition

of breakers to assess the need for life extension or replacement. The project is justified based on the need to replace aged equipment at the end of its useful life.

g. Mobile Communications System Upgrade

(Multi-Year, Justifiable) ***$ 445,000***

The mobile radio system is a critical communication system for the day to day operations of the Maritime Electric electricity system. ECC operators use the mobile radio network to maintain contact with field personnel.

The existing analog mobile radio network is aging and needs to be updated due to obsolescence, increased failure rates and the following deficiencies:

- Replacement parts for the dispatch consoles are obsolete and can no longer be sourced resulting in long lead times for repairs. These consoles provide a vital link between the dispatchers and field personnel to coordinate jobs and ensure the safety of field personnel.

- Vendors have discontinued analog mobile radio networks in favour of promoting digital mobile radio technology.

The existing analog system will be replaced with a new digital system which offers many advantages, including higher reliability, improved voice quality, greater coverage and expected longer life.

The project will be completed over two years with $445,000 budgeted for 2021 and $467,000 budgeted for 2022. A breakdown of the total project costs are provided in Table 17 below:

Table 17 Mobile Communications System Upgrade Project			
Description	**2021 Proposed Budget**	**2022 Proposed Budget**	**TOTAL**
Mobile Radio Network - Repeater Sites	$ 260,000	$ 325,000	$ 585,000
Subscribers – Mobile Radios	25,000	55,000	80,000
Subscribers – Portable Radios	10,000	26,000	36,000
Console System	90,000	-	90,000
Contingency/Other Materials	60,000	61,000	121,000
TOTAL	**$ 445,000**	**$ 467,000**	**$ 912,000**

The Mobile Communications System Upgrade Project is justified based on the need to maintain safe, reliable electrical service and ensuring workplace safety by ensuring the necessary communications between dispatchers and field personnel is maintained.

h. **Fibre Communication - Sherbrooke to Rattenbury (Justifiable)** ***$ 584,000***

Maritime Electric is installing fibre communications to increase connectivity bandwidth and reliability of the backbone communication system and is integrating distribution feeder equipment, such as reclosers, into the SCADA control system through fibre communications which will significantly reduce customer outage time and improve reliability.

Currently, data from the Alberton, O'Leary, Wellington, St Eleanors, Kensington, Rattenbury and City of Summerside Utility substations is routed through the Sherbrooke Substation, transmitted via a 7 GHz radio link to the Bedeque Substation and integrated with redundant communication paths to the ECC. A failure of the 7 GHz radio system between Sherbrooke and Bedeque would result in loss of the SCADA control system for the substations in western PEI.

The proposed Sherbrooke backbone fibre communication project is a 39 kilometre fibre link from the Sherbrooke Substation to the Bagnall Road Substation. This fibre will connect to the existing fibre from the Bagnall Road Substation to the ECC. With this link in service, an additional path from Sherbrooke Substation to ECC will be established eliminating the risk of a single point of failure of the 7 GHz radio

link. It also enables maintenance and repairs to either the fibre or the existing 7 GHz radio links. In addition, the fibre will replace the legacy 900 MHz radio links from the Sherbrooke Substation to the Kensington and Rattenbury Substations.

A breakdown of the proposed budget is shown in Table 18.

Table 18 **Fibre Communication - Sherbrooke Substation to Rattenbury Road Substation**	
Fibre Cost	$ 140,500
Labour for Fibre Installation	246,000
Material for Fibre Installation	97,000
Splicing Services	22,500
Traffic Control	74,500
Other Miscellaneous Material	3,500
TOTAL	**$ 584,000**

i. Substation Communications System Upgrade

(Multi-Year, Justifiable) $ 334,000

This project is a continuation of a two year project originally approved in the 2020 Capital Budget Application. In 2018, the Company received the results of a Cybersecurity Capability Maturity Model Assessment ("C2M2"). The report made several recommendations for improvements to the Operations Network, centering on network segmentation and traffic visibility. In 2019, Maritime Electric engaged IMP Solutions to undertake an Operational Technology ("OT") Communication Network Assessment to review the existing OT network architecture and its effectiveness. The goal of the Assessment was to define a new network architecture meeting both operational and cybersecurity requirements. The Assessment specifically provides insight into the segmentation and visibility of network traffic as a cybersecurity practice, both within the OT network itself, and where the OT and Information Technology ("IT") networks converge. This Assessment included a review of the existing OT network device configurations and highlights areas where operational reliability and redundancy can be improved.

The existing OT communication equipment used for operational services and routing the associated traffic, including the control, telemetry, voice and administration data on the Island wide communication system, was installed in 2008. Maritime Electric's existing OT communication network infrastructure is comprised mostly of devices, which are at, or nearing, the end of their supported life cycle. The IMP report determined that the existing infrastructure does not offer the capability to support the C2M2 recommendations for traffic segmentation and network visibility requirements.

To meet these operational and security requirements, the existing OT infrastructure requires upgrading. A new detailed network architecture for the core substation communication sites is being developed, on a site-by-site basis, and will be based upon the proposed architecture in the IMP Solutions Report. This detailed network architecture will be designed with the following objectives:

- Maintain safe and reliable communications for current operational tasks;
- Provide the ability to accommodate future growth;
- Enhance security of the overall network and system; and
- Reduce the resources required to support the OT network infrastructure.

To achieve the above objectives, hardware that provides these operational services for the substation communication will be updated with next generation utility grade hardware on a site by site basis. This hardware will be deployed in an architecture that will provide redundancy, improve reliability, enhance performance, and be capable of supporting the C2M2 security recommendations.

The 2021 estimated cost is $334,000. A breakdown of the total project cost is provided in Table 19.

Table 19 Substation Communication System Upgrade Project Cost			
Description	**2020 Forecast**	**2021 Proposed Budget**	**TOTAL**
Material/Equipment	$ 807,000	$ 209,000	$ 1,016,000
Professional Services	75,000	75,000	150,000
Project Management	50,000	50,000	100,000
TOTAL	**$ 932,000**	**$ 334,000**	**$ 1,266,000**

j. Substation Fibre Communications Replacements due to Road Alterations (Recurring) ***$ 36,000***

Each year, the Company relocates or replaces distribution assets to accommodate provincial and municipal government infrastructure projects such as sidewalk installations, sewer and water line extensions, road widening, road construction and bridge replacements. This is a new recurring budget item as inter-substation fibre communication continues to expand in the system. This budget amount will be adjusted based on annual costs on a go forward basis.

6.2 Transmission Projects ***$ 3,010,000***

a. 69 kV and 138 kV Switch Program (Justifiable) $ 575,000

This is a provision to upgrade and extend the life of selected 69 kV and 138 kV line switches to improve the reliability and safe operation of this equipment. The Company has an Air Switch Inspection Program and a Transmission Line Refurbishment Program that provides for annual inspection of switches and transmission lines. Based on the results of these inspections, the Company has identified a requirement install one new 69 kV switch and replace two existing switches as follows:

- SW663 – 69 kV - Cardigan
- SW664 – 69 kV - Cardigan
- New Switch East – 69 kV - Cardigan

By adding the new switch listed above, a three-way switch network will be created to provide faster restoration response time during emergencies. Outage time will be reduced with the ability to isolate Dover and Georgetown Substations. A new fibre communication connection will be run to these three switches to aid their operation since radio coverage in this area is poor due to low elevation.

b. <u>Transmission Line Refurbishment</u> (Justifiable) $ 910,000

The 69 kV and 138 kV transmission lines are the backbone of Maritime Electric's electricity delivery system. The proposed budget amount provides for the inspection and life extension activities of the transmission system, which will also support system reliability. Completion of ground inspection and Emergency and Priority 1 deficiencies on the following 69 kV (T-Line) and 138 kV (Y-Line) transmission lines are planned for 2021:

- T-1 between West Royalty and Sherbrooke Substations;
- T-2 between Charlottetown and Lorne Valley Substations;
- T-4 between Scotchfort and Lorne Valley Substations;
- T-10 between Lorne Valley and Dover Substations;
- T-11 between Summerside and Sherbrooke Substations;
- Y-112 between Church Road and Eastern Kings Wind Farm;
- T-13 and T-15 between West Royalty and Charlottetown Substations;
- Y-101 and Y-103 between Richmond Cove and Bedeque Switching Stations;
- Y-104 between West Royalty and West St. Peters Substation;
- Y-108 between Church Road and Hermanville Wind Farm; and
- Y-115 between Sherbrooke and West Cape Wind Farm.

The work is justified based on the need to maintain safe and reliable electrical service. Photographs of deficiencies recently identified through the Program are shown in Appendix J.

c. <u>Y-119 – Tap to Clyde River Substation</u> (Multi-Year, Justifiable) $ 1,525,000

A new Transmission line Y-119 will be constructed from Connelly Woods Road to Bannockburn Road to feed the new Clyde River Substation. This new line will be connected to the existing Y-109 transmission line that connects the Borden Riser Station and West Royalty Substation. Details and justification for this 27.1 kilometre project is provided in Appendix K.

7.0 CORPORATE

7.1 Corporate Services *$ 411,000*

The Corporate Services category provides for facilities including the Main Office at 180 Kent Street, the District Service Centres in West Royalty, Roseneath, Rosebank, Sherbrooke and other general facilities throughout the Province.

a. Recurring Annual Capital Requirements

(Recurring Work Support Services) $ 411,000

This provisional budget item provides for the ongoing capital additions and refurbishments at various facilities including:

- Window and Door Replacements
- Garage Doors
- Roofing and Siding
- Paving for Facility Entrances and Parking Lots
- Office Furniture and Equipment
- Unforeseen Capital Expenditures

7.2 Information Technology *$ 2,116,000*

a. Hardware Acquisitions (Work Support Services) $ 295,000

Table 20
Hardware Acquisitions

Description	Cost
Servers and Communication Equipment	$ 128,000
Personal Computing Devices and Printers	167,000
TOTAL	**$ 295,000**

The budget amount includes the purchase and implementation of additional units and life-cycle replacement or upgrade of computer hardware, servers and communication equipment (switches, routers, etc.) in the data centre as outlined in Table 20. This equipment is critical to ensuring the efficient operation of the Company's business network and provision of service to customers. The

replacement or upgrade of servers and communications equipment is determined based on the existing performance of the equipment, the ability to expand the equipment for future growth, the criticality of the equipment based on the business or customer impact should the equipment fail and the cost of replacing or upgrading as compared to the operating costs of the existing equipment. Industry practice is to replace servers and communication equipment every five years.

The budget amount also includes purchase and implementation of additional units and life cycle replacement of personal computers (desktops, laptops and tablets) and printers as outlined in Table 20. The Company has approximately 240 of these devices which are replaced every five to seven years.

Hardware acquisitions are justified based on the need to replace and upgrade IT hardware to maintain a reliable IT network which is critical to the overall service the Company provides to customers.

b. Purchased Software and Upgrades (Work Support Services) $ 485,000

Table 21
Purchased Software and Upgrades (Work Support Services)

Description	Cost
Microsoft Suite	$ 128,000
Great Plains Financials	35,000
ESRI Mapping	74,000
Software Development Tools	45,000
Cybersecurity Software	70,000
Miscellaneous Software Upgrades	78,000
New Purchases	55,000
TOTAL	**$ 485,000**

Maritime Electric relies on a wide variety of software to deliver service to customers. Vendors who supply and support this software charge for the ongoing development of new features, the creation of security patches and the support of system customizations. These enhancements improve the functionality and

security of the software. The amounts include an internal labor component required for installation, patching, upgrading and testing.

Microsoft supplies end user business software such as word processing, spreadsheets and email. They also supply key data centre software including the corporate database management system and the financial management suite. Microsoft also supplies most core operating systems both on servers and computers. In 2020, Maritime Electric entered into a new three year agreement with Microsoft that resulted in a 30 per cent increase in costs. The budget amount in Table 21 provides for the access and support of the latest versions of each software product.

ESRI is the Company's provider of enterprise Geographic Information System ("GIS") solutions. ESRI maps are embedded in most Maritime Electric applications including the Customer Information System, Vegetation Management System and the outage restoration map on the Corporate Website. The budget amount in Table 21 provides for the continued support by the vendor, contributing to the effective operation of the GIS.

Cybersecurity software is sourced from specialized vendors and provides essential services to Maritime Electric in order to maintain a safe network. These solutions include the management of mobile devices, second factor authentication and intrusion detection.

The Company also uses a wide variety of smaller applications that include software development tools, engineering design software and billing support applications.

Purchased software and upgrades are justified based on the need for the continued support of the software products being utilized to ensure there is no negative impact to the security and operation of the IT network which is critical to the overall service the Company provides to customers.

c. Customer Information System/Billing

(Multi-Year, Work Support Services) $ 330,000

The Company has identified the need to replace its legacy Customer Information System/Billing ("CIS"). While the existing in-house CIS has been a strategic advantage for decades, its reliance on key internal staff and aging technology has become a risk exposure. The CIS system was originally developed and written using Common Business-Oriented Language ("COBOL") nearly forty years ago. Modifications were made over the decades to incorporate Ingres for data management and Microsoft SQL Server for storing and retrieving data. Furthermore, the legacy CIS is not able to leverage the capabilities of Advanced Metering Infrastructure ("AMI"), such as on-demand reads and time-of-use billing.

Implementation of a modern CIS solution will align Maritime Electric with other utilities in the industry and will provide improved functionality as well as keep pace with customer expectations and industry changes. Maritime Electric's objective is to procure a proven mainstream CIS solution that will reduce reliance on aging technology for this critical system and accommodate future AMI requirements.

The Company has identified this as a multi-year project as required by the CEJC. However, the Company does not have sufficient information to determine the total project scope or cost at this time. Based on our initial research, there are only two or three acceptable options available on the market and current installations range between $15 to $20 million over a two to three year period.

The 2021 budget will allow the Company to engage third party expertise to perform a needs analysis, develop a business case as well as a request for proposals. This will allow the Company to provide a more accurate and detailed budget and timeline in a subsequent Application(s) to the Commission. The CIS is one of the Company's most critical and widely used systems and it is imperative that all current and future objectives, interfaces and goals are evaluated. This investment in the CIS selection process will focus on a replacement system that will mitigate the risk of failure of this critical system and maximize the benefits of both AMI and CIS.

d. <u>Business Network Security Review</u> (Work Support Services) $ 87,000

The Business Network provides access to customer data, billing, email and a host of business applications used within Maritime Electric. This budget amount provides for a review and analysis of the Business Network by an external security specialist. The review evaluates the many facets of security against the latest trends in criminal cyber activity. The process consists of an independent audit, recommendations assessment, and the development and implementation of a work plan.

e. <u>Cybersecurity Enhancements</u> (Work Support Services) $ 180,000

Cybersecurity continues to be a core strategic focus for Maritime Electric. Attacks are not only more frequent but more complex, with organizations facing highly sophisticated forms of malware as well as persistent, targeted attacks. The consequences of dealing with a data breach are severe and may include negative press, loss of customer confidence, financial penalties and legal exposure. This issue is even more heightened for companies with critical infrastructure assets such as Maritime Electric.

In response to these threats, the Company continues to invest in new cybersecurity initiatives. These initiatives include security assessments, coordination with operations staff, intrusion detection and staff training. Strategic alliances are also in place with federal government agencies, other Fortis subsidiaries and private external security specialists.

The proposed 2021 budget amount will be used to progress the security assessment recommendations from both the OT (“SCADA”) network and the business network. Improving and maintaining the security of both networks will be ongoing.

The project is justified based on the need to improve the security of the SCADA system and minimize the Company’s vulnerability to cyber-attacks.

f. **Operations Network Data Centre Infrastructure**
(Work Support Services) **$ 395,000**

In 2019, Maritime Electric's Information Technology and Technical Services groups worked together with an external vendor to implement a Cybersecurity Risk Management Program ("CRMP"). The program identified key risk areas, a detailed risk matrix, existing and potential controls as well as a system to score effectiveness. Output from the assessment included a five year cybersecurity roadmap which recommended implementation of a number of technologies and changes to processes, all designed to improve the Company's security posture. Operations network recommendations included operating system patching, backups, network monitoring, network access control and end point protection. Many of these technologies already exist on the business network as well as the expertise to manage them. This has led to a convergence between the IT and Operations groups in the area of cybersecurity.

This project will see the purchase and installation of the foundational data centre hardware and services that will be required to implement the five year roadmap initiatives.

g. **Financial System Upgrade (Work Support Services)** **$ 68,000**

Microsoft Great Plains is a suite of computer software products that assists in the management of the Company's finances. The suite includes General Ledger, Accounts Payable, Accounts Receivable, Purchasing and Financial Reporting. In order for Maritime Electric to stay current with Microsoft's mainstream support it must periodically upgrade to a new version. The last upgrade was performed in 2016. This will be a joint project between an external vendor, Finance and IT and will cover labor required for both internal and external resources.

h. **Work Management (Work Support Services)** **$ 75,000**

Maritime Electric's work management system is an internally developed system that was implemented in 2017. The system tracks and routes work orders through the various stages and work groups. These stages include the customer service request, quotation process, survey, permit validation, customer payment, line work, asset management and quality control. The system also has a dispatching

module that allows line crews to have electronic access to work orders. The system has proved to be a critical tool in work delivery and management particularly during the COVID pandemic. The proposed budget amount will be used to make several improvements to allow for a more efficient and effective work management system. These improvements include a portal for contractor crews, automation of joint use transactions with Bell, a self-reporting of attachments portal for Eastlink and a Billing System interface that will automate updating of several key assets including transformers and street lights.

i. <u>Transmission Line Inspection System</u>

(Work Support Services) $ 65,000

The Transmission Line Inspection System will be used to perform detailed inspections on transmission line assets. System requirements include the ability to record data in the field in an off-line mode and then synchronizing to internal databases when cellular connectivity is available. IT and Operations will build on an existing distribution line inspection software and extend it to transmission assets. The scope of the project will also include additional enhancements and improvements that have been identified by Operations personnel. Many of these enhancements will benefit both distribution and transmission line inspections.

i. <u>On-line Services</u> (Work Support Services) $ 136,000

With the successful implementation of the Virtual Contact Centre and a new Outage Management System in-progress, the Company is proposing to develop a new Customer App that will assist with outage information. Customers will be able to report outages, view outage information and their personal account information, and receive updates on service orders. As well, the Company will be investing in website tools to better improve the digital customer experience, including the integration of more online service options.

8.0 CAPITALIZED GENERAL EXPENSE *$ 518,000*

This amount includes a portion of administrative costs (predominately labour) that are properly recognized as part of the Company's overall capital expenditure program. These recurring expenditures represent an allocation of administrative costs, not specific to any one capital project, but rather as part of the overall development, implementation and management of the Company's capital budget program. The costs are labour and transportation related and derived from departments that support the overall capital program of the Company, primarily the Finance and Purchasing departments and Stores operations.

The proposed budget reflects historical spending over the past five years as shown in Table 22.

Table 22
Capitalized General Expenses

	2016	2017	2018	2019	2020F
Stores	$366,639	$438,405	$407,724	$494,872	$485,000
Finance and Purchasing	111,075	64,045	67,644	72,633	72,000
TOTAL EXPENDITURES	**$477,714**	**$502,450**	**$475,368**	**$567,505**	**$557,000**

9.0 INTEREST DURING CONSTRUCTION *$ 581,000*

This represents an allowance for the cost of funds used during the construction of certain assets. It is reflected in the accounts as an offset to financing costs and is based on the Company's cost of borrowing. This amount is allocated to fixed assets and recovered through amortization over the life of the assets. Appendix L to this Application provides the calculation of the budget provision for Interest During Construction for 2021.

10.0 PROPOSED ORDER

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2021 Annual Capital Budget and for certain approvals incidental to such an order.

UPON receiving an Application by Maritime Electric Company, Limited (the "Company") for approval of the Company's capital budget for year 2021;

AND UPON considering the Application and Evidence filed in support thereof;

NOW THEREFORE, for the reasons given in the annexed Reasons for Order and pursuant to the Electric Power Act;

IT IS ORDERED THAT

The 2021 Capital Budget Application of the Company, filed herein on _____, 2020 and summarized below is approved:

2021 Capital Budget Summary	
Generation	$ 1,330,000
Distribution	31,536,000
Transmission	9,053,000
Corporate	2,527,000
General Expense Capitalized	518,000
Interest During Construction	581,000
Total	$ 45,545,000
Less: Contributions	(3,107,000)
TOTAL (Net)	**$ 42,438,000**

DATED at Charlottetown, Prince Edward Island, this ___ day of _____, 2020.

BY THE COMMISSION:

_____

Chair

_____

Commissioner

_____

Commissioner

_____

Commissioner

APPENDIX A

Summary of Capital Expenditures
(2012 – 2021)

Maritime Electric Company, Limited

Summary of Capital Expenditures (2012-2021)

	2012	2013	2014	2015	2016	2017	2018	2019	2020*	2020*	2021
	Actual	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**	**Actual**	**Budget**	**Forecast**	**Budget**
Generation											
Charlottetown Plant and CT3	844,766	669,275	592,872	451,154	500,777	983,658	814,902	426,114	537,000	537,000	1,025,000
Borden Plant	59,333	881,322	1,468,960	234,642	740,335	81,062	185,765	59,226	230,000	230,000	305,000
	904,099	1,550,597	2,061,832	685,796	1,241,112	1,064,720	1,000,667	485,340	767,000	767,000	1,330,000
Distribution and Transmission											
Distribution	17,371,849	15,707,728	16,974,255	16,132,068	18,246,306	19,834,463	21,445,487	23,777,736	27,319,000	27,319,000	31,536,000
Transmission	3,305,468	4,106,795	6,462,871	8,092,839	8,283,251	10,832,373	6,989,530	8,674,018	9,214,000	9,214,000	9,053,000
	20,677,317	19,814,523	23,437,126	24,224,907	26,529,557	30,666,836	28,435,017	32,451,754	36,533,000	36,533,000	40,589,000
Corporate	997,025	757,930	979,141	897,585	1,039,510	841,786	2,143,044	1,850,589	1,956,000	1,906,000	2,527,000
Sub-total	22,578,441	22,123,050	26,478,099	25,808,288	28,810,179	32,573,342	31,578,728	34,787,683	39,256,000	39,206,000	44,446,000
Capitalized General Expense	263,704	350,331	388,730	458,433	477,714	502,450	475,368	567,505	557,000	557,000	518,000
Interest During Construction	295,027	298,913	368,486	376,452	405,915	449,760	432,111	474,433	563,000	563,000	581,000
	23,137,172	22,772,294	27,235,315	26,643,173	29,693,808	33,525,552	32,486,207	35,829,621	40,376,000	40,326,000	45,545,000
Less: Customer Contributions	(760,444)	(643,920)	(525,236)	(382,693)	(1,262,517)	(746,454)	(677,905)	(758,922)	(2,400,000)	(600,000)	(3,107,000)
Net Capital Expenditures	**22,376,728**	**22,128,374**	**26,710,079**	**26,260,480**	**28,431,291**	**32,779,098**	**31,808,302**	**35,070,699**	**37,976,000**	**39,726,000**	**42,438,000**

Note: Actual amounts above, where applicable, include amounts expended for approved carryovers from the previous year.

* Approved Capital Budget Orders UE19-09 and UE20-02.

APPENDIX B

Expanded Table Figure 2 Projects by CEJC Classification

Table 1
Proposed 2021 Capital Expenditures

	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed	Capital Budget Evidence Reference
4.0 Generation									
4.1 Charlottetown Plant Buildings and Services Projects									
a. Energy Control Centre Upgrades		62,000							*p. 12*
b. Replace Vehicle Gate Actuators and Controllers		63,000							*p. 12*
	-	125,000	-	-	-	-	$ 125,000	9.4%	
4.2 Charlottetown Plant Turbine-Generator Projects									
a. CT3 Electrical Generator Overhaul		448,000							*p. 13 & App D*
b. CT3 Generator Breaker		160,000							*p. 13*
c. 5,000 Amp Siemens Switchgear Breaker		60,000							*p. 13*
d. Combustion Turbine Improvements, Parts and Tools			232,000						*p. 14*
	-	668,000	232,000	-	-	-	900,000	67.7%	
4.3 Borden Plant Projects									
a. Backup Power Supply for CT1 and CT2		76,000							*p. 14*
b. Replace CT2 Radiator Core and Oil Cooler Foundation		73,000							*p. 14*
c. CT1 Generator Breaker		43,000							*p. 15*
d. Miscellaneous Combustion Turbine, Building and Services Improvements			113,000						*p. 15*
	-	192,000	113,000	-	-	-	305,000	22.9%	
	-	**985,000**	**345,000**	**-**	**-**	**-**	**1,330,000**	**100.0%**	
% of Total Category Proposed	**0.0%**	**74.1%**	**25.9%**	**0.0%**	**0.0%**	**0.0%**		**100.0%**	

Proposed 2021 Capital Expenditures

	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed	Capital Budget Evidence Reference
5.0 Distribution									
5.1 Replacements due to Storms, Collisions, Fire and Road Alterations									
a. Replacements due to Storms, Fire and Collisions			970,000						*p. 16*
b. Replacements due to Road Alterations			476,000						*p. 17*
	-	-	1,446,000	-	-	-	1,446,000	4.6%	
5.2 Distribution Transformers	-	-	5,192,000	-	-	-	5,192,000	16.5%	*p. 17 - 18*
5.3 Services and Street Lighting									
a. New Overhead and Underground Services			4,486,000						*p. 18*
b. Street and Area Lighting		815,000							*p. 19*
	-	815,000	4,486,000	-	-	-	5,301,000	16.8%	
5.4 Line Extensions									
a. Customer Driven Line Extensions			1,417,000						*p. 19*
b. Reliability Driven Line Extensions		815,000							*p. 19 & App E*
	-	815,000	1,417,000	-	-	-	2,232,000	7.1%	
5.5 Line Rebuilds									
a. Single Phase and Three Phase Rebuilds		2,879,000							*p. 20 & App F*
b. PEI Broadband Project		8,912,000							*p. 21 & App G*
c. Distribution Line Refurbishment		775,000							*p. 21 - 22 & App H*
d. Accelerated Distribution Component Replacement									
i. Porcelain Cutout Replacement Program		100,000							*p. 23 - 24*
ii. Eastern Cedar Pole Replacement Program		180,000							*p. 24*
	-	12,846,000	-	-	-	-	12,846,000	40.7%	
5.6 System Meters									
a. Watt-hour Meters			280,000						*p. 25*
b. Combination Meters			164,000						*p. 25 - 26*
c. Miscellaneous Metering Equipment			34,000						*p. 26*
d. Outdoor Metering Tanks			142,000						*p. 26*
	-	-	620,000	-	-	-	620,000	2.0%	
5.7 Distribution Equipment	-	-	2,035,000	-	-	-	2,035,000	6.5%	*p. 26 - 31*
5.8 Transportation Equipment	-	-	-	1,864,000	-	-	1,864,000	5.9%	*p. 31 - 32 & App I*
	-	**14,476,000**	**15,196,000**	**1,864,000**	**-**	**-**	**31,536,000**	**100.0%**	
% of Total Category Proposed	**0.0%**	**45.9%**	**48.2%**	**5.9%**	**0.0%**	**0.0%**		**100.0%**	

Proposed 2021 Capital Expenditures

	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed	Capital Budget Evidence Reference
6.0 Transmission									
6.1 Substation Projects									
a. East Royalty Substation		2,890,000							*p. 33 - 36*
b. Crossroads Substation Modifications		208,000							*p. 36*
c. Rattenbury Transformer Upgrade		946,000							*p. 36 - 38*
d. Substation Oil Containment Program		111,000							*p. 38 - 39*
e. Substation Modernization Program		352,000							*p. 39 - 40*
f. 138 kV Breaker Replacement Program		137,000							*p. 40 - 41*
g. Mobile Communications System Upgrade		445,000							*p. 41 - 42*
h. Fibre Communication - Sherbrooke to Rattenbury		584,000							*p. 42 - 43*
i. Substation Communications System Upgrade		334,000							*p. 43 - 45*
j. Substation Fibre Communications Replacements due to Road Alterations			36,000						*p. 45*
	-	6,007,000	36,000	-	-	-	6,043,000	66.8%	
6.2 Transmission Projects									
a. 69 kV and 138 kV Switch Program		575,000							*p. 45 - 46*
b. Transmission Line Refurbishment		910,000							*p. 46 & App J*
c. Y-119 - Tap to Clyde River Substation		1,525,000							*p. 47 & App K*
	-	3,010,000	-	-	-	-	3,010,000	33.2%	
	-	**9,017,000**	**36,000**	**-**	**-**	**-**	**9,053,000**	**100.0%**	
% of Total Category Proposed	**0.0%**	**99.6%**	**0.4%**	**0.0%**	**0.0%**	**0.0%**		**100.0%**	
7.0 Corporate									
7.1 Corporate Services									
a. Recurring Annual Capital Requirements				411,000					*p. 48*
	-	-	-	411,000	-	-	411,000	16.3%	
7.2 Information Technology									
a. Hardware Acquisitions				295,000					*p. 48 - 49*
b. Purchased Software and Upgrades				485,000					*p. 49 - 50*
c. Customer Information System/Billing				330,000					*p. 51*
d. Business Network Security Review				87,000					*p. 52*
e. Cybersecurity Enhancements				180,000					*p. 52*
f. Operations Network Data Center Infrastructure				395,000					*p. 53*
g. Financial System Upgrade				68,000					*p. 53*
h. Work Management				75,000					*p. 53 - 54*
i. Transmission Line Inspection System				65,000					*p. 54*
j. On-line Services				136,000					*p. 54*
	-	-	-	2,116,000	-	-	2,116,000	83.7%	
	-	**-**	**-**	**2,527,000**	**-**	**-**	**2,527,000**	**100.0%**	
% of Total Category Proposed	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**		**100.0%**	
Sub-total	**-**	**24,478,000**	**15,577,000**	**4,391,000**	**-**	**-**	**44,446,000**		
% of Total Proposed	**0.0%**	**55.1%**	**35.0%**	**9.9%**	**0.0%**	**0.0%**		**100.0%**	
8.0 Capitalized General Expense					518,000		518,000		*p. 55*
9.0 Interest During Construction						581,000	581,000		*p. 56 & App L*
Less: Customer Contributions							(3,107,000)		
TOTAL							**$ 42,438,000**		

APPENDIX C

Impact Rate Base, Revenue Requirement and Customer Rates

Depreciation (000s)		**Annual**
Depreciation Expense		
Capital Investment per Table 1, Proposed 2021 Capital Expenditures		45,545
Retirements (Note 1)		(9,109)
Plant Investment for Depreciation	$	36,436
Depreciation Rate (Note 2)		3.49%
Depreciation Expense	$	1,272
Capital Investment		
Capital Investment		45,545
Less: Customer Contributions per Table 1, Proposed 2021 Capital Expenditures		(3,107)
Total Capital Investment	$	42,438
Accumulated Depreciation		
Costs of Removal (Note 3)		(9,328)
Depreciation & Amortization		1,272
Total Change in Accumulated Depreciation	$	(8,057)
Net Book Value (NBV)	**$**	**34,381**
Customer Contributions		
Customer Contributions per Table 1, Proposed 2021 Capital Expenditures	**$**	**3,107**
Depreciation Expense - Contributions		
Annual Contributions	$	3,107
Depreciation Rate (Note 4)		3.64%
Amortization of Customer Contributions	$	113
Total Depreciation Expense (Net of Contributions)	**$**	**1,159**

Note 1: Asset retirements estimated at 20% of capital expenditures based on average for transmission and distribution assets for 2017-2019.

Note 2: Composite depreciation rate per 2017 Depreciation Study.

Note 3: Costs of Removal are estimated to be 17% of total capital investment and costs of removal based on 2018 & 2019 actual costs.

Note 4: Distribution Contributions are depreciated using the rate per 2017 Depreciation Study for Distribution Service Lines.

Income Taxes (000s)		**Annual**
Capital Cost Allowance		
Capital Investment per Table 1, Proposed 2021 Capital Expenditures		45,545
		45,545
UCC for Calculation (Accelerated Investment Incentive)		45,545
Capital Cost Allowance ("CCA") Rate (assumes class 47)		8.00%
CCA (Accelerated Investment Incentive @ 150%)		5,465
Ending UCC	$	40,080
Future Income Taxes		
CCA	$	5,465
Depreciation		1,159
Difference CCA/Depreciation		4,307
Future Tax Rate		31.00%
Future Income Taxes		1,335
Income Tax Effects of Increased Return		
Return on Rate Base	$	2,225
Equity Return (grossed up)		1,756
Debt Return		(1,014)
	$	743
Income Tax Calculation		
Return on Rate Base	$	743
Add: Depreciation		1,159
Less: CCA		(5,465)
		(3,564)
Corporate Tax Rate		31.00%
Current Income Taxes		(1,105)
Future Income Taxes		1,335
Total Income Tax Expense	**$**	**230**

Rate Base & Cost of Capital (000s)		**Annual**
Net Book Value, Capital Investment	$	34,381
Future Income Taxes		(1,335)
Projected Rate Base	**$**	**33,046**
% of 2021 Forecast Year End Rate Base		**7.77%**
Return on Debt	$	1,014
Return on Common Equity		1,212
Total Return On Rate Base	$	2,225
Weighted Average Cost of Capital *		
Debt		60.00%
Common Equity		40.00%
Cost of Debt		5.21%
Cost of Common Equity		9.35%
WA Cost of Debt		3.07%
WA Cost of Common Equity		3.67%
WA Cost of Capital		6.74%
2021 Forecast Year End Rate Base **	**$**	**425,042**

* See response to January 2020 Rate Update Filing GT-RFI-2019-73 for calculation of forecast 2021 WACC.

** See response to January 2020 Rate Update Filing GT-RFI-2019-71 for calculation of forecast 2021 rate base.

Project Revenue Requirement (000s)	**Annual**
Depreciation	$ 1,159
Return on Debt	1,014
Return on Equity	1,212
Income Taxes	230
Estimated Project Revenue Requirement	**$ 3,614**
% of Revenue Requirement	1.56%
Proposed 2021 Revenue Requirement - January 2020 Application *	231,003

* January 2020 Rate Update Filing Appendix 9, Schedule 9-10

Project Rate Impact		**Annual**
Total Project Revenue Requirement	$	3,614,219
Forecast 2021 kWh Sales		1,391,437,164
$ Per kWh Project Rate Impact		**0.00260**
Annual Cost Average Residential Customer (650 kWh per month) before tax	**$**	**20.26**
% of 2021 Forecast Annual Cost for Rural Residential Customer		1.37%
% of 2021 Forecast Annual Cost for Urban Residential Customer		1.40%
Annual Cost Average General Service Customer (10,000 kWh per month) before tax	**$**	**311.64**
% of 2021 Forecast Annual Cost for General Service Customer		1.34%
2021 Forecast Annual Cost Average Rural Residential Customer (650 kWh per month) excluding tax per Table 11-1 of January 2020 Rate Filing	$	1,476.45
2021 Forecast Annual Cost Average Urban Residential Customer (650 kWh per month) excluding tax per Table 11-2 of January 2020 Rate Filing	$	1,448.25
2021 Forecast Annual Cost Average General Service Customer (10,000 kWh per month) excluding tax per Table 11-3 of January 2020 Rate Filing	$	23,174.45

APPENDIX D

CT3 Electrical Generator Inspection and Overhaul

All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

CT3 Electrical Generator Inspection and Overhaul

Table of Contents

1.0 General

Maritime Electric Company, Limited ("Maritime Electric") is a fully integrated electric utility that owns and operates generating assets located in Charlottetown, PEI and Borden-Carleton, PEI. A General Electric LM6000PC NextGen combustion turbine-generator ("CT3"), that is a dual fuel, black start, 10-minute start unit capable of generating up to 50 Megawatts ("MW") of electrical power, is located at the Cumberland Street site in Charlottetown, PEI. General Electric is the Original Equipment Manufacturer ("OEM") of the combustion turbine engine and is the packager. Meidensha Corporation ("Meidensha") of Yokohama, Japan is the OEM for the electric generator.

The CT3 combustion turbine unit was installed in 2005 and has provided Maritime Electric with the ability to defer operation of the Charlottetown Thermal Generating Station ("CTGS") and to provide cable load management on the original submarine cables 1 and 2, prior to the commissioning of submarine cables 3 and 4 interconnecting PE and New Brunswick in 2017. Currently, the CT3 generating unit allows Maritime Electric to offset off-island capacity and energy purchases. Additionally, the generating unit, along with two combustion turbines located in Borden-Carleton, PEI allow Maritime Electric to operate and generate energy during unscheduled interruptions in power delivery from other sources (e.g. off-Island generation and transmission, Maritime Electric transmission outages and on-Island wind generation).

Over the years, Maritime Electric's utilization of CT3 has changed. When the unit was first installed in 2005, PEI's peak electrical load was less than the 200 MW limit of the two 100 MW interconnected submarine cables (installed in 1977); therefore, the unit was only operated for testing purposes and for contingency events on the electrical system. In 2006, however, CT3 was operated several times throughout the year for system events and to prevent the two 100 MW submarine cables from overloading. Since then, the unit has operated as a peaking/standby unit, where it is called upon during high load and low wind conditions, and on standby during energy shortage scenarios (e.g. PEI wind generators being off-schedule).

2.0 Previous Upgrades

The following is a list of substantial upgrades that have been completed on CT3 since it was first installed in 2005:

- 2007 Weather Enclosure for Fuel Forwarding Pump Pad
- 2015 Exhaust Stack Damper
- 2017 RO/EDI Water Treatment Plant - RO Membrane Filter Replacement
- 2017 Redundant High Pressure NOx Water Injection Pump
- 2017 Bird Exclusion Netting
- 2018 Turbine Controls Upgrade
- 2020 Turbo-Generator Overhaul and Service Bulletin Upgrades

3.0 OEM Recommended Equipment Maintenance Schedule

General Electric supplied an Equipment Maintenance Schedule as per Meidensha for the electric generator, which is provided in Appendix 1. The Equipment Maintenance Schedule recommends several maintenance items where parts shall be disassembled and inspected every X months or X hours (whichever comes first). It is considered good utility practice to complete the appropriate inspections and tests of the electrical generator's operational equipment as recommended by the OEM to maintain its electrical and mechanical components. The maintenance intervals have been developed for generators that are either base-loaded (operated 24/7/365) or peaking (operated once or twice daily). Since CT3 was installed, it has operated for a total of 1,675 hours and has had approximately 500 starts which indicates a maintenance schedule aligned to a peaking unit.

4.0 Engineering Assessment

4.1 Scope of the Work

The scope of work for the electrical generator inspection and overhaul includes the following:

- Inspection of the air filtration system;
- Inspection of the oil mist precipitator;

- Inspection of the condition of the shaft earthing brush;
- Inspection of the lube oil piping system (lubricating and jacking);
- Inspection of the air inlet sealing system seals for appropriate clearances;
- Inspection of the bearing shaft seals for appropriate clearances and leaks;
- Inspection and cleaning of the exciter/PMG (permanent magnet generator);
- Inspection and testing of all rectifier fuses and diodes;
- Inspection, cleaning, and tightening of all line/neutral cubical bus bar links/connections;
- Inspection of the operation of all heating elements (stator, exciter, and generator);
- Inspection of the rotor earth ground fault detection system;
- Inspection and testing of the bearing insulation for pressure concentrations, scoring, and drag marking, and non-destructive testing of the bearing bonding;
- Electrical testing of the generator stator, rotor, and exciter (Insulation resistance, polarization index, winding resistance, RTD, etc.).

4.2 Project cost estimating

The estimated cost to complete the project is as follows:

Item	Price
Field Engineering Service (Quote of $152,500 USD converted to with Exchange Rate of 1 USD = 1.35 CAD)	$ 205,875
Replacement parts	202,500
Non-destructive testing	10,000
Maritime Electric Trades Labour	14,640
Maritime Electric Project Management	14,985
Total	**$ 448,000**

Appendix 1:
Meidensha Generator Equipment Maintenance Schedule

RECOMMENDED MAINTENANCE

Periodical Maintenance
(to be performed regularly)

Recommended Interval (hours)	Item	Procedure
1000 (1.5 months)	Pipeworks and gaskets	Check that no oil and water (if applied) leakage exist.
1000 (1.5 months)	Air coolers (if applied)	Check that no water leakage exist.
2000 (3 months)	Shaft earthling brush	Check that brush is free in holder. Change when it become to 15 mm length. NOTE: Original length 30 mm
2000 (3 months)	Rotor earth fault detector	
4000 (6 months)	Coupling for oil pump	At the intervals of about 4000 hours (6 months), a small amount of the SHELL ALVANIA EP Grease should be replenished through the oil plug hole of the coupling case. Note that too much supply of grease to the coupling case will result in oil leakage from the seal.
4000 (6 months)	Labyrinth seals	Check that no oil leakage exist.
4000 (6 months)	Air inlet screens	Check that screens are free from obstructions and cleanness.
8000 (12 months)	Bearing insulation	Check that the shaft voltage or resistance.
8000 (12 months)	Instrumentation and protection devices	Check that the function and settings are correct.
8000 (12 months)	Oil pump bearing	Change the bearing.
8000 (12 months)	Fuses & rotating rectifier	Check the conductivity diodes and fuses.
40000 (5 years)	Painting	Check that it has no damage.

RECOMMENDED MAINTENANCE

Periodical Maintenance (to be performed regularly)		
Recommended Interval (hours)	**Item**	**Procedure**
40000 (5 years)	Stator winding	Remove contaminants by means of brushes, a vacuum cleaner, waste cloths and detergent. Check the cracks, distortion and deterioration of coil surface. Check the looseness of wedges, bolts, nuts, balance weights and etc. **Caution:** Avoid moving contaminants further into the windings
	Rotor winding	
	AC exciter	
	PMG	
40000 (5 years)	Bearing metal	Check the radial and thrust surfaces. Check the corrosion due to shaft current. Check the top clearance of bearings by means of lead strips. Check the side clearance of driven end bearing with thickness gauge.
40000 (5 years)	Labyrinth seals	Check the deterioration of pressurized air pipes.
40000 (5 years)	Air gap	Check the air gap for generator, ac exciter, PMG and rotor earth fault detector.
80000 (10 years)	Whole generator	Pull out the rotor from the generator frame and perform cleaning of all items. Remove contaminants all items by means of brushes, waste cloths, a vacuum cleaner and detergent. Check the all items mentioned for 5 years periodical maintenance. Check the cracks of retaining ring. After reassembling, check the alignment such as the radial difference and parallelism of the coupling by means of dial gauge and thickness gauge.

Note: Maintenance Frequency may be adjusted to suit customer's maintenance schedule.

Note: Sound insulation material of generator inside is not asbestos but rock wool.

Note: Bearing metal and Rotor earth fault detector contain hazardous lead. Please dispose of these, abide by the local regulation.

APPENDIX E

Line Extensions Description and Justification

Title: **Smallman Road**
Location: **O'Leary**
Line Type: **Distribution – One to Three Phase Conversion**
Distance: **6.2 kilometres**
Amount: **$815,000**

Project Description:

This project includes line conversions from single phase to three phase for lines OL09001, OL00973 and OL03102. The project starts at the intersection of the Howlan Road and the Gaspe Road and follows the Howlan Road to the intersection of the Smallman Road, the line then follows the Smallman Road closing a 0.7 kilometre gap ending at the O'Leary Road. The objective of the project is to reduce load on the O'Leary circuit and distribute the customers over two other circuits, the Howland Road circuit and a new West Cape circuit, to provide back-up and greater reliability in this area.

The O'Leary circuit currently has 2,514 customers over 242 kilometres and will reduce to 1,380 customers over 167 kilometres after the new circuit is established. The Howlan Road circuit currently has 741 customers over 85 kilometres and will be reduced to 594 customers over 66 kilometres after the West Cape circuit is established. The West Cape circuit, will feed 1,281 customers over 94 kilometres. The O'Leary Substation average feeder customer count is 1628 customers over 164 kilometres and will be reduced to 1,085 customers over 109 kilometres. These circuit changes will balance the load, provide back-up opportunities and increase reliability to all customers fed from the O'Leary Substation. These circuits operate at 7,200 volts.

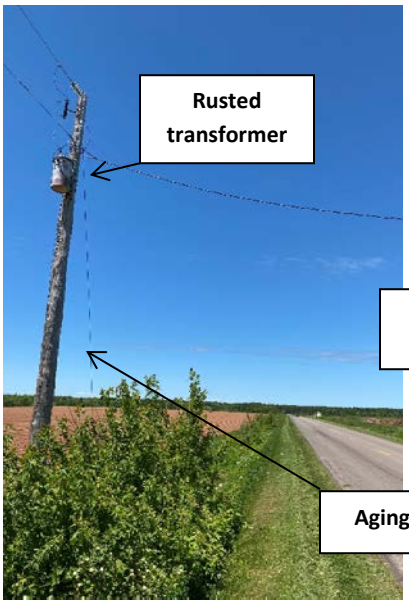
Project Justification:

The primary justification for the project is the reliability improvement that will come from providing another feed to O'Leary and as mentioned above, the project will reduce the load by redistributing the customers and reducing the distance for each circuit. This will also reduce the per customer outage hours by 2.5 hours in the area. The secondary justifications for the project is that OL09001 is aged and deteriorated with 20 out of the 85 poles being eastern cedar poles that need to be replaced. In addition, the line contains inadequate neutral spacing, numerous porcelain insulators and very long spans that present safety concerns placing the line at an increased risk of failure.

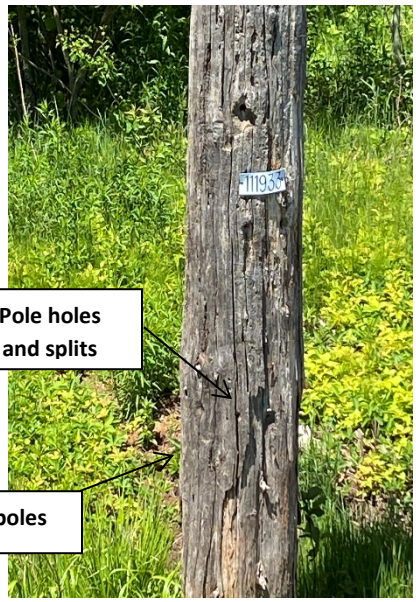
There are over 75 conductor splices in this section of line that were installed during previous repairs.

Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required for the project. It is intended that the line will be built on the same side of the road by leaning the existing line out of the way and building the new line with the existing line still energized. Traffic control personnel will be necessary for the project as traffic volume is low and speed is high.



Eastern cedar pole and rusted transformer



Eastern cedar pole with multiple holes and splits

Leaning pole and long spans

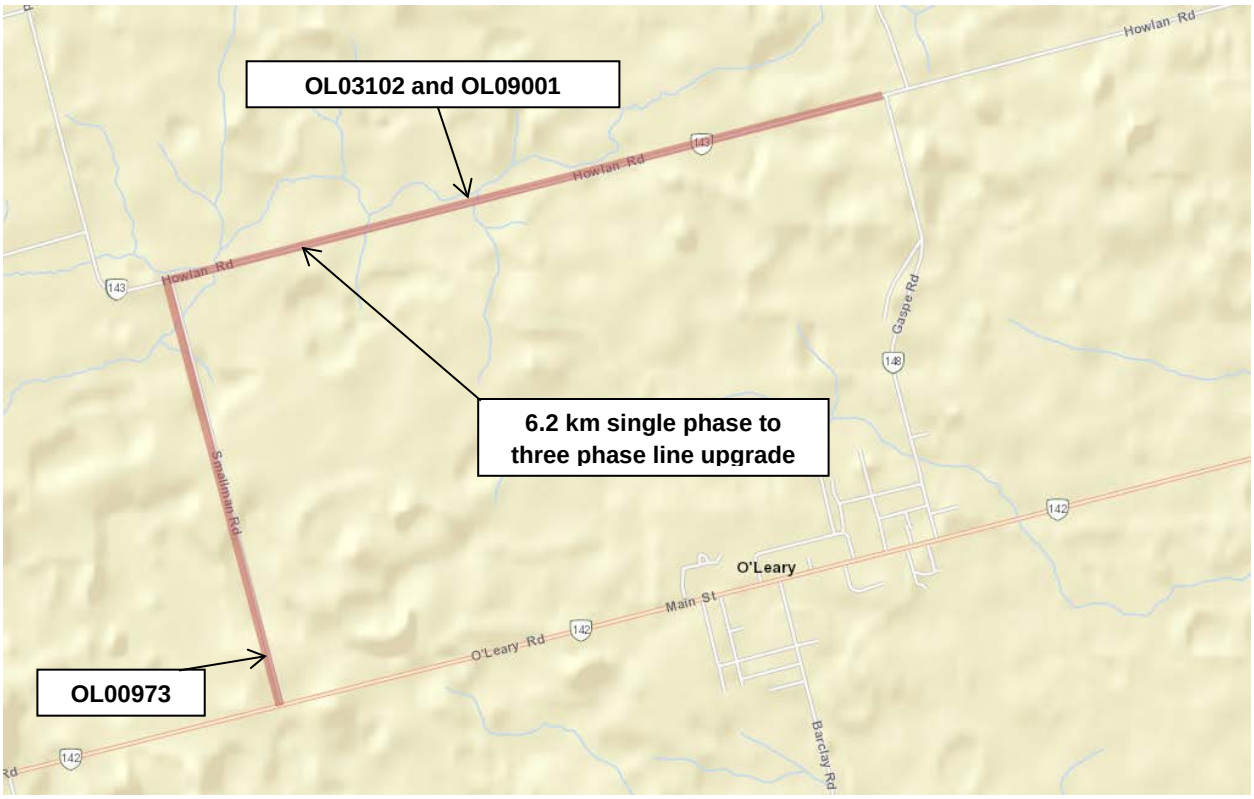


Figure 1:
Scope of 6.2 kilometre Single Phase to Three Phase Line Extension, Howlan, PE

APPENDIX F

Line Rebuilds Description and Justification

Title: **Kinkora - Route 225 - Single Phase Rebuild**
Location: **Kinkora**
Line Type: **Distribution – Single Phase**
Distance: **4.8 kilometres**
Amount: **$475,000**

Project Description:

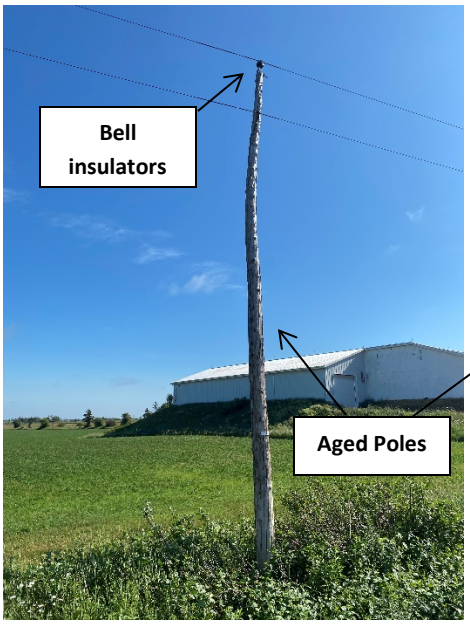
The project is a single phase rebuild to replace a 4.8 kilometre section of line AB3313 from 66 Anderson Road (directly across from the Kinkora High School) to 5100 Rte 225 (the intersection of East County Line Road). The line is operated at 7,200 volts and is connected to the Albany Substation. There are approximately 113 customers fed from this section of line.

Project Justification:

The primary justification for this project is the conductor is in very poor condition with only the steel core remaining in some sections of the line. The poor conductor is causing voltage issues resulting in readings as low as 108 volts and there are over 25 splice repairs in this section of line. There are approximately 62 poles along the route with 50 of them (80 per cent) being aged eastern cedar poles. The existing conductor is #4 Swan conductor (rated for 140 amps) and will be replaced with 2/0 Quail conductor (rated for 270 amps) to bring the line up to the current standard.

Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required for this project. It is intended that the line will be rebuilt to current standards on the opposite side of the road. Traffic control will be necessary for the project as traffic speed is high on this road.



Eastern cedar pole with old bell insulators

Eastern cedar pole with long spans

Rusted transformers

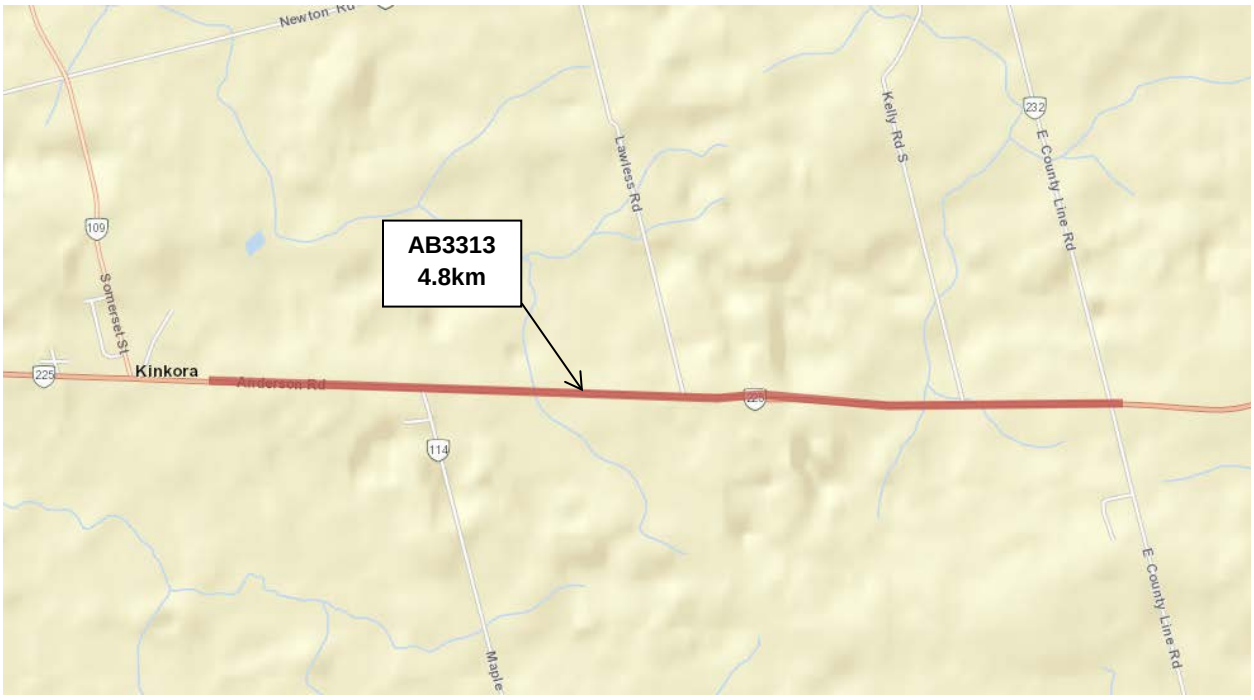


Figure 1:
Scope of the 4.8 kilometre rebuild section in Kinkora, PE

Title: **Lot 16 – Route 12 - Single Phase Rebuild**
Location: **Lot 16**
Line Type: **Distribution – Single Phase**
Distance: **8 kilometres**
Amount: **$758,000**

Project Description:

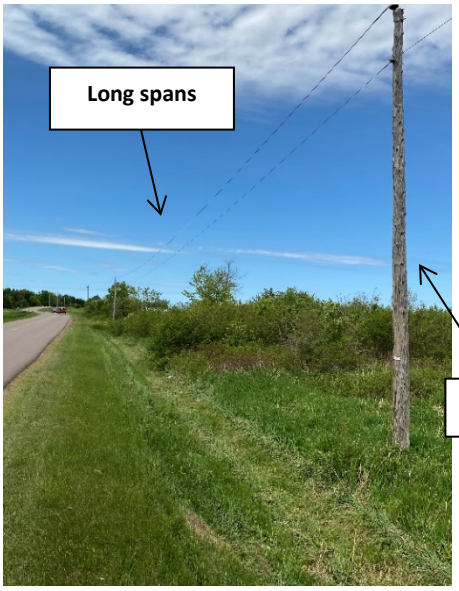
The project is a single phase rebuild to replace an 8 kilometre section of line (WL3550 and WL03560) from 1201 Route 12 to the Allen Road Corner. The line is operated at 7,200 volts and is connected to the Wellington Substation. There are approximately 91 customers fed from this section of line.

Project Justification:

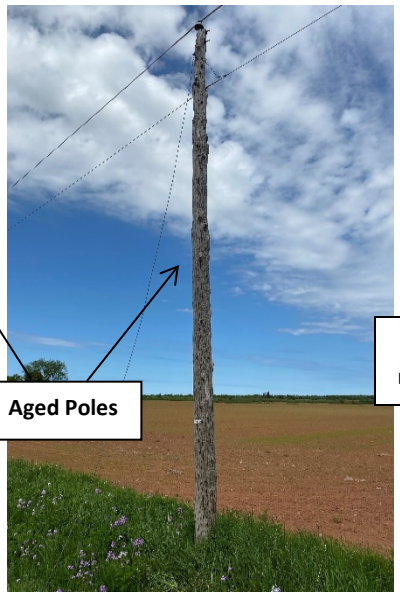
The primary justification for the project is that WL3550 and WL03560 are aged and deteriorated. There are approximately 104 poles along the route with 70 of them (67 per cent) being aged eastern cedar poles that are in bad condition. There are over 30 splice repairs on this section of line. In addition, the spans are very long and parts of the line have old neutral spacing causing frequent outages. The existing conductor has various sizes; #4 (Swan), #2 (Sparrow), 2/0 (Quail) and 4/0 (Penguin), all of which will be replaced with all 2/0 (Quail) to meet current standards.

Construction

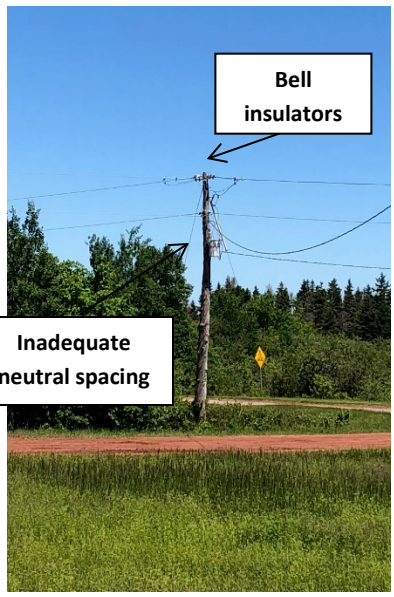
A permit from the Department of Transportation, Infrastructure and Energy will be required for this project. It is intended that the line will be rebuilt to current standards on the opposite side of the road. Traffic control will be necessary for the project as traffic speed is high on this road.



Eastern cedar pole with long spans



Eastern cedar pole



Eastern cedar pole with inadequate neutral spacing and old bell insulators

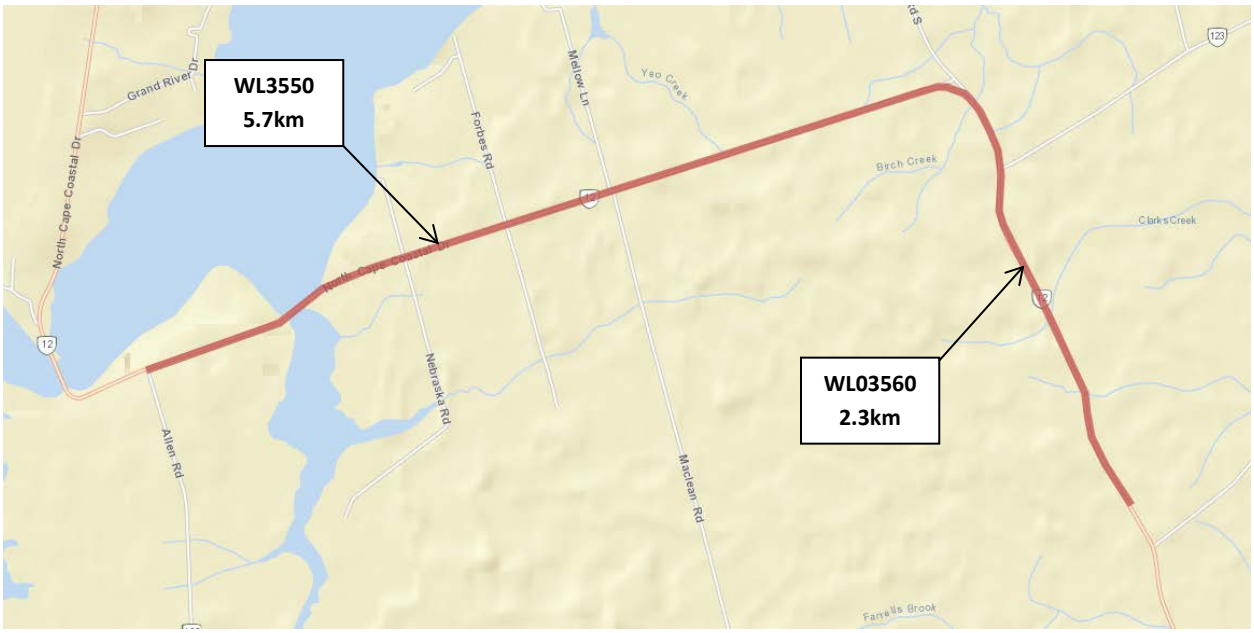


Figure 2:
Scope of the 8 kilometre rebuild section in Lot 16, PE

Title: **Rocky Point (North Side) - Voltage Conversion**
Location: **Rocky Point**
Line Type: **Distribution – Single Phase**
Distance: **9.8 kilometres**
Amount: **$594,000**

Project Description:

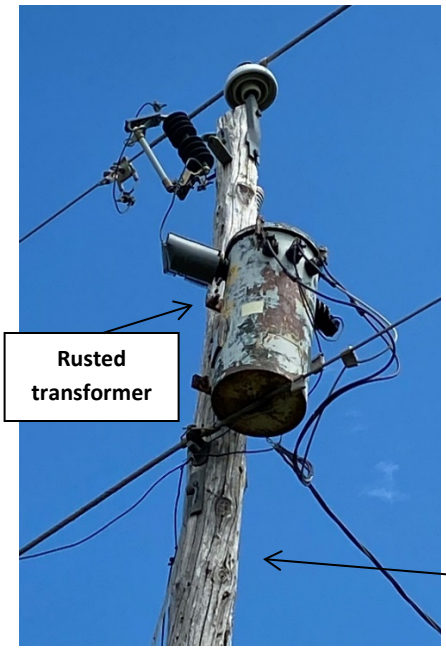
The project is a single phase voltage conversion of the section of line WR02577 from 1537 Route 19 (before the Black Creek Road Intersection) to 4125 Route 19 (just after MacPhail Cove Road). The section is approximately 3.2 kilometres along the main road and 6.6 kilometres of side roads. The line is operated at 7,200 volts and is connected to the West Royalty Substation. There are approximately 144 customers fed from this section of line and 56 transformers will be converted to 14,400 volts.

Project Justification:

The primary justification for the project is to improve the power quality and reliability for customers in the Rocky Point area. The 7,200 volt line is fed from a 14,400 volt feeder from West Royalty through a step down transformer which is currently operating above its rated capacity. The step down transformer was manufactured in 1975 and is approaching the end of its life. By converting a portion of the line to 14,400 volts and feeding customers directly from the 14,400 volt distribution system, reliability and power quality in the area will improve. In addition, there are approximately 165 poles in this section of lines of which 18 are aged eastern cedar poles that are in poor condition and need to be replaced.

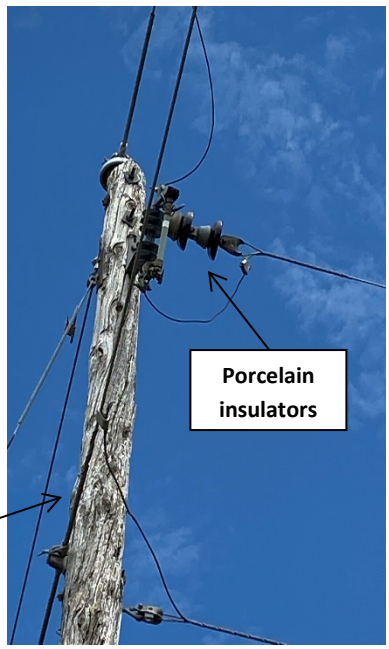
Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required for this project. Traffic control will be necessary for the project as vehicle speed is high on this road.



Eastern cedar pole with rusted transformer

Eastern cedar pole



Eastern cedar pole with porcelain insulators

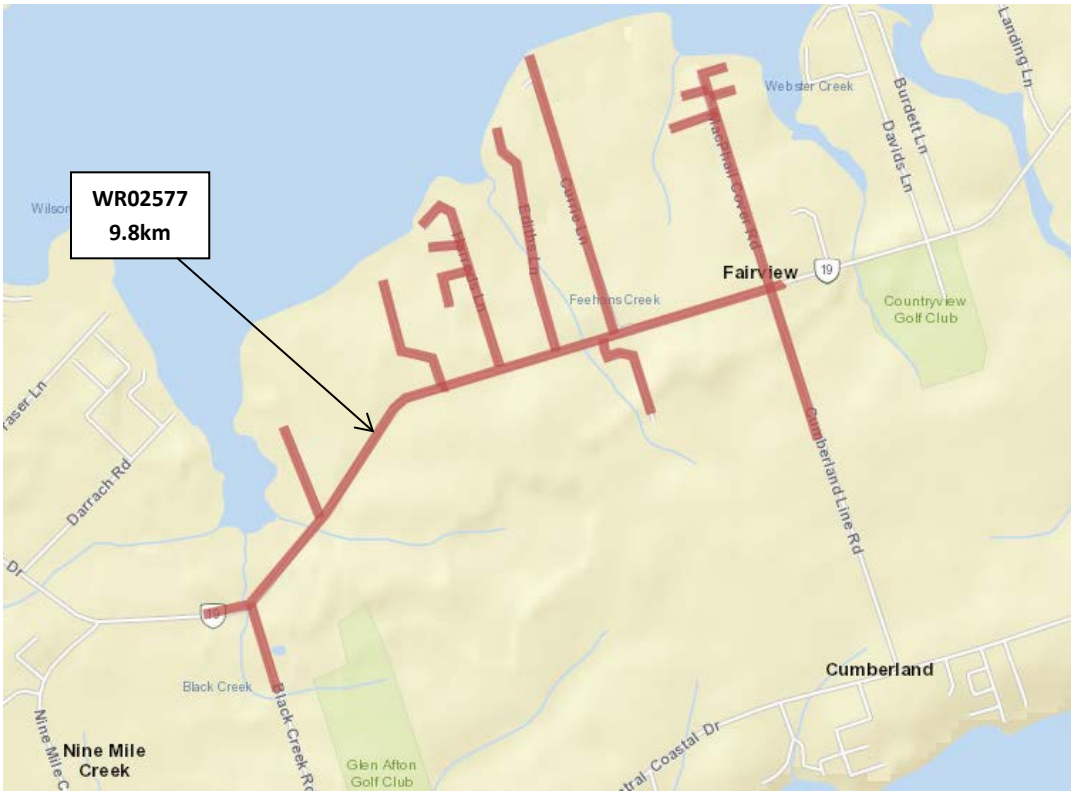


Figure 3:
Scope of the Voltage Conversion section in Rocky Point, PE

Title: **Cable Head East - Re-conductor**
Location: **Cable Head**
Line Type: **Distribution – Single Phase**
Distance: **1.9 kilometres**
Amount: **$171,000**

Project Description:

The project is a single-phase conductor replacement for line DM00535 (along Route 336 from the Cable Head Road to 236 Route 336). The Line is operated at 7,200 volts and is connected to the Dingwells Mills Substation. There are approximately 37 customers fed from this section of line.

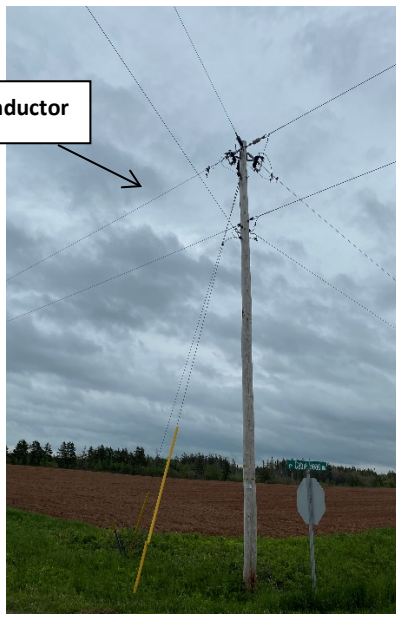
Project Justification:

The primary justification for this project is that the conductor is aged and deteriorated. There are 15 splice repairs in this section of line that were installed as a result of failures caused by storms. The line is located in an open area directly facing the north shore and is vulnerable to strong winds and sleet accumulation. There are approximately 26 poles along the route that are in relatively good condition. The existing conductor is #2 Sparrow conductor (rated for 180 amps) and will be replaced with 2/0 Quail conductor (rated for 270 amps) to bring the line to current standards.

Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required for this project. Traffic control will be necessary for the project as vehicle speed is high on this road.

Old #2 conductor



Old #2 conductor

Eastern cedar pole

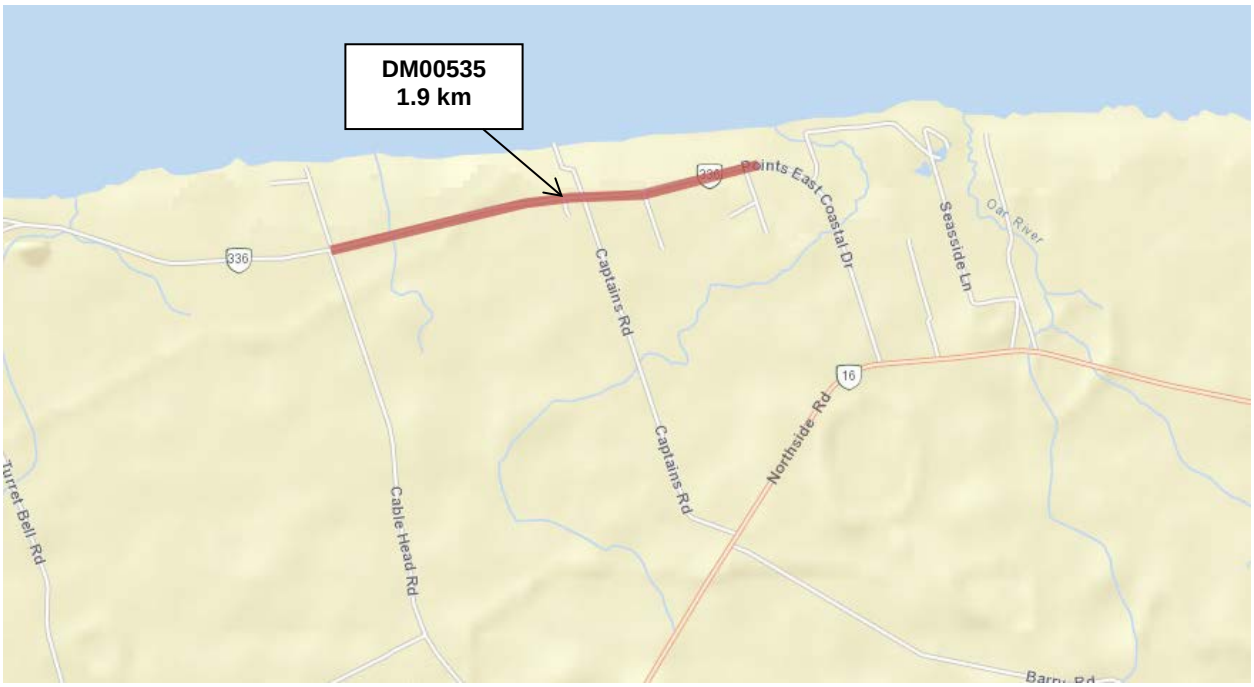


Figure 4:
Scope of the 1.9 kilometres re-conductoring section in Cable Head, PE

Title: **Route #10 Searletown to 7 Mile Bay**
Location: **Searletown**
Line Type: **Distribution – Three Phase**
Distance: **5 kilometres**
Amount: **$881,000**

Project Description:

The project is a three phase rebuild to replace a 5 kilometre section of line AB00357 from MacWilliams Road along Route 10 to the intersection of Searletown Road. The line is operated at 7,200 volts and is connected to the Albany Substation. There are approximately 85 customers fed from this section of line.

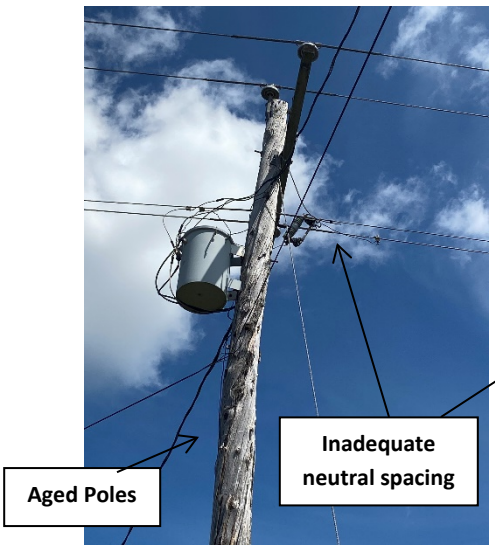
Project Justification:

The primary justification for the project is that the line is aged and deteriorated. There are approximately 70 poles along the route which are old penta and eastern cedar poles in poor condition. In addition, the line contains inadequate neutral spacing, numerous porcelain insulators and very long spans that present safety concerns and put the line at increased risk of failure. There are 35 splice repairs in this section of line.

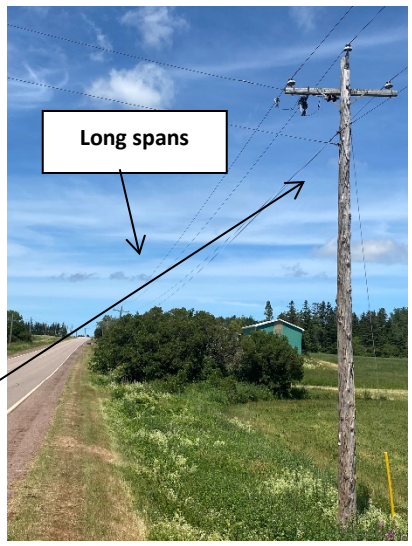
Once the line is rebuilt it will allow for a second feed to the Town of Borden-Carleton which will improve reliability in the Town. The existing conductor is #2 Sparrow conductor (rated for 180 amps) and is in poor condition. This will be replaced with 477 Cosmos conductor (rated for 670 amps) to bring the line to current standards.

Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required for this project. It is intended that the line will be rebuilt to current standards on the opposite side of the road where possible. Traffic control will be necessary for the project as vehicle speed is high on this road.



Eastern cedar pole with inadequate neutral spacing



Inadequate neutral spacing and long spans

Conductor Size is not up to new Standards

Figure 5:
Scope of the 5 kilometre rebuild section in Searletown, PE

APPENDIX G

PEI Broadband Project Description and Justification

Title: **PEI Broadband Project**
Location: **Island Wide**
Amount: **$8,912,000**

Project Description:

The PEI Broadband Project ("Project") is a four year customer driven line rebuild project that includes the installation of approximately 1,150 kilometres of fibre optic cable as well as fixed wireless technologies on new and existing utility poles across the Island. The Project is an initiative of Bell Canada ("Bell") and Xplornet Communications ("Xplornet") under contract with the Government of Prince Edward Island.

In accordance with the draft Capital Expenditure Justification Criteria for multi-year capital projects, the Company filed a Supplemental Budget Request ("SBR") with the Island Regulatory and Appeals Commission ("Commission") on December 5, 2019. On May 5, 2020, the Commission issued Order UE20-02 approving the 2020 capital budget for this project.

Project Timeline:

On July 28, 2020, Maritime Electric filed a Project timelines update with the Commission advising that when the SBR submission was prepared, the Company had a general understanding of the volume of Project work proposed for Bell and Xplornet but did not have specific details as to the construction schedule for each customer. Now that the Project has commenced, Bell and Xplornet have provided more detail on their Project timeline requirements. The July 28th timelines update reflected this new information and the related changes to the timing of capital expenditures and contributions over the course of the Project.

Bell Canada

The joint use cost of Bell's portion of this Project is shared between Maritime Electric and Bell based on the joint ownership ratio of 60 per cent allocated to Maritime Electric and 40 per cent to Bell in accordance with their Joint Use Agreement. In the initial SBR, the annual costs for Bell's portion of the Project were forecast to occur evenly over the four years of this multi-year Project. Bell has since advised Maritime Electric that it plans to complete its fibre installation work by the end of 2021.

Xplornet Communications

Under a Support Structure Agreement ("SSA"), Maritime Electric retains full ownership of the utility lines, and is therefore responsible for the costs associated with converting the lines to allow Xplorent to attach their infrastructure in accordance with industry standards. The initial conversion cost is fully recoverable from Xplornet as a Customer Contribution. Also under the SSA, Xplornet will pay an annual attachment fee to Maritime Electric for its use of Company poles. In the initial SBR, the annual costs for Xplornet's portion of the Project were forecast to occur evenly over the four years of this multi-year Project. Maritime Electric has since been advised by Xplornet that it intends to begin engineering analysis in late 2020 and construction will begin early in 2021. Xplornet will complete its fibre installation work over a three year period.

Through Maritime Electric's SBR submission, the Commission was advised that the most cost effective Project timeframe is four years to allow for completion with minimal overtime work and without the need for higher cost off-island contractors. After consideration of the above noted changes to Bell's and Xplornet's timelines, the Company remains confident that it can meet the needs of both companies within these parameters.

Construction:

A permit from the Department of Transportation, Infrastructure and Energy will be required when an entire line is being rebuilt. It is expected that most of the work will be carried out replacing and adding poles on the same side of the road as existing Maritime Electric plant while energized. Traffic control personnel will be necessary for parts of this project as required. Traffic speed, volume, and weather conditions are factors that determine the need for traffic control services.

Capital Budget Requirements:

A breakdown of Project spending over the four year term based on the revised timelines of the customers is provided in Table 1 below:

Table 1 2020 - 2023 Annual & Multi-year Totals for PEI Broadband Project						
	SBR Table 4[1]		**Revised[2]**		**Change**	
	Line Rebuilds	**Contributions**	**Line Rebuilds**	**Contributions**	**Line Rebuilds**	**Contributions**
2020						
Bell	$ 2,436,000	-	$ 5,710,000	$ -	$ 3,274,000	$ -
Xplornet	3,274,000	2,000,000	-	-	(3,274,000)	(2,000,000)
Subtotal	$ 5,710,000	$ 2,000,000	$ 5,710,000	$ -	$ -	$ (2,000,000)
2021						
Bell	$ 2,508,000	$ -	$ 4,481,000	$ -	$ 1,973,000	$ -
Xplornet	3,373,000	2,060,000	4,431,000	2,707,000	1,058,000	647,000
Subtotal	$ 5,881,000	$ 2,060,000	$ 8,912,000	$ 2,707,000	$ 3,031,000	$ 647,000
2022						
Bell	$ 2,585,000	$ -	$ -	$ -	$ (2,585,000)	$ -
Xplornet	3,472,000	2,121,000	4,564,000	2,788,000	1,092,000	667,000
Subtotal	$ 6,057,000	$ 2,121,000	$ 4,564,000	$ 2,788,000	$ (1,493,000)	$ 667,000
2023						
Bell	$ 2,662,000	$ -	$ -	$ -	$ (2,662,000)	$ -
Xplornet	3,577,000	2,185,000	4,701,000	2,871,000	1,124,000	686,000
Subtotal	$ 6,239,000	$ 2,185,000	$ 4,701,000	$ 2,871,000	$ (1,538,000)	$ 686,000
TOTAL	**$23,887,000**	**$ 8,366,000**	**$23,887,000**	**$ 8,366,000**	**$ -**	**$ -**
Bell	$10,191,000	$ -	$10,191,000	$ -	$ -	$ -
Xplornet	13,696,000	8,366,000	13,696,000	8,366,000	-	-
TOTAL	**$23,887,000**	**$ 8,366,000**	**$23,887,000**	**$ 8,366,000**	**$ -**	**$ -**

[1] See also the Company's Response to IR-13 on the PEI Broadband Project.

[2] Revised amounts for 2021-2023 are subject to annual approval by IRAC in accordance with the Capital Expenditures Justification Criteria.

APPENDIX H

Distribution Inspection Deficiencies

Aging Pole

Leaning pole in trees

Rotten Pole

Broken and Bent Street Light

Bent Eastern Cedar Pole

Rusted Transformer

APPENDIX I

Transportation Justification 2021

Maritime Electric

Transportation Justification

2021

Prepared by

Kevin Burns

Reviewed by

Adam MacKenzie

May 11, 2020

Table of Contents

Appendices

1.0 Introduction

This Transportation budget involves the necessary replacement of heavy fleet, trailers and passenger vehicles as well as the purchase of four (4) additional passenger vehicles. Detailed evaluation of the units to be replaced indicates they have reached the end of their useful service lives.

2.0 Vehicles to be Replaced in 2021

Table 1 summarizes the units to be purchased in 2021.

Table 1
2021 Proposed Vehicle Purchases

Category	No. of Units
Heavy Fleet Vehicles	2
Medium Fleet Vehicles	1
Passenger Vehicles	8
Trailers	1
Total	**12**

In 2021, there will be two heavy fleet vehicles, one medium fleet vehicle and four passenger vehicles that will meet the age, mileage and condition parameters that indicate replacement is necessary. As well, the Company is proposing to add four new vehicles that are required for new positions within the Company that are involved with field operations. The Company's replacement criteria for vehicles are as indicated in Table 2.

3.0 Vehicle Replacement Criteria

Table 2
Maritime Electric Replacement Criteria for Vehicles (Years)

Tracked Heavy Vehicles	15 years
Heavy/Medium Flat Bed Trucks	10 years or 250,000 km
Heavy Vehicles	10 years or 250,000 km
Service Trucks (CSUP – run double shift) Medium Vehicles	5 years or 250,000 km
Passenger Vehicles	7 years or 200,000 km

The age and mileage of the vehicle are the primary replacement factors but vehicles reaching the threshold are also evaluated on a number of additional criteria such as annual maintenance costs, PTO hours (if applicable) and vehicle condition (rust, electrical issues, etc.) to determine whether they have reached the end of their useful service lives. Based on such evaluations, it has been forecast that each unit proposed for replacement will reach the end of its useful service life and require replacement in 2021.

The expenditures for individual vehicle replacements are not inter-dependent. However, they are similar in nature and justification. The expenditures are therefore pooled for consideration as a single capital project. The following table contains further information pertaining to the heavy and medium fleet vehicles to be replaced in 2021 as these three vehicles alone make up approximately 70 per cent of the overall transportation budget.

4.0 Details of Vehicles > $250,000 Slated for Replacement in 2021

Table 3			
Item	**Digger/Derrick for Eastern District**	**Aerial Bucket for Central District**	**CSUP Truck for Eastern District**
Vehicle #	12-12-54	11-12-55	16-10-77
Chassis Make/Model	Freightliner	Freightliner	Dodge 5500
Boom Make/Model	Altec D2050	Posi-Plus 400-46-A	Altec AT37G
Description	Chassis and boom are 2012. Unit is a 50 ft. digger/derrick	Chassis and boom are 2011. Unit is a 46 ft. aerial bucket truck	Chassis and boom are 2016. Unit is a 37 ft. single man aerial bucket truck
Mileage as of May 1,2020	192,000 km	199,000 km	263,000 km
PTO or Engine Hours	10,511 Engine hours	888 PTO hours	1,773 PTO hours
Approximate Maintenance Costs Over Past 3 Years*	$113,500	$160,000	$61,500
Summary	Boom and chassis will be 10 years old at time of replacement. The chassis & body have been well looked after but are starting to deteriorate with age. The maintenance costs over the past 3 years is the 4th highest of all Heavy Vehicles. The vehicles with higher maintenance costs have reduced mileage, were obtained more recently and are slated to be replaced in the coming years.	This Unit will be 11 years old when replaced and has the second highest maintenance costs in the fleet due to increased component failures and a few minor accidents during the last two years.	This unit operates on a double shift, operating 16 hours per day which is reflected in both the high mileage and PTO hours. This unit is first to respond to most trouble calls and is the only CSUP truck in its district so when the unit is down for maintenance it can significantly impact response time.

* This does not include the cost of lost productivity and crew down time for repairs.

5.0 Additional Vehicles Required in 2021

In addition to the units requiring replacement in 2021, there are also four additional units required to meet changes in personnel within the Company.

1. New District Supervisor positions in each of the operating districts (Eastern, Central and Western) in the Company has resulted in the need for three additional ½ ton trucks. One such truck was added in 2020 and two trucks are proposed to be added in 2021. These new positions were created through reorganization of existing resources to increase front line supervision and safety oversight in the field. The individuals in these positions are required to travel extensively to worksites in their respective areas.
2. An increase in the annual volume of service order and road alteration work over the past several years necessitated the addition of a new Engineering and T&D Utility Person position in 2019. This new position requires a dedicated truck to allow them to complete their duties in the field as they relate to surveying and detailing new and existing lines work prior to construction.
3. Increased workload in the Technical Services Department has resulted in the addition of a third technician position in this department. There is presently only one vehicle dedicated to this group and the addition of a second vehicle will allow employee resources in this area to work more efficiently and be at more than one work site at a time.

Appendix 1

Truck #12-12-54 – Side view

Truck 12-12-54 – View from rear street-side

Truck #12-12-54 – Side view

Truck #11-12-55 – Side View

Truck #11-12-55 – Front Side View

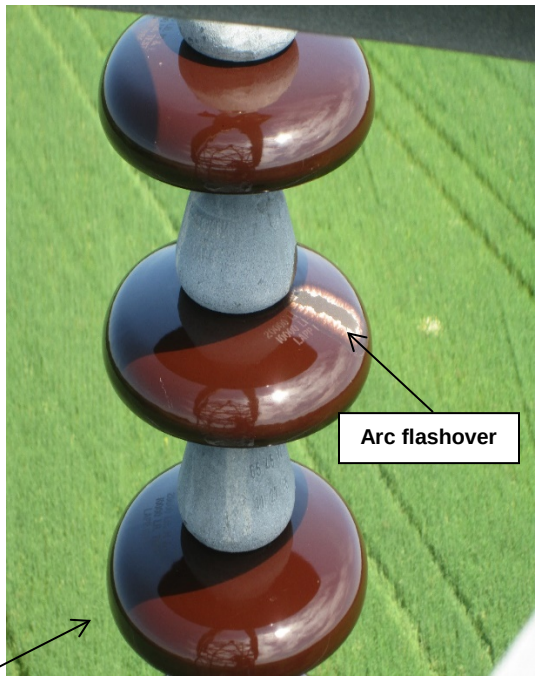
Truck #11-12-55 – Overall view of truck

Truck #16-10-77 – Front Side View

Truck #16-10-77 – View of rear curb-side

APPENDIX J

Transmission Inspection Deficiencies

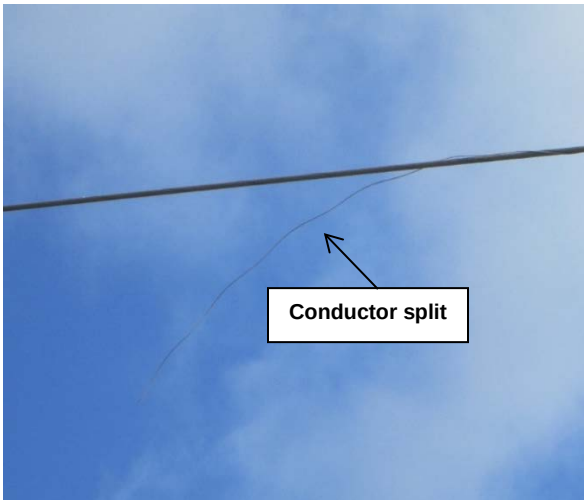


Arc Flashover
Porcelain Insulator to be Replaced

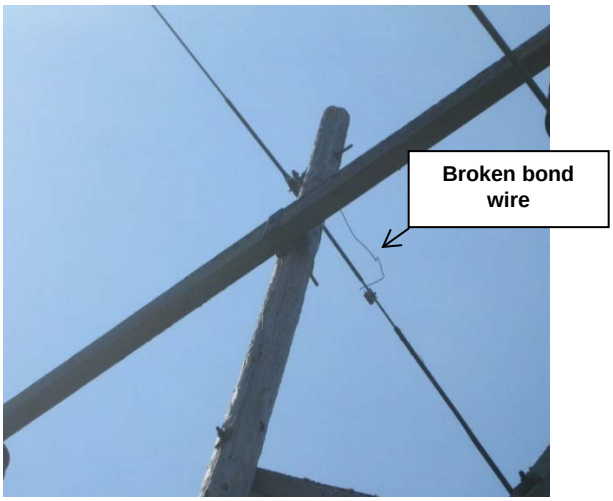
Split in the pole

Cracked due to water damage in insulator

Top of pole split

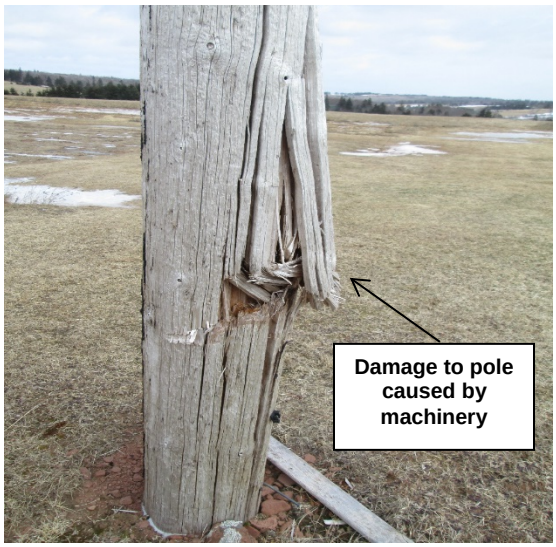


Split in the conductor strand



Broken bond wire

Rotten crossarm



Tractor damage to pole

APPENDIX K

Transmission Line Project Description and Justification

Title: **Y-119 Transmission Line**
Location: **Connelly Woods to Bannockburn Road**
Line Type: **Transmission – 138 kV**
Distance: **27.1 kilometres**
Amount: **$1,525,000**

Project Description:

This project involves the construction of a new 138 kV overhead transmission line over a three year period from 2021 to 2023. The proposed line starts where Y-109 crosses the Connelly Woods Road in Mount Tryon, runs mostly along Route 225 (the Kinkora Road) and ends where Y-109 crosses the Bannockburn Road.

Project Justification:

Y-109 and Y-111 currently serve as the transmission backbone supplying energy to central and eastern PEI. The condition of Y-109 is such that it will require replacement in the next three years. Both Y-109 and Y-111 exist in the same cross country corridor. At one time there was redundancy with the two lines but the load has grown to a point where both lines are required for energy supply and the ability for one line to back up the other has been substantially eliminated.

The initial plan was to replace Y-109, however it was determined that the cost to do so while energized would be very high. In addition, system planning indicates that a third west to east transmission line will be required when the Island load reaches 325 MW (load growth forecasts suggest this could be as soon as 6-10 years). After considering the cost to rebuild Y-109 while energized and the identified need for a third transmission line, building the new third line (Y-119) was determined to be the most appropriate option for the following reasons:

- It provides geographic diversity from the existing Y-109 and Y-111 corridor through the establishment of a new Y-line route.
- It establishes a new west to east route now, expecting that it will become more difficult to establish such routes in the future.
- It has potential to supply additional substations along the route as the PEI load increases.
- Once in service, it would allow for Y-109 to be disconnected and rebuilt while de-energized which will significantly decrease rebuild costs.

In addition, once the entire 27.1 kilometre transmission line is complete, it will permanently feed the Clyde River Substation.

Construction:

The new construction is primarily road-side and will be built to current standards. Permits from the Department of Transportation, Infrastructure and Energy and the Department of Environment, Water and Climate Change will be required for this project. Some tree trimming will be required and traffic control will be necessary as vehicle speed and traffic volume can be high on these roads. Construction will start in the west end and move east.

Y-119	Estimated Cost
2021 (10 kilometres)	$ 1,525,000
2022 (8 kilometres)	1,231,000
2023 (9.1 kilometres)	1,309,000
Total (27.1 kilometres)	**$ 4,065,000**

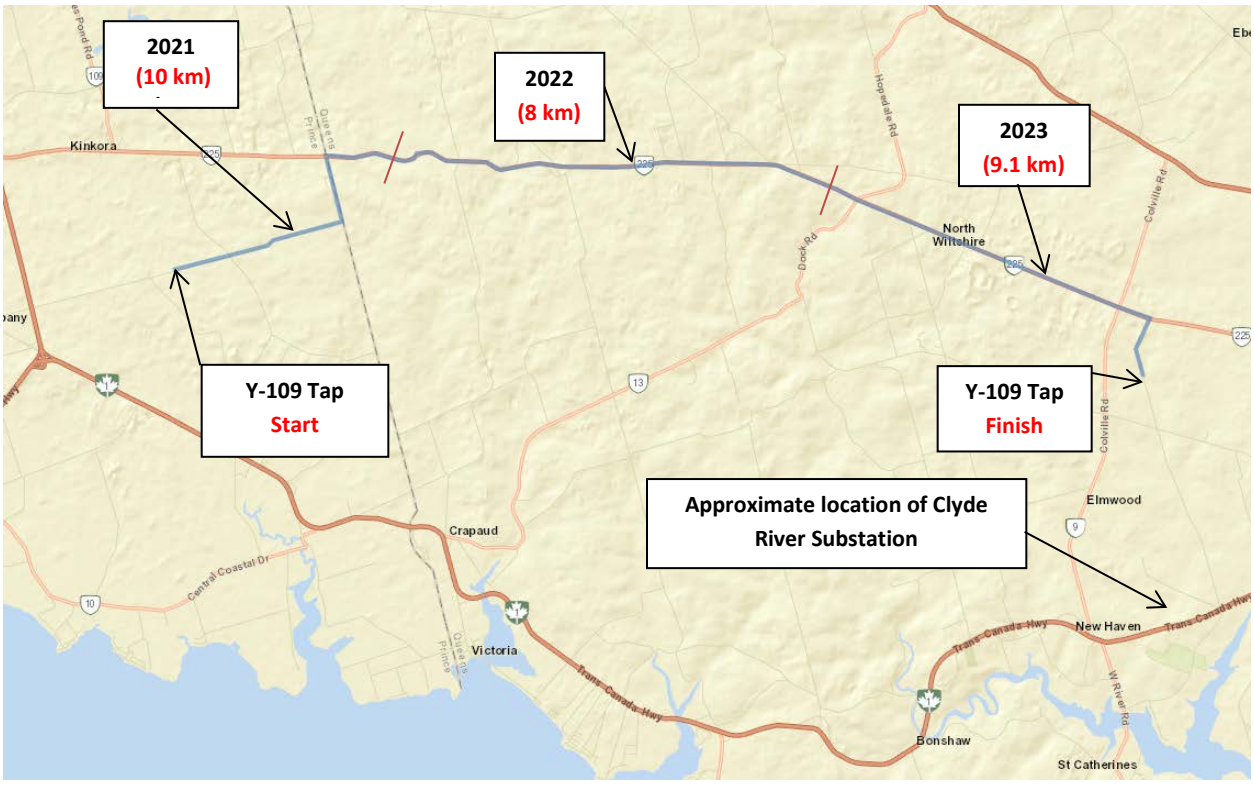


Figure 1:
27.1 kilometres Transmission Line from Connelly Woods Road to Bannockburn Road

APPENDIX L

Interest During Construction

Interest During Construction ("IDC") is calculated on all capital additions except land, distribution service lines (overhead and underground), street lights, communications equipment, engineering and survey equipment, stores equipment, SCADA equipment, office equipment, fleet, computer hardware and computer software. The interest rate used in calculating IDC is the annual return on rate base and it is assumed that all applicable project costs are financed over an average 90 day cycle. The following table shows the calculation of the 2021 budget for Interest During Construction:

2021 Estimate of Interest During Construction	
Total Gross Capital Budget	$ 44,964,000
Less:	
5.3 Services and Street Lighting	(5,301,000)
5.7 Distribution Equipment	(2,035,000)
5.8 Transportation Equipment	(1,864,000)
7.2 a Computer Hardware	(295,000)
7.2 b Purchased Software and Upgrades	(485,000)
Total Estimated Capital Subject to IDC	**$ 34,984,000**
Forecast Average Return on Rate Base*	6.74%
Average Number of Days to Finance	90
Proposed 2021 Budget for IDC	**$ 581,000**

* See response to January 2020 Rate Update Filing GT-RFI-2019-71 for calculation of forecast 2021 return on rate base.