Rideau St. Lawrence Distribution Inc.
Distribution System Plan - 2022

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Table of Contents

Executive Summary 5

1.0 Introduction 6

1.1 Utility Overview 7

1.2 [5.1.2] Investments Related to Renewable Energy Generation (REG) 10

2.0 [5.2] Distribution System Plan 11

2.1 [5.2.1] Distribution System Plan Overview 11

2.2 [5.2.2] Coordinated Planning with Third Parties 11

2.3 [5.2.3] Performance Measurement for Continuous Improvement 12

2.3.1 Planning Performance 18

2.4 [5.2.4] Realized efficiencies due to smart meters 20

3.0 [5.3] Asset Management Process 21

3.1 [5.3.1] Asset Management Process Overview 21

3.2 [5.3.2] Overview of Assets Managed 24

3.2.1 Substations 25

3.2.2 Distribution Station Condition Assessment 31

3.2.3 Transformers 34

3.2.4 Poles 38

3.2.5 Conductor 45

3.2.6 Switches 48

3.2.7 Metering and Monitoring 49

3.3 [5.3.3] Asset Lifecycle Optimization Policies and Practices 50

3.4 [5.3.4] System Capability Assessment for Renewable Energy Generation 51

4.0 [5.4] Capital Expenditure Plan 52

4.1 [5.4.2] Summary 52

4.2 [5.4.1] Capital Expenditure Planning Process Overview 53

4.3 [5.4.3] System Capability Assessment for Renewable Energy Generation 55

4.4 [5.4.2] Capital Expenditure Summary 56

4.5 [5.4.3] Justifying Capital Expenditures 58

4.5.1 [5.4.3.1] Overall Plan 58

4.5.2 [5.4.3.2] Material Investments 58

APPENDIX A – Material Projects 2022 - 2026 ....

APPENDIX B – Renewable Energy Generation B1

B1.0 Renewable Generation Capacity B2
B1.1 Current Capacity to Accommodate Renewable Generation Facilities B3
B1.1.1 Capacity Assessment by Service Area B3
B1.1.2 Capacity Assessment Methodology B6
B1.1.3 Factors Limiting RSL Ability to Connect Renewable Generation Facilities B6
B1.1.4 Expenditures Related to Renewable Generation Connection B6
B1.1.5 Relevant Unique Challenges and Opportunities B6
B1.2 Planned Development of the System to Accommodate Renewable Generation Connections ... B7
B1.3 Renewable Generation Connections Anticipated Over the Five-Year Plan Period B7
B1.3.1 Micro (<10kW) Renewable Generation Connections Forecast B7
B1.3.2 Larger (>10kW) Forecasted Renewable Generation Connections B7
B1.4 Infrastructure Projects and Activities B7
B1.5 Recoverable Costs B8
B1.6 Methodology for Prioritization of Expenditures B8
B1.7 Consultation Process B8
B1.8 Direct Benefits Accruing to Customers of a Distributor B8
B1.9 Letter of Comment from IESO B8
B1.10 Smart Grid Development B8
B1.11 Smart Grid System Initiatives B8
B1.12 Activities During Planning Period B9
B1.13 Reporting B9
B1.13.1 GEA Plan Annual Status Report B9
B1.14 Smart Grid Development Activity Report B9
B1.15 Settlement Clarifications B9
APPENDIX C – IESO Letter of Comment
APPENDIX D – Restricted Station Capacity Update
APPENDIX E – HONI Needs Assessment Report - St Lawrence
APPENDIX F – Regional Infrastructure Plan - St Lawrence Region

LIST of TABLES

Table 1 RSL Major Equipment Summary Overview ... 7
Table 2 RSL General Statistics as of December 31, 2020 ... 9
Table 3 RSL's Asset Class Useful Life ... 11
Table 4 Appendix 5-A Metrics ... 12
Table 5 Five Year System Performance Summary ... 13
Table 6 Historical Budget and Actual Expenditures ... 18
Table 7 Factors for Rating Projects ... 22
Table 8 Environmental Benefits Rating ... 22
Table 9 Efficiency, Customer Value, Reliability Rating ... 22
Table 10 Co-ordination, Interoperability Rating ... 22
Table 11 Economic Development Rating ... 23
Table 12 Cyber-security, Privacy Rating ... 23
Table 13 Station Summary ... 26
Table 14 Overall Station Assessment ... 31
Table 15 Station Health Variables ... 31
Table 16 Station Age Rating ... 31
Table 17 Station Transformer Loading Rating ... 32
Table 18 Station Visual Inspection Rating ... 32
Table 19 RSL Station Health Index Summary ... 33
Table 20 Transformer Unit Data ... 34
Table 21 Overall Transformer Assessment ... 35
Table 22 Transformer Health Variables ... 35
Table 23 Transformer Age Rating ... 36
Table 24 Transformer Loading Rating ... 36
Table 25 Transformer Inspection Rating ... 37
Table 26 Pole Condition Assessment by Community ... 38
Table 27 Pole Condition Assessment by Pole Type ... 39
Table 28 Pole Count for Pole Type by Community ... 40
Table 29 Overall Pole Assessment ... 42
Table 30 Pole Health Variables ... 42
Table 31 Pole Age Rating ... 43
Table 32 Pole Loading Rating ... 43
Table 33 Pole Inspection Rating ... 44
Table 34 System Voltages by Community ... 45
Table 35 Stations by Voltage by Community ... 45
Table 36 Switch Count by Community ... 48
Table 37 Asset Replacement Strategy ... 50
Table 38 Capital Expenditures for the Forecast Period ... 52
Table 39 Capital Expenditure Summary 2016 to 2026 ... 55
Table 40 Capital Expenditure Summary 2016 to 2026 ... 56
Table 41 Renewable Generation Capacity by Station/Feeder ... B2
Table 42 Renewable Generation Connections Summary (as of 2015-12-01) ... B7

LIST of FIGURES

Figure 1 Rideau St. Lawrence Distribution Inc. Service Areas 8
Figure 2 Number of Interruptions by Cause 2016 – 2020 14
Figure 3 Customer-hours of Interruptions by Cause 2016-2020 15
Figure 4 SAIDI 16
Figure 5 SAIDI Excluding Loss of Supply 16
Figure 6 SAIFI 17
Figure 7 SAIFI Excluding Loss of Supply 17
Figure 8 Job Costing System Sample Report 19
Figure 9 RSL Substation Schematic 25
Figure 10 Pole Condition Assessment by Community 38
Figure 11 Pole Condition Assessment by Pole Type 39
Figure 12 Pole Count for Pole Type by Community 40

Executive Summary

This Distribution System Plan (DSP) follows the chapter and section headings set out in Chapter 5 of the filing requirements for electricity transmission and distribution prepared by Rideau St. Lawrence Distribution Inc.'s (RSL) regulator, the Ontario Energy Board (OEB). Although the section numbering in this Distribution System Plan does not match the Chapter 5 reference numbers, the Chapter 5 reference numbers are included in each of the heading titles in brackets. The report follows the headings in the sequence required in Chapter 5.

RSL continues to use categorize investments according to the OEB requested investment categories in the budgeting process. This has allowed RSL's internal processes to align with the regulator and provide consistent reporting to RSL's stakeholders.

Through the 5 years RSL continues to perform well in reliability. To continue robust reliability the distribution system requires costs that are passed to the ratepayers. RSL spends significant effort to engage with customers, regional partners, and interested third parties to confirm the balance reliability and cost. Engagement is accomplished through direct customer engagement at the customer location and at RSL offices. RSL continues to engage customers through surveys. At the same time, regular planning meetings with regional partners and interested third parties are part of our engagement process.

This report will touch on the new Preventative Maintenance program that the RSL operation has began implementing in 2021. Throughout the development of the DSP, RSL has enhanced the asset management process focusing on a variety of inputs including, preventative maintenance, regulatory measurements, demand requirements, strategic objectives, costs. RSL continues to rank critical asset projects to balance the customer interest in balancing reliability and expenses.

RSL's capital expenditure plan is projecting an increase for the forecast period up to an average of $850,000 per year is higher than the historical range of $500,000 per year. One main driver is a proposed System Access investment to replace a deteriorating station infrastructure. The proposed plan is required to ensure continuity of service and to maintain rate stability over the long run. Otherwise, the communities serviced by RSL are not experiencing any significant changes in load.

Overall, RSL feels that the investments as identified in the DSP address RSL's need to bring the distribution system assets up to today's standards and allow RSL to maintain reliability levels throughout the forecast period. RSL has addressed the need to maintain capacity for the forecasted growth within RSL's service territory to appropriately meet the objectives of their customers, municipalities, and third-party requirements.

1.0 Introduction

This document outlines RSL's DSP for the period 2021 to 2026. This report will focus on preventative maintenance, capital expenditure planning and the required supporting information management systems.

In developing this Distribution System Plan, the following factors were considered:

- available asset inventory
- asset condition and analysis, based on the current inspection process, and
- current capital expense programs, as identified by RSL staff

Observations for improvements in data collection, inspection, supporting systems and related asset management processes were also made.

This Distribution System Plan follows the chapter and section headings set out in Chapter 5 of the filing requirements for electricity transmission and distribution prepared by RSL's regulator, the Ontario Energy Board. Although the section numbering in this Distribution System Plan does not match the Chapter 5 reference numbers, the Chapter 5 reference numbers are included in each of the heading titles in brackets. The report follows the headings in the sequence required in Chapter 5. The information in this report was prepared by RSL and Oakley Engineering.

Also, in accordance with OEB Filing Requirements for Electricity Transmission and Distribution Applications, Chapter 5, Consolidated Distribution System Plan Filing Requirements dated March 28, 2013, a basic plan for connection of renewable energy sources was outlined to address the following objective:

Provide information to the Board and interested stakeholders regarding the readiness of the distributor's system to accommodate the connection of renewable generation (RG) and the expansion and/or reinforcement necessary to accommodate RG and the eventual development and implementation of a smart grid

This Distribution System Plan is a 'living document' and will be reviewed on an on-going basis.

This DSP documents RSL's Asset Management Plan and the Capital Expenditure Plan. The DSP covers the period from 2021 to 2026. Except where noted otherwise, the current date for all the information provided is Oct 2021. This report reflects the costs incurred and the practices in place as of this date.

For the purposes of this DSP, 2016 to 2020 is the historical period, 2021 is the bridge year, 2022 is the Test Year and 2022 to 2026 are the forecast years.

RSL has translated all the capital expenditures to the investment categories as required in the Chapter 5 section 5.2.1 filing requirements.

1.1 Utility Overview

RSL services six communities – the Town of Prescott, and the Villages of Westport, Cardinal, Iroquois, Morrisburg and Williamsburg, in Eastern Ontario (Figure 1). The six communities are mature areas with a customer density of 52 customers per kilometer of primary line. The distribution network includes nine distribution stations owned by RSL and two stations that are shared with Hydro One Networks Inc. (HONI). The RSL distribution system is fully embedded in the HONI system. The system consists of 15 km of underground lines, 98 kilometers of overhead lines supported by 1994 poles and 928 utility owned transformers.

The distance from the eastern most community to the western most community is 130 km. The utility has a total service area of 18 km^2. RSL mainly operates out of the central location in Prescott and RSL provides live customer service out of office Morrisburg and Prescott office.

Since the last application, the service area has remained the same. The distribution systems serviced by RSL are isolated from one another and operated independently. All areas are in operating well. Assets are being assessed proactively. RSL has started implementing a Preventative Maintenance program to further improve reliability while optimizing costs.

The RSL DSP primarily focuses on the assets summarized in Table 1 below. These assets represent the major equipment as defined by the ESA Technical Guideline for Approval of Electrical Equipment v1.2, Section 2.1.2. The subsequent sections of the report provide further detail and assessment of each asset type. The table also identifies some key system indicators.

Table 1 RSL Major Equipment Summary Overview

Major Equipment	Qty
Poles	1,994
Primary Lines (km)	113
Overhead	98
Underground	15
Transformer Locations	808
OH	709
UG	99
15kV Switches Load Brake	7
44kV Switches Air Brake	9
In-line Switches	69
Smart Meters	5,939
PME's	11

The process RSL uses to assess the condition of its assets has been documented within the plan.

The Capital Expenditure Forecast for the period 2022 to 2026 and the Historical Capital Budget and Actual Expenditure information for the period 2016 to 2020 is reported in section 4.4 (5.4.2) Table 39.

The materiality threshold for detailed reporting of projects is $50,000.

RSL uses available asset information, asset conditions determined by RSL staff, as well as 3rd party assessments where necessary. RSL follows established processes, and asset assessment practices, defined specifically for each asset class to develop appropriate cost-effective programs that deliver reliable service to its customers.

Figure 1 Rideau St. Lawrence Distribution Inc. Service Areas

Table 2 shows a trend over the past five years – the following observations can be made:

the total customer base is relatively unchanged
the service area is constant
the system load and kWh sold have been flattening, with a modest decline

Table 2 RSL General Statistics as of December 31, 2020

	2016	2017	2018	2019	2020	2021 Forecast
Population Served	10,146	10,120	10,095	10,070	10,045	10,020
Municipal Population	10,146	10,120	10,095	10,070	10,045	10,020
Seasonal Population	-	-	-	-	-	-
Total Customers	**5,875**	**5,893**	**5,909**	**5,910**	**5,899**	**5,907**
Residential Customers	5,071	5,089	5,105	5,113	5,107	5,118
General Service <50 kW Customers	740	741	739	735	731	729
General Service >50 kW Customers	64	63	65	62	61	60
Large User (>5000 kW) Customers	0	0	0	0	0	0
Total Service Area (km^2)	**18**	**18**	**18**	**18**	**18**	**18**
Total kWh Sold (excluding losses)	101,711,018	98,838,309	101,848,630	100,219,092	99,512,150	96,816,968
Total Distribution Losses (kWh)	8,023,454	8,348,090	8,436,959	8,531,255	8,971,609	8,084,217
Total kWh Purchased	**109,734,472**	**107,186,399**	**110,285,589**	**108,750,347**	**108,483,759**	**104,901,184**
Winter Peak (kW)	19,707	23,593	20,206	20,248	18,945	18,418
Summer Peak (kW)	24,788	19,093	19,566	18,760	20,242	20,109
Average Peak (kW)	18,314	17,777	17,629	17,001	17,666	17,640

NOTES:

1. Population figures are estimates based on Canada Census 2006, 2011 and 2016 data.
2. kW peaks fluctuate due to weather conditions - the kWh figures are a better indicator of the load trends from year to year.
3. The recent drop in kWh is due to current market conditions as a result of global factors.

The capital expense program presented later in this document consists of projects driven by factors such as safety, system reliability, customer demand and system loss reduction. RSL is developing a capital expense model based on a set of consistent criteria with weight factors. Local drivers were considered and are primarily based on meetings with Municipal Councils and staff and local developers. Over the historical period have been minimal developments. However, the meetings indicate there will be an increase in development activity due to the short supply of the housing market. Lead times from developers for new projects have been very short and historically hard to forecast. The web links below provide a reference to these official plan documents. Each project identified by RSL is supported by the appropriate documentation in Section 4.5.2. The official plans for the communities served by RSL are linked here:

Leeds County:	[Official Plan - Leeds & Grenville (leedsgrenville.com)]
Cardinal:	[Official Plan.pdf (twpec.ca)]
Prescott:	http://www.prescott.ca/en/do-business/resources/Documents/official_plan_october2006.pdf
	Official Plan Review - Town of Prescott
Westport:	DOING BUSINESS | villageofwestport
SD&G County:	United Counties of Stormont, Dundas and Glengarry (sdgcounties.ca)

1.2 [5.1.2] Investments Related to Renewable Energy Generation (REG)

RSL has seven microFIT renewable energy generation installations in four communities, totaling 58.71 kW of REG connected to their distribution system under the province's Feed-in-Tariff (FIT) and microFIT programs. At this time, there are no proposed microFIT applications registered with the IESO. RSL is currently constrained by Hydro One Networks Inc. (HONI), as indicated by the correspondence in Appendix D, thus preventing connection of additional distributed generation from renewable sources to the distribution system. Based on customer interest, RSL will work with HONI to develop plans to add capacity for connection of distributed and renewable energy. However, until that plan is developed, RSL is not planning any material investments over the forecast period.

2.0 [5.2] Distribution System Plan

2.1 [5.2.1] Distribution System Plan Overview

For the purposes of this Distribution System Plan, 2016 to 2020 are the previous 5 years, 2021 is the Bridge Year, 2022 is the Test Year and 2023 to 2026 are the forecast years.

RSL expects business conditions to continue to be stable. In all municipal areas, there has been a small decline in load, due to CDM programs. Should RSL experience any load growth, it would be primarily driven by the new residential and small commercial developments. There are two identified developments for the forecast years; we do not anticipate significant impact on the load. The distribution systems in all municipal areas have capacity for new load growth at the station level; however, some system improvements are required.

RSL continues to use the previously developed system for project prioritization. This information is consolidated in the Geographic Information System (GIS) database, which acts as the asset management system. Details are provided later in this document.

Investment drivers, for the purpose of this report, are based on information available as of October 1st 2021. In Table 3, minimum, maximum, and typical (RSL) useful life is provided and determined in the Kinectrics Inc. Asset Depreciation Study for the OEB published July 8, 2010. RSL continues to collect and validate asset information as identified by the ESA Technical Guideline for Approval of Electrical Equipment v1.2, Section 2.1.2.

Table 3 RSL's Asset Class Useful Life

Account	Asset Class	MIN UL	RSL	MAX UL
1820	Distribution Station Equipment	30	45	60
1820	Wholesale Energy Meters	15	25	30
1830	Poles, Towers, Fixtures	35	45	75
1835	Overhead Conductors & Devices	50	60	75
1840	Underground Conduit	30	50	85
1845	Underground Conductors & Devices	35	40	55
1850	Line Transformers	30	45	60
1855	Services (Overhead & Underground)	50	60	75
1860	Meters	25	25	35
1860	Smart Meters	5	15	15

2.2 [5.2.2] Coordinated Planning with Third Parties

RSL coordinates with the capital programs identified by the six municipal areas and periodically discusses their plans, their scope of work, the impact on existing plan and the timing proposed by the municipal areas for their programs. Once these projects are committed, RSL responds to meet municipal target dates.

RSL works closely with developers. Once projects have been identified and have a reasonable expectation of proceeding, RSL will incorporate into the plan.

RSL is participating in the IESO regional planning study which is currently planned for late 2021. Currently there are no projects identified that will require significant investments by RSL. RSL further consults with HONI on forecasting load requirements. There are no significant investment projects identified with HONI.

RSL attends utility coordination meetings which include, but are not limited to, the following:

Prescott
South Dundas (Morrisburg, Iroquois, Williamsburg)
Cardinal
Westport
HONI
Bell Canada and COGECO, as required

There are no new studies that RSL has been part of and thus there are no deliverables or plans to be incorporated. In accordance with the filing requirements, a report outlining RSL's REG plan was sent to the IESO. The response to this report can be found in Appendix C. In summary, IESO concurs with the plan and report submitted by RSL.

2.3 [5.2.3] Performance Measurement for Continuous Improvement

In this DSP, comparisons will be made to the previous reporting period. RSL has implemented several systems to facilitate collection of metrics and allow for performance improvements.

The systems implemented include a job cost system, an asset management (GIS) system, asset assessment process and a job prioritization process. These systems have been in place since the last submission, comparisons will be made to the last reporting period. In addition, RSL has completed an assessment of the level of scheduled outages while embarking on the journey of preventative maintenance.

Table 4 Appendix 5-A Metrics

Metric Category	Metric	Measures	
		1 Year	5 Year Average
Cost	Total Cost per Customer[1]	194	190
	Total Cost per km of Line[2]	14,040	13,765
	Total Cost per MW[3]	13,515	12,954
CAPEX	Total CAPEX per Customer	98	92
	Total CAPEX per km of Line	7,106	6,677
O&M	Total O&M per Customer	96	98
	Total O&M per km of Line	6,934	7,089

Notes to the Table:

1 The Total Cost per Customer is the sum of a distributor's capital and O&M costs divided by the total number of customers that the distributor serves.

2 The Total Cost per km of Line is the sum of a distributor's capital and O&M costs divided by the total number of kilometers of line that the distributor operates to serve its customers.

3 The Total Cost per MW is the sum of the distributor's capital and O&M costs divided by the total peak MW that the distributor serves.

RSL measures system performance indicators in accordance with the Distribution System Code. Table 4 showcases a summary of the key system performance indicators for the past five years.

Table 5 Five Year System Performance Summary

		2016	2017	2018	2019	2020
Average Customer Count		5,858	5,888	5,997	5,917	5,911
Number of Customer Interruptions		6,136	9,877	10,577	10,654	8,146
Total Customer Hours of Interruptions		14,430	22,542	19,686	25,100	12,394
SAIDI		2.46	3.83	3.28	4.24	2.10
SAIFI		1.05	1.68	1.76	1.80	1.38
Excluding loss of service from Hydro One	SAIDI	1.01	0.45	0.45	1.43	0.12
	SAIFI	0.38	0.29	0.26	0.72	0.08

Figure 2 with Planned and Scheduled Time assessment shows the following:

Total outages / year have reduced from 56 (2011-2015) to 43 (2016-2020) – Difference of 13.

Unplanned outages / year have reduced from 29 (2011-2015) to 20 (2016-2020) – Difference of 9.

Planned outages / year have reduced from 27 outages/year (2011-2015) to 23 (2016-2020) – Difference of 4. Planned outages are 54% of outages.

This is a clear improvement and showcases the overall effectiveness and efficiency of the preventative maintenance program.

Figure 2 Number of Interruptions by Cause 2016 – 2020

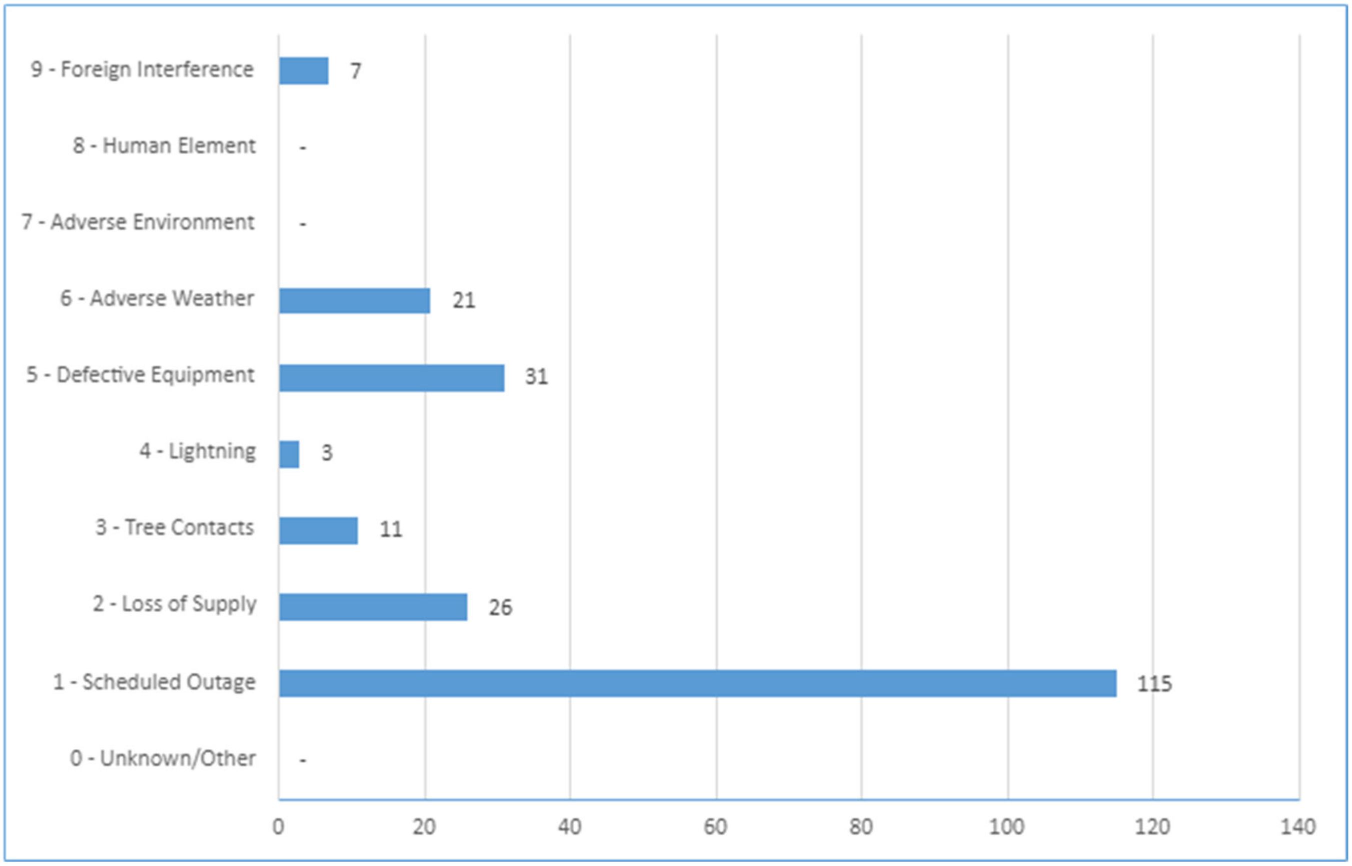


Figure 3 with the planned and Scheduled outage assessment shows the following:

Total customer-hour outage reduction of from 24K (2011-2015) to 18K (2016-2020) customer-hours of interruption per year.

Unplanned customer-hour outage reduction of from 23K (2011-2015) to 16K (2016-2020) customer-hours of interruption per year

Planned customer-hour outage increase from 1K (2011-2015) to 2K (2016-2020) customer-hours of interruption per year.

System work is increasingly consolidated whenever possible to reduce the impact on customers while maintaining fiscal responsibility and worker safety. Although scheduled outages account for 54% of the events, they only account for 12% of the customer-hours of interruption, indicating sound planning procedures.

By contrast, *Loss of Supply* events account for 12% of the events and 79% of the customer hours. In 2017, 2018 and in 2020, RSL experienced lengthy *Loss of Supply* due to issues on the HONI 44kV system to all of Prescott – these events were the primary contributor to the high number of customer-hours of interruptions due to *Loss of Supply*.

Defective Equipment also accounts for 14% of the outage events for RSL and only 3% of the customer-hours, a reduction on both counts over the last reporting period. As

Figure 2 shows, events due to *Defective Equipment* are typically localized and shorter in duration. Most of these events are due to failure of overhead porcelain switches, which are being replaced by the current standard polymer switches. As these equipment failures occur, they are replaced with current standard and construction practices.

***Loss of Supply* and *Weather* related events are two of the major causes of outages in the RSL system, contributing to the year-to-year fluctuations in the system performance data, shown in Table 5 Five Year System Performance Summary**

above. The RSL service area is relatively flat and open and is affected by recent severe windstorms. Loss of Supply events typically affect entire communities, thus contributing to the high customer-hours of interruptions.

Figure 3 Customer-hours of Interruptions by Cause 2016-2020

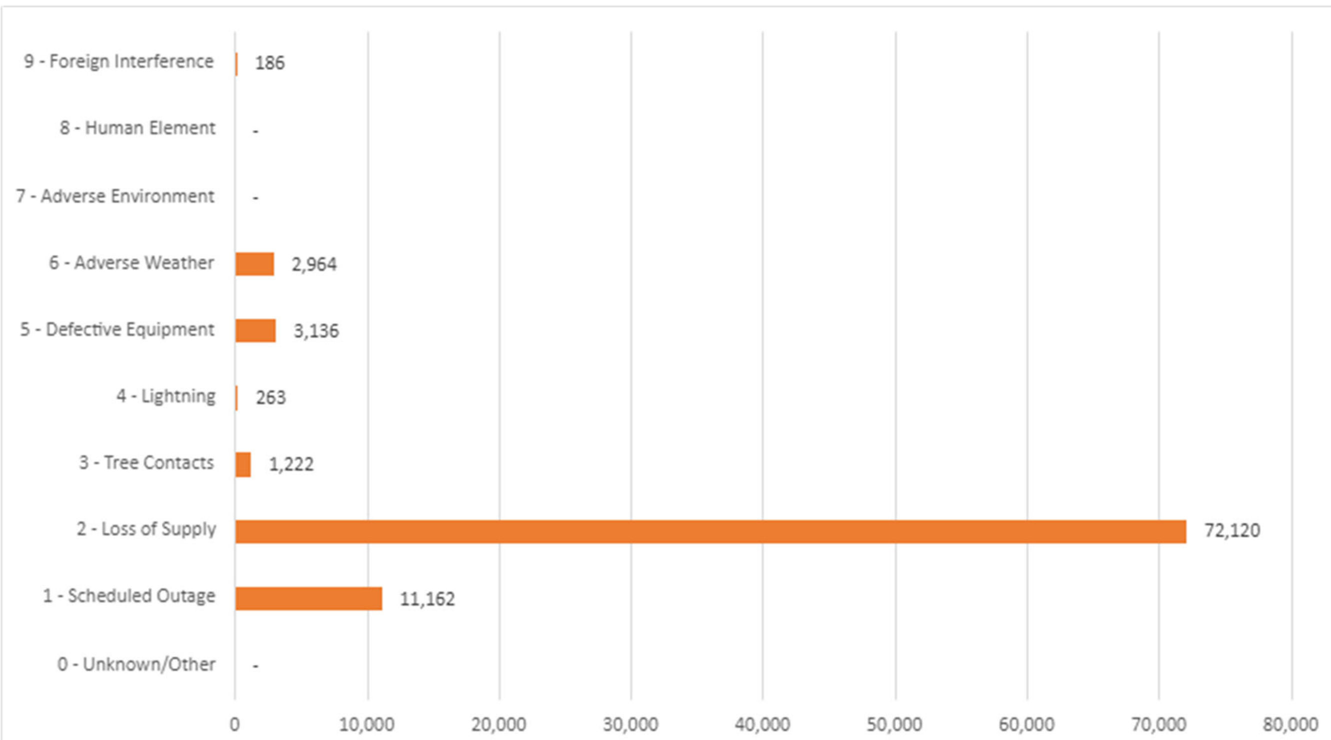


Table 5 Five Year System Performance Summary

. shows a significant improvement in system performance statistics when Loss of Supply events are excluded. This is a more accurate indicator of RSL's true system performance, since the impact of the supplier's outages, which are outside the control of RSL, is removed.

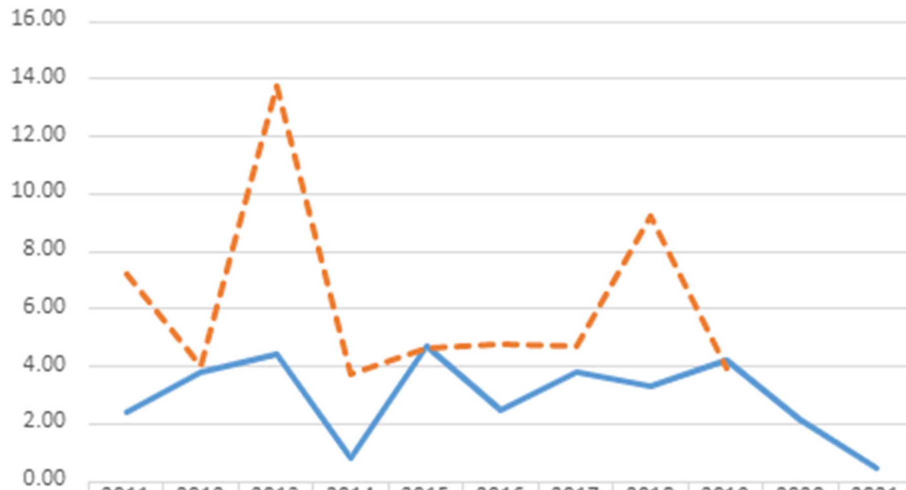
Viewed from within these parameters, RSL performance levels are well above the industry average, as indicated by Figures 4 to 7 below.

System Average Interruption Duration Index (SAIDI)

SAIDI is an indicator used to calculate the average length of time a customer is without power during the year.

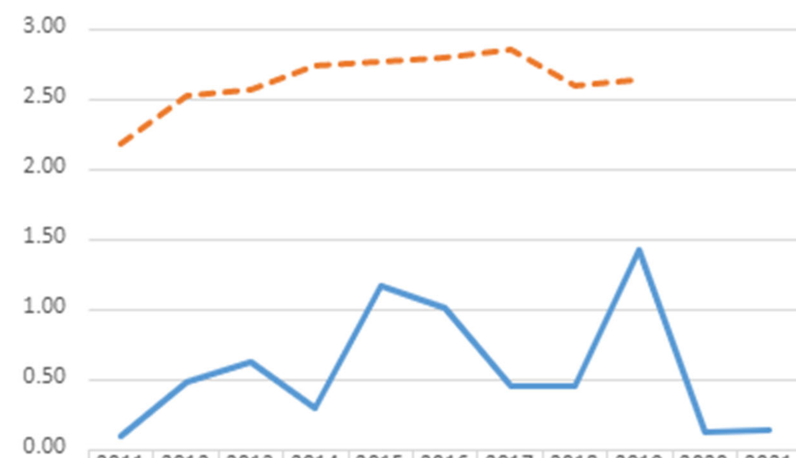
Figure 4 compares RSL's SAIDI indices with the industry average. RSL's 5-year average SAIDI is 3.23 including Loss of Supply interruptions, compared to the Industry average of 6.55. Figure 5 compares RSL's SAIDI indices, excluding the Loss of Supply events, with the industry average. RSL's 5-year average SAIDI excluding Loss of Supply is 0.53, compared to the industry average of 3.11.

Figure 4 SAIDI



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
RSL	2.40	3.82	4.41	0.83	4.67	2.46	3.83	3.28	4.24	2.10	0.46
Industry	7.19	4.02	13.73	3.74	4.64	4.75	4.67	9.25	3.94		

Figure 5 SAIDI Excluding Loss of Supply



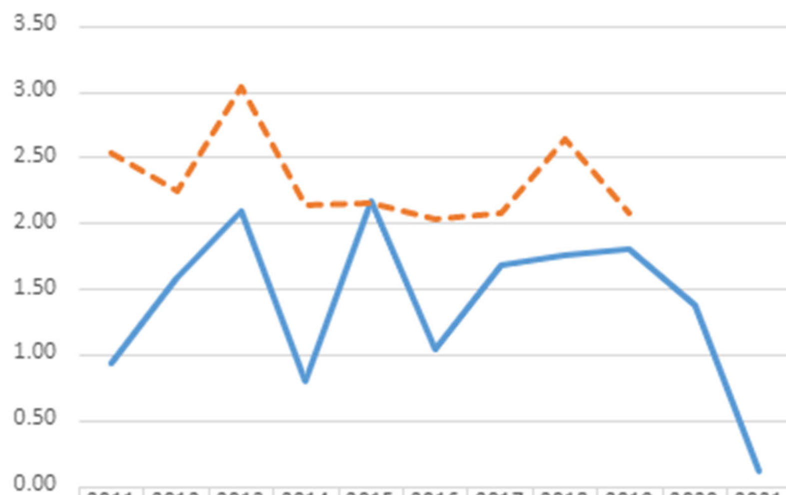
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
RSL	0.09	0.48	0.62	0.30	1.17	1.01	0.45	0.45	1.43	0.12	0.13
Industry	2.18	2.53	2.56	2.74	2.77	2.79	2.85	2.59	2.64		

System Average Interruption Frequency Index (SAIFI)

SAIFI is an indicator used to calculate the average number of interruptions per customer during the year.

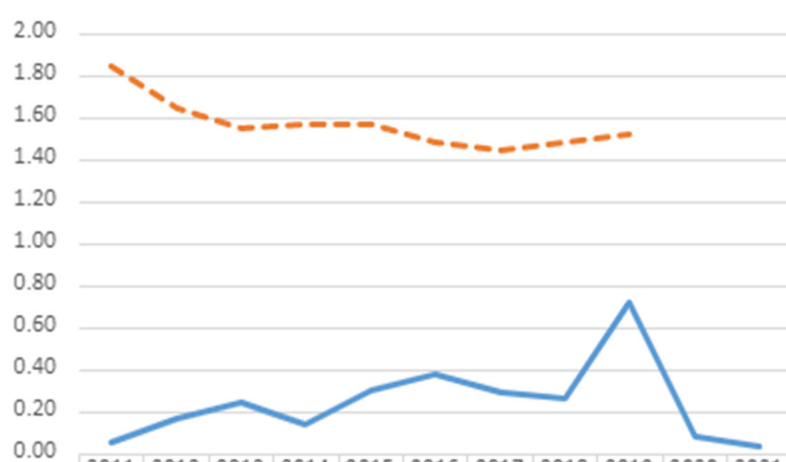
Figure 6 compares RSL's SAIFI indices with the industry average. RSL's 5-year average SAIFI is 1.52 including Loss of Supply interruptions, compared to the industry average of 2.41. Figure 7 compares RSL's SAIFI indices, excluding the Loss of Supply events, with the industry average. RSL's 5-year average SAIFI excluding Loss of Supply is 0.22, compared to the Industry average of 1.87.

Figure 6 SAIFI



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
RSL	0.94	1.59	2.09	0.80	2.17	1.05	1.68	1.76	1.80	1.38	0.12
Industry	2.53	2.25	3.04	2.14	2.15	2.03	2.08	2.65	2.08		

Figure 7 SAIFI Excluding Loss of Supply



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
RSL	0.05	0.17	0.24	0.14	0.30	0.38	0.29	0.26	0.72	0.08	0.04
Industry	1.84	1.64	1.55	1.57	1.57	1.48	1.44	1.48	1.52		

The above figures show that the RSL reliability performance indicators are better than the industry average.

In addition to the above performance indicators, RSL incorporates customer feedback into the planning process. Being a small utility located within the community, customer concerns are communicated quite easily through direct interaction with RSL management and employees. The results of the engagement can be seen in Section 2.3.1.3.

2.3.1 Planning Performance

RSL is a small utility, with fewer than 6,000 customers. As such, the historical planning process related to distribution has been undocumented and casual prior to 2011. During 2011-2015, RSL began documenting and created baselines through the previous COS application. From 2016-2020, has further tracked and analysed its performance and is starting improving it's planning performance.

With a new CEO, RSL is currently creating Mission Statement or Vision Statement for the organization. Over the past 5 years RSL's goal is to provide superior service to our customers. For RSL, this means that our distribution system must be reliable. Our customers must have easy access to all RSL staff, and to this end our office is open for customers to visit in person to express their opinions, pay bills, and complete other transactions.

Each year, RSL management prepares a capital budget for the approval of their Board of Directors. At quarterly meetings with the Board, capital expenditures are reviewed and compared with the capital budget.

The historical capital budgets were based on the average expenditures per asset type from past years. Certain easily identifiable assets, such as vehicles, were anticipated and included in the budget.

Table 6 Historical Budget and Actual Expenditures

	2016	2017	2018	2019	2020		2016	2017	2018	2019	2020	
	DSP	DSP	DSP	DSP	DSP	Total	Actual	Actual	Actual	Actual	Actual	Total
Distribution Buildings						-	-	4,382	2,277	-	-	6,659
Wholesale Meters			6,600			6,600	-	4,109	10,681	18,799	-	33,589
Distribution Station Equip	78,000	154,500	15,500	6,000	-	254,000	124,035	234,862	18,369	40,840	25,284	443,390
Poles, Towers & Fixtures	102,268	63,583	135,764	148,547	72,322	522,484	104,649	75,871	116,896	120,320	274,048	691,784
Distribution Lines & Feeders	97,261	34,217	46,695	65,183	45,756	289,112	87,031	122,598	81,611	103,492	65,005	459,737
Underground Conduit	-	-	-	-	43,125	43,125	3,947	16,433	4,746	9,072	11,904	46,102
Underground Conductors	-	-	-	-	39,010	39,010	14,645	77,336	20,572	38,965	33,491	185,009
Line Transformers	69,832	84,273	106,815	103,798	103,324	468,042	84,374	108,053	131,100	65,545	115,156	504,228
Services	22,200	31,300	57,300	67,500	14,300	192,600	10,624	29,935	40,066	29,758	40,519	150,902
Meters	8,895	20,958	20,958	20,958	5,625	77,394	11,656	28,994	96,574	73,506	42,650	253,380
Leasehold Improvements	-	-	-	-	-	-	-	9,845	-	-	1,914	11,759
Computer Equipment	15,000	20,000	45,000	25,000	10,000	115,000	13,905	58,511	16,161	14,639	31,435	134,651
Computer Software	15,000	5,000	5,000	5,000	55,000	85,000	7,650	5,840	4,137	50,517	104,038	172,182
Rolling Stock	390,000	35,000	-	-	30,000	455,000	3,133	411,028	1,179	1,246	-	416,586
Major Tools	10,000	10,000	10,000	10,000	10,000	50,000	14,845	13,857	13,759	4,729	661	47,851
Communication Equip	-	-	-	5,000	25,000	30,000	-	-	-	-	-	-
	808,456	458,831	449,632	456,986	453,462	2,627,367	480,494	1,201,654	558,128	571,428	746,105	3,557,809

RSL now has an Asset Management System which identifies specific projects to be completed over the next few years. The projects form the basis of our capital plan and the DSP.

In 2014, RSL installed a Job Costing software module, to be used to track the individual project budgets and costs. The reporting capabilities of this module provide RSL with valuable costing information to compare the results to budget, and to improve the planning for future projects. Each project in the DSP is assigned a job number in the Job Costing module. The following is an example of the reporting that is now available to RSL. Job number 1606 is for a project that includes several asset types. The page below shows the budget and the costs year-to-date for the pole asset.

Figure 8 Job Costing System Sample Report

16/08/29-16:04 Rideau St. Lawrence Utilities August 29 2016 Page 2
JC710 Detail Job Status Report
for the period January 1, 2016 to August 31, 2016

Job Area : CP Capital Job : CP1606-1830 CAMPBELL RD EXTENSION PHASE 1 Year : 16

Current Year Statistics

Cost/Rev	Curr.Yr Estimate	Period Actual	Current Year Actual	Current Year Committed	Current Year Total	Variance	% Unexp
1. Labour	9,916.00					9,916.00	100.00
2. Materials	9,100.00	2,750.00	2,750.00		2,750.00	6,350.00	69.78
4. Outside Service	3,500.00					3,500.00	100.00
Gross Cost	22,516.00	2,750.00	2,750.00		2,750.00	19,766.00	87.79
7. Cont Cap	22,500.00-					22,500.00-	100.00
Revenue	22,500.00-					22,500.00-	100.00
Net Cost	16.00	2,750.00	2,750.00		2,750.00	2,734.00-	87.50-

Other metrics are reviewed by the RSL Board of Directors and RSL management:

2.3.1.1 Safety - ESA Customer Awareness Survey Results

In 2020, RSL continued to participate in the ESA Customer Awareness Survey . The survey was conducted by Red Head Media. RSL's overall survey score was 83.6%. Update of survey 2020 – scored 84.0% with a medium score of 83.3%. Note in 2016 RSL scored 83.6%

2.3.1.2 ESA Compliance

Each year, RSL is subject to an audit by the ESA to determine compliance. The audits have found that RSL is in compliance.

2.3.1.3 Customer Focus - Customer Engagement Survey Results

RSL has engaged customer through various mediums. The purpose of the engagements are to help set the direction of our plan while balancing reliability and cost as the customers main interest.

- Surveys
- Customer Visits at their location
- Direct Customer Service - Engagement in our offices (Prescott & Morrisburg)

RSL has conducted individual and group Customer Engagement Surveys in recent years. The latest survey, conducted in 2021, indicated a strong level of satisfaction with RSL. Our customer satisfaction score was 82% which is an improvement vs. our last survey in 2019 of 81%. Our survey vendor indicated we are now 3% higher in customer satisfaction than the average LDC.

During RSL's direct customer engagement through visits at customer location or meetings in our offices, we gather the following feedback.

- Global Adjustments change significantly from month to month. It is a big cause of unpredictable bills and causes issues in forecasting the costs and profitability. RSL is working with the IESO to understand the month-to-month drivers of the varying global adjustments costs and look for industry solutions to help our customers.
- Customers continue to desire RSL to proactively tree trim around the lines.
- Customers are satisfied with the service and reliability

- Customers want to keep up with deteriorating equipment.

RSL held an open house in May 2016 to discuss the five-year capital plan with customers. The customers asked questions about the planned projects and expressed support for the plan. Their responses were consistent with the result of the Customer Satisfaction Survey in that the replacement of deteriorating and aging infrastructure was an important consideration. However, we had less than a handful of attendees. Based on the low engagement in the medium and consistency with the survey results we have not continued to engage our customers through open houses.

Although in recent years there has been a strong push in the industry for the implementation of Outage Management Systems (OMS), RSL customers indicate strongly that they are not in favour of the utility investing in this system. Based on the above responses and reliability performance indicators (SAIDI, SAIFI), RSL would have difficulty justifying the expense and quantifying a noticeable improvement in performance. Net,the respondents indicate RSL is highly respected in the community.

Overall, RSL is paying attention to customer-oriented performance and is meeting their customers' performance expectations.

RSL monitors the reliability performance of its system. While no one wants to have power interruptions, RSL customers have not raised any specific concerns about this area of performance.

Power quality has not been an issue raised by the public in the RSL service areas.

2.3.1.4 SAIDI and SAIFI

Information about customer interruptions was provided earlier in this exhibit. RSL's historical average in these measures is below the provincial average. The great majority of the interruptions to our customers is the result of the loss of supply to RSL from Hydro One. The details are in shown above.

2.4 [5.2.4] Realized efficiencies due to smart meters

Smart meters were first installed in RSL's territory in 2009. The smart meters provide operational efficiencies, but at a high cost. The higher costs are due to a shorter life span of the meters, data collection and networks, MDM/R, Sync Operator, and ODS costs.

The following operational efficiencies have been beneficial:

- Customers can access their hourly consumption data easily. This can reduce the number of customer service calls.
- Daily reports confirm the percent of meters that responded with data. Meters that are not working properly are flagged for investigation and possible replacement.
- Some smart meters can be disconnected remotely, for difficult access or safety issues.

3.0 [5.3] Asset Management Process

3.1 [5.3.1] Asset Management Process Overview

In developing and implementing the Asset Management Plan, RSL has pursued the best practices of the electricity distribution industry and continues to work collaboratively with CHEC utilities for improved efficiencies and implementation of benchmark standards. This has included adhering to the OEB's Distribution System Code ("DSC") that sets out both good utility practices, minimal performance standards for electricity distribution systems in Ontario, and minimal inspection requirements for distribution equipment.

RSL's objective is to provide customers with excellent products and services in a competitive, safe, reliable, and efficient manner, while always recognizing community and environmental responsibilities. Additionally, RSL's customers have been surveyed over the past few years to ensure that the utility focuses its resources in accordance with customer needs, while maintaining reliability. RSL's desire to focus on the priorities of the community has been influenced in part by customer feedback, and emphasizes operational excellence.

The asset management process focuses on asset inspection, preventative maintenance, capital expenditure planning and the required supporting information management systems and an asset condition assessment.

In developing this Asset Management Plan, the following factors were considered:

a. Available asset inventory and lead time for inventory purchases,
b. Asset condition based on a visual inspection and a stress calculation/measurement,
c. Current capital expense programs, and
d. Best practices of the electricity industry.

Observations for improvements in inspection, data collection, supporting systems and related asset management processes were also made.

Each project identified is rated and ranked, based on the following factors, prescribed by the OEB:

a. Safety
b. Environmental Benefits
c. Efficiency, Customer Value, Reliability
d. Co-ordination, Interoperability
e. Economic Development
f. Cyber-security, Privacy

RSL recognized the need for a more structured process for rating and ranking capital project expenditures.
Table 7 Factors for Rating Projects

lists these factors, along with a weight factor, resulting in a possible total project score of 100. Based on this rating system, projects with a low score do not meet RSL objectives as much as projects with a higher score. Although a majority of projects identified for the forecast period are rebuilds to address the removal of small conductor and mitigation of PCB transformers, RSL sees an opportunity to present a process that can be tracked and adjusted over the forecast period and assist in the preparation of subsequent forecast plans to meet their corporate objectives.

Table 7 Factors for Rating Projects

Factor	Rating	Weight	Health Score
Safety	1 to 4	6	24
Environmental Benefits	1 to 4	4	16
Efficiency, Customer Value, Reliability	1 to 4	5	20
Co-ordination, Interoperability	1 to 4	4	16
Economic Development	1 to 4	4	16
Cyber-security, Privacy	1 to 4	2	8

The detailed descriptions for each factor in Tables 7 to 11, resulting in a rating of 1 to 4, have been established based on the projects identified in this forecast period. It is worth noting that the projects identified are somewhat homogeneous.

Table 8 Environmental Benefits Rating

Environmental Benefits	Rating
No environmental impact	1
Conservation Efforts	2
Clean Technology	3
PCB	4

Table 9 Efficiency, Customer Value, Reliability Rating

Efficiency, Customer Value, Reliability	Rating
No customer / reliability impact	1
Low outage risk (single tx)	2
Medium outage risk (commercial, <500 res)	3
High outage risk (critical, industrial, over 500 res)	4

Table 10 Co-ordination, Interoperability Rating

Co-ordination, Interoperability	Rating
No co-ordination or interop. impact	1
Customer coordination	2
Third Party	3
Regional / municipal impact	4

Table 11 Economic Development Rating

Economic Development	Rating
No economic dev impact	1
Minimal economic dev impact	2
Significant economic dev impact	3
Immediate economic dev impact	4

Table 12 Cyber-security, Privacy Rating

Cyber-security, Privacy	Rating
No cyber- security, privacy impact	1
Potential cyber/security, privacy impact	2
Minimal cyber- security, privacy impact	3
Cyber threat - risk to customer data	4

The material projects, identified in Section 4.5.2 show the rating and the score for each project, based on these factors.

Individual major assets are assessed based on unique parameters, determined to be key characteristics for that asset condition, based on industry standards, practices and based on available information. Stress calculations and/or measurements are also used where possible to complement visual inspections and asset characteristics. These assets are then thematically mapped and a visual assessment by feeder segment is made to identify "projects". The specific assessment process for each major asset is discussed in Section 3.2.

As additional asset information becomes available over time and industry standards and practices evolve, RSL will continue to reassess and evolve their asset assessment process. RSL envisions that over time, as they refine their system and information collection, they will be able to calculate a feeder or feeder segment health index.

RSL does not currently apply a reliability-based 'worst performing feeder' in its asset management process. This is due to the fact that RSL experiences a very low volume of unplanned outages; therefore, statistically the inferred results would not be reliable or meaningful.

RSL uses the GIS database as the central storage for all asset information, asset assessment and project identification. In the future, this will allow RSL better data mining and improved decision making.

3.2 [5.3.2] Overview of Assets Managed

Rideau St. Lawrence Distribution Inc. services six communities - Town of Prescott and the Villages of Westport, Cardinal, Iroquois, Morrisburg and Williamsburg, in Eastern Ontario. The six communities are mature areas with a customer density of 57 customers per kilometer of line. The distribution network includes nine distribution stations owned by RSL and two stations that are shared with Hydro One Networks Inc. (HONI). The system consists of 12 km of underground lines, 93 kilometers of overhead lines supported by 1994 poles and 928 utility owned transformers.

RSL is in the process of implementing a GIS system which was used to gather and store most of the information for this study from various paper and digital sources. At the time of this submission, work on the GIS system is ongoing.

This section summarizes the results of the Asset Condition Assessment study completed in 2020, with the objective of establishing the health and condition of fixed assets currently in service in RSL's system.

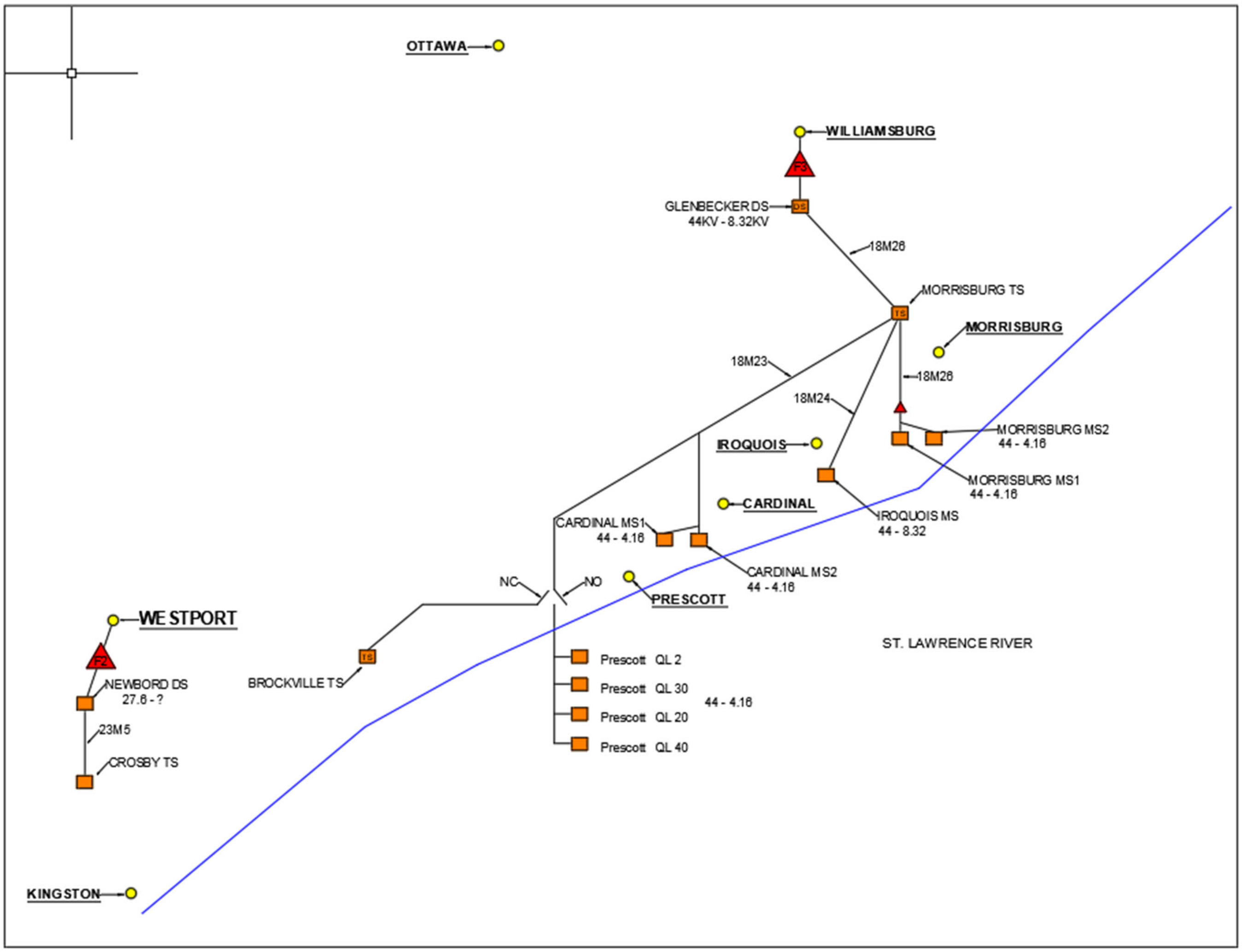
The assets covered by the report include:

a. Substations / Feeders
b. Distribution Transformers
c. Poles
d. Conductors
e. Switches
f. Meters
g. General Plant

3.2.1 Substations

Rideau St. Lawrence Distribution Inc. owns and operates nine substations. They are located within municipal limits, as shown on the map below. Each station is connected by an appropriately rated load break or air break switch. A brief description of each station follows.

Figure 9 RSL Substation Schematic



The following table summarizes the information for the nine stations owned and operated by RSL:

Table 13 Station Summary

Station	Year Energized	Voltage	Transformer Size	No. of Feeders	HV Protection	LV Protection
Cardinal MS1	Jun 1953	44 – 2.4 kV	3.0 MVA	2	65E	400A Fuses
Cardinal MS2	Sep 1996	44 – 2.4 kV	3.0 MVA	2	65E	400A Fuses
Iroquois MS1 (back-up tx)	Jun 1953 (T1) Feb 2016 (T2)	44 – 4.8 kV 44 – 4.8 kV	3.0 MVA 3.0 MVA	2	100E 100E	300A Fuses, 200A Reclosure 400A Fuses
Morrisburg MS1	Sep 1976	44 – 2.4 kV	5.0 MVA	4	150E	400A Fuses
Morrisburg MS2	Jun 1989	44 – 2.4 kV	5.0 MVA	2	150E	400A Fuses
Prescott MS1/QL2	1965	44 – 2.4 kV	3.0 MVA	3	SMD-50	400A Fuses
Prescott MS2/QL20	Jun 1954 Refurb 2017	44 – 2.4 kV	5.0 MVA	2	80E	400A Fuses
Prescott MS3/QL40	June 1963	44 – 2.4 kV	5.0 MVA	4	100E	400A Fuses
Prescott MS4/QL30	Oct 1991	44 – 2.4 kV	5.0 MVA	2	60F	400A Reclosure

3.2.1.1 Station Summary

Cardinal

Cardinal MS1 – 715 Highway #2:

Cardinal Sub-station #1 primarily provides residential service to the part of town north of Highway #2. The transformer is a 3.0MVA and has two feeders, of which only one is being used. The station is currently protected by 400A fuses on the LV side and 65A Type E power fuses on the HV side. A new switching cabinet was installed in 2014. It also contains a Meter Compartment. This station has been providing Cardinal with power since 1953.

Recent assessment by a third party determined this station to be in good condition, with only minor capital maintenance required over the five-year budget period.

Cardinal MS2 – 3037 John Street:

Cardinal Sub-station #2 provides service to almost everything south of Highway #2, which includes a mix of both residential and industrial customers. The transformer is a 3.0MVA and has two feeders all protected by 400A fuses on the LV side and 65A Type E power fuses on the HV side. This station was placed in service in 1996.

Recent assessment by a third party determined this station to have the transformer to be closely monitored for potential replacement.

Iroquois

Iroquois MS1 – 5799 Country Road:

Iroquois Sub-station #1 is the only sub-station in Iroquois and provides power to a mixture of residential and industrial customers. The transformer is a 3.0MVA and has two feeders protected by 300A fuses and 200A reclosers on the LV side and 100A Type E power fuses on the HV side. This station has been in service since 1953. In 2016, a second transformer was installed to improve reliability in case of a transformer failure. RSL now uses this new transformer as the primary with the older transformer as backup.

Recent assessment by a third party determined that the older backup transformer to be in poor condition. RSL plans on replacing the older transformer in this DSP plan to re-establish reliability in Iroquois.

Morrisburg

Morrisburg MS1 – 9 Fifth Street East:

Morrisburg Sub-station #1 provides service to the bulk of the town from County Road 2 South. Most of its customers are residential although there is some industrial load on the eastern edge of the town. The transformer is a 5.0MVA and has four feeders protected by 400A fuses. This station is protected by 150A Type E power fuses and has been in place since 1976.

Recent assessment by a third party determined this station to be in good condition, with only minor capital maintenance required over the five-year budget period.

Morrisburg MS2 – 7 Jones Road:

Morrisburg Sub-station #2 is used to service primarily industrial/commercial load north of County Rd 2. The transformer is a 5.0MVA and has two feeders. LV protection is provided by 400A fuses. HV protection is provided by 150A Type E power fuses. This station was placed in service in 1989 in anticipation of development on the north end of Morrisburg. That development never came to fruition due to a rezoning of the land to protected Wetlands. At the same time, the MS2 station cannot handle the load of the town for Morrisburg outside of minor maintenance outages.

Recent assessment by a third party determined this station to be in critical condition and recommended replacement to provide stable reliability. In the Capital plan there is a 2 year project to replace and relocate the station to a shared yard with MS1. This approach improves efficiency to bring the station closer to the load to increases Morrisburg's reliability and reduce line losses.

Prescott

Prescott MS1 – 675 Corrine Street:

Prescott Sub-station #1 has a 3.0MVA transformer with three feeders protected by 400A fuses. The station's HV side protection is provided by SMD-50 power fuses. Two of the feeders are used to service a mixture of residential, industrial and commercial customers on Sophia Street, Ann Street and everything west of Edward Street South on King Street East, Henry Street West, Dibble Street West and James Street West. The third feeder provides service to a park and parts of downtown, Water Street and King Street. This station was installed in 1965.

Recent assessment by a third party determined this station to be in good condition. However, this transformer contains PCB and will be replaced within the five-year budget period.

Prescott MS2 – 101 Churchill Road:

Prescott Sub-station #2 is used to service mostly commercial central portion of the town. The service area includes Churchill Rd W, Industrial Rd. and Development Dr. The transformer is a 5.0MVA unit with two feeders protected by 400A fuses, with only one feeder used. The HV protection for this station is provided by 80A Type E power fuses. This sub-station has been providing Prescott with power since 1954 but now shares the same yard as Prescott MS3.

Recent assessment by a third party determined this station to be in good condition, with only minor capital maintenance required over the five-year budget period.

Prescott MS3 – 101 Churchill Road:

Prescott Sub-station #3 primarily provides service to the north-western portion of the town. This area contains industrial, commercial and one residential subdivision and includes everything north of the rail line and on or west of Edward Street North. The transformer is a 5.0MVA and has four feeders, with two only three feeders used. It is protected on the LV side by 400A fuses and on the HV side by 100A Type E power fuses. Prescott MS3 was added to Prescott MS2 in 1963.

Recent assessment by a third party determined this station to be in good condition, with only minor capital maintenance required over the five-year budget period.

Prescott MS4 – 800 Boundary Street:

Prescott Sub-station #4 provides service to the eastern portion of the town. North of the rail line this includes all of the residential area east of Edward Street North; south of the rail line it includes everything East of Prince Street. The transformer is a 5.0MVA unit and provides power for two feeders protected with 400A reclosures. The station's HV side protection is provided by 60A Type F fuses. The transformer was installed in 1991.

Recent assessment by a third party determined this station to be in good condition, with only minor capital maintenance required over the five-year budget period.

Williamsburg

Williamsburg is directly fed 8.32kV by Hydro One from the Glen Becker DS F3 feeder.

Westport

Westport is directly fed 8.32kV by Hydro One from the Newboro DS F2 feeder.

3.2.1.2 Inspections

Rideau St. Lawrence Distribution Inc. owns and operates its nine substations, which are patrolled on the first business day of each month. Patrols at substations require the use of the "*Record of Substation Inspection*" which includes a checklist of items to inspect visually for defects. Monthly visual inspections include the following:

Transformer:
Paint condition and corrosion
Phase indicators and unit numbers match operating map
Leaking oil
Flashed or Cracked Insulators
Contamination/discolouration of bushings
Ground lead attachments

Switches and Protective Devices:
Bent, broken bushings and cut-outs
Damaged lightning arresters
Ground wire on arresters unattached

Hardware and Attachments:
Loose or missing hardware
Insulators unattached from pins
Conductor unattached from insulators
Insulators flashed over or obviously contaminated
Tie wire unraveled
Ground wire broken or removed
Ground wire guards removed or broken

Switchgear:
Paint condition and corrosion
Placement on pad or vault
Check for locks
Grading changes
Leaking oil

Vegetation:
Accessibility compromised
Grade changes that could expose cable
Leaning or broken "danger" trees in proximity of station
Growth into line of "climbing" trees
Vines or brush growth interference (line or fence clearance)
Bird or animal nests

3.2.1.3 Major Capital Station Maintenance

Preventive station maintenance is conducted on a three-year cycle according to the RSL Inspection and Maintenance Procedures and includes the following:

Testing of Substation Transformers
Arrester testing
Breaker and Protection Testing and Maintenance
General station maintenance
Conditioned based oil samples
Three-year rotation – time based maintenance
In depth 3rd Party Station assessments on a 5 year basis

The most recent stations to undergo maintenance were Prescott MS2, MS3, MS4.

Recent assessment by a third party identified no major requirements for this five-year budget period; switch and protection upgrades were recommended for the future. The transformers are relatively lightly loaded, with an average load of about 35%; they are not electrically stressed. The station transformers will be monitored and further ongoing assessments will be completed.

3.2.1.4 Load and Load Balancing

Based on historical growth patterns and the local economy, RSL's stations have the capacity to accommodate normal growth for the next five to ten years. RSL regularly monitors station loading during peak winter and summer months and uses this information to rebalance feeders. The frequency of these readings will be increased if any issues arise. Currently these readings are manual.

3.2.1.5 Station Metering and Monitoring

Remote station monitoring has been evaluated but has not been planned for RSL at this time.

3.2.2 Distribution Station Condition Assessment

RSL condition score for station equipment is calculated using a rated weighting of variables. The scoring is based on the age, station transformer loading (or stress), a documented visual inspection and transformer test reports. The assessment is based on a scoring from 0-100 ranging from Excellent to Critical. **Error! Reference source not found.** cross-references the asset score with a rating and required action.

Table 14 Overall Station Assessment

Rating	Asset Health	Description
Excellent	0 – 40	No action required
Good	41 – 60	Re-assess within 5 years
Poor	61 – 75	Replace within 7 years
Critical	76 – 100	Replace immediately

Health:

The four variables used for the assessment were each assigned a range of health scores and an overall weighting per health score. A maximum score would indicate an immediate need for replacement. Table 15 identifies the weighted scaling.

Table 15 Station Health Variables

Station Health Variable	Rating	Weight	Health Score
Age	1 to 4	5	20
Loading (stress)	1 to 4	5	20
Visual Inspection	1 to 4	5	20
Tests	1 to 4	10	40

Age:

RSL currently operates nine stations, with one spare transformer in Iroquois MS. The Health Score assigned for the age range for each station is identified in Table 16.

Table 16 Station Age Rating

Year	Age	Rating
1985 – 2014	0 - 29	1
1970 – 1984	30 – 44	2
1955 – 1969	45 – 59	3
1954 and older	60 +	4

Transformer Loading (Stress):

RSL monitors the station load on a monthly basis. All stations are lightly loaded, consistent with the overall system utilization factor. Table 17 shows the Health Score assigned based on the transformer load, representing the stress or equipment utilization.

Table 17 Station Transformer Loading Rating

Load (% of rated)	Rating
< 50	1
51 – 74	2
75 – 95	3
>95	4

Visual Inspection:

RSL completes visual inspections as per section 3.2.1.2 above and the OEB's DSC requirements of its plant and performs predictive testing on certain assets where such testing is available, and replaces assets based on inspection and testing results as required. In addition, oil sampling has been initiated and will be completed on a bi-annual basis.

The Health Score assigned for issues identified on inspection are identified in Table 18.

Table 18 Station Visual Inspection Rating

Inspection Results	Rating
No issues	1
One issue	2
Two issues	3
More than two issues	4

Station Asset Condition – Overall Health

The major assets reviewed in Substations include only the station transformer at this time. The overall Health Index of RSL's substation equipment was calculated using the above variables and is summarized in Table 19 below.

Table 19 RSL Station Health Index Summary

Station	Age	Stress	Condition	Oil Test	Total Score	Asset Condition
Cardinal MS1	20	5	10	10	45	Good
Cardinal MS2	5	5	5	10	25	Excellent
Iroquois MS1	20	5	20	20	65	Poor
Iroquois (Spare)	5	20	5	10	40	Excellent
Morrisburg MS1	15	5	10	20	50	Good
Morrisburg MS2	10	10	20	40	80	Critical
Prescott MS1	15	5	10	40	70	Poor
Prescott MS2	5	5	5	10	25	Excellent
Prescott MS3	15	5	5	10	35	Excellent
Prescott MS4	10	5	5	10	30	Excellent

Overall, RSL substations are in good condition; this is primarily due to the light loading of the transformers. However, as indicated in the plan, some of the assets are aging and therefore require replacement. RSL will continue regular testing; these tests may indicate additional requirements.

In this reporting period there are 3 major projects.

1. The Morrisburg MS2 station will also be relocated to provide the efficiency and reliability by locating closer to the load and becoming an appropriate back-up for Morrisburg.
2. The Prescott MS1 transformer needs to be replaced due to a positive PCB test.
3. The Iroquois MS1 transformer will be replaced to improve reliability for Iroquois.

Regular maintenance and testing will be performed, recorded, assessed, and acted upon, as required.

3.2.3 Transformers

The RSL distribution system consists of 928 transformer units. These units are configured in single-phase and three-phase installations, with 709 pole mount and 91 padmount transformer locations, including 8 PoleTrans. The breakdown of these locations by community is shown in Table 20. Current data available includes the size, type, manufacturer and serial number; the manufactured year is only available for about 10% of the transformer population. This has been used as the year of purchase and installation, for the purpose of this report. The following tables show a summary of the overhead and underground transformer data by municipal area.

Table 20 Transformer Unit Data

Community	Polemount	Padmount	PoleTran
Cardinal	104	10	2
Iroquois	105	17	
Morrisburg	212	22	
Prescott	293	27	6
Westport	87	12	
Williamsburg	28	3	
Total	**829**	**91**	**8**

Design practices of utilities, particularly in the past 25 years, have been to substantially oversize transformers for the average load required to be supplied. A typical utility average transformer utilization factor is about 30-35%. RSL system analysis studies completed to date indicate an average system utilization factor of about 30%. All transformer installations are fused at approximately 80% of rated amperage. This is a typical practice in Ontario and improves the service life of the transformer, protecting it from overload conditions.

The asset management system is integrated with the existing RSL customer and smart meter information. The availability of smart meter data provides RSL with better information to assess the transformer utilization and related stress. This, together with the GIS connectivity model and weather data, assists RSL to determine which transformers are under more stress and therefore require closer monitoring or maintenance and an appropriate replacement program.

3.2.3.1 Maintenance

A number of units are replaced annually, as part of projects driven by ongoing system improvements. RSL recently implemented a transformer load management system with the use of the GIS connectivity model. This work is still on-going and will be able to provide reports on transformer loading in the near future. The replacement of transformers is completed as a part of maintenance and capital projects.

PoleTran and padmount transformers are cleared of snow after a major snowfall, as part of ongoing maintenance. This reduces the number of emergency outages and extends the transformer life.

Based on the historical data and industry norms, RSL anticipates the need to replace approximately 1-2.5% of the transformer population annually. This activity and the financial requirements are summarized in Section 4.5.2.

3.2.3.2 Capital

RSL completed a multi-year program in which all RSL transformers were tested for PCBs to determine if any were outside of acceptable limits. This process identified 108 transformers with a PCB levels over 50ppm. RSL replaced 58 of these in the last reporting period, leaving 50 to be still replaced. RSL has 6 PoleTran units scheduled for replacement with the current padmount standard. These replacements will be made prior to transformer failure due to a lack of available spare parts and to increase the safety of employees and customers. This project is identified and included in the budget in Section 4.5.2.

3.2.3.3 Distribution Transformer Condition Assessment

RSL condition score for distribution transformers is calculated using a rated weighting of variables. The scoring is based on the age, transformer loading (or stress) and a documented visual inspection. This information is not available at this time.

The assessment is based on a scoring from 0-100 ranging from Excellent to Critical. Table 21 cross-references the asset score with a rating and required action.

Table 21 Overall Transformer Assessment

Rating	Asset Score	Description
Excellent	0 – 40	No action required
Good	41 – 70	Re-assess within 5 years
Poor	71 – 85	Replace within 7 years
Critical	85 – 100	Replace immediately

Health:

The three variables used for the assessment were each assigned a range of health scores and an overall weighting per health score. A maximum score would indicate an immediate need for replacement. Table 22 identifies the weighted scaling.

Table 22 Transformer Health Variables

Variable	Rating	Weight	Health Score
Age	1 to 4	5	20
Visual Inspection	1 to 4	5	20
Loading (stress)	1 to 4	15	60

Age:

The RSL distribution system consists of 928 distribution transformers in service that are being tracked in RSL’s GIS system. A meaningful breakdown by age is not possible at this time, since data is available for only 10% of the population. According to RSL’s asset registry, the majority of the units are single phase overhead transformers; some of these are banked for three-phase operation.

RSL does not have a lot of new development and therefore has a very low population of padmount transformers. Three-phase padmount transformers are used as the new standard for larger commercial installations; smaller commercial installations would still likely be supplied by an overhead bank, due to space constraints. All RSL service areas are urban.

RSL does have a small number of PoleTrans; these have been identified in the 5-year plan for replacement, primarily due to a lack of availability of parts in case of failure. As with most of the transformer population, these locations are not overloaded and are not likely to fail due to electrical stress.

The Health Score assigned for the age range for each transformer is identified in Table 23..

Table 23 Transformer Age Rating

Year	Age	Rating
1985 – 2014	0 - 29	1
1970 – 1984	30 – 44	2
1955 – 1969	45 – 59	3
1954 and older	60 +	4

Transformer Loading (Stress)

RSL uses the available Smart Meter Data, linked to their GIS connectivity model to determine the loading on distribution transformers. Table 24 shows the Health Score assigned based on the transformer load, representing the stress or transformer utilization.

Table 24 Transformer Loading Rating

Load (% of rated)	Rating
< 50	1
51 – 74	2
75 – 95	3
>95	4

At this time, loading based on smart meter data linked with RSL's GIS model is available for approximately half of RSL's transformer locations. Based on this information, 95% of these locations are loaded to 50% of the rated capacity or less. In other words, RSL is more likely to replace a transformer for physical or mechanical reasons than for electrical stress.

Also, the current replacement program proposed in this five-year plan is primarily driven by replacement of transformers with PCBs and in areas of work involving replacement of small conductor, as required.

Visual Inspection

RSL visually inspects transformers every three years under the Overhead Visual Inspection and Underground Visual Inspection Programs, as per OEB's DSC requirements, and records and follows-up on any complaints received from customers.

The inspection of transformers includes:

Paint condition and corrosion
Phase indicators and unit numbers match operating map
Leaking oil
Flashed or cracked insulators
Contamination/discolouration of bushings
Ground lead attachments
Damaged disconnect switches or lightning arresters
Ground wire on arresters unattached

In addition, PCB testing has been performed on all units; 108 units have been tested positive, with PCB levels over 50ppm. 75 units have been identified for replacement in the proposed five-year plan and are the main driver for asset replacement in this plan.

The Health Score assigned for issues identified on inspection are identified in Table 25.

Table 25 Transformer Inspection Rating

Inspection Results	Rating
No issues	1
One issue	2
Two issues	3
More than two issues or PCB test >50ppm	4

Overall Health

Although RSL does not have sufficient data to reliably calculate the Health Index for this asset class, RSL has identified a sufficient number of units for replacement in the subject period, consistent with financial constraints and maximum useful life.

3.2.4 Poles

The RSL overhead distribution system is supported by approximately 2000 poles, as recorded in the GIS system. Table 26 below provides a condition by community distribution, based on available information. Only the height, community, species and condition have been recorded historically. Although visual inspection of poles is conducted in accordance with the Distribution System Code, pole testing is only conducted on a select number of poles at this time to confirm their condition.

Table 26 Pole Condition Assessment by Community

	POLE CONDITION					
Community	Bad	Poor	Fair	Good	New	**Grand Total**
Cardinal	2	21	82	148	58	311
Iroquois	1	16	43	123	72	255
Morrisburg	1	16	48	271	71	407
Prescott		36	109	315	212	681
Westport			31	201	27	259
Williamsburg		4	19	54	4	81
Total	4	93	332	1,112	444	1,994

Figure 10 Pole Condition Assessment by Community

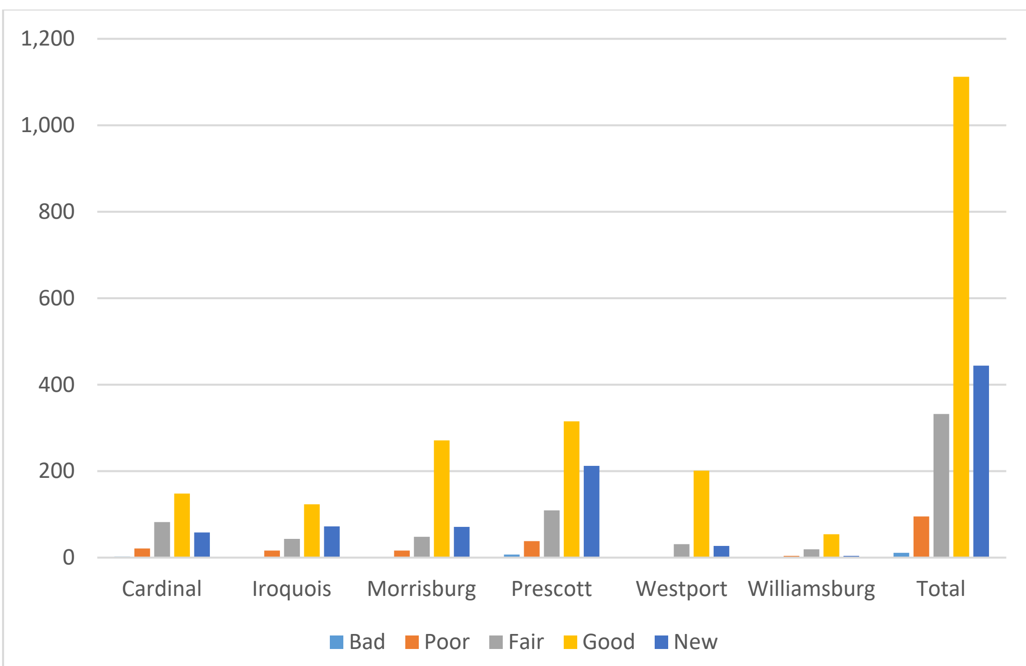


Table 27 Pole Condition Assessment by Pole Type

	POLE CONDITION					
POLE TYPE	Bad	Poor	Fair	Good	New	Grand Total
Cedar	11	82	225	228		546
Pine		13	107	884	444	1,448
Total	**11**	**95**	**332**	**1112**	**444**	**1,994**

Figure 11 Pole Condition Assessment by Pole Type

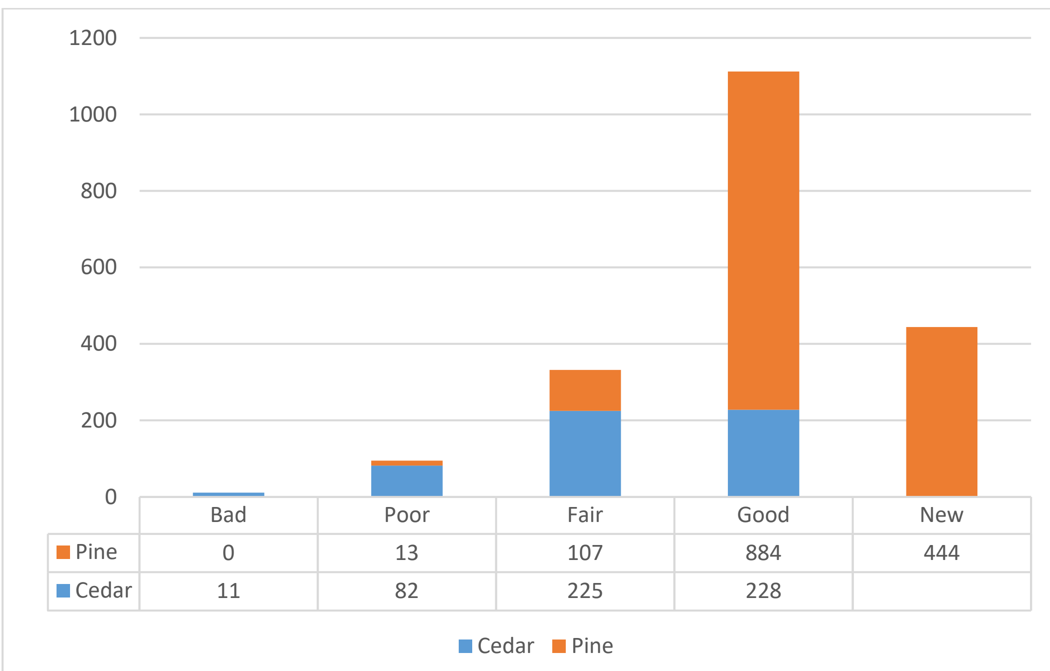
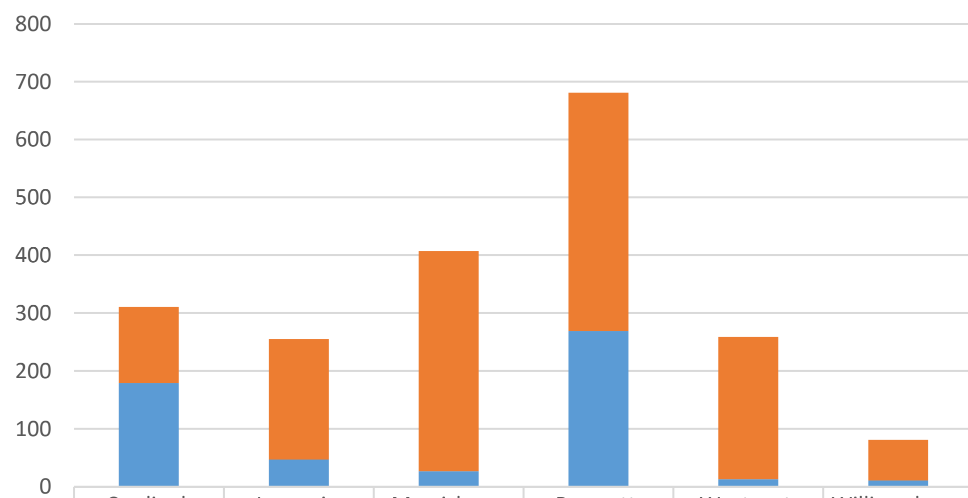


Table 28 Pole Count for Pole Type by Community

Community	Cedar	Pine	Total
Cardinal	179	132	311
Iroquois	47	208	255
Morrisburg	27	380	407
Prescott	269	412	681
Westport	13	246	259
Williamsburg	11	70	81
Total	**546**	**1,448**	**1,994**

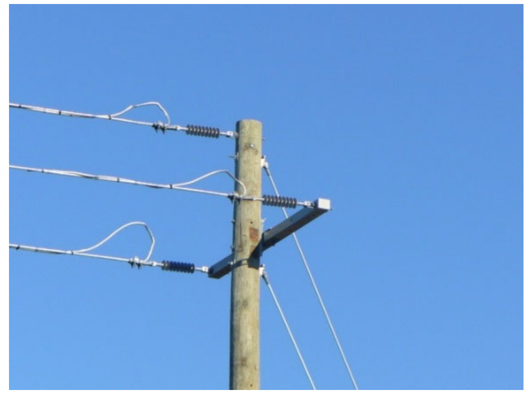
Figure 12 Pole Count for Pole Type by Community



	Cardinal	Iroquois	Morrisburg	Prescott	Westport	Williamsburg
Pine	132	208	380	412	246	70
Cedar	179	47	27	269	13	11

With the implementation of an asset management system, supported by engineering analysis tools, RSL is able to determine which pole assets are under more stress and therefore require more frequent inspection, testing and/or maintenance and ultimately replacement. The RSL 5-year pole replacement plan is prepared accordingly.

Currently, poles that are identified through reports from line patrols as a potential health and safety hazard to the public and staff, are replaced on a high priority basis. Other factors used to determine the priority of the replacements are the equipment supported by the pole and the results of any pole inspections.



RSL's current standard is to purchase treated poles. Historically a large number of cedar poles were used in both Cardinal and Prescott. These poles now represent a large portion of those in bad, poor and fair condition.

It is also recognized that an appropriate replacement program must consider the relationship of the pole asset with other assets in its proximity and within the network system.

Based on the available data and industry norms, RSL anticipates the need to replace approximately 1 - 2.5% of the pole population annually. This activity and the corresponding financial requirements are summarized in Section 4.5.2.

Whenever RSL identifies a pole in need of replacement, several poles in one circuit will be replaced if of similar age. This considers the feeder health over individual components.

The definitions of the pole conditions listed in the charts are as follows:

1 (New) – New poles are those which have been installed in the last few years since age has been recorded. These are expected to survive beyond the next forty-five years.
2 (Good) – Poles in Good condition are those that do not immediately need attention. They may need to be replaced in twenty-one to forty-five years.
3 (Fair) – Poles listed as being in Fair condition should be considered for replacement in eight to twenty years.
4 (Poor/Bad) – Poles listed as being in Poor or Bad condition are those that need to be replaced in the next one to seven years.

The charts above highlight some trends in the pole population:

Cedar poles are most likely older as they make up a larger portion of those poles in either bad or poor condition
Prescott contains the majority of cedar poles in the RSL system and so the majority of poles in poor or bad condition
Going forward the age of poles should be recorded for future planning purposes and assessment

RSL has implemented a pole assessment process based on age, condition, pole utilization and stress, based on a design loading calculation. Data currently available suggests that the majority of our pole population is less than 75% loaded based on design calculations. This data will be completed over time and will assist RSL in future prioritization of pole replacements.

3.2.4.1 Maintenance

RSL currently relies on pole inspections, supported by pole testing where required, to determine the need for pole replacements. As mentioned previously other factors are taken into consideration when planning for future pole replacement.

The stress placed on a pole is important when considering its lifespan; generally, the greater the stress the shorter the lifespan. Poles supporting equipment such as transformers or conductors that are dead-ended or are supporting large angles are typically under more stress. In addition, poles supporting equipment can cause more disruption to the system than lightly used poles if they fail. It is therefore important that they be more closely monitored.

The above pole inspection process has identified the poles to be replaced during the forecast period.

3.2.4.2 Capital

Pole lines with small conductor planned to be replaced typically have older poles, which due to age, may not have the required strength to string the larger conductor. Based on the planned conductor replacement, a number of poles will also be upgraded in the process. This provides better customer service and improves system reliability, while reducing the need for more frequent visits to the same area.

3.2.4.3 Distribution Poles Condition Assessment

RSL condition score for distribution poles is calculated using a rated weighting of variables. The scoring is based on the age, pole loading (or stress) and a documented visual inspection. The assessment is based on a scoring from 0-100 ranging from Excellent to Critical. Table 29 cross-references the asset score with a rating and required action.

Table 29 Overall Pole Assessment

Rating	Asset Score	Description
Excellent	0 – 40	No action required
Good	41 – 70	Re-assess within 5 years
Poor	71 – 85	Replace within 7 years
Critical	85 – 100	Replace immediately

Health:

The three variables used for the assessment were each assigned a range of health scores and an overall weighting per health score. A maximum score would indicate an immediate need for replacement. Table 30 identifies the weighted scaling.

Table 30 Pole Health Variables

Variable	Rating	Weight	Health Score
Age	1 to 4	5	20
Visual Inspection	1 to 4	10	40
Loading (stress)	1 to 4	10	40

Age

The RSL distribution system consists of 1994 poles in service, that are identified and tracked in RSL's GIS system. The Health Score assigned for the age range for each pole is identified in Table 31. Based on the data presented in **Error! Reference source not found.**, 50% of the poles have an age ranking of 2, 21% have a ranking of 1 and 29% have a ranking of 3.

Table 31 Pole Age Rating

Age	Rating
0 - 29	1
30 – 44	2
45 – 55	3
55 +	4

Pole Loading (Stress)

RSL identified the stress the conductors and equipment exert on the pole as a factor to consider when assessing the condition of the pole. The more stress exerted on the pole, the more impact this has on the condition and more likely the pole fibers will deteriorate over time. RSL has calculated the design stress of a number of typical pole configurations used in their system. For the configurations considered, if constructed according to design, the design stress is less than 50%.

Table 32 shows the Health Score assigned based on the pole loading or calculated stress, representing the pole utilization.

Table 32 Pole Loading Rating

Load (% of rated strength)	Rating
< 50	1
51 – 74	2
75 – 95	3
>95	4

Based on the above and the sample calculations, majority of the poles in the RSL system will have a health score of 1 or 2.

Visual Inspection

Line patrols, conducted in accordance with RSL Procedures, include a visual inspection of poles for the following:

Bent, cracked or broken poles
Excessive surface wear or scaling
Loose, cracked or broken cross arms and brackets
Woodpecker or insect damage, bird nests
Loose or unattached guy wires or stubs
Guy strain insulators pulled apart or broken
Guy guards out of position or missing
Grading changes, or washouts
Indications of burning

In addition, pole testing is used to confirm a condition of a pole, as required. The majority of the poles identified for replacement as part of the proposed five-year plan are driven by the replacement of small conductors in rear lots and by PCB transformer replacements. The remainder identified are primarily due to their visibly poor condition. The quantities of replacement of this asset class are consistent with the recommended maximum useful life (MUL) and within the fiscal constraints of this plan.

The Health Score assigned for issues identified on inspection are identified in Table 33.

Table 33 Pole Inspection Rating

Inspection Results	Rating
No issues	1
One issue	2
Two issues	3
More than two issues	4

Overall Health

Although RSL does not have sufficient data to reliably calculate the Health Index for this asset class, RSL has identified a sufficient number of assets for replacement in the subject period, consistent with financial constraints and maximum useful life.

3.2.5 Conductor

The different communities that make up the RSL service area have evolved independently over time, each with its own specific needs and challenges. However most of these communities include some industrial or commercial load. One of the results of this is a few scattered pockets of smaller primary conductors, mostly #2 ACSR. In total, there is approximately 10.8 km of small conductor planned to be replaced over the proposed five-year plan. The replacement of these sections of #2 ACSR have been coordinated with pole and transformer replacements, as required, since the vintage of the assets is similar. This also avoids undue customer interruption and respects the RSL project prioritization criteria.

Table 34 System Voltages by Community

Community	4kV	8kV	44kV	PME
Cardinal	X		X	3x44kV
Iroquois		X		3x44kV
Morrisburg	X		X	1x44kV
Prescott	X		X	2x44kV
Williamsburg		X		1x8kV
Westport		X		1x8kV

Table 35 Stations by Voltage by Community

Community	4kV	8kV
Prescott	4	
Cardinal	2	
Williamsburg		
Westport		
Iroquois		1
Morrisburg	2	

RSL uses existing system analysis tools to assess the conductor needed to balance system requirements, line losses and voltage drop. Analysis tools are also used to determine the appropriate feeder routing for loss optimization. The small conductors (#2 and smaller) identified in each community are typically replaced with the current standard 3/0 and 336 mcm ACSR conductor. This larger conductor provides more operational and expansion flexibility.

Secondary

Although the secondary bus is not always replaced when one customer upgrades their service, should a number of customers supplied by the same transformer upgrade, the secondary would be assessed and replaced based on current standards.

3.2.5.1 Inspection

RSL patrols its entire distribution system every three years, in accordance with RSL Procedures. Distribution system line patrols are tracked using the "*Record of Overhead Inspection*". Line patrols are performed by RSL line staff and contractors, where appropriate. RSL staff inspects the condition of lines whenever they are working in an area.

RSL places a high emphasis on informal inspections. Due to the relatively small size of the distribution system and the employees' intimate knowledge of the system, employees visually inspect much of the system in their day to day activities. This results in any issues identified by these inspections being mitigated on a timely basis or added to the work plan, based on severity and the defined planning process.

The line patrols include a visual inspection of the following:

Conductors and Cables

- Low conductor clearance
- Broken/frayed conductors or tie wires
- Exposed broken ground conductors
- Broken strands, bird caging, and excessive or inadequate sag
- Insulation fraying on secondary

Hardware and Attachments

- Loose or missing hardware
- Insulators unattached from pins
- Conductor unattached from insulators
- Insulators flashed over or obviously contaminated (difficult to see)
- Tie wires unraveled
- Ground wire broken or removed
- Ground wire guards removed or broken

General Conditions and Vegetation

- Leaning or broken "danger" trees
- Growth into line of "climbing" plants
- Accessibility compromised
- Vines or bush growth interference (line clearance)
- Bird or animal nests

RSL performs inspections of the underground distribution system every three years. This inspection is mainly visual, in accordance with RSL procedures and includes:

Pad Mounted Transformers and Switching Kiosks:

- Paint condition and corrosion
- Placement on pad or vault
- Check for lock and penta-bolt in place or damage
- Grading changes
- Access changes (Shrubs, trees etc.)
- Phase indicators and unit numbers match operating map (where used)
- Leaking oil
- Lid Damage, missing bolts, cabinet damage
- Cable connections
- Ground connections
- Nomenclature
- Animal nests/damage
- General Condition

Vegetation and Right of Way:

- Accessibility compromised
- Grade changes that could expose cable
- Excessive vegetation on right of way

3.2.5.2 Maintenance

As part of the regular maintenance plan for the conductor assets, RSL schedules regular tree-trimming activities, as described below.

3.2.5.3 Overhead System - Tree-Trimming

Vegetation and Right of Way control is a requirement under the Minimum Inspection Requirements of the Distribution System Code and good utility practice. RSL's distribution area includes some tourist areas and therefore can be sensitive to tree trimming activities. RSL has a relatively heavy mature tree cover where overhead hydro lines are in proximity to trees.

Tree contact with energized lines can cause the following:

Interruption of power due to short circuit to ground or between phases
Damage to conductors, hardware and poles
Danger to persons and property within the vicinity due to falling conductors, hardware, poles and trees
Danger of electric shock potential from electricity energizing vegetation

Care must be taken to balance the requirements of customers and stakeholders with safe and reliable operation of the distribution system. In general, the three-phase circuit sections require higher reliability and are therefore trimmed on a more frequent basis than the single-phase circuit sections. Tree trimming inspections have been incorporated into the other inspection programs included in this plan and additional checks are performed by work crews in the areas in which regular work is performed.

RSL performs line clearing in accordance with the line clearing practices. Maintenance work plans are prepared as a result of field observations and inspections. All work is scheduled accordingly. To mitigate direct contact between trees and distribution assets, RSL conducts tree trimming in accordance with RSL procedures. Depending on the size, shape and growth aspect of relevant trees, the tree trimmers remove sufficient foliage from the tree to limit the possibility of contact during high wind situations. All debris is removed and the site is returned to as-found condition. Any pole line damage or anomaly noticed by the tree trimming crew is reported to the Operations Manager of RSL for remedial action.

3.2.5.4 Capital

In a recent report released by ESA, concerns have been raised about the possibility of failure of older small conductors, due to aging, stretching and a general weakening under certain installation conditions. The report does not identify these conditions; however, it does recommend the elimination of #6 Cu as a primary conductor and suggests replacement of other small conductors, such as #4 ACSR and #2 ACSR.

RSL currently maintains several kilometers of #2 ACSR in Prescott, Cardinal and Morrisburg. 3/0 ACSR will replace all #2 ACSR in the current 5-year plan and the poles currently supporting the #2 ACSR will be replaced in union with the conductor.

3.2.6 Switches

RSL relies upon 69 switches for control of its 8.32kV and 4.16kV systems. They are distributed between the six communities as follows:

Table 36 Switch Count by Community

Community	4.16kV	8.32kV
Cardinal	14	
Iroquois		7
Morrisburg	18	
Prescott	24	
Westport		4
Williamsburg		2
TOTAL	**56**	**13**

In addition, RSL also operates 9 air-break on the 44kV system, which isolate the 9 stations operated by RSL and 7 15kV rated load-break switches on the 4.16kV system, throughout the six areas. All of these are gang-operated.

3.2.6.1 Inspection

RSL has been conducting annual switch inspections for damage on all gang-operated switches.

Additionally, visual inspections are carried out on all switches as part of the Overhead Visual Inspection Program. These visual inspections occur once every three years and include:

Bent, broken bushings and cut-outs
Damaged lightning arresters
Ground wire on arresters unattached

3.2.6.2 Maintenance

Gang-operated switches are maintained annually. This involves cleaning the contacts and lubricating the moving parts where required. Additional work is performed wherever the above inspections indicate deficiencies.

Non-gang operated switches are maintained when the above visual inspections indicate a requirement.

3.2.7 Metering and Monitoring

RSL currently bills customers as follows:

Electric heat and commercial -- monthly
Residential – Prescott and Westport – monthly
Cardinal, Iroquois, Morrisburg, Williamsburg – bi-monthly

RSL currently operates an Elster Energy Access system, monitored by Olameter and Savage Data Systems as the Operational Data Store.

3.2.7.1 Wholesale

Rideau St. Lawrence Distribution Inc. receives its power from three Hydro One TS locations – Morrisburg, Brockville and Crosby TS. In total, RSL has 11 wholesale metering points as shown in Figure 9.

3.2.7.2 Retail Metering

The RSL customer information is summarized in Table 2. RSL utilizes Elster/Olameter to provide remote meter reading services for smart meters and Utilismart provides meter reading services for large customers. Peterborough Utilities Services Inc. is the Meter Service Provider (MSP).

3.2.7.3 Inspection

All maintenance activities related to meters follow the requirements of Measurement Canada guidelines.

3.2.7.4 Capital

RSL has prepared a budget that should complement its load growth over the next five years. The budget also accounts for an expected number of failures among smart meters each year. RSL has also planned smart meter implementation for General Service customers over 50kW.

3.3 [5.3.3] Asset Lifecycle Optimization Policies and Practices

RSL has integrated Preventative maintenance to optimize lifecycle of assets. The program aims to first improve effectiveness by lowering unplanned outages as they are the most impactful to RSL and customers. Once the Preventative maintenance is effective then drive efficiencies by learning more about the assets and increasing the life of each asset.

Replacements of assets, equipment, or parts are based on the following:

Table 37 Asset Replacement Strategy

Type of Replacement	Description	Examples	Comments
Breakdowns (Undesired)	Unplanned outage where the asset/part needs to be replaced. Or an asset/part does not reach designed service life.	Car knocks over a pole	Most impactful for customer and LDC. Costs are high due to unplanned nature.
Run To Failure	Assets are replaced on an unpredicted timing, but there is a plan for its method of replacement & spares strategy in place	Underground power lines	Underground wires do not fail due to usage or time. Locates prevent hitting the wires. No practical inspection in place.
Usage Based	Assets replaced based on usage.	Line Trucks	Line trucks get evaluated based on km usage and inspection conditions. Many components of trucks are replaced on usage in combination with time.
Time Based	Based on a time frequency	Smart Meters	Calibrated useful life based on time set by regulators. Note many usage-based assets/parts are converted to time for convenience.
Condition Based	Replaced based on certain predefined conditions through inspection eg. Stress.	Station Transformer	Expensive asset and takes lots of time to replace if down. Oil samples are used to predict life.

Note: Parts/Assets are often replaced with a combination of Usage, Time, Condition, and Run to Failure

The lowest impact approach is chosen and sometimes multiple approaches are used to prevent breakdowns for the same asset.

While we continue to develop the preventative maintenance strategy, the approach is mixed practical and hands-on experience by the operations and industry experts. With time based activity, RSL uses information provided in the Kinectrics Inc. Asset Depreciation Study for the OEB published July 8, 2010 and the information stored in the corporate GIS system. RSL is developing written practices and policies, as appropriate, so the organization provides clear and objective direction to staff. This is an important part of succession planning as retirements and personnel changes occur as part of the ongoing activities of the organization.

When RSL was formed, it assumed assets from the six municipal areas, the assets in each area were in varied conditions. Since the acquisitions, the RSL strategy has been more long-term than short-term issue mitigation. The industrial base is changing while developers adjust their building strategies over time. As a result, some RSL assets, due primarily to low stress levels, appear to have a useful life greater than the values suggested by the Kinectrics report cited above. A more formal inspection and assessment process allows RSL to analyze the available information and determine a more meaningful correlation between the asset variables and asset life, thus improving the asset lifecycle optimization policy.

The primary driving force for the projects proposed is safety and reliability: Morrisburg substation project. mitigation of PCB transformers, replacement of small conductors as recommended by the Electrical Safety Authority, and the replacement of unsafe poles. RSL has implemented a number of systems and processes as part of the preparation of this DSP. These include a job costing system, a GIS/asset management system, which includes asset assessment, integration of smart meter data and project prioritization process. These will be validated by the current plan and used to prepare project prioritization and asset replacements for future periods.

RSL carries out the following routine maintenance activities:

Usage Based:

- Utility Trucks

Run To Failure

- Conductors

PoleTrans replacement program
Poles

Time Based:

- Regular vegetation management based on a regular cyclical geographically based schedule as well as input from the routine inspections.
- Load interrupter switch maintenance.
- Switchgear inspection and maintenance
- Routine inspections as required by the DSC.
- Pole Replacement Program
- Smart Meters
- Computer Software

Condition based Maintenance:

- Repair of all deficiencies noted in the routine inspections and any items discovered when operating the system. (Transformers, Substations, Poles)
- Monitoring and reviewing trouble reporting to determine where maintenance is required.
- Oil sampling on distribution station transformers is completed every annually by a third party.
- Distribution transformer replacement program

RSL understands that future asset replacements will be based on the tools newly implemented and described above, integrated with financial realities and constraints.

3.4 [5.3.4] System Capability Assessment for Renewable Energy Generation

As of January 1, 2021, there are no current applications from renewable generators over 10kW for connection in the RSL's service area. For a complete assessment, please refer to Appendix B.

4.0 [5.4] Capital Expenditure Plan

4.1 [5.4.2] Summary

The distribution systems serviced by RSL are isolated from one another and operated independently. Overall, the areas are in good operating condition. The primary driving force for the projects proposed for the forecast period is safety & reliability: Morrisburg substation, mitigation of PCB transformers, replacement of small conductors as recommended by the Electrical Safety Authority, and the replacement of unsafe poles. The plan recognizes the need to maintain ongoing reliability, while leveling of capital and maintenance expenditures.

In this proposed five-year plan, the emphasis for the distribution system rebuilds is on the following:

- Reliable substation operation (Morrisburg, Iroquois)
- Transformer replacements, primarily due to PCBs
- Small conductor replacement
- Pole replacements

The current net capital expenditures, including contributed capital over the forecast period, are shown in Table 38.

Table 38 Capital Expenditures for the Forecast Period

Investment Category	2022	2023	2024	2025	2026	5yr Total
System Access	**$500,000**	**$500,000**	**$-**	**$-**	**$-**	**$1,000,000**
System Renewal	**$335,012**	**$258,443**	**$592,665**	**$537,215**	**$144,936**	**$1,868,271**
System Service	**$-**	**$49,105**	**$-**	**$93,929**	**$150,000**	**$293,033**
General Plant	**$94,000**	**$139,000**	**$89,000**	**$164,000**	**$440,000**	**$926,000**
Total Capital Spending	$929,012	$946,548	$681,665	$795,143	$734,936	$4,087,304

RSL's capital program was developed using information provided by the Asset Management System and the asset inspection and condition assessment process and inspection information provided by a station consultant. The activities by investment category and major projects are summarized below. A materiality factor of $50,000 has been used for the preparation of the detailed project list.

System Access Projects:

- Morrisburg MS2 Relocation

System Renewal Projects:

- Iroquois MS1 – due to condition of Transformer and operational constraint
- Prescott MS1 - replacement of Transformer due to PCB
- Rebuild of various areas to replace small conductor, primarily #2 ACSR, which could become both a safety and operational constraint.
- Overhead transformer replacement program – mostly driven by removal of about 55 PCB transformers.

System Service Projects:

- PoleTran replacement at Kingston Cr.
- New feeder for Prescott MS4 to increase capacity to commercial area.

General Plant Projects:

- Line Truck
- Elster/Olameter
- IVR – voice recognition for service
- Customer Portal/Green Button

RSL coordinates with the IESO and HONI. The HONI and IESO regional planning study is currently in progress with input from local utilities and can be found here:

https://www.hydroone.com/about/corporate-information/regional-plans/st-lawrence

https://www.ieso.ca/en/Get-Involved/Regional-Planning/East-Ontario/St-Lawrence

Currently there have been no projects identified that will require significant investments by RSL.

Another form of regional planning is customer engagement. Based on the results of our customer engagement survey, our customers support RSL's Capital Plan and believe that the replacement of aging infrastructure is important. RSL also meets with municipal owners to coordinate capital projects.

RSL expects its load and its customer base to be stable with very modest growth over the next five years. It does not anticipate any material requirements to make expenditures for REG or Smart Grid projects at this time.

4.2 [5.4.1] Capital Expenditure Planning Process Overview

In managing its distribution system assets, RSL's main objective is to optimize performance of the assets at a reasonable cost with due regard for system reliability, safety, and customer service expectations. RSL is committed to providing our customers with an economical, safe, reliable supply of electricity and helping the six municipal areas become more energy efficient communities in Ontario.

Capital Planning:

RSL's capital plan has been divided into the following categories:

- System Access
- System Renewal
- System Service
- General Plant

System Access investments are modifications (including asset relocation) to a distributor's distribution system. These requirements are generally developer or municipally-driven capital expenditures and are directly related to growth; they are partially funded through capital contributions.

System Renewal investments involve replacing and/or refurbishing system assets to extend their original service life. Historically, RSL has been able to replace aging infrastructure to accommodate growth. Planning has been shifting to accommodate RSL's aging system.

System Service investments are modifications to a distributor's distribution system. RSL has had limited need to invest in this category in the past. Due to some modest growth and some operating limitations in Morrisburg, the proposed plan includes the construction of an additional feeder.

General Plant investments are modifications, replacements, or additions to a distributor's assets that are not part of its distribution system. Historically, this includes vehicles, tools and computer hardware and software.

RSL's Capital Plan process is based on the following inputs and works in conjunction with the asset management process:

Customer/Third Party Demand

These are projects that RSL undertakes to meet customer obligations in accordance with the OEB's DSC and RSL's Conditions of Service. Activities include connecting new residential and general service customers, constructing distribution plant to connect new subdivisions and relocating system plant equipment for roadway reconstruction work. RSL contributes to the cost of these projects using economic evaluation methodology in accordance with the DSC and the provisions of its Conditions of Service for system expansions to determine the level of capital contribution.

Infrastructure Renewal/Replacement

Replacement projects are identified through the asset condition assessment and the projects are completed when it has been determined that the assets have reached the end of their useful life. RSL completes visual inspections of its distribution system and performs predictive testing on certain assets where such testing is available and warranted and replaces assets based on inspection and testing results. In some cases, the projects involve spot replacement of assets. In other cases, the projects involve a system rebuild -- a complete asset replacement within a geographic area. New assets require less maintenance, deliver better reliability and reduce safety risks to the general public.

Capacity

Load growth caused by new customer connections and increased demand of existing customers over time can result in a need for capacity improvements in the system. Projects can take the form of new or upgraded feeders and transformers. These projects are not customer-specific, but rather, they benefit many customers.

Regulatory Requirements

These projects are capital investments which are being driven by regulatory requirements. These requirements may include, among others, directions from the OEB, the IESO and the Ministry of Energy & Infrastructure or the Ministry of Environment. The PCB Regulations (SOR/2008-273) came into force on September 5, 2008, and were amended by the Regulations Amending the PCB Regulations (SOR/2010-57) which came into force March 11, 2010. These regulations prescribe the storage and end-of-use dates and requirements for assets containing PCBs. RSL is working towards the December 31, 2025 deadline for removal of all PCB transformers.

Substation

Substation investments are undertaken to improve or maintain reliability to large numbers of customers and to maintain security and safety at the substations. Substations are also investments which increase capacity in growth areas.

Customer Connections and Metering

Capital expenditures include meter installations, meter upgrades, and the capital components of wholesale and retail meter verification activities.

General Plant Capital Projects

Capital Expenditures include vehicles, tools and computer hardware and software upgrades.

Capitalization Practice

RSL follows IFRS, in particular the IAS 16, Property, Plant and Equipment as well as the guidelines as set out in the OEB Accounting Procedures Handbook.

RSL does not capitalize interest on funds used during the construction of capital projects. In addition, RSL does not capitalize, through internal cost allocations, any indirect administrative support costs such as Finance or Facilities.

RSL's forecasted plan entails capital investments driven by growth and a replacement strategy that is mostly driven by safety and reliability concerns. As shown in section 4.1 [5.4.1] there are only a few proposed capital projects. These specific projects are not directly influenced by any maintenance programs, but rather identified through RSL's asset condition assessment.

RSL has a capital plan that has a relatively small impact on the customer's power bill. However, RSL is sensitive to this impact and attempts to do only what is necessary to be done and also smooth the capital expenditures.

In order to smooth capital expenditures, the projects are reviewed if they can be completed economically over the course of two or more years and what the impact of this smoothing will be to RSL customers. The result may be the same total cost or the total cost may be higher as a result of this smoothing. Also the benefits are only achieved to the extent that the work is completed. This was considered when the developing RSL's asset replacement strategy.

4.3 [5.4.3] System Capability Assessment for Renewable Energy Generation

The RSL distribution system evolved independently in each area serviced. The system components, on the whole, are not stressed in their daily operation and supply of energy to the customer base. The systems are primarily designed to service small urban loads over short distances. Based on this, the systems are in good operational order.

A detailed Renewable Energy Generation Plan is included in Appendix B, indicating the capacity to accommodate new RE projects, by community and feeder. However, HONI has station capacity restrictions, included in Appendix D.

4.4 [5.4.2] Capital Expenditure Summary

The comparative expenditures made by RSL in the capital categories are shown in Table 39.

Table 39 Capital Expenditure Summary 2016 to 2026

CATEGORY	Historical Period (previous plan[1] & actual)								
	2016			2017			2018		
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var
	$ '000		%	$ '000		%	$ '000		%
System Access	162	106	-34.6%		219	--		19	--
System Renewal	217	334	53.9%	389	484	24.4%	390	502	28.7%
System Service			--		-	--	-		--
General Plant	430	40	-90.7%	70	499	612.9%	60	38	-36.7%
TOTAL EXPENDITURE	809	480	-40.7%	459	1,202	161.9%	450	559	24.2%
Capital Contributions	-	- 99	--		- 124	--		- 63	--
Net Capital Expenditures	809	381	-52.9%	459	1,078	134.9%	450	496	10.2%
System O&M	$ 674	$ 678	0.6%	$ 710	$ 814	14.6%	$ 816	$ 753	-7.7%

CATEGORY	Historical Period (previous plan[1] & actual)									Forecast Period (planned)				
	2019			2020			2021			2022	2023	2024	2025	2026
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual[2]	Var					
	$ '000		%	$ '000		%	$ '000		%	$ '000				
System Access		75	--		82	--	-	208	--	500	500	-	-	-
System Renewal	412	425	3.2%	247	542	119.4%	405	555	37.0%	335	258	593	537	145
System Service			--	77		-100.0%			--		49	-	94	150
General Plant	45	71	57.8%	130	136	4.6%	30	81	170.0%	94	139	89	164	440
TOTAL EXPENDITURE	457	571	24.9%	454	760	67.4%	435	844	94.0%	929	946	682	795	735
Capital Contributions		- 139	--		- 176	--		- 400	--	- 200				
Net Capital Expenditures	457	432	-5.5%	834	584	-30.0%	435	444	2.1%	729	946	682	795	735
System O&M	$ 816	$ 806	-1.2%	$ 834	$ 742	-11.0%	$ 796	$ 712	-10.6%	$ 813	$ 829	$ 850	$ 871	$ 893

System Access:

System access jobs are generally customer-driven, unplanned jobs. The only year of the DSP with planned System Access jobs is 2016, as the projects were known at the time of filing.

2016 Variance = (34.6%)

The project for the Westport Sewage Treatment Plant was not completed until 2017, but was in the DSP plan for 2016.

System Renewal:

2016 Variance = 53.9%

The variance in 2016 was due to a few factors. The backup transformer remaining work project was planned at $50,000 but actually cost $90,000. There was an unplanned large transformer replacement in Westport worth $27,000. The rest of the variance is due to a number of small projects that are combined into a miscellaneous job.

2017 Variance = 24.4%

This variance was caused by two factors. First, there was a project for Prescott MS1 to change the main breakers to reclosers. $150,000 was in the DSP for this project. The actual cost was $225,000.

The second part of the variance was caused by moving a the MacKenzie Road project from 2020 to 2017. This project cost $79,000. The project was moved due to other work being done in the area, so it made sense to do the work at the same time to minimize impact on customers.

2018 Variance = 28.7%

The overall spending in this category is higher by $112,000. There were two jobs, William Place, and Orchardway that were completed in 2018 but originally planned for 2016 and 2017. The two jobs added $27,000 to the 2018 total. Two unplanned jobs were completed in 2018: Replacement of a large padmount transformer in Williamsburg ($22,000), and a pole replacement project at Dibble and Edward Streets in Prescott ($23,000). Meter replacements were in the DSP for $21,000, and our actual expense was $82,000. The additional meter costs were related to unplanned data collector replacements.

2020 Variance = 119.4%

There were two large projects that were not planned, as they were not known at the time of creation of the 2016 DSP. The Bell Fibre To Home project cost $166,000 in 2020 and will continue in 2021 and 2022. In addition a large unplanned project was completed at Fifth Street in Morrisburg in the amount of $49,000.

System Service:

2020 Variance = (100%)

A project was planned for the installation of a new feeder at MS#2 in Morrisburg. This project was not done, due to other priorities plus the knowledge that there would be substantial station work over the next few years. This project is still on our list of potential projects, but has not been assigned a year within the five-year period of the new DSP.

General Plant

2016 Variance = (90.7%)

The variance was caused by the delay in delivery of a POSI digger truck. It was scheduled to be delivered in 2016, and as such was in the DSP. The truck was delivered in 2017.

2017 Variance = 612.9%

The variance in 2017 is the opposite of what happened in 2016. The POSI digger truck was delivered in 2017 instead of in 2016.

2018 Variance = (36.7%)

Part of the General Plan budget for 2018 was $35,000 for the replacement of the Server that stores our Customer Billing and Financial software. The purchase was delayed until 2020, as the existing server was still working well.

2019 Variance = 57.8%

The variance was due to an unplanned software purchase. Elster notified RSL that the software used to retrieve smart meter readings needed to be upgraded. It was a mandatory, unexpected purchase in the amount of $46,000.

4.5 [5.4.3] Justifying Capital Expenditures

4.5.1 [5.4.3.1] Overall Plan

The comparative expenditures by category for the historical and forecast periods are shown in the table below.

Table 40 Capital Expenditure Summary 2016 to 2026

CATEGORY	Historical Period (previous plan[1] & actual)																		Forecast Period (planned)				
	2016			2017			2018			2019			2020			2021			2022	2023	2024	2025	2026
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual[2]	Var					
	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000				
System Access	162	106	-34.6%		219	--		19	--		75	--		82	--	-	208	--	500	500	-	-	-
System Renewal	217	334	53.9%	389	484	24.4%	390	502	28.7%	412	425	3.2%	247	542	119.4%	405	555	37.0%	335	258	593	537	145
System Service			--		-	--	-		--			--	77		-100.0%			--		49	-	94	150
General Plant	430	40	-90.7%	70	499	612.9%	60	38	-36.7%	45	71	57.8%	130	136	4.6%	30	81	170.0%	94	139	89	164	440
TOTAL EXPENDITURE	809	480	-40.7%	459	1,202	161.9%	450	559	24.2%	457	571	24.9%	454	760	67.4%	435	844	94.0%	929	946	682	795	735
Capital Contributions	-	- 99	--		- 124	--		- 63	--		- 139	--		- 176	--		- 400	--	- 200				
Net Capital Expenditures	809	381	-52.9%	459	1,078	134.9%	450	496	10.2%	457	432	-5.5%	834	584	-30.0%	435	444	2.1%	729	946	682	795	735
System O&M	$ 674	$ 678	0.6%	$ 710	$ 814	14.6%	$ 816	$ 753	-7.7%	$ 816	$ 806	-1.2%	$ 834	$ 742	-11.0%	$ 796	$ 712	-10.6%	$ 813	$ 829	$ 850	$ 871	$ 893

It is the policy of the company to maintain strong financial control over expenditures for capital assets by evaluating and approving capital projects that enhance or improve the efficiency of the Company's assets.

Capital Assets include property, plant, and equipment provided they are held for use in the production or supply of goods and services. A capital expenditure must provide a benefit lasting beyond one year. Capital expenditures also include the improvement or "betterment" of existing assets. Intangible assets are also considered capital assets and are identified as assets that lack physical substance.

A "betterment" is a cost which enhances the service potential of a capital asset and is therefore capitalized. A "betterment" includes increasing the capacity of the asset, lowering associated operating costs, improving the quality of output or extending the asset useful life. This enhancement can result in an increase in physical output or service capacity, a decrease to operating costs, extension of the useful life of the asset, or improvement in the quality of the asset's output. Service potential may be enhanced when there is an increase in physical output or service capacity, associated operating costs are lowered, the useful life is extended, or the quality of output is improved. For example, a refurbished transformer in which the service potential has been enhanced should be capitalized. Further, if during an underground fault repair, the work results in a reconfiguration of the asset that will clearly benefit future periods, there may be an argument to capitalize the work.

REPAIR

A repair is a cost incurred to maintain the service potential of a capital asset. Expenditures for repairs are expensed to the current operating period. Expenditures for repairs and/or maintenance designed to maintain an asset in its original state are not capital expenditures and should be charged to an operating account.

MATERIALITY

The amount to be capitalized is the cost to acquire or construct a capital asset, including any ancillary cost incurred to place a capital asset into its intended state of operation.

Assets that are expected to provide future economic benefit greater than one year will be capitalized.

4.5.2 [5.4.3.2] Material Investments

This section lists the material projects ($50,000 and over) by year from 2022 to 2026. For each year, a write-up of the project can be found in Appendix A.

APPENDIX A – Material Projects 2022 - 2026

2022

MATERIAL PROJECTS

Project Year	2022
Investment Category	System Renewal
Project Number	CP2202
Community	All Areas
Project Title	PCB Transformer Replacements (15)

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	24
1835 - OH Wires	$ -	Environment	16
1850 - Tx	$ 58,698.41	Customer Value	20
1855 - Services	$ -	Economic Dev	0
1860 - Meters	$ -	Co-ordination	16
		Security	0
TOTAL	**$ 58,698.41**	**Total Score**	**76**

Project Description

This project is to replace approximately 60 transformers containing PCB oil over the 5-year forecast period – 15 will be replaced in 2022. RSL has approximately 60 transformers remaining on the system, containing PCB oil over 50ppm, the limit set by the Ministry of the Environment. Majority are smaller sized transformers, 50kVA and smaller. RSL will dispose of these units and replace them with current standard units, typically 50kVA and up.

Safety

The main driver for the replacement of these units is safety. The Ministry of the Environment has mandated the removal of any active equipment containing PCBs from the system by December 31, 2025. The removal of this equipment from the RSL system reduces possible employee and public exposure to PCB's. In RSL, equipment containing PCBs is older and has reached its Typical Useful Life (TUL). As such, it is likely that additional maintenance would be required to keep these units in working order. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

Removal of PCB transformers from the RSL distribution system will reduce the potential for a PCB oil spill.

Efficiency, Customer Value, Reliability

Based on field conditions, the transformer replacement may provide an opportunity to consolidate loads with neighbouring units and replace two transformers with one. This should reduce the losses associated with transformers on the RSL distribution system. Service reliability will also be maintained by installing new transformers.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities, customers and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

RIDEAU ST. LAWRENCE DISTRIBUTION INC.	**Project Year**	2022
	Investment Category	System Renewal
	Project Number	CP2207
	Community	Morrisburg
	Project Title	High St - Small Conductor (Bell FTTH)

Account No	Amount	OEB Category	Rating
1830 - Poles	$ 29,526.07	Safety	24
1835 - OH Wires	$ 11,847.73	Environment	0
1850 - Tx	$ -	Customer Value	20
1855 - Services	$ 11,600.00	Economic Dev	0
		Co-ordination	12
		Security	0
TOTAL	**$ 52,973.80**	**Total Score**	**56**

Project Description

Small conductor, defined as #2 and smaller, has been identified by ESA as unsafe. Some utilities will not allow their workers to work on a pole with small conductor, unless de-energized, thus causing an interruption to customer service. This conductor is part of an older design standard and may also break easier in high winds. This area was constructed in the late 50's. Most assets have reached their Typical Useful Life (TUL) and have a poor visual inspection rating. Replacement will be in accordance with current RSL standards.

This project is designed to replace the #4 Solid Cu primary conductor in accordance with the safety recommendations of ESA. While replacing approximately 350m of primary, 9 poles will be replaced along with 28 services.

Safety

Currently, to work on this line section, an outage is always required for worker safety. This project will enhance safety since the current #4 solid Cu conductor will be replaced by our current standard 1/0 ACSR, based on loading in this area. The poles will also be replaced with new poles which will meet current standards for ice and wind loading and better support the joint use requirements. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

This is not applicable to this project

Efficiency, Customer Value, Reliability

The main driver of the conductor replacement program is aging infrastructure, which affects the system reliability. There is a risk of plant failing in service and creating outages for customers. This is intensified if there are severe weather conditions such as high winds or ice loading. Transformers will also be placed at the street, whenever possible, to assist with power restoration during outage situations.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

RIDEAU ST. LAWRENCE DISTRIBUTION INC.	**Project Year**	2022
	Investment Category	System Access
	Project Number	CP2211
	Community	Morrisburg
	Project Title	Morrisburg MS - Relocate Phase 1

Account No	Amount	OEB Category	Rating
1820 - Station	$ 500,000.00	Safety	12
1845 - Primary	$ -	Environment	12
1850 - Tx	$ -	Customer Value	20
1855 - Services	$ -	Economic Dev	8
		Co-ordination	16
		Security	2
TOTAL	**$ 500,000.00**	**Total Score**	**70**

Project Description
An additional feeder is required to supply the demand in the community and provide reasonable reliability. Due to the current location of the station, near the boundary, this project will relocate the station closer to the load center. The cost of expanding the current site is comparable to the cost of bringing a new feeder from the existing location.

Safety
The proposed expansion reduces number of station sites, thus improving operational safety during back-up and maintenance operations.

Environment
There will be a lower impact expanding the existing MS site than bringing an additional feeder from edge of town.

Efficiency, Customer Value, Reliability
Expanding the station near the load center will provide better operating efficiency and flexibility, improved reliability, resulting in better customer value and customer service.

Economic Dev
This is not applicable to this project

Co-ordination
This project will be co-ordinated with the municipality, Hydro One and affected utilities, as required. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project

2023

MATERIAL PROJECTS

	Project Year	2023
RIDEAU ST. LAWRENCE DISTRIBUTION INC.	Investment Category	System Renewal
	Project Number	CP2302
	Community	All Areas
	Project Title	PCB Transformer Replacements (15)

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	24
1835 - OH Wires	$ -	Environment	16
1850 - Tx	$ 58,698.41	Customer Value	20
1855 - Services	$ -	Economic Dev	0
1860 - Meters	$ -	Co-ordination	16
		Security	0
TOTAL	**$ 58,698.41**	**Total Score**	**76**

Project Description

This project is to replace approximately 60 transformers containing PCB oil over the 5-year forecast period – 15 will be replaced in 2023. RSL has approximately 60 transformers remaining on the system, containing PCB oil over 50ppm, the limit set by the Ministry of the Environment. Majority are smaller sized transformers, 50kVA and smaller. RSL will dispose of these units and replace them with current standard units, typically 50kVA and up.

Safety

The main driver for the replacement of these units is safety. The Ministry of the Environment has mandated the removal of any active equipment containing PCBs from the system by December 31, 2025. The removal of this equipment from the RSL system reduces possible employee and public exposure to PCB's. In RSL, equipment containing PCBs is older and has reached its Typical Useful Life (TUL). As such, it is likely that additional maintenance would be required to keep these units in working order. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

Removal of PCB transformers from the RSL distribution system will reduce the potential for a PCB oil spill.

Efficiency, Customer Value, Reliability

Based on field conditions, the transformer replacement may provide an opportunity to consolidate loads with neighbouring units and replace two transformers with one. This should reduce the losses associated with transformers on the RSL distribution system. Service reliability will also be maintained by installing new transformers.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities, customers and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

Project Year	2023
Investment Category	System Renewal
Project Number	CP2303
Community	Cardinal
Project Title	Hwy 2 E - replace small conductor

Account No	Amount
1830 - Poles	$ 29,473.41
1835 - OH Wires	$ 13,750.49
1850 - Tx	$ 3,913.23
1855 - Services	$ 7,200.00
TOTAL	**$ 54,337.13**

OEB Category	Rating
Safety	24
Environment	0
Customer Value	20
Economic Dev	0
Co-ordination	12
Security	0
Total Score	**56**

Project Description

Small conductor, defined as #2 and smaller, has been identified by ESA as unsafe. Some utilities will not allow their workers to work on a pole with small conductor, unless de-energized, thus causing an interruption to customer service. This conductor is part of an older design standard and may also break easier in high winds. This area was constructed in the late 50's. Most assets have reached their Typical Useful Life (TUL) and have a poor visual inspection rating. Replacement will be in accordance with current RSL standards.

This project is designed to replace the #4 ACSR primary conductor in accordance with the safety recommendations of ESA. While replacing approximately 500m of primary with 3/0 ACSR, 10 poles will be replaced along with 1 transformer.

Safety

This project will enhance safety since the current #4 ACSR conductor will be replaced by our current standard 1/0 ACSR, based on loading in this area. The poles will also be replaced with new poles which will meet current standards for ice and wind loading and better support the joint use requirements. Part of the line is on Hydro One joint use poles. Currently, to work on this line section, an outage is always required for worker safety. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

This is not applicable to this project

Efficiency, Customer Value, Reliability

The main driver of the conductor replacement program is aging infrastructure, which affects the system reliability. There is a risk of plant failing in service and creating outages for customers. This is intensified if there are severe weather conditions such as high winds or ice loading. Transformers will also be placed at the street, whenever possible, to assist with power restoration during outage situations.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipality, Hydro One and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

Project Year	2023
Investment Category	System Access
Project Number	CP2311
Community	Morrisburg
Project Title	Morrisburg MS - Relocate Phase 2

Account No	Amount
1820 - Station	$ 500,000.00
1845 - Primary	$ -
1850 - Tx	$ -
1855 - Services	$ -
TOTAL	**$ 500,000.00**

OEB Category	Rating
Safety	12
Environment	12
Customer Value	20
Economic Dev	8
Co-ordination	16
Security	2
Total Score	**70**

Project Description

An additional feeder is required to supply the demand in the community and provide reasonable reliability. Due to the current location of the station, near the boundary, this project will relocate the station closer to the load center. The cost of expanding the current site is comparable to the cost of bringing a new feeder from the existing location.

Safety

The proposed expansion reduces number of station sites, thus improving operational safety during back-up and maintenance operations.

Environment

There will be a lower impact expanding the existing MS site than bringing an additional feeder from edge of town.

Efficiency, Customer Value, Reliability

Expanding the station near the load center will provide better operating efficiency and flexibility, improved reliability, resulting in better customer value and customer service.

Economic Dev

This is not applicable to this project

Co-ordination

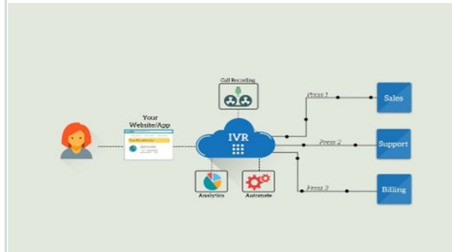
This project will be co-ordinated with the municipality, Hydro One and affected utilities, as required. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

	Project Year	2023
	Investment Category	General Plant
	Project Number	CP2313
	Community	RSL Office
	Project Title	IVR System

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	0
1835 - OH Wires	$ -	Environment	0
1850 - Tx	$ -	Customer Value	0
1611 - Comp SW	$ 50,000.00	Economic Dev	0
		Co-ordination	0
		Security	0



Project Description
Interactive Voice Response ('IVR') systems are used by businesses to provide both incoming and outgoing communication functionality for its customers. The IVR software connects with the LDC telephone system and the Customer Information System ('CIS'). The incoming functionality allows our customers to retrieve information about their account balance. In some IVR systems, the customer is able to pay their bills by phone. This will require coordination with a third-party payment processing company.

The external functionality will provide the ability to send phone messages for customers. The messages can be related to planned power outages, other customer service messages, and collections.

IVR systems have been in use by LDCs for many years and are considered a normal and important aspect of customer service and engagement.

Safety
NA

Environment
Implementation of an IVR system will potentially save on paper and gas, currently required with the manual processes.

Efficiency, Customer Value, Reliability
An IVR system would replace the current need for manual processes, such as planned power outage notice delivery.

Economic Dev
This is not applicable to this project

Co-ordination
This project may require coordination with a third-party payment processing company and other software integration vendors, depending on the extent of automation and implementation. This project is not affected by regional or municipal plans.

Security
Implementation of an IVR system will not impact the security of existing systems.

2024

MATERIAL PROJECTS

	Project Year	2024
	Investment Category	System Renewal
	Project Number	CP2402
	Community	All Areas
	Project Title	PCB Transformer Replacements (15)

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	24
1835 - OH Wires	$ -	Environment	16
1850 - Tx	$ 58,698.41	Customer Value	20
1855 - Services	$ -	Economic Dev	0
1860 - Meters	$ -	Co-ordination	16
		Security	0
TOTAL	**$ 58,698.41**	**Total Score**	**76**

Project Description
This project is to replace approximately 60 transformers containing PCB oil over the 5-year forecast period – 15 will be replaced in 2024. RSL has approximately 60 transformers remaining on the system, containing PCB oil over 50ppm, the limit set by the Ministry of the Environment. Majority are smaller sized transformers, 50kVA and smaller. RSL will dispose of these units and replace them with current standard units, typically 50kVA and up.

Safety
The main driver for the replacement of these units is safety. The Ministry of the Environment has mandated the removal of any active equipment containing PCBs from the system by December 31, 2025. The removal of this equipment from the RSL system reduces possible employee and public exposure to PCB's. In RSL, equipment containing PCBs is older and has reached its Typical Useful Life (TUL). As such, it is likely that additional maintenance would be required to keep these units in working order. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment
Removal of PCB transformers from the RSL distribution system will reduce the potential for a PCB oil spill.

Efficiency, Customer Value, Reliability
Based on field conditions, the transformer replacement may provide an opportunity to consolidate loads with neighbouring units and replace two transformers with one. This should reduce the losses associated with transformers on the RSL distribution system. Service reliability will also be maintained by installing new transformers.

Economic Dev
This is not applicable to this project

Co-ordination
This project will be co-ordinated with the municipalities, customers and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project

Project Year	2024
Investment Category	System Renewal
Project Number	CP2403
Community	Iroquois
Project Title	Church St S side rear lot Bay St to Elizabeth Dr - rebuild

Account No	Amount
1830 - Poles	$ 64,280.36
1835 - OH Wires	$ 17,788.93
1850 - Tx	$ 11,739.68
1855 - Services	$ 19,000.00
TOTAL	**$ 112,808.97**

OEB Category	Rating
Safety	18
Environment	8
Customer Value	20
Economic Dev	0
Co-ordination	12
Security	0
Total Score	**58**

Project Description
This project is designed to replace the #2 Cu stranded primary conductor and #2 Cu secondary bus in accordance with the safety recommendations of ESA. While replacing approximately 375m of primary, 14 poles will be replaced along with 3 transformers, 700m of secondary and 42 services. These areas were constructed in the late 50's. Most assets have reached their Typical Useful Life (TUL) and have a poor visual inspection rating. Replacement will be in accordance with current RSL standards.

Safety
Currently, to work on this line section, an outage is always required for worker safety; due to the age of the equipment, the system is only worked on de-energized for worker safety. This project will enhance safety since the current #2 Cu conductor will be replaced by the current standard, typically 1/0 ACSR, based on loading in this area. The poles will also be replaced with new poles which will meet current standards for ice and wind loading and better support the joint use requirements. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment
These projects will be completed primarily during the winter months to reduce the impact on customers' properties. Any equipment, such as transformers, will be relocated to the street for improved access and reduce the need to impact customer properties.

Efficiency, Customer Value, Reliability
The main driver of the conductor replacement program is aging infrastructure, which affects the system reliability. There is a risk of plant failing in service and creating outages for customers. This is intensified if there are severe weather conditions such as high winds or ice loading. Transformers will also be placed at the street, whenever possible, to assist with power restoration during outage situations.

Economic Dev
This is not applicable to this project

Co-ordination
This project will be co-ordinated with the municipalities and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project.

RIDEAU ST. LAWRENCE DISTRIBUTION INC.	**Project Year**	2024
	Investment Category	System Renewal
	Project Number	CP2410
	Community	Prescott
	Project Title	MS#1 - Transformer Replacement

Account No	Amount	OEB Category	Rating
1820 - Station	$ 250,000.00	Safety	12
1845 - Primary	$ -	Environment	16
1850 - Tx	$ -	Customer Value	10
1855 - Services	$ -	Economic Dev	8
		Co-ordination	4
		Security	2
TOTAL	**$ 250,000.00**	**Total Score**	**52**

Project Description

Prescott MS#1 was built in 1965. During the recent routine maintenance, the oil test was positive for PCBs. Due to the age of the transformer and increased load in the Prescott community, this transformer will be replaced with a 5MVA. This has been established as the new station standard size.

Safety

The age of the transformer, along with the positive PCB test pose a possible safety risk, in case of an oil leak (aging gaskets/seals).

Environment

Replacing the transformer with a new non-PCB transformer reduces the environmental risk of a possible oil leak or spill.

Efficiency, Customer Value, Reliability

The main driver for the replacement of the station transformer is aging infrastructure. With newer equipment, worker safety will be improved for regular maintenance and reliability will be improved.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipality, Hydro One and affected utilities, as required. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

Project Year	2024
Investment Category	General Plant
Project Number	CP2412
Community	RSL Office
Project Title	Elster/Olameter Smart Meter Software Upgrade

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	0
1835 - OH Wires	$ -	Environment	0
1850 - Tx	$ -	Customer Value	0
1611 - Comp SW	$ 50,000.00	Economic Dev	0
		Co-ordination	0
		Security	0
TOTAL	**$ 50,000.00**	**Total Score**	**0**

Project Description

RSL uses Elster and their partner Olameter to provide smart meter data retrieval service. As with all software and hardware, updates and upgrades occur from time to time. It is expected that within the five-year window of the DSP that the software will change to reflect changes to the operating environment for the smart meters and technology in general.

Safety

This is not applicable to this project

Environment

This is not applicable to this project

Efficiency, Customer Value, Reliability

This is not applicable to this project

Economic Dev

This is not applicable to this project

Co-ordination

This is not applicable to this project

Security

This is not applicable to this project.

2025

MATERIAL PROJECTS

	Project Year	2025
RIDEAU ST. LAWRENCE DISTRIBUTION INC.	Investment Category	System Renewal
	Project Number	CP2502
	Community	All Areas
	Project Title	PCB Transformer Replacements (15)

Account No	Amount	OEB Category	Rating
1830 - Poles	$ -	Safety	24
1835 - OH Wires	$ -	Environment	16
1850 - Tx	$ 58,698.41	Customer Value	20
1855 - Services	$ -	Economic Dev	0
1860 - Meters	$ -	Co-ordination	16
		Security	0
TOTAL	**$ 58,698.41**	**Total Score**	**76**

Project Description

This project is to replace approximately 60 transformers containing PCB oil over the 5-year forecast period – 15 will be replaced in 2025. RSL has approximately 60 transformers remaining on the system, containing PCB oil over 50ppm, the limit set by the Ministry of the Environment. Majority are smaller sized transformers, 50kVA and smaller. RSL will dispose of these units and replace them with current standard units, typically 50kVA and up.

Safety

The main driver for the replacement of these units is safety. The Ministry of the Environment has mandated the removal of any active equipment containing PCBs from the system by December 31, 2025. The removal of this equipment from the RSL system reduces possible employee and public exposure to PCB's. In RSL, equipment containing PCBs is older and has reached its Typical Useful Life (TUL). As such, it is likely that additional maintenance would be required to keep these units in working order. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

Removal of PCB transformers from the RSL distribution system will reduce the potential for a PCB oil spill.

Efficiency, Customer Value, Reliability

Based on field conditions, the transformer replacement may provide an opportunity to consolidate loads with neighbouring units and replace two transformers with one. This should reduce the losses associated with transformers on the RSL distribution system. Service reliability will also be maintained by installing new transformers.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities, customers and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

RIDEAU ST. LAWRENCE DISTRIBUTION INC.		
	Project Year	2025
	Investment Category	System Renewal
	Project Number	CP2503
	Community	Morrisburg
	Project Title	Kyle St S side rear lot Farlinger Ave to Laurier - rebuild

Account No	Amount
1830 - Poles	$ 58,871.82
1835 - OH Wires	$ 16,501.36
1850 - Tx	
1855 - Services	$ 17,000.00
TOTAL	**$ 92,373.18**

OEB Category	Rating
Safety	18
Environment	8
Customer Value	20
Economic Dev	0
Co-ordination	12
Security	0
Total Score	**58**

Project Description
This project is designed to replace the #2 Cu stranded primary conductor and #2 Cu secondary bus in accordance with the safety recommendations of ESA. While replacing approximately 900m of primary, 15 poles will be replaced along with 30 services. These areas were constructed in the late 50's. Most assets have reached their Typical Useful Life (TUL) and have a poor visual inspection rating. Replacement will be in accordance with current RSL standards.

Safety
Currently, to work on this line section, an outage is always required for worker safety; due to the age of the equipment, the system is only worked on de-energized for worker safety. This project will enhance safety since the current #2 Cu conductor will be replaced by the current standard, typically 1/0 ACSR, based on loading in this area. The poles will also be replaced with new poles which will meet current standards for ice and wind loading and better support the joint use requirements. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment
These projects will be completed primarily during the winter months to reduce the impact on customers' properties. Any equipment, such as transformers, will be relocated to the street for improved access and reduce the need to impact customer properties.

Efficiency, Customer Value, Reliability
The main driver of the conductor replacement program is aging infrastructure, which affects the system reliability. There is a risk of plant failing in service and creating outages for customers. This is intensified if there are severe weather conditions such as high winds or ice loading. Transformers will also be placed at the street, whenever possible, to assist with power restoration during outage situations.

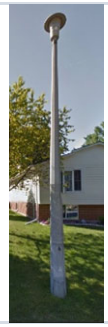
Economic Dev
This is not applicable to this project

Co-ordination
This project will be co-ordinated with the municipalities and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project.

	Project Year	2025
RIDEAU ST. LAWRENCE DISTRIBUTION INC.	Investment Category	System Renewal
	Project Number	CP2504
	Community	Prescott
	Project Title	Kingston Cres - replace Pole Tran with padmount

Account No	Amount	OEB Category	Rating
1840 - UG Conduit	$ 28,750.00	Safety	24
1845 - Primary	$ 32,825.73	Environment	16
1850 - Tx	$ 32,352.91	Customer Value	20
1855 - Services	$ -	Economic Dev	0
		Co-ordination	12
		Security	0
TOTAL	**$ 93,928.64**	**Total Score**	**72**




Project Description

This project is designed to replace four Pole Tran transformers with a padmount transformer of similar size. RSL will take the opportunity to prepare a loading study to size the replacement transformer accordingly.

Safety

Pole Trans are an older design, combining a transformer inside a streetlight pole. Due to the tight working space, this represents a potential safety hazard to the worker and does not conform to today's RSL equipment standards. Replacement parts are also not available. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

This is not applicable to this project

Efficiency, Customer Value, Reliability

The main driver for the replacement of the pole trans is aging infrastructure, which potentially affects the system reliability. Although a potential outage would likely be localized, due to lack of replacement components, the outage duration could potentially be long.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project

RIDEAU ST. LAWRENCE DISTRIBUTION INC.		
	Project Year	2025
	Investment Category	System Renewal
	Project Number	CP2509
	Community	Iroquois
	Project Title	MS 1 - Transformer Replacement

Account No	Amount	OEB Category	Rating
1820 - Station	$ 250,000.00	Safety	12
1845 - Primary	$ -	Environment	0
1850 - Tx	$ -	Customer Value	20
1855 - Services	$ -	Economic Dev	16
		Co-ordination	16
		Security	0
TOTAL	**$ 250,000.00**	**Total Score**	**64**

Project Description
The community of Iroquois is supplied by a single station transformer. A second transformer was installed in 2017 to provide back-up and improve the reliability of supply to this community. The new transformer has become the main supply, with the old being the back-up and requiring an update

Safety
The Iroquois MS was built in 1953 – some of the components are aged and may be replaced with newer current standard equipment, thus improving worker safety.

Environment
This is not applicable to this project

Efficiency, Customer Value, Reliability
The main driver for the installation of a second transformer is reliability – a need to have a back-up supply to perform maintenance on the existing equipment, without undue loss of supply to customers. This will also ensure that the existing system reliability is maintained. The loss of a single transformer would potentially imply a long outage to the entire community

Economic Dev
The new transformer will provide the benefit of improved flexibility to accommodate the potential for economic development. No new development projects have currently been identified for Iroquois.

Co-ordination
This project will be co-ordinated with the municipality, Hydro One and affected utilities, as required. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project

2026

MATERIAL PROJECTS

RIDEAU ST. LAWRENCE DISTRIBUTION INC.

Project Year	2026
Investment Category	System Renewal
Project Number	CP2603
Community	Prescott
Project Title	Roberta Cres - Pole Replacement

Account No	Amount
1830 - Poles	$ 25,140.18
1835 - OH Wires	$ 18,139.00
1850 - Tx	$ 3,913.23
1855 - Services	$ 3,000.00
TOTAL	**$ 50,192.41**

OEB Category	Rating
Safety	24
Environment	4
Customer Value	10
Economic Dev	8
Co-ordination	4
Security	0
Total Score	**50**

Project Description

Small conductor, defined as #2 and smaller, has been identified by ESA as unsafe. Some utilities will not allow their workers to work on a pole with small conductor, unless de-energized, thus causing an interruption to customer service. This conductor is part of an older design standard and may also break easier in high winds. This area was constructed in the late 50's. Most assets have reached their Typical Useful Life (TUL) and have a poor visual inspection rating. Replacement will be in accordance with current RSL standards.

This project is designed to replace the #2 Cu stranded primary conductor and #2 Cu secondary bus in accordance with the safety recommendations of ESA. While replacing approximately 525m of primary, 10 poles will be replaced along with 1 new transformer, 525m of secondary and 10 services.

Safety

Currently, to work on this line section, an outage is always required for worker safety; due to the age of the equipment, the system is only worked on de-energized for worker safety. This project will enhance safety since the current #4 Cu conductor will be replaced by the current standard, typically 3/0 Poly ACSR (due to heavily treed rear lot), based on loading in this area. The poles will also be replaced with new poles which will meet current standards for ice and wind loading and better support the joint use requirements. The installation work will be completed according to RSL standards and Ontario regulation 22/04 to ensure no undue safety hazards. The work will be inspected by RSL staff and signed off as safe prior to energization.

Environment

These projects will be completed primarily during the winter months to reduce the impact on customers' properties. Any equipment, such as transformers, will be relocated to the street for improved access and reduce the need to impact customer properties.

Efficiency, Customer Value, Reliability

The main driver of the conductor replacement program is aging infrastructure, which affects the system reliability. There is a risk of plant failing in service and creating outages for customers. This is intensified if there are severe weather conditions such as high winds or ice loading. Transformers will also be placed at the street, whenever possible, to assist with power restoration during outage situations.

Economic Dev

This is not applicable to this project

Co-ordination

This project will be co-ordinated with the municipalities and affected utilities. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security

This is not applicable to this project.

	Project Year	2026
	Investment Category	System Access (Service)
	Project Number	CP2602
	Community	Prescott
	Project Title	MS#4 - New Feeder - Boundary St to Commercial Area

Account No	Amount	OEB Category	Rating
1820 - Station	$ 150,000.00	Safety	6
1845 - Primary	$ -	Environment	4
1850 - Tx	$ -	Customer Value	20
1855 - Services	$ -	Economic Dev	16
		Co-ordination	16
		Security	0
TOTAL	**$ 150,000.00**	**Total Score**	**62**

Project Description
The major commercial area on the north end of Prescott currently has a single point of supply with no back-up. The proposed feeder would provide a second feeder from a second station for improved reliability to this site and also allow for possible expansion.

Safety
This project poses minimal safety impact.

Environment
Although a new pole line is required, it would be built on an existing right-of way, with minimal environmental impact.

Efficiency, Customer Value, Reliability
The additional feeder would provide improved reliability to a commercially sensitive area (main food store in town) and also offer possible commercial expansion.

Economic Dev
The new feeder would allow for new economic development to be considered.

Co-ordination
This project will be co-ordinated with the municipality, Hydro One and affected utilities, as required. RSL works closely with all authorities involved to maintain project coordination and avoid unnecessary costs. This project is not affected by regional or municipal plans.

Security
This is not applicable to this project

	Project Year	2026
	Investment Category	Transportation Equipment
	Project Number	
	Community	RSL Fleet
	Project Title	Service Truck Replacement

Account No	Amount	OEB Category	Rating
1930 - Transport	$ 400,000.00	Safety	0
	$ -	Environment	0
	$ -	Customer Value	0
	$ -	Economic Dev	0
		Co-ordination	0
		Security	0
TOTAL	**$ 400,000.00**	**Total Score**	**0**

Project Description
The 2010 Altec Service Truck will reach its useful life by the year 2026 with 16 years of in service. This truck is the trouble truck and is also used on a daily basis, so reliability is a must. The repairs on this unit continue to grow each year even with regular maintenance being performed. These units are being used longer and more often than in years past when trucks were kept for up to 20 years. With the technology and ergonomics changing so quickly, it is good to be up to date on the latest.

Safety
An older vehicle, even maintained, will not have the safety features of a newer design vehicle. This will improve the safety for our workers.

Environment
Older vehicles are less efficient – a newer vehicle will likely be better for the environment.

Efficiency, Customer Value, Reliability
As mentioned above, since this vehicle is used as the service/trouble truck, reliability is critical to keep response and recovery times down and outage statistics under check.

Economic Dev
This is not applicable to this project

Co-ordination
This is not applicable to this project

Security
This is not applicable to this project.

APPENDIX B – Renewable Energy Generation

B1.0 Renewable Generation Capacity

This section has not changed since the last DSP. Peak and minimum feeder load and the corresponding FIT capacity are shown in Table 40. RSL has set up systems to monitor these loads and trends and will reassess each station/feeder capacity as required, based on system changes. A reassessment would also be performed, should the Hydro One connection restriction be lifted.

Table 41 Renewable Generation Capacity by Station/Feeder

	Peak kW	Min kW	FIT Capacity (kW)
PRESCOTT (4.16kV)			
QL2	**2,087**	**26.0%**	
2F1	447	116.2	8
2F2	656	170.5	12
2F3	985	256.0	18
QL30	**1,026**	**37.7%**	
30F1	584	220.0	15
30F2	442	166.6	12
QL40	**2,704**	**37.7%**	
40F1	841	316.9	22
40F2	697	262.6	18
40F3	1,167	440.1	31
QL20	**709**	**37.7%**	
20F2	709	267.1	19
CARDINAL (4.16kV)			
Station #1	**817**	**24.0%**	
23F1	817	196.0	14
23F2	0	0	0
Station #2	**795**	**27.5%**	
33F4	437	120.2	8
33F5	358	98.4	7
IROQUOIS (8.32kV)			
Station #1	**2,061**	**35.2%**	
F1	1,316	463.3	32
F2	745	262.1	18
MORRISBURG (4.16kV)			
MS1	**3,096**	**42.3%**	
46F1	1,256	531.4	37
46F2	668	282.4	20
46F3	348	147.3	10
46F4	824	348.5	24
MS2	**1,275**	**42.3%**	
2F1	665	281.4	20
2F2	610	258.1	18
WESTPORT (8.32kV)			
PME		337.1	24
WILLIAMSBURG (8.32kV)			
PME		150.6	11

B1.1 Current Capacity to Accommodate Renewable Generation Facilities

B1.1.1 Capacity Assessment by Service Area

RSL has experienced load reductions over the past few years, resulting in lightly loaded distribution system feeders, particularly during off-peak periods. This creates greater technical and safety concerns for connection of renewable generation projects. All RG projects larger than 10kW would require a CIA study as part of a connection assessment.

Prescott

The distribution system in Prescott consists of two subsystems:

a. A 44kV three-wire system, supplied from the HONI operated Morrisburg TS 18M23 and Brockville TS 24B1R, which serves as the bulk delivery system for the four local 4.16kV substations and also directly serves some large load customers.
    - Any point on the RSL system is within 3 km of the 44kV network, should an extension be required to accommodate the connection of a large RG project.
    - The 44kV system is embedded in the HONI system; only the station and customer taps are operated and maintained by RSL. This network should be robust enough to accommodate most proposed RG projects. A detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

b. A 4.16kV grounded-wye distribution system, consisting of four substations and a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 3/0 ACSR three-phase primary and 1/0 ACSR taps.
    - It is likely that larger loads would require connection directly to the 44kV network.
    - As a lower capacity distribution system, it was never intended to connect large load customers directly to this system. It has been a normal past practice for RSL to connect loads larger than 350kVA directly to the 44kV HONI system. A similar constraint would also be placed on an RG project.
    - The 4.16kV system was built to supply smaller local loads. Due to load reductions on this system, the feeders are lightly loaded, particularly during off-peak periods. This creates greater technical and safety concerns for the connection of RG projects.
    - Parts of the system were originally built using smaller conductor and may limit the capacity to connect potential RG proponents. These limited sections of conductor will be replaced as part of the RSL asset management plan.

The substations in Prescott have a capacity restriction, resulting from the Hydro One Restricted Station Capacity Update of March 1, 2012.

Morrisburg

The distribution system in Morrisburg consists of two subsystems:

a. A 44kV three-wire system, supplied from the HONI operated Morrisburg TS 18M26, which serves as the bulk delivery system for the two local 4.16kV substations and also directly serves some large load customers.
    - Any point on the RSL system is within 2 km of the 44kV network, should an extension be required to accommodate the connection of a large RG project.
    - The 44kV system is embedded in the HONI system; only the station and customer taps are operated and maintained by RSL. This network should be robust enough to accommodate most proposed RG projects. A detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

b. A 4.16kV grounded-wye distribution system consisting of two substations and a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 3/0 ACSR three-phase primary and 3/0 and 1/0 ACSR taps.
    - It is likely that larger loads would require connection directly to the 44kV network.
    - As a lower capacity distribution system, it was never intended to connect large load customers directly to this system. It has been a normal past practice for RSL to connect loads larger than 350kVA directly to the 44kV HONI system. A similar constraint would also be placed on an RG project.
    - The 4.16kV system was built to supply smaller local loads. Due to load reductions on this system, the feeders are lightly loaded, particularly during off-peak periods. This creates greater technical and safety concerns for connection of RG projects.

The substations in Morrisburg have a capacity restriction, resulting from the Hydro One Restricted Station Capacity Update of March 1, 2012.

Iroquois

The distribution system in Iroquois consists of two subsystems:

a. A 44kV three-wire system, supplied from the HONI operated Morrisburg TS 18M24, which serves as the bulk delivery system for the single local 8.32kV substations and also directly serves some large load customers.
    - Any point on the RSL system is within 2 km of the 44kV network, should an extension be required to accommodate the connection of a large RG project.
    - The 44kV system is embedded in the HONI system; only the station taps are operated and maintained by RSL. This network should be robust enough to accommodate most proposed RG projects. A detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

b. A 8.32kV grounded-wye distribution system, consisting of a single substation and a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 3/0 ACSR throughout.
    - It is likely that larger loads would require connection directly to the 44kV network operated by HONI.
    - As a lower capacity distribution system, it was never intended to connect large load customers directly to this system. It has been a normal past practice for RSL to connect loads larger than 350kVA directly to the 44kV HONI system. A similar constraint would also be placed on an RG project.
    - The 8.32kV system was built to supply smaller local loads. Due to load reductions on this system, the feeders are lightly loaded, particularly during off-peak periods. This creates greater technical and safety concerns for connection of RG projects.

The substations in Iroquois have a capacity restriction, resulting from the Hydro One Restricted Station Capacity Update of March 1, 2012.

Cardinal

The distribution system in Cardinal consists of two subsystems:

a. A 44kV three-wire system, supplied from the HONI operated Morrisburg TS 18M23, which serves as the bulk delivery system for the two local 4.16kV substations and also directly serves some large load customers.
    - Any point on the RSL system is within 1 km of the 44kV network, should an extension be required to accommodate the connection of a large RG project.
    - The 44kV system is embedded in the HONI system; only the station taps and one large load customer are operated and maintained by RSL. This network should be robust enough to accommodate most proposed RG projects. A detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

b. A 4.16kV grounded-wye distribution system, consisting of a two substations and a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 3/0 ACSR three-phase primary and 1/0 ACSR taps.
    - It is likely that larger loads would require connection directly to the 44kV network.
    - As a lower capacity distribution system, it was never intended to connect large load customers directly to this system. It has been a normal past practice for RSL to connect loads larger than 350kVA directly to the 44kV HONI system. A similar constraint would also be placed on an RG project.
    - The 4.16kV system was built to supply smaller local loads. Due to load reductions on this system, the feeders are lightly loaded, particularly during off-peak periods. This creates greater technical and safety concerns for connection of RG projects.
    - Parts of the system were originally built using smaller conductor and will limit the capacity to connect potential RG proponents. These limited sections of conductor will be replaced as part of the RSL asset management plan.

The substations in Cardinal have a capacity restriction, resulting from the Hydro One Restricted Station Capacity Update of March 1, 2012.

Williamsburg

The distribution system in Williamsburg is a single non-dedicated 8.32kV grounded-wye feeder supplied by the HONI operated Glen Becker DS. The distribution system consists of a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 1/0 ACSR throughout.

- It is likely that larger loads may not be accommodated and would be referred to HONI.
- The 8.32kV system was built to supply smaller local loads.
- The majority of the system was rebuilt about 15 years ago. The system is in good condition to accommodate any small RG project, less than 10kW. For any RG project greater than 10kW, a detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

The substation supplying Williamsburg is capacity restricted, resulting from the Hydro One Restricted Station Capacity Update of March 1, 2012.

Westport

The distribution system in Westport is a single non-dedicated 8.32kV grounded-wye feeder supplied by the HONI operated Newboro DS. The distribution system consists of a number of overhead and underground distribution transformers supplying the required loads. The distribution system lines are mainly 1/0 ACSR throughout.

- It is likely that larger loads may not be accommodated and would be referred to HONI.
- The 8.32kV system was built to supply smaller local loads.
- The majority of the system was rebuilt about 15 years ago. The system is in good condition to accommodate any small RG project, less than 10kW. For any RG project greater than 10kW, a detailed CIA study would have to be performed and coordinated with HONI to ensure that no technical issues exist to prevent the connection of such a project.

B1.1.2 Capacity Assessment Methodology

Based on current information and industry practice, RSL has adopted a limit of 7% of the minimum feeder load for RSL owned 4.16kV and 8.32kV feeders. This is founded on the fact that most problems with reverse power flow will occur under light loading conditions. The relatively light load on most RSL feeders generate a limit of potential RG load of 20kW to 50kW per feeder.

It is also imperative to ensure that reliable service to existing customers is not impacted by the addition of new RG projects. Since RSL does not own nor have any dedicated 44kV feeders, RSL is limited by HONI guidelines and limits on the 44kV network.

B1.1.3 Factors Limiting RSL Ability to Connect Renewable Generation Facilities

RSL loads are completely embedded in a HONI 8.32kV or 44kV feeder – as such, there may be constraints in the HONI network that impact the capacity for RSL's system. As a result of being embedded, both RSL and HONI also have load transfer customers with each other that they must consider.

B1.1.4 Expenditures Related to Renewable Generation Connection

To date, RSL has not expended any costs to accommodate the connection of RG projects.

B1.1.5 Relevant Unique Challenges and Opportunities

RSL is completely embedded in the HONI 8kV or 44kV systems. All applications for RG greater than 10kW will have to be coordinated with HONI.

Prescott

One Prescott DS is supplied by Brockville TS and the other three DS's by Morrisburg TS. Based on HONI information, these TS's cannot be tied together. This restricts RSL in the operation of the 4.16kV distribution system. This situation would be further compounded by the addition of RG loads. Due to this condition and also the light loading on the feeders, RSL will need to be cognizant of operating procedures, during planned and emergency situations, to ensure that RG loads during transfers do not exceed the proposed limits.

Westport and Williamsburg

RSL does not own the DS supplying either of these areas.

Islanding

In all service areas, RSL is embedded and supplied from a single source of supply. As such, islanding, due to RG issues, may be a concern.

B1.2 Planned Development of the System to Accommodate Renewable Generation Connections

It should be noted that currently, there are no FIT applications and seven microFIT connection requests have been connected to date (see **Error! Reference source not found.**). In this general geographic area, most RG applications are for small solar rooftop installations. Applications for larger RG projects tend to require larger land acreage. Since all of the RSL areas are small urban, RSL is not likely to see any applications for these types of projects.

B1.3 Renewable Generation Connections Anticipated Over the Five-Year Plan Period

B1.3.1 Micro (<10kW) Renewable Generation Connections Forecast

a. Current Connections
   To date, RSL has completed the seven connections identified in Table 42 (below). At this time, there are no applications on the microFIT administration website to be reviewed.

b. Future Connections
   It is anticipated that RSL will continue to see similar types of applications, as we have seen to date and with a similar frequency. In other words, about two RG applications per year, spread over the six areas.

   Table 42 shows current RG connections.

Table 42 Renewable Generation Connections Summary (as of 2015-12-01)

AREA	STN FDR	kW	Type	STATUS
Cardinal	23F1	10.00	Solar PV	Connected
Westport		9.88	Solar PV	Connected
Iroquois	MS1F1	9.88	Rooftop Solar PV	Connected
Iroquois	MS1F2	10.00	Solar PV	Connected
Morrisburg	46F4	4.95	Rooftop Solar PV	Connected
Westport		4.00	Rooftop Solar PV	Connected
Westport		10.00	Rooftop Solar PV	Connected
TOTAL		**58.71**		

B1.3.2 Larger (>10kW) Forecasted Renewable Generation Connections

a. Current Connections
   RSL currently does not have any RG projects larger than 10kW.

b. Future Connections
   At this time, RSL does not anticipate receiving applications for projects larger than 10kW.

B1.4 Infrastructure Projects and Activities

As outlined in Section A1.3 above, RSL has not identified any specific RG projects or expenditures that are known to be required in the five-year planning horizon. If and when such a project is identified, RSL will perform the appropriate CIA review and adjust this plan accordingly.

B1.5 Recoverable Costs

Where costs may be recovered from provincial ratepayers, a calculation of the direct benefits accruing to the distributor's customers, consistent with the Board's policy, will be made.

B1.6 Methodology for Prioritization of Expenditures

As outlined in section A1.1 above, RSL has not identified any specific RG projects or expenditures that are known to be required in the five-year planning horizon – prioritization is not required at this time. If and when such projects or expenditures are identified, RSL will perform the appropriate review and adjust this plan accordingly.

B1.7 Consultation Process

RSL is effectively embedded within the HONI 8.32kV and 44kV systems. As such, all applications received will require to be referred to HONI for review. RSL would engage with HONI to discuss the proposed RG project to be connected to the main feeder. This would occur over a number of consultations with HONI specialists in the preparation of a CIA study performed by both RSL and HONI. The purpose of the consultation would be to resolve any technical issues and ensure appropriate preparation of each party's CIA studies, as required. RSL would engage in further consultation with IESO, as required, on a project basis.

B1.8 Direct Benefits Accruing to Customers of a Distributor

RSL has not identified any specific RG projects or expenditures that may be required in the five-year planning period. When a project is identified, RSL will comply with the most recent Board direction with respect to the calculation or quantification of the direct benefits and file information with the Board consistent with the policy.

B1.9 Letter of Comment from IESO

The letter of comment from the IESO is located in Appendix C.

B1.10 Smart Grid Development

RSL has completed the mandatory installation of Smart Meters and continues to evolve the supporting systems to provide additional value for daily operation. In 2015, RSL activated a portal on their website that allows customers to see detailed time-of-use consumption from the MDMR. This is an important tool to assist our customers in managing their consumption. Customers have expressed their support for this initiative.

B1.11 Smart Grid System Initiatives

RSL operates six separate areas, urban in nature, and a relatively simple distribution system network. Expensive SCADA systems would have minimal value to enhance daily operations or improve customer service. It is also uncertain what value a SCADA system would provide RSL as a basis for the development of a Smart Grid. This can be better assessed once the concept of Smart Grid is better defined.

It is recognized, however, that there is a greater need for information to make sound business and management decisions. In order to better utilize the vast amount of Smart Meter Data available through the Operational Data Store (ODS), RSL has recently implemented a pilot project to integrate ODS data with their GIS system. RSL has been working on a GIS system implementation over the past few years and is now in a position to utilize a connected system model to assist with engineering planning studies and operational decisions. This provides RSL with capabilities such as transformer and feeder/segment loading information. Together, these systems will provide RSL with the ability to effectively collect and analyze asset and operational information related to the distribution system. These in turn will support any Smart Grid initiative, even though not all were necessarily considered Smart Grid investments.

B1. To complement the above initiatives, RSL is considering the implementation of monitoring equipment, primarily at the station feeder level. It is also possible to utilize the existing Primary Metering Equipment (PME) locations to provide additional information at the network level. This type of implementation, together with the above initiatives and a complete roll-out of the pilot project, will further assist RSL with the normal daily operations of the distribution system and would be considered good utility practice, not as part of a GEA plan implementation.

B1.12 Activities During Planning Period

During the five-year planning period, RSL does not expect to undertake any Smart Grid initiative projects. Although EB-2009-0397 allows for smart grid development activities and expenditures, limited to smart grid demonstration projects, smart grid studies or planning exercises and smart grid education and training, RSL will not be engaging in any of these activities.

RSL is, however, implementing “smart systems”, which make better use of data already available, such as the ODS integrated to its GIS. For relatively simple and stable systems, such as the RSL areas, these “smart systems” provide valuable planning and operational information that can also assist in the preparation of a more comprehensive Distribution System Plan.

B1.13 Reporting

B1.13.1 GEA Plan Annual Status Report

RSL is not implementing any qualified Smart Grid projects. As such, RSL is not preparing to file an annual status report.

B1.14 Smart Grid Development Activity Report

RSL is not planning to undertake any activities or expenditures specifically justified for the Smart Grid. Although there is mention of some activities in the sections above, these would have been undertaken even if the Smart Grid was not identified in the GEA plan. RSL does not intend to prepare any reports designed to specifically address the Smart Grid.

B1.15 Settlement Clarifications

In proceeding EB-2011-0274, RSL confirmed that if a proposed microFIT or FIT facility exceeded RSL’s criterion for connection, then RSL would be willing to consider applications on a case-by-case basis and, if feasible, consult with HONI Distribution staff to examine key aspects of the proposed connection. These would include the adequacy and type of anti-islanding protection scheme (UOFV) proposed by the microFIT or FIT proponent, as discussed in section 4.5, page 18 of the Technical Review of Hydro One’s Anti-Islanding Criteria for microFIT PV Generators, dated November 22, 2011, and characteristics of the feeder such as its length, and the ratio of the total capacity of microFIT plus FIT installations, including the proposed project, to the minimum load on that feeder.

APPENDIX C – IESO Letter of Comment

Rideau St. Lawrence Distribution Inc.

Renewable Energy Generation Plan

Letter of Comment From The IESO:

In its 2016 Cost of Service rate application, RSL provided a letter of comment from the IESO about the Renewable Energy Generation (REG) plan for the period of 2015 – 2020.

RSL has not filed a REG plan, as it is restricted from attaching any renewable generation that would export power into our system. The IESO has not requested information concerning REG. For this reason, there is no report, and no comment from the IESO.

In the IESO's letter of comment 2015, it is stated that it is not mandatory for a fully-embedded distributor like RSL to participate in the Regional Planning process with the IESO.

The IESO has indicated that Regional Planning for the St. Lawrence Region will begin in late 2021. RSL will participate in the planning process if invited.

The following is the latest letter of comment received from the IESO.

IESO Letter of Comment

Rideau St. Lawrence Distribution Inc.

Renewable Energy Generation Plan

Date: December 7, 2015

Independent Electricity System Operator

Introduction

On March 28, 2013, the Ontario Energy Board ("the OEB" or "Board") issued its Filing Requirements for Electricity Transmission and Distribution Applications; Chapter 5 – Consolidated Distribution System Plan Filing Requirements (EB-2010-0377). Chapter 5 implements the Board's policy direction on 'an integrated approach to distribution network planning', outlined in the Board's October 18, 2012 Report of the Board - A Renewed Regulatory Framework for Electricity Distributors: A Performance Based Approach.

As outlined in the Chapter 5 filing requirements, the Board expects that the Ontario Power Authority[1] ("OPA") comment letter will include:

- the applications it has received from renewable generators through the FIT program for connection in the distributor's service area;
- whether the distributor has consulted with the OPA, or participated in planning meetings with the OPA;
- the potential need for co-ordination with other distributors and/or transmitters or others on implementing elements of the REG investments; and
- whether the REG investments proposed in the DS Plan are consistent with any Regional Infrastructure Plan.

Rideau St. Lawrence Distribution Inc. – Distribution System Plan

On November 30, 2015, Rideau St. Lawrence Distribution Inc. ("RSL") provided its Green Energy Plan dated May 2015 containing Renewable Energy Generation information ("Plan") to the IESO as part of a 5-year plan period. The IESO has reviewed RSL's Plan and provides the following comments.

OPA FIT/microFIT Applications Received

Table 3 on page 9 of the Plan, shows that as of May 1, 2015, 7 microFIT projects were connected to the RSL distribution system, representing 60.08 kW of capacity; with no renewable generation projects connected that are >10 kW (section 4.1.2).

Page 9 also states the forecast of microFIT connections to continue at about two per year, over the next six years. The Plan anticipates no FIT connections over the planning period, since the RSL service territory serves six small urban communities, while FIT projects being >10 kW tend to require larger land acreage.

According to the IESO's information, as of October 31, 2015, the IESO has offered contracts to 7 microFIT projects totalling 58.71 kW of capacity. The renewable energy generation connections information in RSL's Plan is therefore reasonably consistent with that of the IESO.

[1] On January 1, 2015, the Ontario Power Authority ("OPA") merged with the Independent Electricity System Operator ("IESO") to create a new organization that will combine the OPA and IESO mandates. The new organization is called the Independent Electricity System Operator.

Independent Electricity System Operator
1600 – 120 Adelaide Street West, Toronto, ON M5H 1T1
t 416 967-7474 f 416 967-1947 toll free 1-800-797-9604 customer.relations@ieso.ca www.ieso.ca

Consultation / Participation in Planning Meetings; Coordination with Distributors / Transmitters / Others; Consistency with Regional Plans

The IESO notes that the RSL distribution system is fully embedded in the Hydro One distribution system. Section 3.1 of the Plan describes the upstream transmission and distribution stations that supply the RSL territory, and how constraints in the upstream Hydro One system will restrict the ability to connect renewable generation on the RSL distribution system. Besides the March 1, 2012 Restricted Station Capacity Update from Hydro One (attached to the Plan), the IESO's Transmission Availability Table ("TAT Table")[2] dated July 9, 2015, confirms that Morrisburg TS, as well as the Crosby TS DESN 1 (the TS supplying Newboro DS) are both currently constrained. Therefore the RSL downstream distribution system is not able to accommodate additional renewable energy generation at these locations.

Sections 3.4 and 3.5 state that there have been no expenditures to date to accommodate the connection of REG projects, and that any applications >10 kW would need to be coordinated with Hydro One Distribution as the host distributor.

For regional planning purposes, along with Cooperative Hydro Embrun Inc. and Hydro One Networks Inc. ("Hydro One"), Rideau St. Lawrence Distribution Inc. is part of "Group 3" and the St. Lawrence Region.

Under the new regional planning process endorsed by the OEB in August 2013, while the host distributor is required to gather information from their respective embedded LDCs, it is not required that embedded LDCs be directly involved in the regional planning process. On November 12, 2015, Hydro One hosted a pre-meeting conference call on regional planning for the St. Lawrence Region. The IESO confirms that it participated in this pre-meeting with RSL along with other regional participants. On December 3, 2015, Hydro One kicked off the Needs Assessment as the first step of the regional planning process by requesting load forecast information from all LDCs in the St. Lawrence Region.

While participation of embedded LDCs is not mandatory, the IESO will include RSL in its relevant communications on the regional planning activities in the St. Lawrence Region. The IESO looks forward to working with Rideau St. Lawrence Distribution Inc. on regional planning for the St. Lawrence Region and appreciates the opportunity to comment on the information provided as part of its Plan at this time.

[2] The TAT Table may be found on the IESO's FIT website:
http://fit.powerauthority.on.ca/sites/default/files/version4/FIT-4-TS-TAT-table-final-July-9-2015.pdf

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APPENDIX D – Restricted Station Capacity Update

RSL continues to be restricted from attaching additional renewable generation to its system. The following is a letter received in 2012 from Hydro One. The restrictions are still applicable.

hydro one

Restricted Station Capacity Update

March 1, 2012

Attention: **Rideau St. Lawrence Distribution Inc.**

Hydro One has revised the list of capacity restricted stations effective today. Hydro One reviews all stations on a monthly basis for the following:

- Thermal capability of HON equipment
- Short circuit ratings of interrupting devices and available short circuit current
- Normal station operating conditions
- Known generation currently connected
- Transmission constraints which may impact station operation

There has been a change to your current list of restricted stations and buses. Stations may, from time to time, be removed from, or added to, the restricted list. Hydro One will notify you monthly if a station or bus status affecting your supply has changed. The table below identifies which changes in the current review month have affected your supply.

Station	Bus	Status
Morrisburg TS	JQ	restricted

If a Hydro One station and/or bus has been removed from the restricted list in the above table (Status = No longer restricted), you may start processing generator applications as follows:

- Capacity Allocation Required (CAR) or Capacity Allocation Exempt (CAE) applications must still be assessed by the LDC by referring to the list of station capacity posted on the Hydro One website prior to requesting a Connection Impact Assessment from Hydro One.

- microFIT applications may be processed in accordance with the current OPA rules.

If a Hydro One station and/or bus has been added to the list in the table above (Status = NOW RESTRICTED), you are not to provide an offer to connect to any generator going forward.

If you have further questions regarding the restricted stations list, please contact Stefanie Urbanowicz at (647) 261-9575.

Thank you

Brad Colden
Manager, Customer Business Relations
Hydro One Networks Inc.

APPENDIX E – HONI Needs Assessment Report - St Lawrence

Hydro One Networks Inc.
483 Bay Street
Toronto, Ontario
M5G 2P5

NEEDS ASSESSMENT REPORT

Region: St Lawrence

Date: September 15, 2021

Prepared by: St Lawrence Region Study Team

Disclaimer

This Needs Assessment Report was prepared for the purpose of identifying potential needs in the St Lawrence Region and to recommend which need may be a) directly addressed by developing a preferred plan as part of NA phase and b) identify needs requiring further assessment and/or regional coordination. The results reported in this Needs Assessment are based on the input and information provided by the Study Team for this region.

The Study Team participants, their respective affiliated organizations, and Hydro One Networks Inc. (collectively, "the Authors") shall not, under any circumstances whatsoever, be liable to each other, to any third party for whom the Needs Assessment Report was prepared ("the Intended Third Parties") or to any other third party reading or receiving the Needs Assessment Report ("the Other Third Parties"). The Authors, Intended Third Parties and Other Third Parties acknowledge and agree that: (a) the Authors make no representations or warranties (express, implied, statutory or otherwise) as to this document or its contents, including, without limitation, the accuracy or completeness of the information therein; (b) the Authors, Intended Third Parties and Other Third Parties and their respective employees, directors and agents (the "Representatives") shall be responsible for their respective use of the document and any conclusions derived from its contents; (c) and the Authors will not be liable for any damages resulting from or in any way related to the reliance on, acceptance or use of the document or its contents by the Authors, Intended Third Parties or Other Third Parties or their respective Representatives.

Executive Summary

REGION St Lawrence Region (the "Region")

LEAD Hydro One Networks Inc. ("HONI")

START DATE: JULY 15, 2021 **END DATE:** September 15, 2021

1. INTRODUCTION

The first cycle of the Regional Planning process for the St Lawrence Region was completed in April 2016 with the publication of the Needs Assessment Report. As no further regional coordination or planning was required, the NA identified needs to be addressed between relevant Local Distribution Companies (LDCs) and Hydro One and other parties as required.

This is the second cycle of regional planning and the purpose of this Needs Assessment ("NA") is a) to identify any new needs and/or to reaffirm needs identified in the previous St Lawrence Regional Planning cycle and b) recommend which need may be i) addressed by developing a preferred plan as part of NA phase and ii) identify needs requiring further assessment and/or regional coordination.

2. REGIONAL ISSUE/TRIGGER

In accordance with the Regional Planning process, the regional planning cycle should be triggered at least every five years. In light of these timelines, the 2nd Regional Planning cycle was triggered for St Lawrence Region.

3. SCOPE OF NEEDS ASSESSMENT

The assessment's primary objective is to identify the electrical infrastructure needs over the study period, develop options and recommend which needs require further regional coordination.

The scope of this NA includes:

- Review and reaffirm needs/plans identified in the previous NA; and
- Identification and assessment of system capacity, reliability, operation, and aging infrastructure needs in the region: and
- Develop options for need(s) and/or a preferred plan or recommend which needs require further assessment/regional coordination.

The Study Team may also identify additional needs during the next phases of the planning process, namely Scoping Assessment ("SA"), IRRP and RIP, based on updated information available at that time.

The planning horizons of regional planning is considered over a 20 year time period; however, focus of this NA assessment is over the next 10 years.

4. INPUTS/DATA

The Study Team representatives from Local Distribution Companies ("LDC"), the Independent Electricity System Operator ("IESO"), and Hydro One provided input and relevant information for this Region regarding capacity needs, reliability needs, operational issues, and major assets/facilities approaching end-of-life ("EOL"). Hydro One has also researched to find community energy plans in the region. No energy plans have been identified that would impact the assessment undertaken as part of this report. The working group will monitor and take them into consideration as they are developed.

5. ASSESSMENT METHODOLOGY

The assessment methodology include review of planning information such as load forecast, conservation and demand management ("CDM") forecast and available distributed generation ("DG") information, any system reliability and operation issues, and major high voltage equipment identified to be at or near the end of their life.

A technical assessment of needs was undertaken based on:

- Current and future station capacity and transmission adequacy;
- Reliability needs and operational concerns; and
- Any major high voltage equipment reaching the end of its life.

6. NEEDS

I. Update of identified needs from previous cycle

a. Chesterville TS was identified to have missed customer delivery point target (frequency of interruption) due to momentary outages. After reviewing the root causes, it is recommended that no immediate action is required and the delivery point performance will continue to be monitored. Update is provided in Section **7.**

II. Newly identified needs in the region

a. Line / Station Capacity

No new transmission line or station capacity issues identified for the area.

b. Aging Infrastructure Transformer Station and Transmission Circuit Replacements

i. L22H: replacement of conductor, shieldwire, insulator and tower work (2026)

7. RECOMMENDATIONS

The Study Team recommends that Replacement of end of life asset identified in above in 6 II b. does not require further regional coordination (see further details in Section 7.1). The implementation and execution plan for these needs will be coordinated by Hydro One with affected LDCs and/or customers. This assessment did not identify any other needs, therefore no further regional coordination required.

TABLE OF CONTENTS

1 Introduction ... 6
2 Regional Issue/Trigger ... 6
3 Scope of Needs Assessment ... 6
4 Regional Description and Connection Configuration ... 7
5 Inputs and Data ... 11
6 Assessment Methodology ... 11
7 Needs ... 12
8 Conclusion and Recommendations ... 16
9 References ... 17
Appendix A: Extreme Weather Adjusted Non-Coincident Summer / Winter Load Forecast ... 18
Appendix B: Lists of Step-Down Transformer Stations ... 20
Appendix C: Lists of Transmission Circuits ... 21
Appendix D: Acronyms ... 22

List of Tables and Figures

Table 1: St Lawrence Region Study Team Participants ... 6
Table 2. Transmission Station and Circuits in the St Lawrence Region ... 8
Table 3: Needs Identified in the Previous Regional Planning Cycle ... 12

Figure 1: Map of St Lawrence Regional Planning Area ... 7
Figure 2: Single Line Diagram 230kV St Lawrence Planning Area ... 9
Figure 3: Single Line Diagram 115kV St Lawrence Planning Area ... 10

1 INTRODUCTION

The first cycle of the Regional Planning process for the St Lawrence Region was completed in April 2016 with the publication of the Needs Assessment ("NA") Report [1].

The purpose of this Needs Assessment ("NA") is to identify new needs and to reconfirm and update any needs identified in the previous St Lawrence regional planning cycle.

This report was prepared by the St Lawrence Region Study Team ("Study Team"), led by Hydro One Networks Inc. Participants of the Study Team are listed below in Table 1. The report presents the results of the assessment based on information provided by the Hydro One, the Local Distribution Companies ("LDC") and the Independent Electricity System Operator ("IESO").

Table 1: St Lawrence Region Study Team Participants

Niagara Study Team
Hydro One Networks Inc. (Lead Transmitter)
Cooperative Hydro Embrun Inc.
Hydro One Distribution
Rideau St Lawrence Distribution Inc.
Independent Electricity System Operator

2 REGIONAL ISSUE/TRIGGER

In accordance with the Regional Planning process, the Regional Planning cycle should be triggered at least every five years. As such, the 2nd Regional Planning cycle was triggered for the St Lawrence region

3 SCOPE OF NEEDS ASSESSMENT

The scope of this NA covers the St Lawrence region and includes:

- Review the status of needs/plans identified in the previous NA and
- Identification and assessment of any new needs (e.g. system capacity, reliability, operation, and aging infrastructure)

The Study Team may identify additional needs during the next phases of the regional planning process, namely Scoping Assessment ("SA"), Local Planning ("LP"), IRRP, and/or RIP.

4 REGIONAL DESCRIPTION AND CONNECTION CONFIGURATION

The St Lawrence Region covers the southeastern part of Ontario bordering the St Lawrence River. The region starts at the Gananoque in the West and extends to the inter-provincial boundary with Quebec in the East.

The western part of the region is supplied from Hydro One owned stations connected to the 230kV network. The reminder of the region is supplied from Hydro One stations connected to the 115kV network except for St Lawrence TS which is supplied from 230kV.

The City of Cornwall is supplied by Fortis Ontario with transmission lines from Quebec and is not included in this Region. A map of the region is shown below in Figure 1.

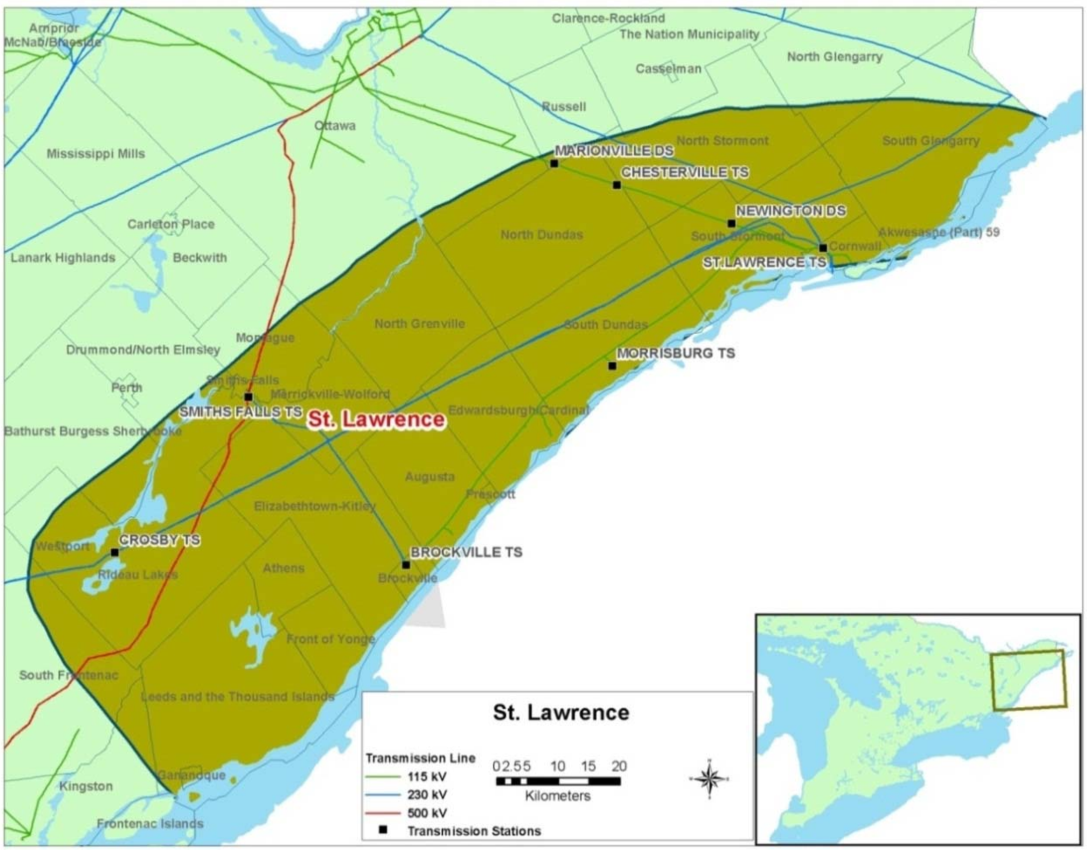


Figure 1: Map of St Lawrence Regional Planning Area

Electrical supply for this region is provided through a network of 230kV and 115kV transmission circuits. The major source of supply for this region is OPG's Saunders Hydro Electric station which connects to St Lawrence TS 230kV yard.

The St Lawrence Region is connected to the Greater Ottawa Region through 230kV circuits L24A and B31L. Circuit B31L also provides an interconnection between the Provinces of Ontario and Quebec. In addition, 115kV circuit L2M also connects St Lawrence to the Greater Ottawa Region, however this connection is normally open and is only used for load transfers between the two areas in case of system need. The Region is also connected to the Peterborough to Kingston Region through 230kV circuits L20H, L21H, and L22H.

The existing facilities in the Region are summarized below and depicted in the single line diagram shown in Figure 2 and 3.

- St Lawrence TS is the major transmission station for the region and connects to the main source of supply for the area, Saunders GS via four 230kV circuits. Also connecting to the 230kV yard of the station are two International Power Lines (IPL). These IPLs connect Ontario to the State of New York and power exchange across the IPLs are regulated using two phase shifting transformers. The station also has two 230kV/115kV 250MVA autotransformers to connect the 230kV and 115kV networks.

- Seven step-down transformer stations supply the St Lawrence Area load. At 230kV: Brockville TS, Crosby TS, Smith Falls TS, and St Lawrence TS. At 115kV: Chesterville TS, Morrisburg TS, and Newington DS.

- Two Customer Transformer Stations (CTS) are supplied in the Region from the 115kV network: Dyno Nobel Nitrogen and Enbridge Pipeline Cardinal.

- Another source of supply to the area is an existing transmission connected generating station, Cardinal Power CGS with maximum output 134MW (summer) and 184MW (winter) [4].

The circuits and stations of the area are summarized in the Table 2 below:

Table 2. Transmission Station and Circuits in the St Lawrence Region

115kV circuits	230kV circuits	Hydro One Transformer Stations
L1MB, L2M, L5C[1]	L20H, L21H, L22H, L24A[2], B31L[2], L33P[3], L34P[3]	Brockville TS, Chesterville TS, Crosby TS Morrisburg TS, Newington DS, Smith Falls TS St Lawrence TS*

*Stations with Autotransformers installed

[1] L5C is normally o/s, and used as a backup supply for the City of Cornwall.

[2] L24A and B31L connect to St Lawrence TS but do not have load customers connection.

[3] IPLs circuits.

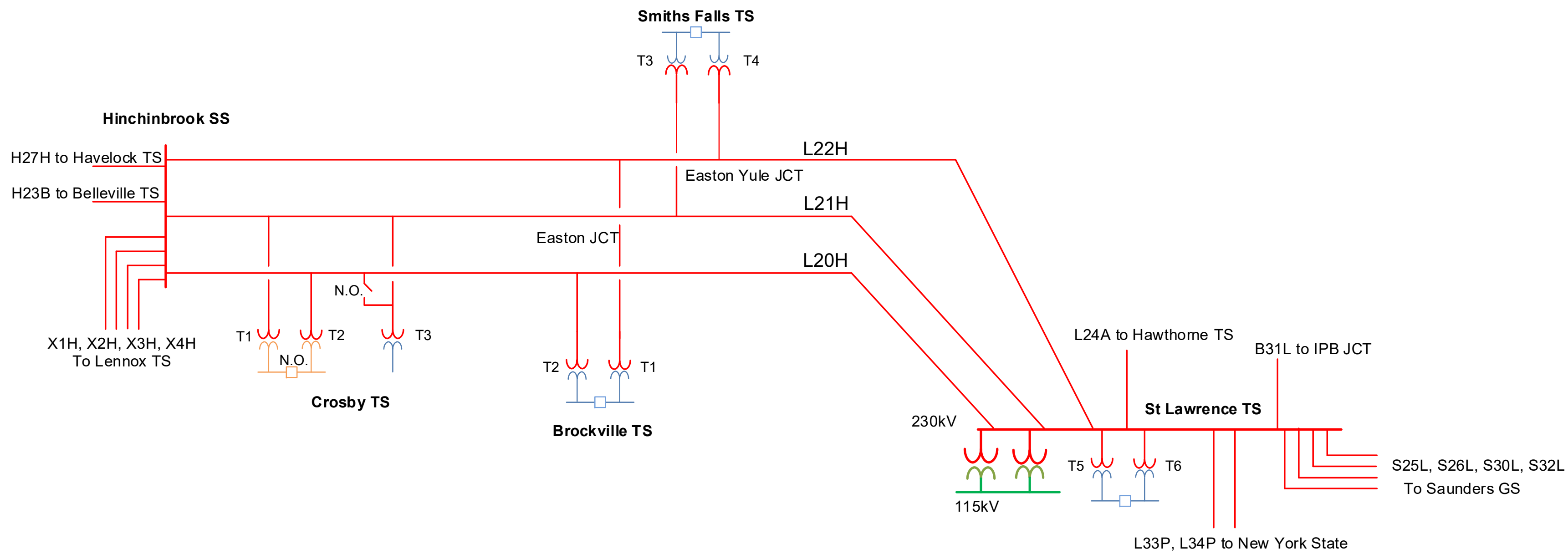


Figure 2: Single Line Diagram 230kV St Lawrence Planning Area

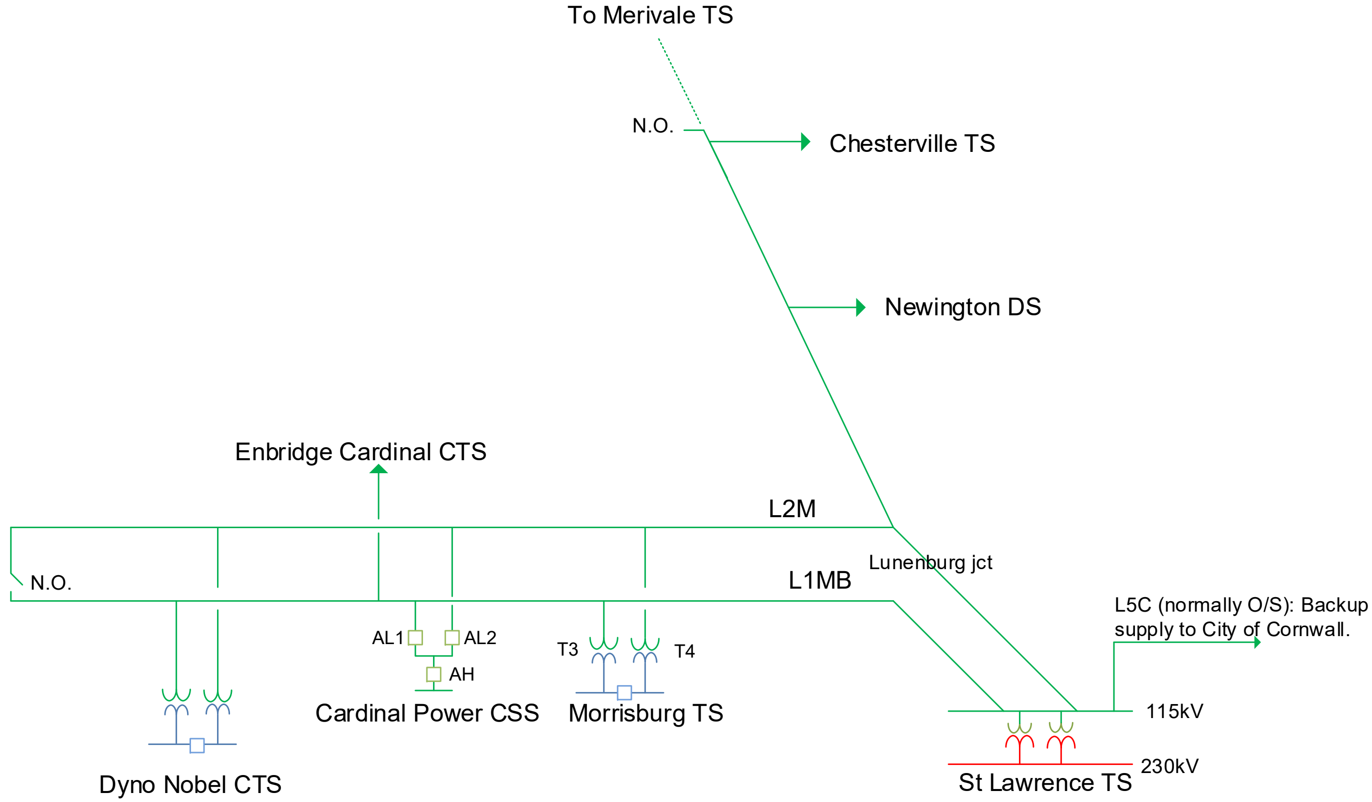


Figure 3: Single Line Diagram 115kV St Lawrence Planning Area

5 INPUTS AND DATA

Study Team participants, including representatives from LDCs, IESO, and Hydro One provided information and input for the St Lawrence Region NA. The information provided includes the following:

- St Lawrence Load Forecast for all supply stations;
- Known capacity and reliability needs, operating issues, and/or major assets approaching the end of life ("EOL"); and
- Planned/foreseen transmission and distribution investments that are relevant to regional planning for the St Lawrence Region.
- Hydro One has also researched to find community energy plans in the region. No energy plans have been identified that would impact the assessment undertaken as part of this report. The working group will monitor and take them into consideration as they are developed

6 ASSESSMENT METHODOLOGY

The following methodology and assumptions are made in this Needs Assessment:

Information gathering included:

i. Load forecast: The LDCs provided load forecasts for all the stations supplying their loads in the St Lawrence region for the 10 year study period. The IESO provided a Conservation and Demand Management ("CDM") and Distributed Generation ("DG") forecast for the St Lawrence region. The region's extreme winter and summer non-coincident peak gross load forecasts for each station were prepared by applying the LDC load forecast growth rates to the actual 2020 summer and 2020 winter peak extreme weather corrected loads. The extreme summer / winter weather correction factors were provided by Hydro One. The net extreme weather summer / winter load forecasts were produced by reducing the gross load forecasts for each station by the percentage CDM and then by the amount of effective DG capacity provided by the IESO for that station. It is to be noted that in the long-term (10+ year) time frame, contracts for existing DG resources in the region begin to expire, at which point the load forecast indicates a decreasing contribution from local DG resources, and an increase in net demand. These extreme weather corrected net summer / winter load forecast for the individual stations in the St Lawrence region is given in Appendix A;

ii. Relevant information regarding system reliability and operational issues in the region; and

iii. List of major HV transmission equipment planned and/or identified to be refurbished and/or replaced due to the end of life which is relevant for regional planning purposes. This includes HV transformers, autotransformers, HV Breakers, HV underground cables and overhead lines.

A technical assessment of needs was undertaken based on:

- Current and future station capacity and transmission adequacy;
- System reliability and operational concerns;
- Any major high voltage equipment reaching the end of life;
- Generating station Saunders GS was assumed to generate at its average 98% of time dependable hydro generation level which is 467MW for winter and 511MW for summer.
- No power exchanges on the Ontario Eastern interconnections.
- Load forecast data was requested from industrial customers in the region. Where data was not provided, the load was assumed to be consistent with historical loads.
- The Region is winter peaking so this assessment is based on winter peak loads. However sensitivity analysis was also done using summer peak loads

7 NEEDS

This section describes emerging needs identified in the St Lawrence Region, and also reviews the near, mid, and long-term needs already identified in the previous regional planning cycle. A contingency analysis was performed for the region using the load forecast developed and no new system needs were identified.

The status of the previously identified needs is summarized in Table 2 below.

Table 3: Needs Identified in the Previous Regional Planning Cycle

Type of Needs identified in the previous RP cycle	Needs Details	Current Status
Chesterville TS delivery point performance	Missed customer delivery point target (frequency of interruption) due to momentary outages (due to severe weather patterns). Action: Hydro One will review and monitor its supply point performance at Chesterville TS to determine if corrective measures are required.	In 2019, there were interruptions due to equipment issues at another station supplied by circuit L2M. Because of the nature of these interruptions, they can be considered as isolated incidents, and performance is expected to return to normal. Hydro One will continue to monitor the performance of delivery points within the region.

7.1 End-Of-Life (EOL) Equipment Needs

Hydro One have reviewed and provided high voltage asset information under the following categories that have been identified at this time and are likely to be replaced over the next 10 years:

- Autotransformers
- Power transformers
- HV breakers
- Transmission line conductor

The end-of-life assessment for the above high voltage equipment typically included consideration of the following options:

1. Replacing equipment with similar equipment and built to current standards (i.e., "like-for-like" replacement);
2. Replacing equipment with similar equipment of higher / lower ratings i.e. right sizing opportunity and built to current standards;
3. Replacing equipment with lower ratings and built to current standards by transferring some load to other existing facilities;
4. Eliminating equipment by transferring all of the load to other existing facilities;

In addition, from Hydro One's perspective as a facility owner and operator of its transmission equipment, do nothing is generally not an option for major HV equipment due to safety and reliability risk of equipment failure. This also results in increased maintenance cost and longer duration of customer outages.

Accordingly, the following major high voltage equipment has been identified as approaching its end of life over the next 10 years and assessed for right sizing opportunity.

The Study Team recommended continuation of these end of life asset replacement as per the plan. As per Section 7.2, under the assumptions of Regional Planning, circuit L22H is adequate over the study period. However the circuit is also used for bulk power transfers across Ontario. Determination of whether upgrade to the capacity of this section of circuit L22H is required for power bulk transfer will be reviewed as part of Bulk Planning studies completed by IESO and Hydro One.

Station/Circuit	Proposed I/S	Description
Circuit L22H	**2026**	• This investment refurbishes a total of 65 km of 230 kV circuit L22H between Easton JCT X Hinchinbrook North JCT. Work in this project includes the replacement of conductors, shieldwire, insulators and refurbishment of lattice steel structures.

In addition to the plan mentioned above, Hydro One is in the process of replacing the two phase shifting transformers at St Lawrence TS which are used to control the power flow exchange with New York across the IPL circuits.

7.2 Station and Transmission Capacity Needs in the St Lawrence Region

The following Station and Transmission supply capacities have been reviewed and no needs have been identified in the St Lawrence region during the study period of 2021 to 2031.

7.2.1 230/115 kV Autotransformers

The 230/115 kV autotransformers at St Lawrence TS supplying the Region are within their ratings and are adequate to supply the forecasted load over the study period.

7.2.2 230 kV Transmission Lines

The 230kV circuits supplying the Region are adequate over the study period for the loss of a single 230kV circuit in the Region under the study assumptions of the Needs Assessment.

As discussed in previously Section 4, St Lawrence TS is connected to Saunders generating station, to the State of New York through two IPLs, and to Province Quebec interconnection through circuit B31L (Beauharnois generating station). As a results of these connections, many operating scenarios and system conditions can influence the flows on circuits L20H, L21H, and L22H. These scenarios are evaluated under Bulk planning and are not part of the scope of the Needs Assessment. However it should be noted that there is a generation rejection scheme in place that can runback Saunders GS and/or Beauharnois GS under post-contingency conditions. This scheme ensures that the St Lawrence to Hinchinbrook TS lines are not overloaded under peak summer conditions.

7.2.3 115kV Transmission Lines

The 115kV circuits supplying the Region are adequate over the study period for the loss of a single 115kV circuit in the Region under the study assumptions of the Needs Assessment.

7.2.4 230 kV and 115 kV Connection Facilities

A station capacity assessment was performed over the study period for the 230 kV and 115 kV TSs in the Region using either the summer or winter station peak load forecasts as appropriate that were provided by the study team. The results are as follows:

a) Transformer stations

All the transformer stations in the region are forecasted to remain within their normal supply capacity during the study period. Capacity needs for these stations will be reviewed in the next planning cycle.

Depending on the load growth and the future decisions on contracts for distributed energy resources connected to the station, the capacity of some stations could be reached in the long term (10+ years). The Working Group will continue to monitor the load growth at the stations and will re-evaluate the capacity at the next planning cycle.

7.2.5 115kV System

The distributed energy resources (DER) connected to the 115kV stations of the area and the 115kV generating station have resulted in the following identified in the Cardinal Power G3 Expansion SIA/CIA [3, 4]:

a) Reverse Power Flow at Morrisburg TS and Dyno Nobel CTS

At Morrisburg TS, under light load condition with high output for DER and 115kV connected generation, a reverse power flow issue was identified. This situation occurs if one of the line breakers at Cardinal Power has an inadvertent opening (IBO). This IBO results in all of Cardinal Power's generation being sent to one line, which causes reverse power at Morrisburg TS beyond its maximum limit. Additional generation connection has been restricted at Morrisburg TS to manage the reverse power flow at the station.

Under the same conditions mentioned above, an IBO at Cardinal Power can also result in power flow through the Dyno Nobel CTS transformers to exceed their rating.

For Morrisburg TS and Dyno Nobel CTS transformer loading issues, Cardinal Power run back scheme is triggered to reduce the flows to within equipment ratings as it was outlined in the SIA and CIA [3, 4]. No further action is recommended within the scope of this regional planning.

b) L2M/L1MB

Under light load condition and with all distributed generation in the area and the Cardinal Power generation at maximum output the section of the L1MB/L2M line between St Lawrence to Lunenburg JCT can be loaded beyond its short time emergency (STE) rating for loss of either circuit [3,4].

To manage the situation, Morrisburg TS has been restricted to accept new generation connection. In addition, there is Cardinal Power's runback scheme which will reduce the plant output following the loss of either circuit and hence reduce the post-contingency loading on either of the L1MB/L2M lines. However since the lines could be loaded beyond their STE, measures such generation re-dispatch is implemented by the IESO as per the Cardinal Power G3 Expansion studies [3, 4].

7.3 System Reliability, Operation and Restoration Review

No new significant system reliability and operating issues identified for this Region. Based on the net load forecast, the loss of one element will not result in load interruption greater than 150MW. The maximum load interrupted by configuration due to the loss of two elements is below the load loss limit of 600MW by the end of the 10-year study period.

8 CONCLUSION AND RECOMMENDATIONS

The Study Team recommends that refurbishment of L22H between Easton JCT X Hinchinbrook North JCT does not require further regional coordination. The implementation and execution plan for this need will be coordinated by Hydro One with affected LDCs. However, IESO led Bulk Planning Studies will review and confirm if there are any changes required to Hydro One refurbishment plan before the end of Q3 2022. No other needs have been identified that require regional coordination.

9 REFERENCES

1. Needs Assessment Report – St Lawrence – April 2016
2. IESO Ontario Resource and Transmission Assessment Criteria (ORTAC) – Issue 5.0
3. Cardinal Power 15MW Plant Expansion SIA (2011-432)
4. Cardinal Power 15MW Plant Expansion CIA

Appendix A: Extreme Weather Adjusted Non-Coincident Summer / Winter Load Forecast

Station		LTR (MW)	Type	Near Term Forecast (MW)					Medium Term Forecast (MW)					Long Term Forecast (MW)				
				2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2033	2035	2037	2039
Brockville TS	T1/T2	166.2	Load	125.3	130.2	134.6	138.1	140.8	141.9	143.2	144.5	145.7	146.9	148.0	150.2	152.6	154.9	157.2
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.5	-45.3	-45.3	-45.3
			CDM	0.8	1.8	2.8	3.6	4.2	4.4	4.6	4.7	5.2	5.5	5.6	5.8	7.1	6.8	6.4
			NET	124.5	128.4	131.8	134.5	136.7	137.5	138.6	139.8	140.5	141.4	142.4	144.9	190.8	193.4	196.0
			NET_DG	124.5	128.4	131.8	134.5	136.7	137.5	138.6	139.8	140.5	141.4	142.4	144.4	147.1	149.6	152.2
Chesterville TS	T1/T2	56.7	Load	39.5	39.8	40.1	40.4	40.6	40.9	41.2	41.4	41.7	41.9	42.1	42.6	43.0	43.4	43.8
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.4
			CDM	0.3	0.5	0.8	1.0	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.5	1.4
			NET	39.2	39.2	39.3	39.3	39.4	39.6	39.9	40.1	40.2	40.3	40.5	40.9	41.6	42.1	42.8
			NET_DG	39.2	39.2	39.3	39.3	39.4	39.6	39.9	40.1	40.2	40.3	40.5	40.9	41.5	42.0	42.4
Crosby TS	T1/T2	65.6	Load	13.8	13.9	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	15.0	15.2	15.4	15.6
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5
			NET	13.7	13.7	13.7	13.8	13.8	13.9	14.0	14.1	14.1	14.2	14.3	14.4	14.7	14.9	15.1
			NET_DG	13.7	13.7	13.7	13.8	13.8	13.9	14.0	14.1	14.1	14.2	14.3	14.4	14.7	14.9	15.1
Crosby TS	T3	75.0	Load	22.7	23.0	23.2	23.4	23.6	23.7	24.0	24.2	24.3	24.5	24.7	25.1	25.4	25.8	26.1
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.2	0.3	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0	0.9	0.9	0.8
			NET	22.6	22.6	22.7	22.8	22.9	23.0	23.2	23.4	23.5	23.6	23.8	24.1	24.5	24.9	25.3
			NET_DG	22.6	22.6	22.7	22.8	22.9	23.0	23.2	23.4	23.5	23.6	23.8	24.1	24.5	24.9	25.3
Morrisburg TS	T3/T4	127.2	Load	56.3	59.1	62.0	62.6	63.2	63.7	64.4	65.0	65.7	66.3	66.8	68.1	69.3	70.6	71.9
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-11.3	-11.3	-11.3	-11.3
			CDM	0.4	0.8	1.3	1.6	1.9	2.0	2.1	2.1	2.3	2.5	2.5	3.1	2.9	2.8	2.6
			NET	55.9	58.3	60.8	61.0	61.3	61.8	62.3	62.9	63.4	63.8	64.3	76.4	77.8	79.1	80.6
			NET_DG	55.9	58.3	60.8	61.0	61.3	61.8	62.3	62.9	63.4	63.8	64.3	65.5	66.8	68.2	69.6
Newington DS	-	13.5	Load	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
			NET	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4
			NET_DG	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4
Smiths Falls TS	T3/T4	176.4	Load	114.1	117.4	119.7	120.4	121.1	121.9	122.7	123.6	124.4	125.1	125.8	127.3	128.7	130.1	131.5
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.8	1.6	2.5	3.1	3.6	3.8	4.0	4.0	4.4	4.7	4.8	4.9	4.6	4.4	4.2
			NET	113.3	115.8	117.2	117.3	117.5	118.1	118.8	119.5	120.0	120.4	121.0	122.4	124.1	125.7	127.4
			NET_DG	113.3	115.8	117.2	117.3	117.5	118.1	118.8	119.5	120.0	120.4	121.0	122.4	124.1	125.7	127.4
St. Lawrence TS	T5/T6	183.5	Load	40.1	40.4	40.7	40.9	41.1	41.3	41.5	41.8	42.0	42.1	42.3	42.7	43.0	43.3	43.7
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.3	0.5	0.8	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.5	1.5	1.4
			NET	39.8	39.8	39.9	39.8	39.9	40.0	40.2	40.4	40.5	40.6	40.7	41.0	41.5	41.9	42.3
			NET_DG	39.8	39.8	39.9	39.8	39.9	40.0	40.2	40.4	40.5	40.6	40.7	41.0	41.5	41.9	42.3

Table A.1: St Lawrence Region Winter Non-Coincident Load Forecast

Please note: In the table above NET assumes DG contracts begin to expire and NET_DG assumes DGs remain.

Transformer Station		LTR (MW)	Type	Near Term Forecast (MW)					Medium Term Forecast (MW)					Long Term Forecast (MW)				
				2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2033	2035	2037	2039
Brockville TS	T1/T2	145.6	Load	97.3	101.4	105.2	108.0	110.2	111.2	112.1	113.1	114.0	114.9	115.8	117.6	119.5	121.3	123.2
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.5	-4.6	-49.5	-49.5
			CDM	0.5	1.6	2.8	3.7	4.4	4.6	5.0	5.1	5.3	5.3	5.2	5.2	4.8	6.4	6.4
			NET	96.8	99.8	102.4	104.3	105.9	106.5	107.1	107.9	108.8	109.6	110.6	117.0	119.3	164.3	166.3
			NET_DG	96.8	99.8	102.4	104.3	105.9	106.5	107.1	107.9	108.8	109.6	110.6	112.6	114.9	116.7	118.6
Chesterville TS	T1/T2	52.9	Load	36.1	36.6	37.0	37.2	37.3	37.6	37.9	38.1	38.4	38.6	38.8	39.2	39.6	40.0	40.3
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-3.0	-3.0	-3.2
			CDM	0.2	0.6	1.0	1.3	1.5	1.6	1.7	1.7	1.8	1.8	1.7	1.7	1.7	1.6	1.6
			NET	35.9	36.0	36.0	35.9	35.9	36.0	36.2	36.4	36.6	36.8	37.1	37.6	40.9	41.3	42.0
			NET_DG	35.9	36.0	36.0	35.9	35.9	36.0	36.2	36.4	36.6	36.8	37.0	37.5	38.0	38.5	38.9
Crosby TS	T1/T2	57.6	Load	12.0	12.1	12.3	12.3	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.3	13.4	13.6
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.0	-3.0	-3.0
			CDM	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
			NET	11.9	11.9	11.9	11.9	11.9	12.0	12.1	12.1	12.2	12.3	12.4	12.6	15.6	15.8	16.0
			NET_DG	11.9	11.9	11.9	11.9	11.9	12.0	12.1	12.1	12.2	12.3	12.4	12.6	12.8	12.9	13.1
Crosby TS	T3	75.0	Load	21.6	21.9	22.2	22.4	22.5	22.7	22.9	23.1	23.3	23.4	23.6	23.9	24.3	24.6	24.9
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.1	-5.5	-5.5	-5.5
			CDM	0.1	0.4	0.6	0.8	0.9	0.9	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.1	1.1
			NET	21.5	21.5	21.6	21.6	21.6	21.7	21.9	22.0	22.2	22.3	22.5	26.9	28.6	29.0	29.3
			NET_DG	21.5	21.5	21.6	21.6	21.6	21.7	21.9	22.0	22.2	22.3	22.5	22.9	23.3	23.7	24.0
Morrisburg TS	T3/T4	115.2	Load	48.7	51.3	53.9	54.4	54.9	55.4	55.9	56.5	57.0	57.5	58.1	59.2	60.3	61.4	62.4
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-6.8	-6.8	-6.8
			CDM	0.2	0.8	1.4	1.8	2.2	2.3	2.5	2.6	2.6	2.7	2.6	2.5	2.6	2.6	2.6
			NET	48.5	50.5	52.5	52.5	52.7	53.0	53.4	54.0	54.4	54.9	55.5	56.7	64.5	65.6	66.7
			NET_DG	48.5	50.5	52.5	52.5	52.7	53.0	53.4	54.0	54.4	54.9	55.5	56.7	58.0	59.1	60.1
Newington DS	-	13.5	Load	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			CDM	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
			NET	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
			NET_DG	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
Smiths Falls TS	T3/T4	154.9	Load	92.9	95.8	97.9	98.5	99.0	99.7	100.4	101.1	101.7	102.3	102.9	104.1	105.3	106.4	107.6
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.8	-7.9	-11.0	-11.2	-11.2
			CDM	0.5	1.5	2.6	3.3	3.9	4.2	4.4	4.6	4.7	4.8	4.7	4.7	4.5	4.4	4.4
			NET	92.4	94.3	95.3	95.1	95.1	95.5	95.9	96.5	97.0	97.6	100.9	107.2	111.7	113.2	114.4
			NET_DG	92.4	94.3	95.3	95.1	95.1	95.5	95.9	96.5	97.0	97.6	98.3	99.7	101.2	102.4	103.6
St. Lawrence TS	T5/T6	168.1	Load	33.3	33.6	33.9	34.1	34.2	34.4	34.6	34.8	35.0	35.1	35.3	35.6	35.9	36.1	36.4
			DG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.9	-8.3	-8.3	-9.7
			CDM	0.2	0.5	0.9	1.2	1.4	1.4	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7
			NET	33.1	33.1	33.0	32.9	32.9	33.0	33.1	33.2	33.4	33.5	33.7	36.8	42.5	42.8	44.4
			NET_DG	33.1	33.1	33.0	32.9	32.9	33.0	33.1	33.2	33.4	33.5	33.7	34.1	34.5	34.8	35.0

Table A.2: St Lawrence Region Summer Non-Coincident Load Forecast

Please note: In the table above NET assumes DG contracts begin to expire and NET_DG assumes DGs remain.

Appendix B: Lists of Step-Down Transformer Stations

Sr. No.	Transformer Stations	Voltages (kV)
1.	Brockville TS (T1/T2)	230/44
2.	Chesterville TS (T1/T2)	115/44
3.	Crosby TS (T1/T2)	230/27.6
4.	Crosby T3	230/44
5.	Morrisburg TS (T3/T4)	115/44
6.	Newington DS	115/27.6
7.	Smith Falls TS (T3/T4)	230/44
8.	St Lawrence TS (T5/T6)	230/44

Appendix C: Lists of Transmission Circuits

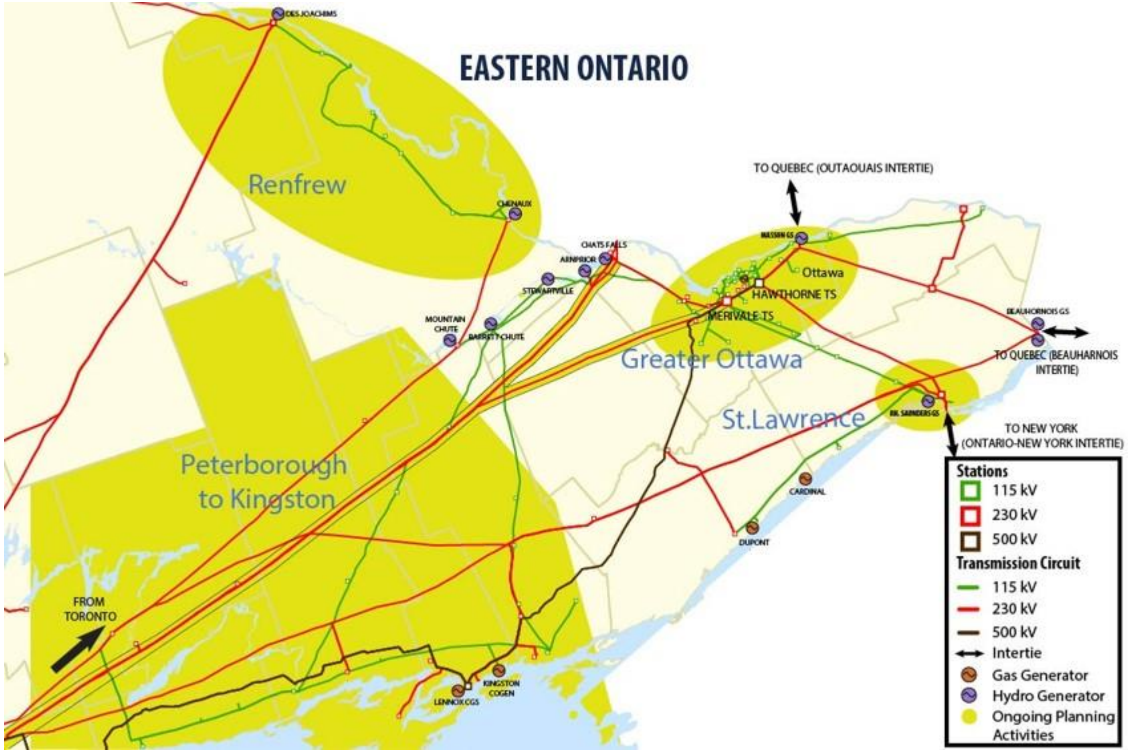
Sr. No.	Circuit ID	From Station	To Station	Voltage (kV)
1	L20H, L21H, L22H	St Lawrence TS	Hinchinbrook TS	230k
2	L1MB	St Lawrence TS	Brockville TS	115kV
3	L2M	St Lawrence TS	Brockville TS/ Merivale TS	115kV

Appendix D: Acronyms

Acronym	Description
A	Ampere
BES	Bulk Electric System
BPS	Bulk Power System
CDM	Conservation and Demand Management
CIA	Customer Impact Assessment
CGS	Customer Generating Station
CSS	Customer Switching Station
CTS	Customer Transformer Station
DESN	Dual Element Spot Network
DG	Distributed Generation
DS	Distribution Station
GS	Generating Station
HV	High Voltage
IESO	Independent Electricity System Operator
IRRP	Integrated Regional Resource Plan
kV	Kilovolt
LDC	Local Distribution Company
LP	Local Plan
LTE	Long Term Emergency
LTR	Limited Time Rating
LV	Low Voltage
MTS	Municipal Transformer Station
MW	Megawatt
MVA	Mega Volt-Ampere
MVAR	Mega Volt-Ampere Reactive
NA	Needs Assessment
NERC	North American Electric Reliability Corporation
NGS	Nuclear Generating Station
NPCC	Northeast Power Coordinating Council Inc.
NUG	Non-Utility Generator
OEB	Ontario Energy Board
ORTAC	Ontario Resource and Transmission Assessment Criteria
PF	Power Factor
PPWG	Planning Process Working Group
RIP	Regional Infrastructure Plan
SA	Scoping Assessment
SIA	System Impact Assessment
SPS	Special Protection Scheme
SS	Switching Station
STG	Steam Turbine Generator
TS	Transformer Station

APPENDIX F – Regional Infrastructure Plan - St Lawrence Region

Eastern Ontario



Connecting Today. Powering Tomorrow.

Regional Planning in Eastern Ontario

- Seeks to align electricity system planning with local plans
- Focuses on opportunities for coordination
- Status update: Greater Ottawa (complete); Peterborough to Kingston (underway); Renfrew (starting soon); and St. Lawrence (starting later in 2021)