Appendix L

Alectra Value Framework Implementation Document

Alectra Utilities

Distribution System Plan (2020-2024)

March 27, 2018

Alectra Value Framework Implementation Document

Copperleaf Technologies
2920 Virtual Way, #140
Vancouver, BC
V5M 0C4
Canada

Tel: +1 604 639 9700
Fax: +1 604 639 9699

Table of Contents

Document Control Sheet

Version	Date	Description	Originator
1.0	Apr 2, 2014	Initial Draft	Stan Coleman
2.0	Apr 17, 2014	Updated risk definitions	Vlad Serdiuk
3.0	Apr 20, 2014	Updated Reliability benefit calculation	Vlad Serdiuk
4.0	May 2, 2014	Reformatted the document for easier read	Vlad Serdiuk
5.0	Mar 20, 2015	Added methodology description. Updated Financial Value Measures to include changes to Capital and OM&A financial benefits. Reorganized mapping to strategic objectives. Enhanced benefit and risk descriptions.	Vlad Serdiuk
6.0	Mar 23, 2015	General edits, addition of A3	Victoria Wills
7.0	Apr 1, 2015	Edits to Reputational risk definitions	Victoria Wills
8.0	Apr 13, 2015	Updated section A3. Added reference to PowerStream Value Measures spreadsheet	Vlad Serdiuk
9.0	Feb 15, 2018	Updated consequences, likelihoods	Brian Dewan
10.0	Feb 19, 2018	Replaced the list of value measures with new format. General cleanup of value measure descriptions.	Vlad Serdiuk
11.0	Feb 20, 2018	Updated Reliability and Reliability for spares value measures based on the Alectra's most recent models.	Grant Burwash
12.0	Mar 08, 2018	Removed extra factor of 60 from reliability for spared value measure. Clarified Duration lookup. Added Diversity Factor table. Added table for system configurable fields.	Brian Dewan
13.0	Mar 22, 2018	Updated Alectra Strategic goals, Probabilities, Risk Consequences and Risk Matrix. Removed table mapping to strategic pillars.	Brian Dewan
14.0	Mar 27, 2018	Updated Labour Rates	Brian Dewan
15.0	Mar 26, 2019	Updated Name of Value Measure for consistency	Tracy Martin

1. Value-Based Decision-Making Approach

This document outlines Alectra Value Function description as well Copperleaf's Value-Based Decision Making (VDM) approach for valuing investments for comparison against each other in a manual or automated investment decision-making process. This document addresses the following:

- How to determine the value of an investment
- The method used to create a Value Framework
- Alectra Value Function description

How to Determine the Value of an Investment

Every organization needs a mechanism by which they determine the value of an investment if they intend to optimize the use of their scarce resources. There are a number of elements that can contribute to assessing the value of an investment to an organization.

- Improvements in Key Performance Indicators (KPIs)
- Risks mitigated by an investment, often grouped into categories
- Consequences of a given risk, were they not mitigated
- Financial benefits such as cost savings
- Other elements that may bring value to the organization

An investment's value is used to determine both its independent merit and its standing among other investments competing for resources in a constrained optimization process.

The process that Copperleaf uses to determine an investment's value is called VDM, or Value-Based Decision Making. It is an implementation of Multi-Criteria Decision Analysis (MCDA). Copperleaf's VDM approach captures the strategic management decisions made by the organization as to the relative importance of KPIs, risk categories, and financial benefits. These categories can be individually weighted to suit the priorities of the organization or to determine the sensitivities inherent in each recommendation. The function that is used to weight and combine the individual categories that deliver value to the organization is termed the Value Function. The Value Function along with the detailed supporting calculations, assumptions and quantification, as well as the broader methodology and supporting processes is termed the Value Framework.

C55, Copperleaf's Asset Investment Planning and Management software, supports the VDM process. Based on asset and investment data, C55 automatically calculates the investment value for each project based on the Value Function and this is then used in the optimization process.

What is Copperleaf's VDM approach

Copperleaf's VDM approach (**Figure 1**) is a best practice in Asset Investment Planning and Management (AIPM) today. In a nutshell, it means that the organization uses a value-based decision-making approach that aligns with their organizational and strategic objectives to consistently quantify investment value across their organization.

The following provides an overview of the key elements of Copperleaf's VDM process. Copperleaf's model encourages organizations to:

- Use a value-based approach to guide the development of the decision criteria and the relative weighting of the criteria to one another.

- Use a rational economic approach calibrated to a common scale so dissimilar investments can be compared based on a wide range of criteria.
- Align this model to the objectives and values of the organization to ensure that higher value translates into more success for the organization sooner.
- Optimize investments across the entire organization to determine the highest total value that can be achieved with the available resources.
- Use a quantitative, consistent and repeatable approach to assess all benefits.
- Use a risk-informed approach, made by constructing an appropriate risk matrix, to align the mitigation of risk to the common scale ensuring risk is factored into decision-making.
- Ensure that both financial and non-financial benefits are included and that their contributions are aligned to the common scale.
- Use a time-sensitive approach to planning investments that takes into account differing costs and consequences resulting from deferral or acceleration of projects. Timing is everything.
- Employ a decision-support solution that delivers transparency, consistency, accuracy, repeatability and rigor to your organization in an efficient and collaborative manner.
- Provide an efficient mechanism to communicate and defend the recommended investment decisions.

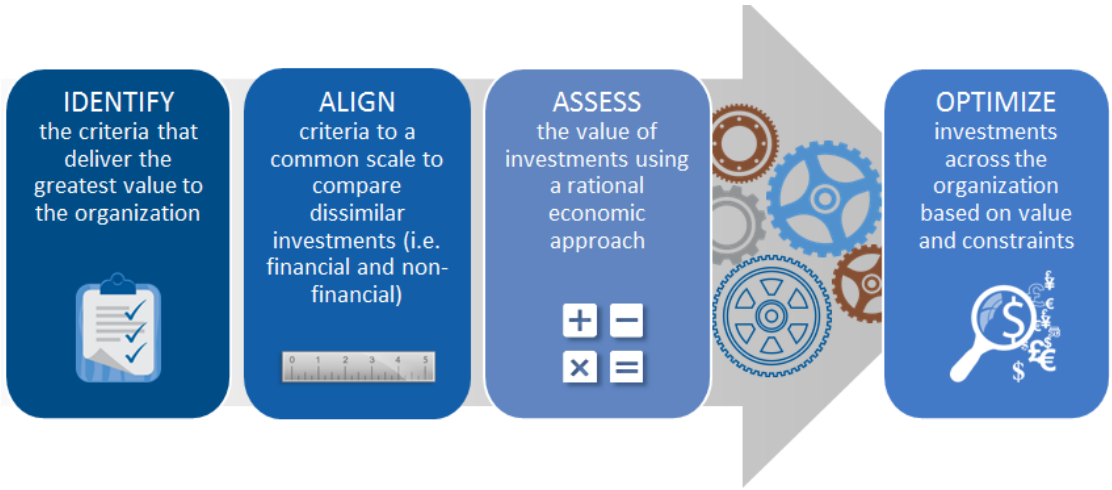


Figure 1 Copperleaf's VDM Approach

2. Summary

Within C55 all projects are valued (and optimized) based upon a Value Function. The Value Function is a weighting of a number of Value Measures. Value Measures are grouped in to the Value Drivers and Value drivers are aligned with the Company's strategic objectives. Value Measures can include risk mitigation, financial benefits, impacts on KPIs, and cost. The Value Function is configurable for Alectra to reflect how projects contribute to the organization. The sections below describe the Value Function and the Value Measures that constitute the Value Function, including the details of how each Value Measure is computed.

3. Alectra Value Framework

3.1 Alectra Strategic Goals & Objectives

The figure below outlines Alectra's Strategic goals and objectives.

THEMES (WHAT WE DO)	MANAGING THE TRANSITION	OPTIMIZING OPERATIONS AND ENHANCING CUSTOMER EXPERIENCE	GROWING THE BUSINESS	BUILDING CORPORATE RESILIENCE
STRATEGIC GOALS (WHAT WE WANT TO ACHIEVE IN THE NEXT 5 YEARS)	**Deliver the outcomes planned in the merger business case**	**Optimize the operation of assets and related processes and enhance customer experience in a financially prudent manner**	**Grow the core business through mergers and acquisitions as well as regional and community planning initiatives** **Grow the non-regulated business**	**Invest in our people and processes to meet the needs of our customers and stakeholders**
STRATEGIC OBJECTIVES (HOW WE WILL ACHIEVE OUR GOALS)	Achieve the post-merger integration synergies and shareholder dividends outlined in the merger business case Maintain or exceed existing customer service levels, reliability performance and employee engagement Evolve the separate corporate cultures into a Alectra culture Continue to make process improvements for best-in-class status Provide regular and comprehensive communications to all our shareholders, customers, employees and other stakeholders	Optimize operations and asset lifecycle management and related processes regarding asset rehabilitation and renewal Invest in and leverage emerging technologies to enable and enhance operations optimization Enhance grid integration to enable continued conservation & demand management and distributed generation endeavors Enhance reliability through smart grid initiatives Advocate for more predictable and balanced rate regulation to protect existing revenue streams, and to acquire new revenue streams Proactively enhance customer engagement and levels of service Develop engaging customer relationships that leverage various channels/ technologies, including social media Maintain and continue to improve upon our strong safety record	**Core business:** Continue to explore and pursue merger and acquisition opportunities that are value accretive, with a preference to greater urban density and geographic contiguity - at the same time, expand our service area to the full extent of our municipal boundaries Explore and pursue innovative ways to obtain capital to finance acquisitions Service organic growth requirements by building integrated regional and community smart energy plans, promoting sustainability, affordability and reliability **Non-regulated business:** Build on existing non-regulated lines of business in multiple jurisdictions to enhance the integrated energy solutions model (i.e. solar renewables, high voltage electrical servicing, sub-metering, meter service provider (MSP)services) Explore and pursue emerging opportunities that have the appropriate risk profile and rate of return and are complimentary to the existing asset-based businesses Develop and expand strategic partnerships and alliances, where appropriate and advantageous Explore and pursue innovative ways to obtain capital for growth Explore the feasibility of future technologies and investments Develop market segmentation studies, financing plans and value propositions for each of the emerging lines of business	Strengthen the development and engagement of our employees Attract and retain the best talent Be a focused, sustainable and flexible organization positioned to succeed in the evolving market, in the energy industry and in the face of increasingly extreme weather due to climate change Continuously optimize business practices and processes to best-in-class performance

Figure 2 - Alectra Strategic Goals & Objectives

3.2 C55 Value Function

Alectra Value Measures are grouped in to the Value Drivers. Each Value Driver and Value Measure is aligned with Alectra's Strategic Pillar and Strategic objective.

C55 Value Measures

Value Measure Categories	Value Measures	Conversion Factor	Polarity
• **Financial**	• Capital Financial Benefit	0.001	+
	• OM&A Financial Benefit	0.001	+
	• OM&A Costs	0.001	-
	• Financial Risk*	Risk Matrix	+
	• IT Capacity Risk*	Risk Matrix	+
	• Project Cost	0.001	-
• **Reliability**	• Distribution System Capacity Risk*	Risk Matrix	+
	• Reliability Benefit	0.001	+
	• Reliability for Spares Benefit	0.001	+
• Safety	• Safety Risk*	Risk Matrix	+
• **Compliance**	• Compliance Risk*	Risk Matrix	+
• Customer Service	• Customer Satisfaction Benefit	1	+
	• Customer Service Benefit	1	+
• Environmental	• Environmental Improvements Benefit	0.001	+
	• Environmental Risk*	Risk Matrix	+
• Regulatory Approval	• Application Ready Organization Benefit	1	+
• Public and Employee Perception	• Reputational Risk*	Risk Matrix	+
	• Employee Wellness Benefit Benefit	1	+
• **Innovation**	• Technological Innovation Benefit	1	+

Figure 3 - C55 Value Measures

*Risk profile for baseline and residual risk. Receive Value Units based on the Risk Matrix.

As described in the sections below, each of the Value Measures is calibrated to the same scale (1 value point approximately equal to $1,000). Consequently, within the Value Function, each of the Value Measures (except Project Cost and OM&A Cost) is weighed with the same value of +1. As Project Cost and OM&A Cost are a negative contributor to Project Value it is weighted with a cost of -1. In addition, Finnacial benefits and costs are calibrated to the Value Measure by applying a conversion factor of 0.001 to bring them to the same scale as the value points.

All Value Measures are computed on a monthly or annual basis (e.g. the financial benefits for 2017 can be specified as being different than 2018). The stream of benefits (or costs) is converted to a single value for the Value Measure, by taking the Present Value of the stream, back to the beginning of the current fiscal year. The PV calculation uses the system defined discount rate (currently set to 5.91%).

4. Value Measures: Financial Benefits

4.1 Capital Financial Benefits

Capital Financial Benefits is used to measure Capital savings such as labour cost saving, productivity improvements, other capital cost savings. Financial Benefit Type variable determines whether the savings would result in the tangible future cost reduction (Expected Reduction), cost avoidance (Avoided Cost) or productivity improvement (Efficiency Benefit).

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
TYPE	Financial Benefit Type	Enumeration	
			Expected Reduction
			Avoided Cost
			Efficiency Benefit
LABH	Inside Labour Savings (hours per year)	Number	
OLAB	Outside Labour Savings (hours per year)	Number	
COST	Other Capital Cost Savings or Revenue (dollars per year)	Number	
TYCO	Type of Other Capital Cost Savings or Revenue	Enumeration	
			Not Applicable
			Contract
			Materials
			Revenue
			Other
PROB	Probability of Benefit Achievement (for Avoided Cost and Efficiency Benefits). (%)	Number	
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

Examples of Benefits Types

Expected Reduction benefit type:
This benefit type measures a tangible reduction that can be applied to future budget. For example, a change to the project is made such that services of an outside contractor are no longer needed. Therefore, the contractor position can be eliminated saving Alectra the cost of the contractor. The budget for the years following the contractor elimination can be reduced by the amount saved.

Avoided Cost benefit type:
This benefit type measures the potential expenditures that would be avoided as a result of the project. To reflect the uncertainty in measuring and achieving the avoided costs the probability factor can be applied. For example, the project targets installing automated digital fault detectors. The new equipment would save hours of crew time by reporting the exact location of faults that would otherwise have to be determined manually by Alectra crews. In this example the probability of realizing the benefit is 100% as it is certain that the equipment will automatically determine and report fault information to the control.

Efficiency benefit:
This benefit type is aimed at measuring productivity improvements. To reflect the uncertainty in measuring and achieving productivity gains the probability factor can be applied. For example, new software can enable employees to perform their day-to-day tasks faster. The time savings can be utilized by the employees to perform additional tasks. For demonstration purposes, let's say that the probability of employees taking advantage of the time savings is 75% meaning that that 3/4 of the employees will become more productive as result of the project.

Capital Financial Benefits are computed in dollars and then calibrated to the Value Measure by applying the conversion factor of 0.001. This conversion factor is used because Alectra's Value Function uses a common scale of one value point to each thousand dollars.

4.2 OM&A Financial Benefits

OM&A Financial Benefits is used to measure OM&A savings such as labour cost saving, productivity improvements, other OM&A cost savings. Financial Benefit Type variable determines whether the savings would result in the tangible future cost reduction (Expected Reduction), cost avoidance (Avoided Cost) or productivity improvement (Efficiency Benefit). This benefit is similar to Capital Financial only is targeted at OM&A expenditures.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
TYPE	Financial Benefit Type	Enumeration	
			Expected Reduction
			Avoided Cost
			Efficiency Benefit
LABH	Inside Labour Savings (hours per year)	Number	
OLAB	Outside Labour Savings (hours per year)	Number	
COST	Other OM&A Cost Savings (dollars per year)	Number	
TYCO	Type of Other OM&A Cost Savings	Enumeration	
			Not Applicable
			Contract
			Materials
			Other
PROB	Probability of Benefit Achievement (for Avoided Cost and Efficiency Benefits). (%)	Number	
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

[redacted]

Expected Reduction, Avoided Cost, and Efficiency Benefit carry the same meaning in this value measure as in the Capital Financial Benefits value measure. Expected Reduction measures tangible cost elimination, Avoided Cost measures projected cost avoidance, and Efficiency Benefit measures productivity gains. Probability of benefit achievement for Expected Reduction is always considered to be 100% whereas Avoided Cost and Efficiency Benefit allow for adjustments to account for uncertainty in the benefit realization.

OM&A Financial Benefits are computed in dollars and then calibrated to the Value Measure by applying the conversion factor of 0.001. This conversion factor is used because Alectra's Value Function uses a common scale of one value point to each thousand dollars.

4.3 OM&A Costs

OM&A Costs is aimed at measuring any OM&A costs that would be added as a result of completing the project. It is a negative contributor to the project value and typically occurs on projects that create additional maintenance upon project completion.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
LABH	Inside Labour Costs (hours per year)	Number	
OLAB	Outside Labour Costs (hours per year)	Number	
COST	Other OM&A Costs (dollars per year)	Number	
TYCO	Type of Other OM&A Costs	Enumeration	
			Not Applicable
			Contract
			Materials
			Annual Maintenance
			Annual License
			Other
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

[redacted]

[redacted]

- [redacted]
- [redacted]

OM&A Costs are computed in dollars and then calibrated to the Value Measure by applying the conversion factor of 0.001.

5. Value Measures: KPI Impacts

5.1 Reliability

The **Reliability Benefit Value** computes the societal cost of an outage to the customer, and is based on the variables: peak load lost, duration of the outage, duration for which redundancy is lost and the type of the customer affected. The inputs are outlined below. Additional reliability benefits are allocated to project which affects worst performing feeders which is in line with Alectra's mandate of improving the reliability for the worst performing areas.

Variable Name	Variable Label	Variable Type	Enumeration Values
FAIL	How many failures per year will be avoided by implementing this project?	Number	
PEAK	For each of the failures what would be the expected Peak Lost Load (Connected KVA), or in the case of redundant equipment the Peak load at risk (KVA)	Number	
DUR	What is the average duration of the outage caused by the failures? (hours)	Number	
DURR	If this is redundant equipment and there is a failure, what is the duration of the period for which redundancy will be lost?	Number	
TYPE	What is the customer type?	Enumeration	
			Residential
			Industrial
			Commercial
			Mixed Residential/ Commercial
			Mixed Commercial/ Industrial
			Mixed Residential/ Industrial
			Mixed Residential/ Commercial/ Industrial
WORS	Has this feeder been identified on the worst performing feeder report in the past 2 years, OR has this area been identified by the Key Accounts Manager as an area of concern?	Enumeration	
			Yes
			No
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

The Reliability Value Measure is computed as a sequence of steps:

1. **Customer Interruption Costs** (frequency and Duration) at Alectra are valued as per Table 1
   The numbers listed in the table below were based on metrics developed by Roy Billinton of the University of Saskatchewan published in 2008. The values below are quantified in $/kW. There will be an opportunity in the future to improve these numbers to reflect the current customer interruption cost.

Customer Type	1 Hour Outage	2 Hour Outage	3 Hour Outage	4 Hour Outage	5 Hour Outage	6 Hour Outage	7 Hour Outage	8 Hour Outage	% Weighting
Industrial	12.88	20.3037	29.844	35.68	48.993	58.463	68.003	79.13	100
Commercial	12.13	22.4809	37.739	44.41	68.255	83.513	98.771	117.71	100
Residential	0.68	2.6808	5.8319	6.97	12.134	15.285	18.436	22.45	100
Mix(Comm/Res)	6.405	12.5838	21.786	25.69	40.195	49.399	58.604	70.08	50/50
Mix(Comm/Ind)	12.505	21.3924	33.791	40.045	58.589	70.988	83.387	98.42	50/50
Mix(Res/Ind)	10.44	16.7791	25.041	29.938	41.565	49.828	58.09	67.794	20/80
Mix(Res/Comm/Ind)	10.14	17.6492	28.198	33.43	49.296	59.845	70.394	83.226	20/40/40

Table 1 - Customer Interruption Costs

Regardless of the nature of the cause of the interruption, Industrial and Commercial customers are weighted far greater than Residential. Customer outage costs for Industrial and Commercial customers are directly linked with lost production and/or lost sales.

An assessment is first performed to determine an approximate ratio of customers based on the categories of Industrial, Commercial and Residential.

Typically, if the industrial customers are serviced from dedicated feeders or on shared feeders with other industrial customers as such they will be categorized in the “Industrial” type.

When dealing with station related projects the project owner should look at the type of customers being fed from the bus. In most cases, stations project will likely fall in the mixed (res/comm/ind).

Residential customers also tend to be grouped together in subdivisions throughout the city. While there may be some commercial businesses affected by an outage in a residential neighbourhood, these subdivisions will be given the “Residential” type in most cases.

This value measure is implemented such that outage duration decimals are rounded to the closest number for looking up the appropriate Customer Interruption Cost in Table 1. For outage durations that are less than 1 hour, the Customer Interruption Cost for 1 hour will be used. This value measure uses the actual outage duration in the formula, and not the rounded values used to determine the appropriate Customer Interruption Cost. Also, if the outage duration is greater than 8 hours, it will choose the Customer Interruption Cost for 8 hours.

System Configurable Fields

Configurable Field Name	Configurable Field Code	Configured Value
Power Factor	Power Factor	0.9
Secondary Failure Probability	Secondary Failure Probability	0.05
CIC_Industrial_1Hr	CIC_Industrial_1Hr	12.88
CIC_Industrial_2Hr	CIC_Industrial_2Hr	20.3037
CIC_Industrial_3Hr	CIC_Industrial_3Hr	29.844
CIC_Industrial_4Hr	CIC_Industrial_4Hr	35.68
CIC_Industrial_5Hr	CIC_Industrial_5Hr	48.993
CIC_Industrial_6Hr	CIC_Industrial_6Hr	58.463
CIC_Industrial_7Hr	CIC_Industrial_7Hr	68.003
CIC_ Industrial_8Hr	CIC_ Industrial_8Hr	79.13
CIC_ Commercial _1Hr	CIC_ Commercial _1Hr	12.13
CIC_ Commercial _2Hr	CIC_ Commercial _2Hr	22.4809
CIC_Commercial_3Hr	CIC_Commercial_3Hr	37.739
CIC_Commercial_4Hr	CIC_Commercial_4Hr	44.41
CIC_Commercial_5Hr	CIC_Commercial_5Hr	68.255
CIC_Commercial_6Hr	CIC_Commercial_6Hr	83.513
CIC_Commercial_7Hr	CIC_Commercial_7Hr	98.771
CIC_Commercial_8Hr	CIC_Commercial_8Hr	117.71
CIC_Residential_1Hr	CIC_Residential_1Hr	0.68
CIC_Residential_2Hr	CIC_Residential_2Hr	2.6808
CIC_Residential_3Hr	CIC_Residential_3Hr	5.8319
CIC_Residential_4Hr	CIC_Residential_4Hr	6.97
CIC_Residential_5Hr	CIC_Residential_5Hr	12.134
CIC_Residential_6Hr	CIC_Residential_6Hr	15.285
CIC_Residential_7Hr	CIC_Residential_7Hr	18.436
CIC_Residential_8Hr	CIC_Residential_8Hr	22.45
CIC_Mix_CR_1Hr	CIC_Mix_CR_1Hr	6.405
CIC_Mix_CR_2Hr	CIC_Mix_CR_2Hr	12.5838
CIC_Mix_CR_3Hr	CIC_Mix_CR_3Hr	21.786
CIC_Mix_CR_4Hr	CIC_Mix_CR_4Hr	25.69
CIC_Mix_CR_5Hr	CIC_Mix_CR_5Hr	40.195
CIC_Mix_CR_6Hr	CIC_Mix_CR_6Hr	49.399
CIC_Mix_CR_7Hr	CIC_Mix_CR_7Hr	58.604
CIC_Mix_CR_8Hr	CIC_Mix_CR_8Hr	70.08
CIC_Mix_CI_1Hr	CIC_Mix_CI_1Hr	12.505
CIC_Mix_CI_2Hr	CIC_Mix_CI_2Hr	21.3924
CIC_Mix_CI_3Hr	CIC_Mix_CI_3Hr	33.791
CIC_Mix_CI_4Hr	CIC_Mix_CI_4Hr	40.045

CIC_Mix_CI_5Hr	CIC_Mix_CI_5Hr	58.589
CIC_Mix_CI_6Hr	CIC_Mix_CI_6Hr	70.988
CIC_Mix_CI_7Hr	CIC_Mix_CI_7Hr	83.387
CIC_Mix_CI_8Hr	CIC_Mix_CI_8Hr	98.42
CIC_Mix_RI_1Hr	CIC_Mix_RI_1Hr	10.44
CIC_Mix_RI_2Hr	CIC_Mix_RI_2Hr	16.7791
CIC_Mix_RI_3Hr	CIC_Mix_RI_3Hr	25.041
CIC_Mix_RI_4Hr	CIC_Mix_RI_4Hr	29.938
CIC_Mix_RI_5Hr	CIC_Mix_RI_5Hr	41.565
CIC_Mix_RI_6Hr	CIC_Mix_RI_6Hr	49.828
CIC_Mix_RI_7Hr	CIC_Mix_RI_7Hr	58.09
CIC_Mix_RI_8Hr	CIC_Mix_RI_8Hr	67.794
CIC_Mix_RCI_1Hr	CIC_Mix_RCI_1Hr	10.14
CIC_Mix_RCI_2Hr	CIC_Mix_RCI_2Hr	17.6492
CIC_Mix_RCI_3Hr	CIC_Mix_RCI_3Hr	28.198
CIC_Mix_RCI_4Hr	CIC_Mix_RCI_4Hr	33.43
CIC_Mix_RCI_5Hr	CIC_Mix_RCI_5Hr	49.296
CIC_Mix_RCI_6Hr	CIC_Mix_RCI_6Hr	59.845
CIC_Mix_RCI_7Hr	CIC_Mix_RCI_7Hr	70.394
CIC_Mix_RCI_8Hr	CIC_Mix_RCI_8Hr	83.226
Diversity Factor - Industrial	Diversity Factor - Industrial	0.6
Diversity Factor - Commercial	Diversity Factor - Commercial	0.5
Diversity Factor – Residential	Diversity Factor – Residential	0.5
Diversity Factor – Mixed Comm_Res	Diversity Factor – Mixed Comm_Res	0.5
Diversity Factor – Mixed Comm_Ind	Diversity Factor – Mixed Comm_Ind	0.55
Diversity Factor – Mixed Res_Ind	Diversity Factor – Mixed Res_Ind	0.58
Diversity Factor – Mixed Res_Comm_Ind	Diversity Factor – Mixed Res_Comm_Ind	0.54

Table 2: Reliability System Configurable Fields

2. **Peak Load Lost**

To determine the peak KVA lost, the project owners would determine the connected KVA and the following diversity factor will be applied based on the type of customers connected.

Industrial – 60%
Residential – 50%
Commercial – 50%

The diversity factor for each customer type is calculated based on the % weightings in Table 1 and the value is stored in a System Configurable field as listed in Table 2. For example, the diversity factor for Mix(Res/Comm/Ind) = (0.2 x .5) + (0.4 x 0.5) + (0.4 x 0.6) = 0.54

Customer Type	% Weightings	Diversity Factor
Industrial	100	0.6
Commercial	100	0.5

Residential	100	0.5
Mix(Comm/Res)	50/50	0.5
Mix(Comm/Ind)	50/50	0.55
Mix(Res/Ind)	20/80	0.58
Mix(Res/Comm/Ind)	20/40/40	0.54

Table 3: Diversity Factor

The peak lost KW will be determined based on the Power Factor (e.g. 0.9) and Diversity Factor.

[redacted]

3. **Duration**

DUR represents the duration of the outage that is experienced by customers, [redacted]

[redacted]

4. **Reliability Cost**

The customer interruption cost will be determined based on the calculated outage duration (Duration) and the customer type, as outlined in Table 1. The outage duration will be rounded to the nearest hour and the customer outage cost for a particular customer will be selected based this time interval. The outage cost for any outages over 8 hours will be capped at the 8 hour outage level.

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

5. **Reliability Value**

Reliability Value is then computed from the Reliability Cost. A 25% premium is added to the Reliability Cost if a feeder has been identified on the worst performing feeder report in the past 2 years, OR the area been identified by the Key Accounts Manager as an area of concern. This weighting factor was determined by the Optimizer Team.

As all costs were performed in dollars, to convert to value units the dollar value is divided by 1000.

[redacted]

[redacted]

- [redacted]
- [redacted]

5.2 Reliability for Spares

This Value Measure is used to assess the impact of spare equipment on reliability. Reliability Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type
PROB	What is the probability that a spare will be required in this year? (%)	Number
DUR	Without a spare available what would be the expected outage duration? (days)	Number
DURS	With a spare available what would be the expected outage duration? (days)	Number
DURR	If this spare is for redundant equipment: If no spare was available, and the equipment was to fail, what is the duration of the period for which redundancy will be lost? (days)	Number
PEAK	What is the peak load (Connected KVA) served by this equipment?	Number
TEXT	Provide the rationale or assumptions for the answers provided above.	Text

The peak lost KW will be determined based on the 0.9 PF and the Diversity Factor for the Mixed Industrial/Commercial/Residential customer type from Table 3.

Reliability for Spares uses the same principles as Reliability model, only it takes into account spares availability and how spares reduce outage duration and lost load.

[redacted]

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

5.3 Customer Satisfaction

The Value Measure is used to assess the impact (positive % change) of the project on the customer satisfaction survey. Customer Satisfaction Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
ECC1	What is the expected impact of this project on the percentage of customers answering "Satisfied" or "Very Satisfied" on the next Utility Pulse Survey?	Enumeration	
			Positive Impact of 5 or more percentage points
			Positive Impact of 4 percentage points
			Positive Impact of 3 percentage points
			Positive Impact of 2 percentage points
			Positive Impact of 1 percentage point
			Positive Impact of less than 1 percentage point
			Non-Measurable Positive Impact
			No Impact
TEXT	Provide the rationale or assumptions for the answers	Text	

Variable Name	Variable Label	Variable Type	Enumeration Values
	provided above.		

[redacted]

[redacted]

5.4 Customer Service

This Value Measure is used to assess the impact of a project on Service Quality Indicators (SQI). Customer Service Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type
SQ01	Percentage Improvement in New Connections SQI	Number
SQ02	Percentage Improvement in Appointments Scheduled SQI	Number
SQ03	Percentage Improvement in Appointments Met SQI	Number
SQ04	Percentage Improvement in Rescheduled Missed Appointments SQI	Number
SQ05	Percentage Improvement in Telephone Calls Answered Within Acceptable Time SQI	Number
SQ06	Percentage Improvement in Telephone Calls Abandon Rate SQI	Number
SQ07	Percentage Improvement in Written Response SQI	Number
SQ08	Percentage Improvement in Emergency Response SQI	Number
SQ09	Percentage Improvement in Reconnection Performance Standards following disconnection for Non-Payment	Number
SQ10	Percentage Improvement in Micro-Embedded Generation Facility Connections on time	Number

Variable Name	Variable Label	Variable Type
TEXT	Provide the rationale or assumptions for the answers provided above.	Text

[redacted]

5.5 Application Ready Organization

Application Ready Organization benefit is aimed at measuring the increase in likelihood of Alectra rate application approval by the regulator. Application Ready Organization Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
RRO1	If the project is completed, what will be the impact on the ability to prepare/defend rate submission?	Enumeration	
			Will make it possible to prepare rate submission or significantly increase the likelihood of approval
			No impact
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

[redacted]

5.6 Environmental Improvements

Environmental Improvements measures the positive impact on the environment. It is used to measure improvements such value of CO2 emission reduction and energy efficiency (MWh) savings. Environmental Improvements Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type
EI1	Quantity of waste paper that will be reduced each year (sheets of standard size paper)	Number
EI2	Quantity of CO2 Emissions to be reduced each year (tonnes)	Number
EI3	Energy Saved (MWh) saved per year if project completed (Line Losses, Reduced Consumption)	Number
TEXT	Provide the rationale or assumptions for the answers provided above.	Text

[redacted]

Note 1: Paper

- http://www.foex.fi/ also gives pricing of about $1000 USD per tonne (or $1/kilogram)
- A typical sheet of paper is approximately 5 grams – price per sheet is approximately 0.5 cents or 0.005 dollars

Note 2: Emissions

Survey of information:

- US government uses a value of $41/ton for Avoided CO2
- According to Wikipedia http://en.wikipedia.org/wiki/Carbon_tax, carbon taxes are in the range of $10 to $100 per tonne of C02
- Forbes article http://www.forbes.com/2009/06/03/cap-and-trade-intelligent-investing-carbon.html puts the price in the range of $20 to $30 per tonne of CO2

- CBC news http://www.cbc.ca/news/business/u-s-ups-social-cost-of-carbon-emissions-1.1330833 states that the US has increased the social cost it uses in evaluation projects from $22 USD/metric tonne to $36 USD/metric tonne

Base on this survey, Copperleaf has configured a value of $40/tonne for avoided CO2.

Note 3: Energy

- http://www.ieso.ca/, gives the average weighted price for February 2014 as 8.15 cents/kilowatt-hour or $82/MWh

5.7 Employee Wellness Benefit

This Value Measure is used to assess the improvement in physical wellness of Alectra employees. Employee Wellness Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
EW1	How will the employee's physical wellness be improved?	Enumeration	
			Build awareness
			Mitigate injuries or improve employee comfort
			Eliminate injuries
EW2	What percentage of all Alectra employees will be improved by this project?	Number	
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

[redacted]

5.8 Technological Innovation

Technological Innovation is used to indicate that a new technology is adopted by Alectra. This Value Measure is used only when clearly new technology is adopted by Alectra; it does not apply when an upgrade to an existing

technology is implemented. Technological Innovation Benefits are computed directly in Value Units so the conversion factor for the value measure is 1.

The project owner specifies the benefits by answering the following questions:

Variable Name	Variable Label	Variable Type	Enumeration Values
TI1	Does this project introduce or apply new technology that has never been used at Alectra before (does not include enhancements to existing technology)?	Enumeration	
			Yes
			No
TEXT	Provide the rationale or assumptions for the answers provided above.	Text	

6. Value Measures: Risk Mitigation

The Value of Risk Mitigation in all risk categories is computed using the same methodology. Mitigated Risk is computed directly in Value Units therefore the conversion factor for the value measure is 1.

The project owner specifies:

Baseline Risk: The risk present if the project is not completed.
Residual Risk: The risk present if the project is completed.

Value of Risk Mitigated is computed as:

Mitigated Risk = Baseline Risk – Residual Risk

For each risk the project owner specifies:

- Consequence
- Probability of Occurrence

The selection of the probability and consequence is done based on the definitions for each risk category (see Appendix A1).

The Probability and Consequence are converted to values using the Risk Matrix (see Appendix A2). The value is computed per year and the total value is determined by taking the present value of the stream.

6.1 Financial Risk

Financial risk is used to represent a failure mode or an event that will have a direct financial consequence for Alectra. For example, if the failure of a piece of equipment in a switchyard causes the destruction of a nearby breaker, there would be a financial risk associated with that failure whose consequence is valued at the cost of repair or replacement of the breaker.

Assessment of financial risk is based on the direct cost to Alectra of a failure or event occurring.

6.2 IT Capacity Risk

IT capacity risk represents the potential productivity impact of failing to meet Alectra's IT requirements. An example of IT capacity risk would be a network link between sites that potentially does not have the bandwidth required to support all of the users at one site.

Assessment of IT capacity risk is based on the number of users whose productivity would likely be significantly impacted by the insufficiency.

IT Capacity Consequences are aligned with financial consequences as follows:

The productivity of an average employee is valued at $100,000
A significant impact is assumed to be a 10% reduction in efficiency.
Thus, IT capacity risk is assumed to be equivalent to **$10,000 per affected employee**.

6.3 Environmental Risk

Environmental risk is assessed based on the cost of remediation efforts to reverse any damage potentially caused. Damage so severe as not to be reversible is ranked using the most severe consequence classification.

6.4 Reputational Risk

Reputational risk represents the risk that a failure or event will cause Alectra customers or other external stakeholders to lose or weaken confidence in the organization.

Because it is difficult to directly assess public perception, the level of consequence is assessed based on the amount of negative media coverage expected if the event or failure occurs. The higher levels of risk are associated with loss in stakeholder confidence, where the stakeholder is defined as the Ontario Energy Board or key shareholders (e.g. City of Vaughan).

6.5 Safety Risk

Alectra does not purposefully expose employees or the general public to known safety hazards.

If a significant safety risk that could lead to serious injury or death has been identified then that risk must be mitigated either by a capital investment, an O&M investment or some kind of operating restriction. If no operating restriction is possible to mitigate the risk and the only way to address the safety risk is by a capital investment, then that investment should be considered mandatory. Multiple alternatives may be created to represent multiple approaches to mitigating the risk on a temporary or permanent basis.

6.6 Distribution System Capacity Risk

Distribution System Capacity risk is used when a failure or event will threaten Alectra's ability to deliver power to all customers according to tariff.

The following types of risk would typically fall under this category:

- Overloading of transmission or distribution circuits
- Lack of required redundancy in transmission or distribution circuits (classed as "Exceeding planning limits")
- Events that lead to an under-voltage situation for some customers

6.7 Compliance Risk

Compliance risk is used to capture the impact of an event or a failure which would cause the utility to fail to comply with a government or regulatory mandate or with an internal policy.

Compliance risk is typically assessed based on the fines that would be assesses for non-compliance or the cost to Alectra of any operating restrictions that would be imposed as a result of the non-compliance.

Failure to conform to an internal policy is evaluated as a minor consequence.

7. Value Measures: Project Cost

The Project Cost is computed in dollars and then calibrated to the Value Measure scale by dividing by 1000.

8. Mandatory Compliance Investments

Projects in the following categories have been identified as Mandatory or Must Do investments as Alectra is mandated to complete these investments, specifically:

- Emergency Restoration
- Subdivision Services
- Road Authority Projects
- Emerging Development Capital
- Customer RGEN

These projects will be flagged as “MUST DO” and are considered as mandatory as part of the optimization process. These projects will have mitigated risk value as they are mitigating a compliance risk.

9. Other Mandatory Investments

Emergent Capital projects (both operations and sustainment) are not assigned benefits or risk mitigation with the level of funding determined by historical need.

ICI Projects, Layouts and Emerging Customers are also considered mandatory projects.

These projects are considered “Must Do” and are considered as mandatory as part of the optimization process.

10. Value and the Optimization Process

The Value function combines all the value measures to compute the overall value of an investment.

The Value of an investment reflects the total value that the project is bringing to Alectra, taking into account all of its financial benefits, impact on KPIs, risk mitigation and costs. The C55 optimizer selects the combination of start dates of projects that brings the highest total value to Alectra while fitting within the specified financial constraints.

Until projects are compared with one or another and the financial constraints are specified it is not known whether a project will be funded or not – so a project owner cannot know for certain whether or not a project will be funded. However, there are some indicators available to the project owner to help determine the goodness of a project:

1. Value. The net value of the project is visible to the project owner (as well as the components making up that value). A project with a value less than 0, is a project in which all the benefits specified for the project have a present value LESS than the present value of the cost. Projects with a value less than zero should never be considered unless they are considered mandatory for some reason.
2. Value/$. A project with a larger value is bringing more value to Alectra, however as one would expect larger projects typically bring more value than smaller projects. So, Value/$ can help to compare effectiveness of projects of different sizes.

While these indicators can help project, owners get a sense for the effectiveness of the projects neither is a perfect measure of which project will be preferred by the optimizer as the optimizer takes into account how the value (and value/$) changes over time.

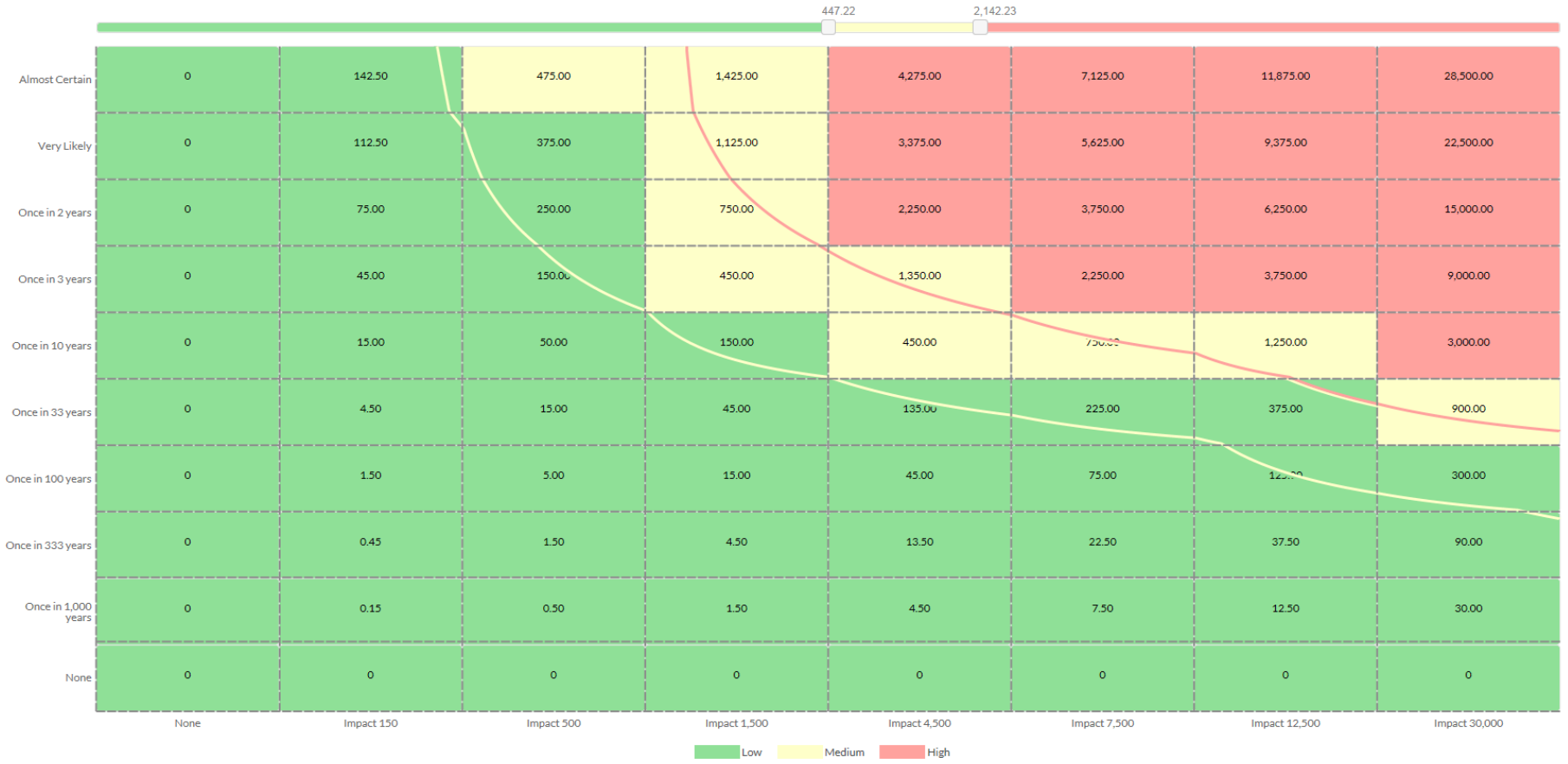
11. Risk Consequence Levels, Probabilities & Risk Matrix

Consequence and Probability Definitions for Risk Categories

Consequence Aide	None	Impact 150	Impact 500	Impact 1,500	Impact 4,500	Impact 7,500	Impact 12,500	Impact 30,000
COMPLIANCE	None: no corporate or legal requirements	**Threat:** Non-compliance resulting in receipt of an administrative order OR Non-compliance with a law or regulation resulting in a financial penalty of $150K or more	**Threat**: Corporate/Other: Corporate or other requirements (including contractual issues) where obligations would be approximately $500K. OR Non-compliance with a law or regulation resulting in a financial penalty of $500K or more	**Threat:** Municipal: Regulated (local level through Municipal by-laws) OR Non-compliance with a law or regulation resulting in a financial penalty of $1M or more	**Threat:** Non-compliance with a law or regulation resulting in a financial penalty of $3M or more	**Threat:** Federal/Provincial: Regulated (including OEB, CSA) OR Non-compliance resulting in work shut-down	**Threat:** Non-compliance resulting in a criminal conviction	**Threat:** Non-compliance resulting in suspension of license
DISTRIBUTION SYSTEM CAPACITY	**Threat:** Able to supply load without exceeding planning limits.	n/a	**Threat:** Can supply all load but temporarily exceeding planning limits	**Threat:** Can supply all load but there is sustained operation exceeding planning limits	**Threat:** Can supply all load but exceeding thermal limits	N/A	**Threat:** Unable to service a new load	N/A
SAFETY	No risk of incidents	**Threat:** Impact of event can be absorbed through routine activity Reportable incidents. Opportunity: Small operational improvements can be managed through routine activity	**Threat:** Risk of injury requiring medical attention	**Threat:** Non-life threatening Injuries requiring hospitalization	**Threat:** Impact of event required actions greater than routine activity. Reportable incident with serious but non-life threatening injuries **Opportunity:** Operational improvement provides minor or incremental improvement to day to day operations	**Threat:** A significant event which cannot be managed under routine activity Life threatening injuries **Opportunity:** Operational improvement provides sustained improvements to day-to-day operations	**Threat:** A critical event with a long recovery period which stretches plans to the limit and requires significant management effort to endure Life threatening injuries with long-term health implications **Opportunity:** Operational improvements provides significant improvements to day-to-day operations	**Threat:** A disaster with the potential to lead to the collapse of the organization Any loss of life and/or multiple serious long term health implications as a result of our actions **Opportunity:** Operational improvement provides a major innovative approach or significant rethink in terms of service delivery or operational improvement
ENIVRONMENTAL	No noticeable impacts with minor clean-up implications	Known impacts contained to the worksite such as fugitive emissions, minor spills with short term (< 1 year) clean-up implications	Known impacts contained to the worksite such as fugitive emissions, minor spills with medium term (up to 2 years) clean-up implications	Impacts with medium term (2 to 5 years) cleanup implications that are contained to the worksite.	Impacts are long term (>5 years) and are not contained on the worksite resulting in potential loss of flora, fauna and/or fish habitat. Impact significant enough to gain attention in provincial news media.	N/A	Impacts cause long term (> 20 years) damage to a water body, an environmentally/culturally sensitive receptor resulting in actual loss of flora, fauna or fish habitat. Impact significant enough to gain attention in national news media.	N/A
FINANCIAL	**Threat/Opportunity:** Immaterial financial impact	**Threat/Opportunity:** Financial impact of an event up to $300,000	**Threat/Opportunity:** Financial impact of an event $300,000 to $1,000,000	**Threat/Opportunity:** Financial impact of an event $1,000,000 to $3,000,000	**Threat/Opportunity:** Financial impact of an event $3,000,000 to $5,000,000	**Threat/Opportunity:** Financial impact of an event $5,000,000 to $10,000,000	**Threat/Opportunity:** Financial impact of an event $10,000,000 to $15,000,000	**Threat/Opportunity:** Financial impact an event over $15,000,000
REPUTATIONAL	Immaterial consequence	**Threat:** Some public embarrassment OR Minor effect on overall staff morale/public attitudes.	**Threat:** Short term local adverse media coverage	**Threat:** Negative press in more than one media **Opportunity:** Positive press in more than one media	**Threat:** Short-term negative media focus and /or significant concerns raised by one stakeholder **Opportunity:** Short-term positive media focus and/or significant recognition from one stakeholder	**Threat:** Long-term negative media focus and/or sustained concerns raised by more than one stakeholder **Opportunity:** Long –term positive media focus and/or sustained recognition raised by more than one stakeholder	**Threat:** Long-term negative and/or sustained concerns raised by more than one stakeholder. Indications of Stakeholders loss of confidence **Opportunity:** Long-term positive media focus and/or sustained recognition from more than one stakeholder, indicating stronger long term support	**Threat:** Stakeholders lose confidence in the organization in the long-term, permanent withdrawal of support by several key stakeholders **Opportunity:** Sustained recognition from the majority of stakeholders, long-term commitment for additional support
IT CAPACITY	Lack of capacity (or currency) of a system has no expected impact on Alectra's workforce.	Lack of capacity (or currency) of system that impacts significantly (e.g. >10% average decrease in productivity) for more than 10 Alectra's employees.	Lack of capacity (or currency) of system that impacts significantly (e.g. >10% average decrease in productivity) for more than 50 Alectras's employees.	Lack of capacity (or currency) of system that impacts significantly (e.g. >10% average decrease in productivity) for more than 150 Alectra's employees.	Lack of capacity (or currency) of system that impacts significantly (e.g. >10% average decrease in productivity) for more than 450 Alectra's employees.	Lack of capacity (or currency) of system that impacts significantly (e.g. >10% average decrease in productivity) for more than 750 Alectra's employees.	Lack of capacity (or currency) of an Enterprise wide system that impacts significantly (e.g. >10% average decrease in productivity) the entire Alectra's workforce.	N/A

Probability Aide	None	Once in 1,000 years	Once in 333 years	Once in 100 years	Once in 33 years	Once in 10 years	Once in 3 Years	Once in 2 years	Very Likely	Almost Certain
Probability	Event unlikely to occur in next 1000 years	Approximately 0.1% chance of event occurring this year (e.g. 1 in 1000 year event)	Approximately 0.3% chance of event occurring this year (e.g. 1 in 333 year event)	Approximately 1% chance of event occurring this year (e.g. 1 in 100 year event)	Approximately 3% chance of event occurring this year (e.g. 1 in 33 year event)	Approximately 10% chance of event occurring this year (e.g. 1 in 10 year event)	Approximately 30% chance of event occurring this year (e.g. 1 in 3 year event)	Approximately 50% chance of event occurring this year (e.g. 1 in 2 year event)	Approximately 75% chance of event occurring this year (e.g. 1 in 1.3 year event)	Imminent (>95% chance of occurring this year)

Risk Matrix



Appendix M

Major Event Days (2014 – 2018)

Alectra Utilities

Distribution System Plan (2020-2024)

Major Event Days

Alectra Utilities reports major event day (MED) in which the daily SAIDI exceeds a MED threshold value (T_{MED}). Alectra Utilities utilizes the MED Threshold value (T_{MED}) to identify events significantly beyond typical system performance indicators. In accordance with the OEB Electricity Reporting and Record Keeping Requirements dated November 2018, Alectra Utilities Alectra applies the Institute of Electrical and Electronic Engineers (IEEE) Standard 1366 for MED monitoring. Furthermore, Alectra Utilities applies the '1 Day Rolling Beta' method to identify major event days as per IEEE Standard 1366. In calculating the daily SAIDI, Alectra appropriately applies interruption durations that extend into subsequent days accrue to the day on which the interruption originates.

Alectra Utilities further examines such major events to understand the outage contributors, distribution system vulnerabilities, as well as system maintenance and sustainment, needs to mitigate the impacts of such events in the future. This section provides a summary of MED events experienced from 2014 to 2018.

Table M01 - 1: Summary of Outages on Major Event Days in 2018

Date	Zone	Number of Interruptions	Number of Customer Interruptions	Customer Hours of Interruption
12-Mar-18	Central-North	2	7,038	13,480
4-Apr-18	Central-South	29	13,408	18,429
14-Apr-18	West	5	15,715	38,487
15-Apr-18	Central-South	23	5,854	10,403
4-May-18	Central-South	69	72,926	132,543
4-May-18	Central-North	20	3,616	9,819
4-May-18	West	59	60,993	218,163
4-May-18	East	57	91,371	315,856
4-May-18	Guelph	20	13,025	11,300

Total	**284**	**283,946**	**768,480**

Table M01 - 1 lists the summary impacts of the MED events experienced at Alectra Utilities in 2018. In total for 2018, Alectra Utilities experienced 284 interruptions related to five days resulting in 768,480 hours impacting 283,946 customers. Most significant MED event occurred on May 4th 2018 which impacted multiple operating zones at Alectra Utilities, the MED events on that day were as a result adverse weather conditions from extreme high winds. The cumulative impact of MED events in 2018 of 768,480 hours was the highest impact of interruption hours over the last five years.

Table M01 - 2: Summary of Outages on Major Event Days in 2017

Date	Zone	Number of Interruptions	Number of Customer Interruptions	Customer Hours of Interruption
11-Jan-17	Central-North	9	3,779	11,795
8-Mar-17	West	44	29,386	59,843
7-Apr-17	East	24	27,857	54,070
15-Oct-17	Central-South	17	12,497	19,575
15-Oct-17	East	17	41,081	90,512
	Total	**111**	**114,600**	**235,795**

Table M01 - 2 lists the summary impacts of the MED events experienced at Alectra Utilities in 2017. In total for 2017, Alectra Utilities experienced 111 interruptions related to four days resulting in 235,795 hours impacting 114,600 customers. Most significant MED event occurred on October 15th 2017 which impacted two operating zones at Alectra Utilities, the MED events on that day were as a result adverse weather conditions from extreme high winds resulting in pole failures in multiple locations.

Table M01 - 3: Summary of Outages on Major Event Days in 2016

Date	Zone	Number of Interruptions	Number of Customer Interruptions	Customer Hours of Interruption
24-Mar-16	West	14	12,815	31,711
24-Mar-16	East	23	136,252	592,779
24-Mar-16	Guelph	21	13,274	13,602
25-Mar-16	East	49	28,402	78,891
	Total	**107**	**190,743**	**716,982**

Table M01 - 3 lists the summary impacts of the MED events experienced at Alectra Utilities in 2016. In total for 2016, Alectra Utilities experienced 107 interruptions related to two days resulting in 716,982 hours of interruption impacting 190,743 customers. Most significant MED event occurred on March 24th 2016 which impacted three operating zones at Alectra Utilities, the MED events on that day were as a result adverse weather conditions from freezing rain and high winds.

Table M01 - 4: Summary of Outages on Major Event Days in 2015

Date	Zone	Number of Interruptions	Number of Customer Interruptions	Customer Hours of Interruption
3-Mar-15	Central-North	20	36,852	35,993
3-Mar-15	East	38	78,607	113,906
14-Mar-15	East	34	58,740	174,408
28-Jun-15	West	26	12,549	50,299
	Total	**118**	**186,748**	**374,606**

Table M01 - 4 lists the summary impacts of the MED events experienced at Alectra Utilities in 2015. In total for 2015, Alectra Utilities experienced 118 interruptions related to three days resulting in 374,606 hours of interruption impacting 186,748 customers. Most significant MED

event occurred on March 14th 2015 which impacted three operating zones at Alectra Utilities, the MED events on that day were as a result adverse weather conditions resulting in contaminating insulators, leading to a significant number of pole fires.

Table M01 - 5: Summary of Outages on Major Event Days in 2014

Date	Zone	Number of Interruptions	Number of Customer Interruptions	Customer Hours of Interruption
20-Mar-14	West	7	24,345	121,830
19-Apr-14	West	8	30,212	38,185
1-Jun-14	Central-North	1	21,424	27,354
17-Jun-14	Central-South	12	13,296	15,376
17-Jun-14	East	25	23,200	37,479
22-Jul-14	West	10	13,126	33,274
24-Nov-14	Central-South	32	19,697	14,107
24-Nov-14	East	27	56,485	41,574
27-Nov-14	West	59	37,138	91,258
	Total	**181**	**238,923**	**420,437**

Table M01 - 5 lists the summary impacts of the MED events experienced at Alectra Utilities in 2014. In total for 2014, Alectra Utilities experienced 181 interruptions related to seven days resulting in 420,437 hours of interruption impacting 238,923 customers. Most significant MED event occurred on March 20th 2014 which impacted the West operating zone at Alectra Utilities, the MED event on that day was as a result loss of supply of a transformer station which was on single contingency stranding Alectra Utilities customers.

Major Event Days (MEDs) – 2018

Alectra Central South – 2018:

Table M01 - 6: MEDs April 4th, 2018 Caused by High Wind (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	2	4	4.37
3	Tree Contacts	7	4,477	6,295.98
5	Defective Equipment	2	1,367	194.77
6	Adverse Weather	17	7,540	11,631.15
9	Foreign Interference	1	20	303.00
	Total	29	13,408	18,429.27

Comments: Gusts up to 91km/h were recorded at Pearson Airport. This not only impacted the Enersource Rate Zone, but also neighbouring municipalities, as well. The outages on April 4, 2018 resulted in a SAIDI of 5.35, which exceeded the Major Event Day Threshold of 2.92. It took nine hours to restore 90% of the customers.

Table M01 - 7: MEDs April 15th, 2018 Caused by High Wind (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	2	1,765	117.93
3	Tree Contacts	13	2,971	8,804.00
6	Adverse Weather	8	1,118	1,480.93
	Total	23	5,854	10,402.87

Comments: Environment Canada issued wind warnings for the Mississauga area with frequent gusts near 90 km/h on the night of April 14, continuing into the morning of April 15, with a few gusts of 100 km/h. There were also periods of freezing rain and ice pellets during the event. This not only affected the Enersource Rate Zone, but also neighbouring municipalities. The outages on April 15th, 2018 resulted in a SAIDI of 3.02, which exceeded the Major Event Day Threshold of 2.92. It took four hours to restore 90% of the customers.

Table M01 - 8: MEDs May 4th, 2018 Caused by High Wind (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
3	Tree Contacts	13	9,295	30,815.60
5	Defective Equipment	3	156	2,792.26
6	Adverse Weather	53	63,475	98,935.08
	Total	69	72,926	132,542.94

Comments: Environment Canada issued wind warnings for the Mississauga area with frequent gusts near 90-100 km/h on May 4. The outages on May 4th, 2018 resulted in a SAIDI of 35.55, which exceeded the Major Event Day Threshold of 2.63. It took 12 hours to restore 90% of the customers.

Alectra Central North – 2018:

Table M01 - 9: MEDs March 12th, 2018 Caused by a Vehicle that Hit a Pole (Alectra Central North - Brampton)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	1	28	125.53
9	Foreign Interference	1	7,010	13,354.88
	Total	2	7,038	13,480.42

Comments: Foreign Interference is an OEB cause category for Major Events. These types of events are outside of the control of Alectra Utilities. The SAIDI minute per day was 4.94 on March 12 which exceeded the threshold of 3.11 for the Brampton Rate Zone. It took 2 hours and 55 minutes to restore 90% of the customers.

Table M01 - 10: MEDs May 4th, 2018 Caused by High Wind (Alectra Central North - Brampton)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
3	Tree Contacts	5	163	2,840.98
5	Defective Equipment	5	634	926.75
6	Adverse Weather	10	2,819	6,051.45
	Total	20	3,616	9,819.18

Comments: Environment Canada issued wind warnings for the Brampton area with frequent gusts near 90-100 km/h on May 4. The outages on May 4th, 2018 resulted in a SAIDI of 3.59, which exceeded the Major Event Day Threshold of 3.11. It took 5 hours and 55 minutes to restore 90% of the customers.

Alectra West – 2018:

Table M01 - 11: MEDs April 14th, 2018 Caused by High Wind (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
2	Loss of Supply	1	15,594	38,180.22
5	Defective Equipment	1	14	20.53
6	Adverse Weather	2	97	243.42
9	Foreign Interference	1	10	42.33
	Total	5	15,715	38,486.50

Comments: Environment Canada issued wind warnings for the Hamilton / St. Catharines areas with frequent gusts near 90 km/h the night of April 14 continuing into the morning of April 15, with a few gusts of 100 km/h. There were also periods of freezing rain and ice pellets during the event.. This not only affected the Horizon Rate Zone, but also neighbouring municipalities, as well. The outages on April 14, 2018 resulted in a SAIDI of 9.35, which exceeded the Major Event Day Threshold of 8.19. It took 6 hors to restore 90% of the customers.

Table M01 - 12: MEDs May 4th, 2018 Caused by High Wind (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
6	Adverse Weather	59	60,993	218,163.07
	Total	59	60,993	218,163.07

Comments: Environment Canada issued wind warnings for the Hamilton and St.Catharines area with frequent gusts near 90-100 km/h on May 4. The outages on May 4th, 2018 resulted in a SAIDI of 52.87, which exceeded the Major Event Day Threshold of 8.19. It took 18 hours to restore 90% of the customers.

Alectra East – 2018

Table M01 - 13: MEDs May 4th, 2018 Caused by High Wind (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
2	Loss of Supply	3	14,148	74,697.37
3	Tree Contacts	3	3,047	10,675.40
5	Defective Equipment	5	3,443	3,425.12
6	Adverse Weather	46	70,733	227,058.03
	Total	57	91,371	315,855.92

Comments: Environment Canada issued wind warnings for the Vaughan and Barrie area with frequent gusts near 90-100 km/h on May 4. The outages on May 4th, 2018 resulted in a SAIDI of 51.09, which exceeded the Major Event Day Threshold of 5.83. It took 8 hours to restore 90% of the customers.

Alectra Southwest – 2018

Table M01 - 14: MEDs May 4th, 2018 Caused by High Wind (Alectra Southwest - Guelph)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	5957	1022.35
1	Scheduled Outage	1	5	4.92
2	Loss of Supply	2	3,010	9,756.67
3	Tree Contacts	11	102	411.17
5	Defective Equipment	1	2,382	44.20
6	Adverse Weather	3	1,568	55.53
9	Foreign Interference	1	1	4.82
	Total	20	13025	11299.65

Comments: High Wind

Major Event Days – 2017

Alectra Central South – 2017:

Table M01 - 15: MEDs Oct 15th, 2017 Caused by High Wind (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	2	2	7.77
3	Tree Contacts	3	1,073	897.87
5	Defective Equipment	1	17	121.00
6	Adverse Weather	9	11,306	18,382.00
9	Foreign Interference	2	99	166.00
	Total	17	12,497	19,574.64

Comments: Wind up to 102km/h were recorded at Pearson Airport. It took 5 hours and 54 minutes to restore 90% of the customers.

Alectra Central North – 2017

Table M01 - 16: MEDs Jan 11th, 2017 Caused by Tree Contacts (Alectra Central North- Brampton)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
3	Tree Contacts	3	2,832	9,201.88
5	Defective Equipment	3	21	57.48
6	Adverse Weather	3	926	2,535.42
	Total	9	3,779	11,794.78

Comments: Weather Service Warning of high winds, although conditions ended up being far worse. The SAIDI duration of this event exceeded the 5 year Threshold. It took 3 hours to restore 90% of customers.

Alectra West – 2017

Table M01 - 17: MEDs March 8th, 2017 Caused by High Wind (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	166	199.20
1	Scheduled Outage	1	25	58.75
3	Tree Contacts	2	682	2,045.37
5	Defective Equipment	1	4	146.07

6	Adverse Weather	38	28,496	57,382.42
9	Foreign Interference	1	13	11.48
	Total	44	29,386	59,843

Comments: Prior to the event, wind gusts were forecast to reach 80 km/h, although in some areas wind gusts reached 115 km/h. The total customer minutes of interruptions experienced on March 8, 2017 due to outages that started on the same day exceeded the Major Event Day threshold (1.84 million customer minutes). It took nine hours to restore 90% of the customers.

Alectra East – 2017

Table M01 - 18: MEDs April 7th, 2017 Caused by High Wind (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	2	1,739	73.48
2	Loss of Supply	2	5,698	555.00
3	Tree Contacts	2	3	19.43
5	Defective Equipment	5	215	1,459.53
6	Adverse Weather	13	20,202	51,962.85
	Total	24	27,857	54,070.29

Comments: High winds gusting up to 76km/h and blowing snow/rain/ice accretion in portions of the Simcoe County service area caused "galloping" of conductors and equipment failure. Temperature ranged between 0 and -4 C. Galloping is the high-amplitude, low-frequency oscillation of overhead power lines due to wind. The total customer minutes of interruptions experienced on April 7, 2017 due to outages that started on the same day exceeded the Major Event Day threshold of 2.2 million customer minutes. It took nine hours to restore 90% of the customers.

Table M01 - 19: MEDs October 15th, 2017 Caused by High Wind (Alectra East)

Cause Code	**Causes**	**Number of Interruptions**	**Number of Customer Interruptions**	**Number of Customer Hours**
3	Tree Contacts	9	302	3,005.02
5	Defective Equipment	4	2,663	8,186.12
6	Adverse Weather	2	38,079	79,210.32
9	Foreign Interference	2	37	110.95
	Total	17	41,081	90,512.41

Comments: Peak wind recorded at Pearson Airport was 102krn/h at 3:22PM EDT, in post event discussion with Environment Canada, based on the damage done in and around the GTA and other parts of Southern Ontario, there could have been peak winds in the 110 to 120km/h range. These wind causes pole failures in several locations. The total customer minutes of interruptions experienced on October 15, 2017 on the same day exceeded the Major Event Day threshold of 2.2 million customer minutes. It took four hours to restore 90% of the customers.

Major Event Days – 2016

HRZ – 2016:

Table M01 - 20: EDs March 24th, 2016 Caused by Freezing Rain (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	39	224.90
2	Loss of Supply	2	283	1,295.58
3	Tree Contacts	2	5,898	17,496.32
6	Adverse Weather	9	6,595	12,694.40
	Total	14	12,815	31,711

Comments: Freezing Rain was the cause of this Major Event Day.

PRZ – 2016

Table M01 - 21: MEDs March 24th, 2016 Caused by Freezing Rain (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	7	13.80
1	Scheduled Outage	2	16	15.48
2	Loss of Supply	2	16,777	285,655.75
5	Defective Equipment	2	32,622	67,676.23
6	Adverse Weather	15	86,819	239,395.10
9	Foreign Interference	1	11	22.53
	Total	23	136,252	592,778.90

Comments: Freezing rain mostly in the Simcoe County area.

Table M01 - 22: MEDs March 25th, 2016 Caused by Freezing Rain (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	12	47.58
2	Loss of Supply	3	3,607	503.33
5	Defective Equipment	2	3,947	5,035.85
6	Adverse Weather	40	20,738	72,084.76
7	Adverse Environment	2	91	1,192.00
9	Foreign Interference	1	7	26.98
	Total	49	28,402	78,890.51

Comments: Freezing rain mostly in the Simcoe County area.

GRZ – 2016:

Table M01 - 23: MEDs March 24th, 2016 Caused by Freezing Rain and High Wind (Alectra Guelph)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	1	14	64.63
2	Loss of Supply	5	9,125	9,307.50
3	Tree Contacts	8	183	717.67
6	Adverse Weather	7	3,952	3,512.10
	Total	21	13,274	13,601.90

Comments: Freezing Rian, High Wind was the cause of this Major Event Day.

Major Event Days – 2015

BRZ – 2015:

Table M01 - 24: MEDs March 3rd, 2015 Caused by Ice Storm and Freezing Rain (Alectra Central North - Brampton)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
2	Loss of Supply	2	15,708	785.40
5	Defective Equipment	1	17	6.80
6	Adverse Weather	17	21,127	35,200.32
	Total	20	36,852	35,992.52

Comments: An Ice storm resulting in freezing rain was the cause of this Major Event Day.

HRZ – 2015:

Table M01 - 25: MEDs June 28th, 2015 Caused by Tree Contact (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
3	Tree Contacts	11	8,121	37,122.15
5	Defective Equipment	2	18	36.30
6	Adverse Weather	9	4,212	12,947.83
9	Foreign Interference	4	198	192.73
	Total	26	12,549	50,299

Comments: Tree Contacts as a result of high wind was the cause of this Major Event Day.

PRZ – 2015:

Table M01 - 26: MEDs March 3rd, 2015 Caused by Pole Fires (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
2	Loss of Supply	6	15,674	12,632.26
7	Adverse Environment	31	62,932	101,243.40
9	Foreign Interference	1	1	30.75
	Total	38	78,607	113,906.41

Comments: Insulator contamination (salt/brine) causing pole fires was the cause of this Major Event Day.

Table M01 - 27: MEDs March 14th, 2015 Caused by Pole Fires (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	1	26.98
2	Loss of Supply	4	8,121	6,844.02
5	Defective Equipment	2	827	8,011.30
7	Adverse Environment	26	47,842	152,270.60
8	Human Element	1	1,949	7,254.87
	Total	34	58,740	174,407.77

Comments: Insulator contamination (salt/brine) causing pole fires was the cause of this Major Event Day.

Major Event Days – 2014

ERZ – 2014

Table M01 - 28: MEDs June 17th, 2014 Caused by Thunderstorm (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
3	Tree Contacts	5	2,213	3,479.22
6	Adverse Weather	7	11,083	11,897.15
	Total	12	13,296	15,376.37

Comments: Intense Thunderstorm was the cause of the Major Event Day.

Table M01 - 29: MEDs November 24th, 2014 Caused by Thunderstorm (Alectra Central South - Mississauga)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
6	Adverse Weather	32	19,697	14,107.07
	Total	32	19,697	14,107.07

Comments: Intense Thunderstorm was the cause of the Major Event Day.

BRZ – 2014:

Table M01 - 30: MEDs June 1st, 2014 Caused by Animal Contact (Alectra Central North - Brampton)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
9	Foreign Interference	1	21,424	27,354.00
	Total	1	21,424	27,354.00

Comments: Animal contact at riser pole causing the Transformer Station secondary breakers to lock out (at that time station was on single line contingency) entire station was lost.

HRZ – 2014

Table M01 - 31: MEDs March 20th, 2014 Caused by Loss of Supply (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	2	10	6.20
2	Loss of Supply	1	19,292	100,266.08
5	Defective Equipment	2	3,292	21,406.88
9	Foreign Interference	2	1,751	150.80
	Total	7	24,345	121,830

Comments: Outage at station, station was on single contingency and therefore all station load was lost.

Table M01 - 32: MEDs April 19th, 2014 Caused by Loss of Supply due to Foreign Interference (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
2	Loss of Supply	8	30,212	38,185.17
	Total	8	30,212	38,185

Comments: Balloon across Carlton T3 transformer caused the D10S trip out, station was on single contingency at the time so the entire station was lost.

Table M01 - 33: MEDs July 22nd, 2014 Caused by Foreign Interference (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
0	Unknown/Other	1	463	7.72
1	Scheduled Outage	3	14	33.37
5	Defective Equipment	2	4,354	22,789.33
9	Foreign Interference	4	8,295	10,443.92
	Total	10	13,126	33,274

Comments: Pole Hit, accident investigation halted access to site.

Table M01 - 34: MEDs November 27th, 2014 Caused by High Wind (Alectra West)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	1	1	0.07
3	Tree Contacts	2	2,325	1,122.95
5	Defective Equipment	1	9	25.80
6	Adverse Weather	54	34,780	90,069.23
9	Foreign Interference	1	23	40.25
	Total	59	37,138	91,258

Comments: High Winds were the cause of this Major Event Day.

PRZ – 2014

Table M01 - 35: MEDs June 17th, 2014 Caused by Microburst in Markham (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	2	58	201.25
3	Tree Contacts	12	5,200	9,430.85
5	Defective Equipment	2	56	1,026.15
6	Adverse Weather	7	17,769	26,184.33
9	Foreign Interference	2	117	636.48
	Total	25	23,200	37,479.07

Comments: Microburst of winds in Markham (12 poles down).

Table M01 - 36: MEDs November 24th, 2014 Caused by High Wind (Alectra East)

Cause Code	Causes	Number of Interruptions	Number of Customer Interruptions	Number of Customer Hours
1	Scheduled Outage	1	2	0.53
2	Loss of Supply	3	4,441	787.48
3	Tree Contacts	4	7,771	7,419.42
5	Defective Equipment	5	18,375	14,800.78
6	Adverse Weather	14	25,896	18,565.63
	Total	27	56,485	41,573.85

Comments: High wind across the service area was the cause of the Major Event Day.

Appendix N

Climate and Trend

Alectra Utilities

Distribution System Plan (2020-2024)

Climate and Trend

Alectra Utilities monitors utilizes climate impacts to ensure that the distribution system investments continue to operate in a safe and reliable manner considering climate and environmental trends.

Alectra Utilities has acquired and analyzed historical climate data published by the Government of Canada[1] including statistics for mean temperature, maximum temperature, minimum temperature, precipitation, as well as maximum wind gusts. Table N01 - 1provides the Weather Station location and the corresponding service area.

Table N01 - 1: Weather Stations and Corresponding Alectra Utilities Service Areas

Weather Station	Alectra Utilities Service Area
Barrie	Barrie, Bradford, Tottenham, Beeton, Alliston, Thornton, & Penetanguishene
Mississauga	Mississauga, Brampton West Vaughan
Hamilton	Hamilton, St. Catharines
Markham	Markham, Richmond Hill, East Vaughan, & Aurora

To ensure that such details put in the appropriate context, Alectra Utilities examines 30 years of historical weather to identify trends in climate data. For comparison purposes, Alectra Utilities has established a baseline of climate data from the 15 year period from 1987 to 2002 and compares that against climate data derived from the most recent 15-year period from 2003 to 2017. Table N01 - 2 below summarizes the findings.

[1] http://climate.weather.gc.ca/historical_data/search_historic_data_e.html

Table N01 - 2: Summary of Climate Data Comparison between Recent Period (2003 to 2017) from Baseline Period (1987 to 2002)

Difference in Climate Trends Recent (2003 to 2017) from Baseline (1987 to 2002)				
Measure	**Barrie**	**Mississauga**	**Hamilton**	**Markham**
Mean Temperature (ºC)	- 0.66	+ 0.60	+ 0.13	+ 0.63
Maximum Temperature (ºC)	- 6.95	- 3.81	- 2.87	- 2.60
Minimum Temperature (ºC)	+ 0.61	+ 1.12	+ 0.39	+ 1.12
Precipitation (mm)	- 0.04	+ 5.01	+ 4.26	+ 3.15
Wind Gust (km/h)	N/A	+ 2.46	+ 1.32	- 3.48

Mean Temperature

The mean temperature for the Baseline Period was compared against the mean temperature for Recent Period. The difference in these two means are summarized below in Table N01 - 3.

Table N01 - 3: Difference in Average Mean Temperature

Area	Difference in Recent from Baseline
Barrie	Decrease of 0.66ºC
Mississauga	Increase of 0.60ºC
Hamilton	Increase of 0.13ºC
Markham	Increase of 0.63ºC

Table N01 - 3 highlights the overall trend between the Baseline period and the Recent period. Barrie experienced a slightly lower mean temperature in the Recent Period compared to the Baseline Period, whereas Mississauga, Hamilton, and Markham all experienced slightly higher mean temperatures in the Recent Period compared to the Baseline Period.

Figure N01 - 1 below illustrates the mean temperature trend graphically for the Baseline Period, and Figure N01 - 2 illustrates the mean temperature trend graphically for the Recent Period.

Figure N01 - 1: Mean Temperature (1987 to 2002)

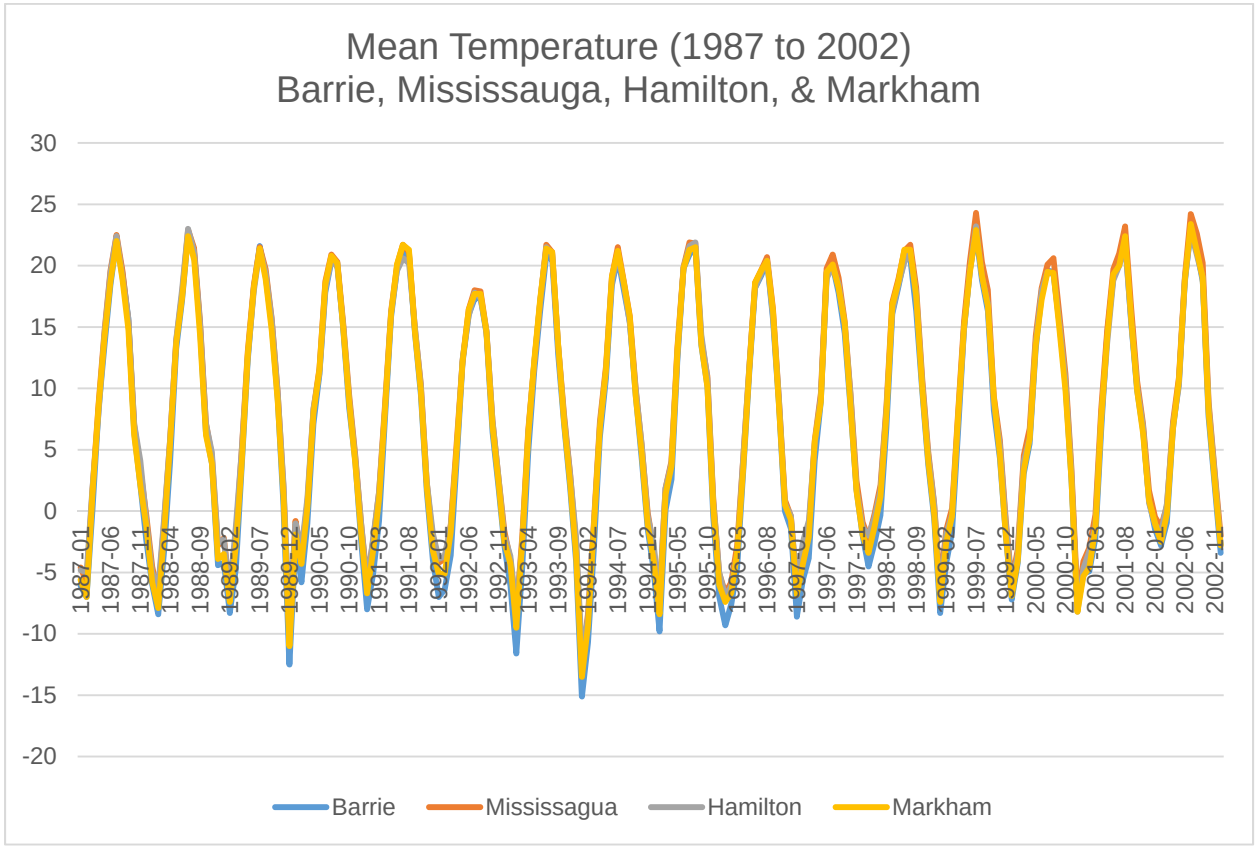
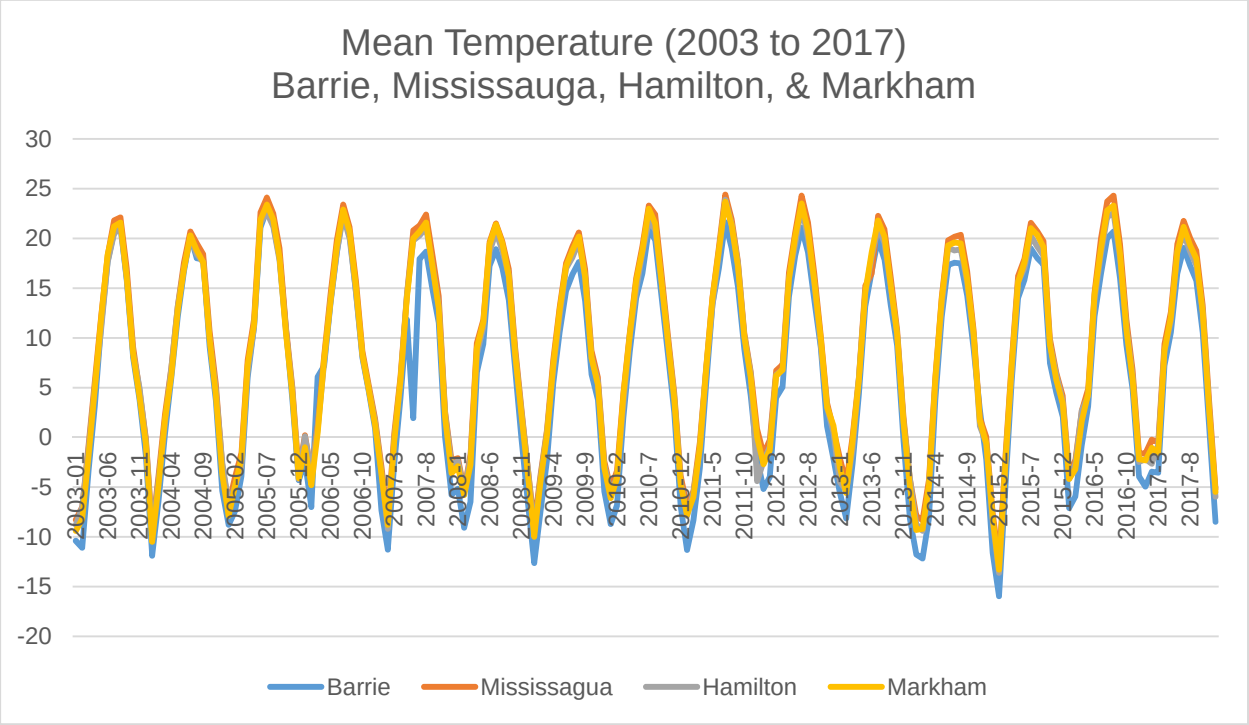


Figure N01 - 2: Mean Temperature (2003-2017)



Both Figure N01 - 1 and Figure N01 - 2 graphical display data summarized in Table N01 - 3 which is average temperatures in general are rising in the Recent Period relative to the Baseline Period.

Maximum Temperature

The maximum temperature for Baseline Period was compared with the maximum temperature for Recent Period. The difference in these two Periods are summarized below in Table N01 - 4.

Table N01 - 4: Difference in Average Maximum Temperature

Area	Difference in Recent from Baseline
Barrie	Decrease of 0.11ºC
Mississauga	Decrease of 0.31ºC
Hamilton	Decrease of 0.46ºC
Markham	Decrease of 0.18ºC

As Table N01 - 4 suggests, all 4 areas experienced a decrease in their maximum temperatures when the Baseline Period is compared against the Recent Period.

Figure N01 - 3 below illustrates the maximum temperature trend graphically for Baseline Period and Figure N01 - 4 illustrates the maximum temperature trend graphically for the Recent Period.

Figure N01 - 3: Maximum Temperature (1987 to 2002)

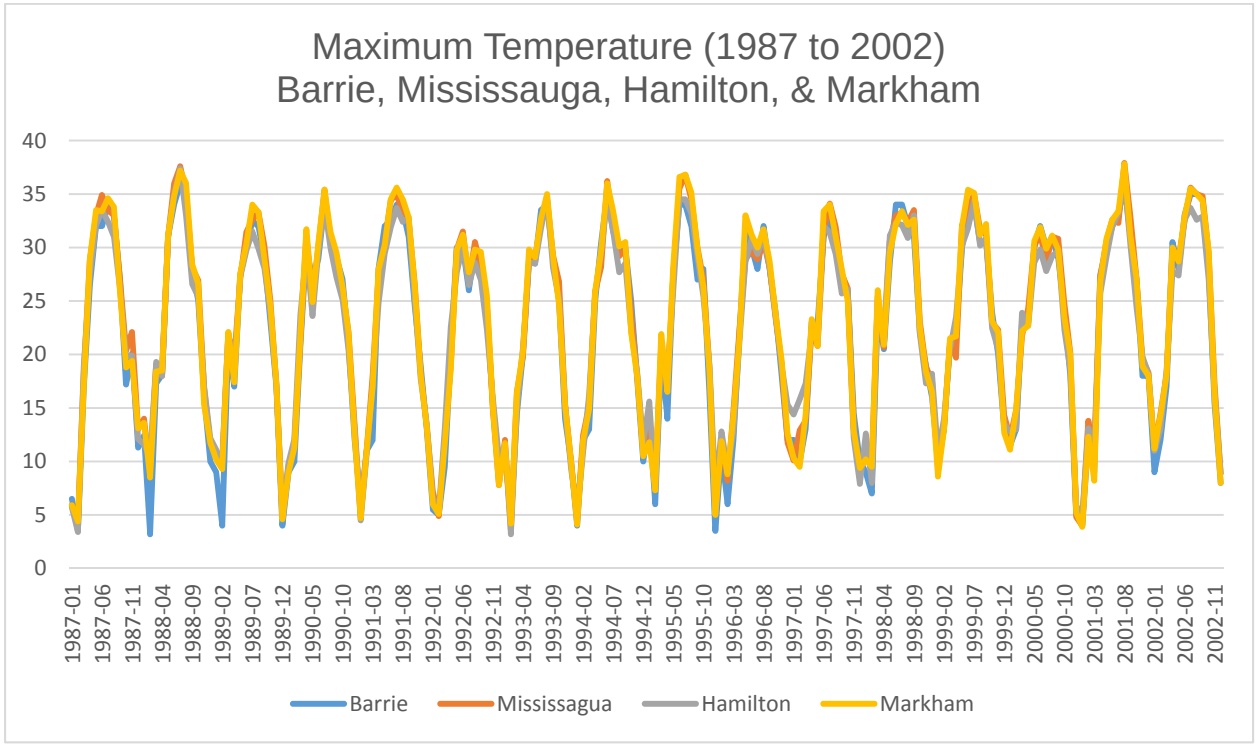


Figure N01 - 4: Maximum Temperature (2003 to 2017)

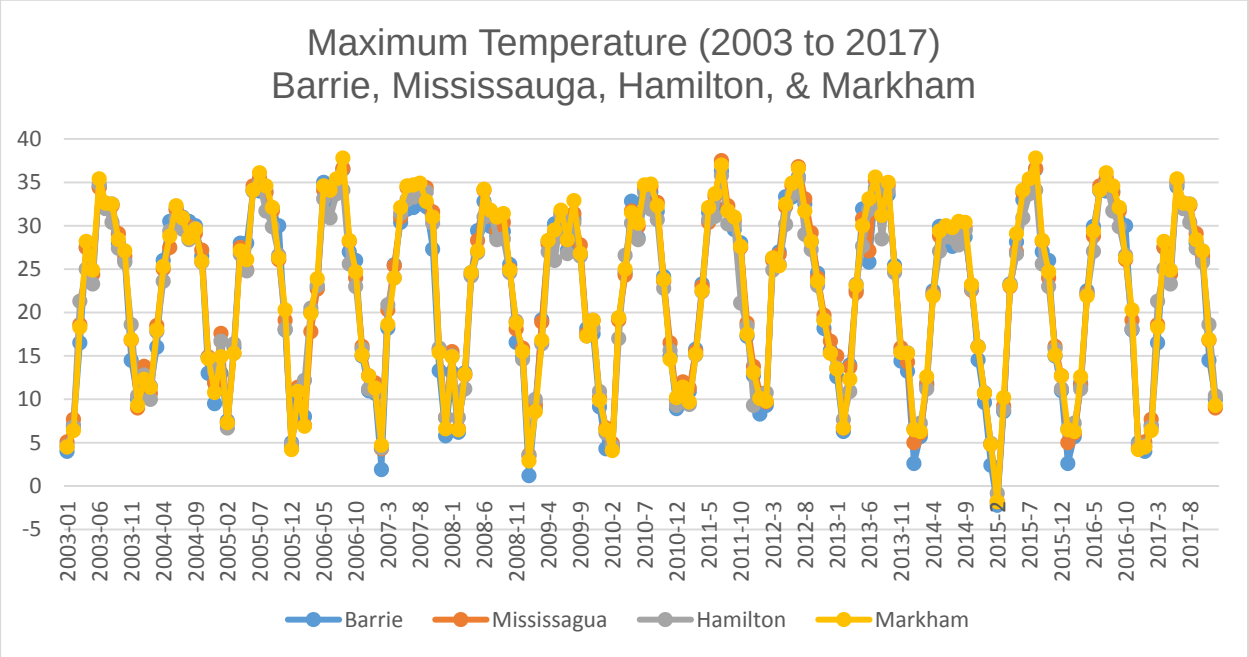


Figure N01 - 4 in contrast to Figure N01 - 3 highlights the number of occurrences where the maximum temperature dropped below 5ºC, this supports the notion of an overall decrease in the average maximum temperature. However the number of days where the average maximum temperature above 35ºC was identical between the 'Baseline' years and the 'Recent' years.

Minimum Temperature

The average minimum temperature for Baseline Period was compared with the average minimum temperature for Recent Period. The difference in these two averages are summarized below in Table N01 - 5.

Table N01 - 5: Difference in Average Minimum Temperature

Area	Difference in Recent from Baseline
Barrie	Increase of 0.61ºC
Mississauga	Increase of 1.12ºC
Hamilton	Increase of 0.39ºC
Markham	Increase of 1.12ºC

Table N01 - 5 informs Alectra Utilities that all 4 areas experienced an increase in minimum temperature. Figure N01 - 5 and Figure N01 - 6 below illustrates the minimum temperature trend graphically for the Baseline and Recent Periods.

Figure N01 - 5: Minimum Temperature (1987 to 2002)

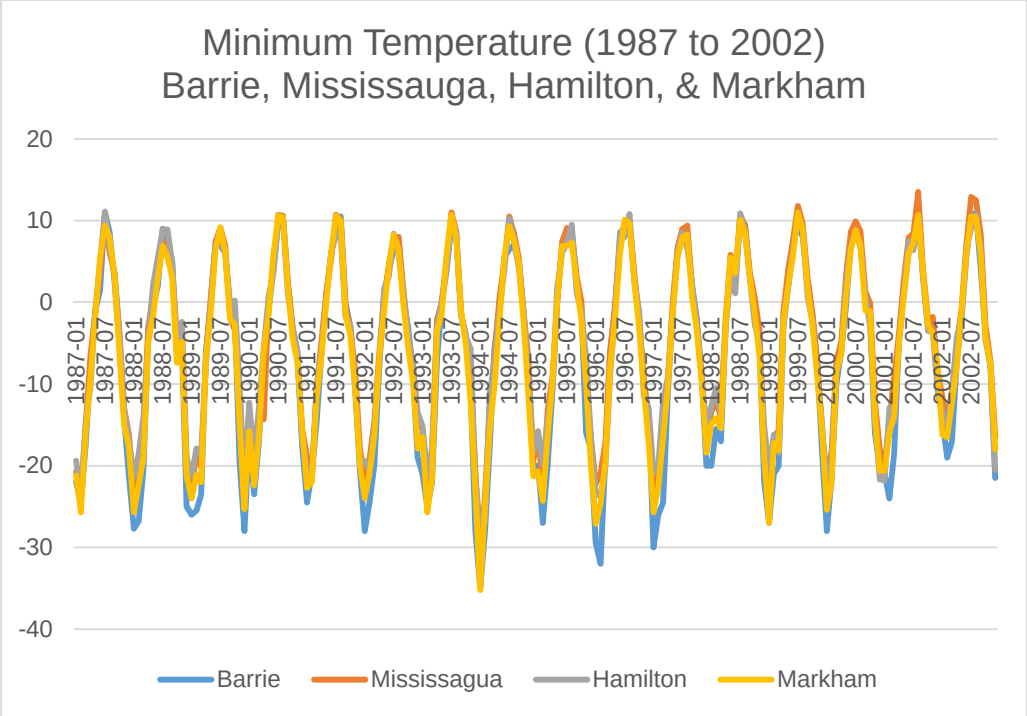
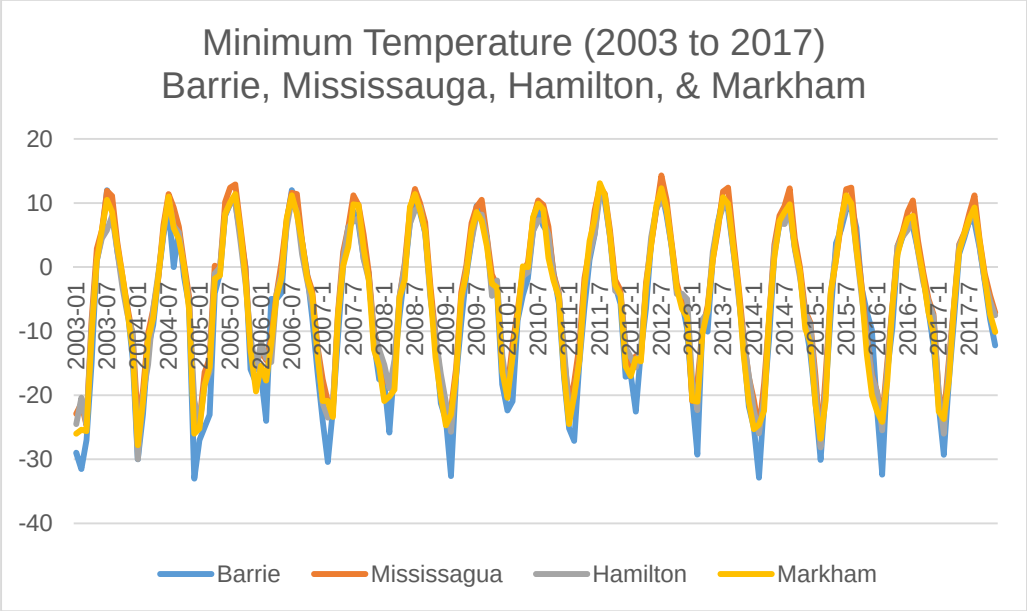


Figure N01 - 6: Minimum Temperature (2003 to 2017)



Precipitation

Precipitation represents the total rain and snow call an area receives. Assessing precipitation climate trends enables Alectra Utilities in determining the understanding trends in rain storms, flooding, and snow storms.

The average precipitation for Baseline Period was compared with the average precipitation for Recent Period. The difference in these periods are summarized below in Table N01 - 6.

Table N01 - 6: Difference in Average Precipitation

Area	Difference in Recent from Baseline
Barrie	Decrease of 0.04 mm
Mississauga	Increase of 5.01 mm
Hamilton	Increase of 4.26 mm
Markham	Increase of 3.15 mm

Results as summarized in Table N01 - 6 identify that the Barrie area experienced a slightly lower average precipitation in the Recent Period compared to Baseline Period, whereas Mississauga, Hamilton, and Markham all experienced higher average precipitation in the Recent Period.

Figure N01 - 7 and Figure N01 - 8 below illustrates the precipitation trend graphically for Baseline and Recent Periods.

Figure N01 - 7: Precipitation (1987 to 2002)

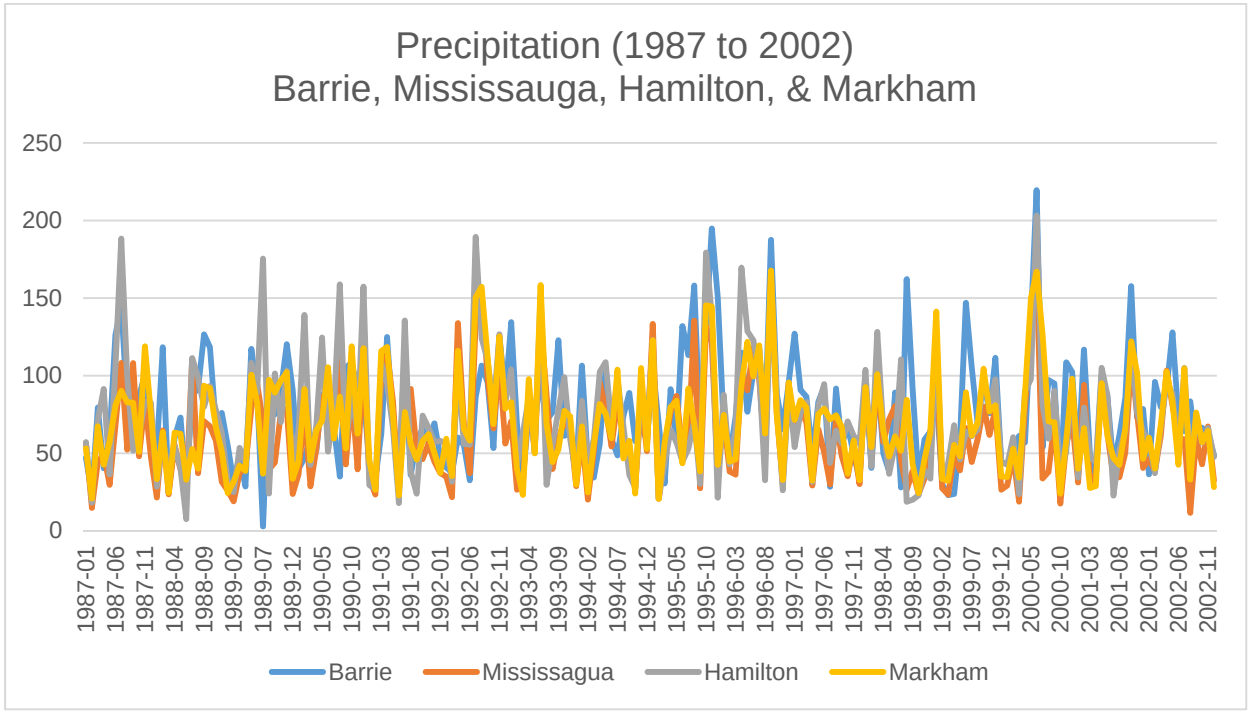
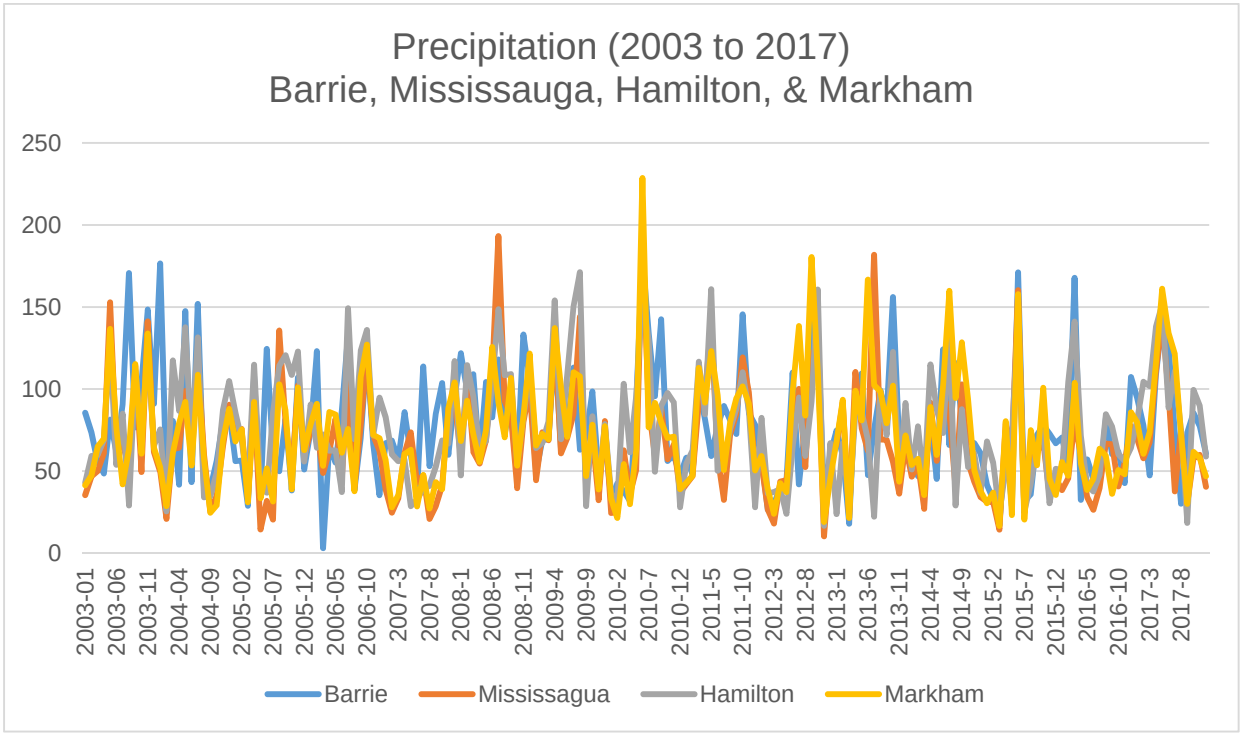


Figure N01 - 8: Precipitation (2003 to 2017)



When comparing the monthly data from Figure N01 - 7 and Figure N01 - 8, the number of months with over 100mm of precipitation occurred 8 days more in the Recent Period then the Baseline Period.

In December 2011 a report by SENES Consultants limited prepared for the City of Toronto predicted that in the long term due to the increase in warmer winter temperatures more rain would be expected then snow.[2] The report suggests that the number of extreme rain events (rain greater then 25mm in a single day) will also increase. Alectra Utilities believes this assumption to be reasonable. Examples of increasing number of heavy precipitation events include an event in August 2014 where 191mm of rain fell over a 10 hours period in Burlington, and as recent as

[2] Toronto's Future Weather and Climate Driver Study – Volume 1 (pdf)

August 2018 in Toronto, where 100mm of rain in less then two hours.[3] Alectra Utilities was impacted by these events. Alectra Utilities is also concerned that transmission systems supplying Alectra Utilities customers are also exposed to adverse weather including heavy precipitation and flooding which impact Alectra Utilities through prolonged loss of supply events. Alectra Utilities has considered these risks and has incorporated specific and prudent plans for flood mitigation of stations.

Maximum Wind

The leading cause of Alectra Utilities' MEDs are caused by High Wind events, therefore the analysis of wind gust patterns is important to Alectra Utilities. The data provided from the Barrie weather stations does not provide wind guest information and therefore the Barrie area has not been included in the wind analysis. The average maximum wind gusts for the Baseline Period when compared to Recent Period is provided in Table N01 - 7.

Table N01 - 7: Difference in Average Wind Speed

Area	Difference in Recent from Baseline
Mississauga	Increase of 2.46 km/h
Hamilton	Increase of 1.32 km/h
Markham	Decrease of 3.48 km/h

Mississauga and Hamilton experienced higher maximum wind gusts, whereas Markham experienced a decrease in maximum wind gusts in the Recent Period when compared to Baseline

[3] https://www.tvo.org/article/current-affairs/there-will-be-floods--and-ontarios-not-ready-for-them, https://www.theglobeandmail.com/canada/toronto/article-flash-floods-reignite-debate-over-torontos-sewer-system/

Period. Figure N01 - 9 and Figure N01 - 10 provide a graphical representation of the wind data for the ‘Baseline’ and ‘Recent’ years.

Figure N01 - 9: Maximum Wind Gust (1987 to 2002)

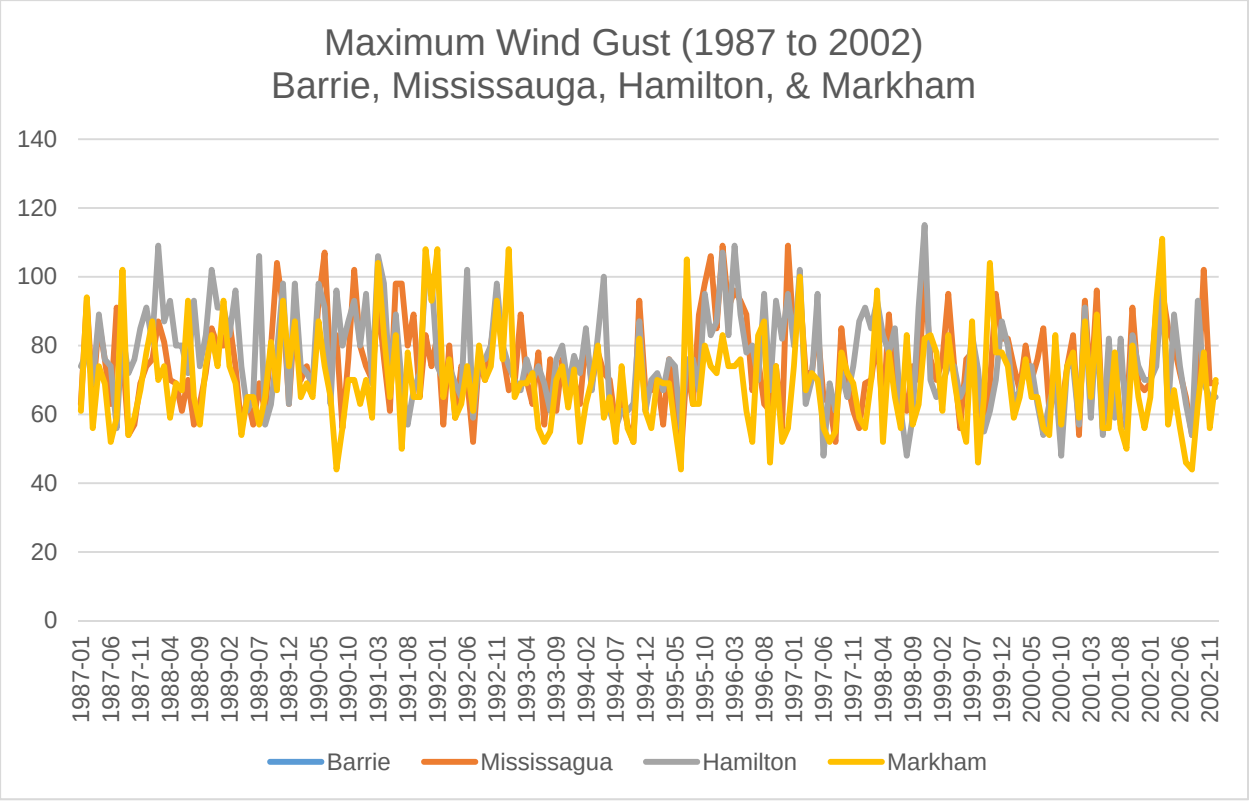


Figure N01 - 10: Maximum Wind Gust (2003 to 2017)

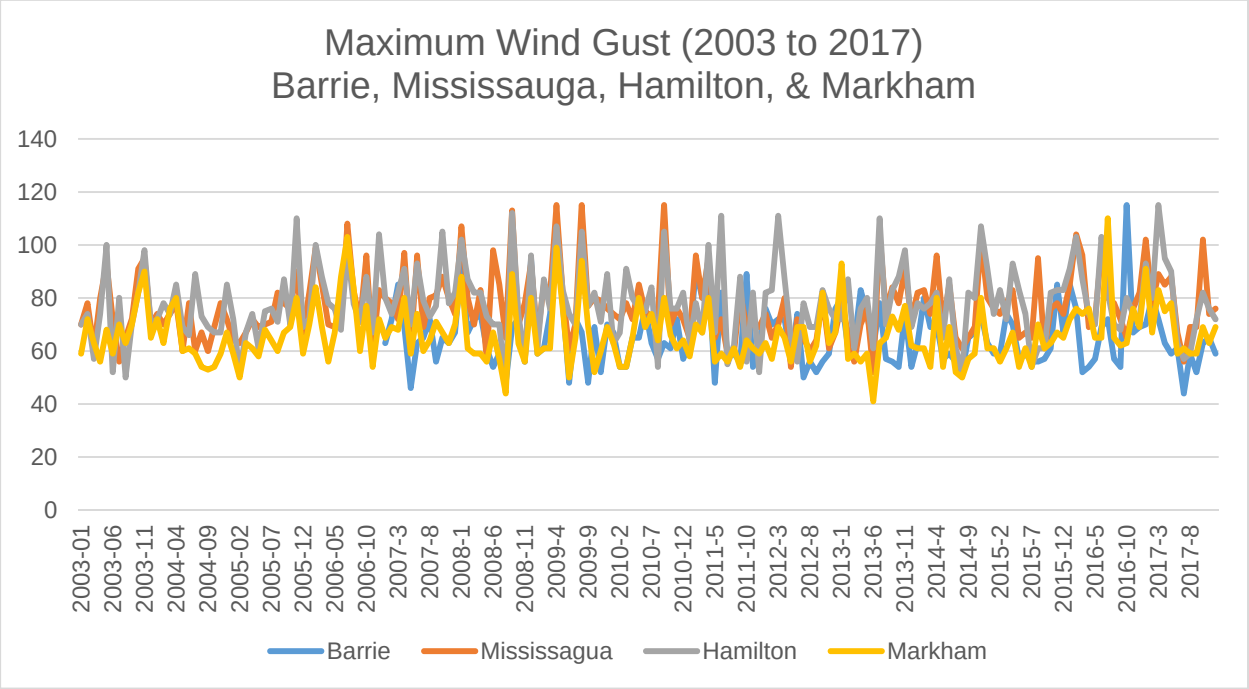


Table N01 - 8 compares the Baseline Period to Recent Period in regards to number of months with over events exceeding 100km/h winds, and the difference is significant. In the last 15 years, while Markham has seen a decrease of six events, both Hamilton and Mississauga have increased of six and four events respectively.

Table N01 - 8: Baseline vs. Recent: Number of months with over 100km/h winds

Period	Mississauga	Hamilton	Markham
Baseline	7	9	8
Recent	11	15	2

The increase in high wind (winds over 100km/h) events are a concern and one of the reasons Alectra Utilities is experiencing more significant wind related events (adverse weather). If the trend continues the majority of Alectra Utilities distribution system will be facing far more high wind events. Monitoring this change allows for shifts in investment, such as continued expenditure on four circuit storm hardening and rear lot conversions.

In May 2018, all Alectra Utilities operational areas experienced a MED due to a Wind Storm. This storm was listed as a top contributor in terms of property damage and insurance claims for Ontario over the previous five years.[4] This event was listed by Catastrophe Indices and Quantification Inc. as the most costly insured event since the 2013 floods which impacted Toronto. The impact of such events effects Alectra Utilities not only in terms of reliability to its customers but also in terms of resources and costs on restoration efforts instead of on planned investments. An over expenditure on reactive renewal means an under expenditure somewhere else in comparison to plan investments. If these events occur more often that will put more pressure on maintaining and executing planned investments when needed ultimately placing more assets into the backlog.

[4] https://www.newswire.ca/news-releases/may-windstorm-largest-insured-event-in-ontario-in-5-years-684265591.html

Figure N01 - 11: Pole failure due to Microburst on October 15, 2017

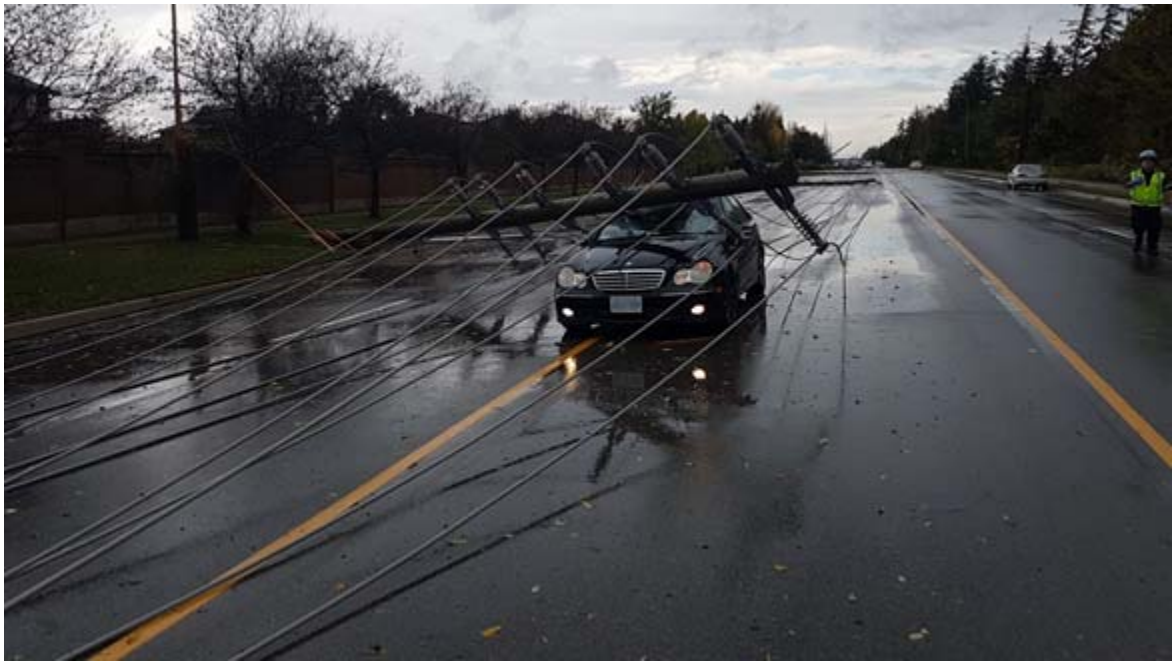


Figure N01 - 11 provides an image of a recent incident where an Environment Canada indicated peak winds in the speed ranges between 110 to 120km/h. These types of events are of concern to Alectra Utilities due to the significant risk on public safety. Alectra Utilities has plans to renew overhead system assets susceptible to adverse weather conditions to address the renewal investment need and mitigate public safety risks. Details on all Alectra Utilities investments can be found in Appendix B – Material Investment Business Cases.

Appendix O

Station and Feeder Loading Tables

Alectra Utilities

Distribution System Plan (2020-2024)

Station and Feeder Loading – East

The two planning parts located in the East operating area are:

A. York Region
B. Simcoe County

List of Tables

Part A: York Region

Table O01A - 1: York Region Alectra Owned Transformer Stations

Table O01A - 2: York Region (HONI) Transformer Stations

Table O01A - 3: York Region Municipal Substations

MS Name	Transformer ID	Transformer Capacity (ONAN)	Peak (MVA)	Ratio of Peak to Max Transformer Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MVA)	N-1 Contingency Ratio with Development by 2024
Amber MS	T1	10	0.7	4%	20%	0.7	20%
	T2	10	2.5	16%	20%	2.5	20%
John MS	T1	10	0.0	0%	4%	0.0	4%
	T2	10	0.7	4%	4%	0.7	4%
Morgan MS	T1	5	0.2	1%	9%	0.2	9%
Baythorn MS	T1	7.5	1.2	8%	9%	1.2	9%
	T2	7.5	0.5	3%	11%	0.5	11%
King MS**	T1	5	1.0	6%	6%	1.0	6%

MS Name	Transformer ID	Transformer Capacity (ONAN/ONAF/ONAF-ONAF)	2018 Peak (MVA)	Ratio of Peak to Name Plate Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MVA)	N-1 Contingency Ratio with Developments by 2024
AMS#1	T1	10/13/16	8	53%	100%	1.4	100%
	T2	10/13/16	8	53%	100%	1.1	100%
AMS#2	T1	10/13/16	10	73%	N/A**	2.8	N/A**
AMS#3	T1	10/13/16	6	39%	100%	0.5	100%
	T2	10/13/16	9	61%	100%	1.3	100%
AMS#4	T1	10/13/16	6	39%	39%	3	63%
	T2	10/13/16	0	0%	39%	0	63%
AMS#5	T1	10/13/16	11	73%	100%	1.3	100%
	T2	10/13/16	6	39%	100%	0.4	100%
AMS#6	T1	10/13/16	11	74%	74%	1.5	87%
	T2	10/13/16	0	0%	74%	0	0%
AMS#7	T1 (44/27.6kV)	10/13	1	6%	46%	0.2	55%
AMS#8	T1 (44/27.6kV)	10/13	5	43%	46%	1.7	55%

*MS in Aurora is typically built with two transformers (T1 & T2) except MS2, MS7, MS8. The two transformers back up each other. If one transformer is out of service (N-1), all load will be carried by the remaining transformer up to the name plate capacity. Load over name plate capacity will be transfer to adjacent MS.

**MS2 has only one transformer. In case of transformer contingency, all load will be transferred to other MS.

***MS7 and MS8 have one transformer each. MS7 and MS8 back up each other.

Table O01A - 4: York Region TS Feeder Loading

Feeder	Rated Capacity (A)	2018 (Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Buttonville								
12M1	**600**	217	226	235	244	254	264	275
12M2	**600**	0	0		120	120	140	160
12M3	**600**	270	281	292	304	316	320	320
12M4	**600**	349	359	370	381	393	380	380
12M5	**600**	411	400	400	400	400	400	350
12M6	**600**	381	200	220	240	260	280	280
12M7	**600**	360	400	400	300	320	340	340
12M8	**600**	230	300	309	318	328	338	340
12M9	**424**	196	202	208	214	221	227	234
12M10	**424**	197	220	230	240	270	280	280
12M11	**424**	0	150	150	160	170	180	180
12M12	**600**	289	300	350	360	360	370	370
Markham TS#1 - J.V.Fry								
22M1	**533**	194	200	206	212	218	225	232
22M2	**488**	258	266	274	282	280	280	280
22M3	**488**	61	63	65	67	69	71	73
22M4	**537**	143	147	152	156	161	166	170
22M5	**488**	171	200	206	212	219	225	232
22M6	**488**	297	306	315	325	325	325	325
22M7	**574**	390	402	414	350	350	350	350
22M8	**574**	206	250	258	265	273	280	280
Markham TS#2 - A.M.Walker								
24M1	**532**	337	347	358	368	379	391	400
24M2	**540**	175	180	186	191	197	203	209
24M3	**540**	147	151	156	161	165	170	176
24M4	**532**	306	350	361	371	382	394	400
24M5	**511**	335	345	355	366	377	388	400
24M6	**532**	204	210	216	223	230	236	244
24M7	**511**	198	204	204	210	216	223	230
24M8	**532**	114	150	150	155	159	164	169
Markham TS#3 - D.H.Cockburn T1&T2								
26M1	**421**	275	283	292	300	310	319	328
26M2	**421**	294	350	361	371	382	394	400
26M3	**421**	171	176	181	187	192	198	204

Feeder	Rated Capacity (A)	2018 (Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
26M4	**421**	39	40	41	43	44	45	47
26M5	**421**	216	250	258	265	273	281	290
26M6	**421**	48	100	120	140	220	240	260
26M7	**421**	100	150	160	180	200	220	240
26M8	**421**	321	331	341	351	361	372	383
Markham TS#3 - D.H.Cockburn T3&T4								
26M11	**607**	287	293	299	305	311	317	323
26M12	**551**	178	182	185	189	193	197	200
26M13	**645**	95	97	99	101	103	105	107
26M14	**645**	270	275	281	287	292	298	304
26M15	**645**	250	255	260	265	271	276	282
26M16	**645**	278	284	289	350	357	364	371
26M17	**645**	75	140	125	135	145	155	175
26M18	**645**	60	100	140	150	180	200	240
Markham TS#4 - R.M. Fabro								
10M1	**622**	156	300	300	300	306	312	318
10M2	**622**	170	320	320	320	300	330	350
10M3	**622**	48	100	120	140	160	180	200
10M4	**622**	195	199	203	207	211	215	220
10M7	**622**	67	150	153	156	159	162	166
10M8	**622**	168	200	204	208	212	216	221
10M9	**622**	336	343	350	357	364	371	378
10M10	**622**	238	243	248	253	258	263	268
Richmond Hill MTS#1								
27M1	**413**	5	350	361	371	382	394	400
27M2	**413**	189	195	201	207	213	219	226
27M3	**413**	397	400	400	400	400	400	400
27M4	**413**	91	94	97	99	102	105	109
27M5	**413**	199	205	211	217	224	231	238
27M6	**413**	288	297	306	315	324	334	344
27M7	**413**	267	275	283	292	301	310	319
27M8	**413**	326	336	346	356	367	378	389
27M9	**577**	386	398	400	400	400	400	400
27M10	**487**	192	198	204	210	216	223	229
27M11	**577**	294	303	312	321	331	341	351
27M12	**487**	207	213	220	226	233	240	247

Feeder	Rated Capacity (A)	2018 (Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Richmond Hill MTS#2								
36M1	594	487	410	400	400	400	400	400
36M2	594	234	300	300	306	312	318	325
36M3	753	432	200	206	212	219	225	232
36M4	753	21	21	140	143	146	149	152
36M5	594	356	363	370	378	385	393	400
36M6	594	201	350	357	364	371	379	386
36M7	**589**	80	130	133	135	160	163	166
36M8	**589**	206	210	214	219	223	227	232
Vaughan MTS#1 T1&T2								
20M1	**738**	128	240	245	250	255	260	265
20M3	**618**	352	356	359	363	366	366	366
20M4	**618**	389	393	397	400	360	360	360
20M5	**778**	138	141	144	146	149	152	155
20M6	**778**	132	135	137	140	143	146	149
20M7	**550**	273	278	284	290	296	301	307
20M8	**550**	251	256	261	266	272	277	280
20M9	**618**	312	320	330	340	300	310	310
20M10	**618**	376	387	399	400	350	350	350
20M11	**550**	82	200	200	200	200	200	200
20M12	**550**	267	300	309	318	328	338	340
20M14	**735**	220	300	300	300	300	300	300
Vaughan MTS#1 T3&T4								
20M15	**572**	228	233	237	242	247	252	257
20M16	**572**	275	278	283	289	295	301	307
20M17	**572**	375	379	386	394	400	400	400
20M18	**572**	422	420	400	400	400	400	400
20M19	**572**	294	300	320	340	360	370	380
20M20	**572**	404	400	400	400	400	400	400
20M21	**572**	170	200	204	208	212	216	221
20M22	**572**	357	368	375	383	390	398	406
20M23	**572**	98	200	210	220	240	240	250
20M24	**572**	294	300	320	340	350	360	370
Vaughan MTS#2								
21M1	**600**	0	200	300	400	450	450	450
21M2	**600**	63	80	100	110	130	140	140

Feeder	Rated Capacity (A)	2018 (Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
21M3	**600**	393	360	360	300	300	300	200
21M4	**428**	229	200	200	200	200	200	200
21M5	**428**	228	300	306	312	318	325	325
21M6	**428**	298	304	310	316	323	329	330
21M7	**428**	191	195	200	200	200	200	200
21M8	**428**	131	135	139	143	147	152	152
21M9	**428**	358	365	360	367	300	300	310
21M10	**428**	364	370	370	370	300	300	300
21M11	**428**	220	300	306	312	300	300	310
21M12	**600**	0	200	300	400	450	450	450
Vaughan MTS#3								
5122M3	**471**	**172**	300	240	280	280	300	320
5122M4	**471**	**237**	242	247	252	257	262	267
5122M5	**471**	**213**	250	255	260	300	306	312
5122M6	**471**	**196**	230	237	280	320	340	360
5122M7	**471**	**85**	300	309	318	328	338	348
5122M8	**471**	**237**	300	309	318	328	338	348
5122M9	**471**	**380**	388	395	300	300	320	300
5122M10	**471**	**230**	400	400	300	300	320	300
5122M11	**471**	**0**						
5122M12	**471**	**310**	319	329	300	309	318	328
5122M13	**471**	**156**	300	309	318	328	338	348
5122M14	**471**	**0**						
Vaughan MTS#4								
25M1	**572**	450	400	400	400	400	400	400
25M2	**572**	169	310	319	329	339	349	359
25M3	**572**	370	400	400	400	400	400	400
25M4	**572**	312	360	361	372	383	394	400
Leslie								
51M1	**600**	**184**	300	306	312	318	325	331
51M2	**600**	**227**	250	255	260	300	306	312
51M31	**600**	**339**	350	357	364	371	379	386
Agincourt								
63M1	**600**	**104**	120	140	160	180	200	220
63M2	**400**	**0**	0	0	0	0	0	0
Woodbridge								

Feeder	Rated Capacity (A)	2018 (Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
D6M2	**500**	**305**	308	311	314	317	321	324
D6M3	**500**	**317**	320	323	327	330	333	337
D6M5	**500**	**333**	336	340	300	340	343	347
D6M6	**500**	**329**	332	336	339	342	346	349
Fairchild								
80M12	**500**	**0**	340	347	354	361	368	375
80M25	**500**	**339**	200	204	208	212	216	221
80M7	**500**	**320**	260	265	271	276	281	287
Finch								
55M11	**500**	**176**	200	240	280	280	300	320
55M12	**500**	**111**	200	180	210	220	230	250
Kleinburg								
45M3	**500**	**30**	31	31	32	32	33	34
45M4	**500**	**145**	148	151	154	157	160	163
Armitage								
41M11	**600**	**80**	130	137	148	162	175	188
41M14	**600**	**363**	385	395	400	400	400	400
41M41	**600**	**288**	300	309	318	328	338	348
41M43	**600**	**259**	280	288	297	306	315	325
41M44	**600**	**295**	320	330	343	356	371	380

Part B: Simcoe County

Table O01B - 1: Simcoe County Municipal Substations

Region	MS Name	Station Name	Number of Feeders	Transformer Capacity (ONAN/ONAF/ONAF-ONAF)	2018 Peak (MVA)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MVA)	Forecasted Peak (2024)	Ratio of 2024 Peak to Maximum TX Rating	N-1 Contingency Ratio with Developments by 2024
Barrie North (13.8kV)	MS301 (13.8kV)	Anne North	4	20/26.6/33.2	11.1	33%	47%	8.8	14.1	42%	60%
	MS310 (13.8kV)	Livingstone	4	20/26.6/33.2	12	36%			14.9	45%	
	MS306 (13.8kV)	Little Lake	4	20/26.6/33.2	7.9	24%			10.9	33%	
Barrie South-West (13.8kV)	MS303 (13.8kV)	Ferndale South	4	20/26.6/33.2	15.8	48%	88%	19.0	20.5	62%	117%
	MS305 (13.8kV)	Holly	4	20/26.6/33.2	24	72%			32.3	97%	
	MS302 (13.8kV)	Saunders	4	20/26.6/33.2	18.8	57%			24.9	75%	
Barrie South-East (13.8kV)	MS307 (13.8kV)	Huronia	3	10/13.3/16.6	13.7	83%	63%	18.8	15.7	95%	85%
	MS309 (13.8kV)	Painswick	4	20/26.6/33.2	13.1	39%			16.9	51%	
	MS304 (13.8kV)	Big Bay Point	4	20/26.6/33.2	12.6	38%			15.0	45%	
	MS308 (13.8kV)	Park Place	4	20/26.6/33.2	12.7	38%			23.6	71%	
Barrie Allandale (4.16kV)	MS406 (4.16kV)	Burton	3	5	3.2	64%	85%	0.6	3.4	68%	91%
	MS414 (4.16kV)	Little	2	5	2.6	52%			2.7	54%	
	MS411 (4.16kV)	Innisfil	3	5	2.7	54%			2.9	58%	
Barrie West Village (4.16kV)	MS410 (4.16kV)	Ferndale	2	5	2.7	54%	108%	0.5	2.8	56%	113%
	MS402 (4.16kV)	Anne Temp	2	5	3.4	68%			3.5	70%	
	MS413 (4.16kV)	Letitia	3	5/6.7	4.7	70%			4.9	73%	
Barrie Downtown (4.16kV)	MS405 (4.16kV)	Brock	4	10	4.3	43%	80%	4.7	5.1	51%	103%
	MS419 (4.16kV)	Perry	4	10	5.9	59%			7.2	72%	
	MS415 (4.16kV)	Mary	4	10	5.7	57%			8.3	83%	
Barrie Queens Park (4.16kV)	MS408 (4.16kV)	Cundles West	3	5	2.9	58%	103%	0.6	3.1	62%	109%
	MS407 (4.16kV)	Cundles East	3	5	3	60%			3.2	64%	
	MS409 (4.16kV)	Duckworth	3	5	4.4	88%			4.7	94%	
Barrie Grove (4.16kV)	MS418 (4.16kV)	Wellington	4	10	6.5	65%	72%	0.8	7.1	71%	75%
	MS417 (4.16kV)	St. Vincent	4	10	4.8	48%			4.9	49%	
	MS404 (4.16kV)	Blake	4	10	4	40%			4.1	41%	
	MS412 (4.16kV)	Johnson	2	5	2.6	52%			2.6	52%	
Bradford	MS321 (13.8kV)	John	4	10/13.3	4.9	37%	86%	8.8	5.7	43%	108%
	MS322 (13.8kV)	Melbourne	3	10/13.3	9.8	74%			13.0	98%	
	MS323 (13.8kV)	8th Line	3	10/13.3	8.5	64%			9.9	74%	
	MS324 (13.8kV)	Reagans	3	10/13.3	11.1	83%			14.5	109%	
Alliston (13.8kV)	MS330 (13.8kV)	8th Avenue	2	10/13.3	7.4	56%	92%	9.7	8.7	65%	129%
	MS331-T1 (13.8kV)	14th Line	2	10/13.3	9.7	73%			14.9	112%	
	MS331-T2 (13.8kV)	14th Line	2	10/13.3	7.5	56%			10.8	81%	
Alliston (4.16kV)	MS431 (4.16kV)	Dufferin	3	5	2.1	42%	88%	0.4	2.3	46%	96%
	MS432 (4.16kV)	Fletcher	2	5	2.3	46%			3.2	64%	
Beeton (13.8kV)	MS336-T1 (13.8kV)	Patterson	2	7.5/10	2.7	27%	60%	0.9	3.3	33%	72%
	MS336-T2 (13.8kV)	Patterson	2	7.5	1.8	24%			2.2	29%	
Tottenham (8.32kV)	MS834 (8.32kV)	Nolan	2	10	3.2	32%	76%	2.2	4.0	40%	98%
	MS835 (8.32kV)	Mill	2	10/13.3/16.6	4.4	27%			5.8	35%	
Penetanguishene (4.16kV)	MS421 (4.16kV)	Fox	2	5	2.1	42%	64%	1.6	2.4	48%	75%
	MS422 (4.16kV)	Robert	2	5	2.7	54%			2.9	58%	
	MS423 (4.16kV)	Bellisle	2	5	2.8	56%			3.2	64%	
	MS424 (4.16kV)	Centennial	4	6	2	33%			2.7	45%	

Table O01B - 2: Simcoe County TS Feeder loading

Feeder	Rated Capacity (A)	2018 Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Barrie TS								
13M1	600	294	139	140	142	143	145	146
13M2	600	195	208	210	212	214	216	219
13M4	600	42	45	45	46	47	47	48
13M5	600	250	15	21	30	42	54	67
13M6	600	218	232	238	244	250	257	263
13M7	600	-	173	178	183	189	194	200
Midhurst TS								
23M5	600	44	53	61	70	80	93	106
23M6	600	335	353	356	359	362	364	367
23M7	600	384	412	422	432	443	454	466
23M8	600	170	185	192	200	208	216	225
23M21	600	150	164	171	179	187	195	204
23M22	600	-	263	276	289	303	318	333
23M24	600	324	352	365	379	393	408	424
23M25	600	415	273	282	292	303	313	324
23M26	600	366	402	422	443	465	488	513
23M27	600	-	189	209	232	258	286	318
23M28	600	30	196	204	212	220	229	238
Holland TS								
153M3	600	218	282	288	315	342	363	368
153M4	600	310	338	380	429	480	488	496
153M10	600	76	77	78	80	82	83	84
Everett TS								
138M6	600	297	314	332	352	372	394	417
138M7	600	187	196	206	216	227	239	251
138M8	600	210	218	225	234	242	251	260
Wabaushene TS								
98M3	600	175	179	182	186	190	194	198
98M7	600	47	48	48	49	50	51	51

Table O01B - 3: Simcoe County TS Feeder loading

Area	Station ID	Feeder	Rated Capacity (A)	2018 Actual (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Barrie	MS301	F1	410	107	111	116	120	125	130	135
	MS301	F2	410	64	70	76	83	90	98	107
	MS301	F3	410	65	70	76	82	88	96	103
	MS301	F4	410	228	230	233	235	237	240	242
	MS302	F1	480	183	193	204	215	227	239	252
	MS302	F2	480	305	309	313	317	321	325	330
	MS302	F3	480	112	124	137	151	167	185	204
	MS302	F4	480	187	197	208	220	232	244	258
	MS303	F1	410	222	226	229	233	237	240	244
	MS303	F2	410	190	196	202	208	214	220	227
	MS303	F3	410	130	139	149	159	170	182	195
	MS303	F4	410	119	129	139	151	163	176	191
	MS304	F1	480	126	129	132	136	139	143	146
	MS304	F2	480	187	189	191	193	195	197	199
	MS304	F3	480	200	202	204	206	208	210	212
	MS304	F4	480	15	20	25	33	43	56	72
	MS305	F1	447	236	248	261	274	288	303	318
	MS305	F2	447	231	247	263	281	301	321	343
	MS305	F3	447	199	216	234	254	276	299	325
	MS305	F4	447	337	342	347	351	356	361	366
	MS306	F1	457	39	43	46	51	55	60	65
	MS306	F2	457	53	58	64	71	78	85	94
	MS306	F3	457	55	59	64	69	75	81	87
	MS306	F4	457	185	189	192	196	200	204	208
	MS307	F1	410	268	271	273	276	279	282	284
	MS307	F2	410	160	164	168	173	177	182	187
	MS307	F3	410	147	153	159	165	172	179	186
	MS308	F1	435	104	119	136	156	179	205	234
	MS308	F2	435	170	179	189	200	211	222	234
	MS308	F3	435	190	200	209	220	231	242	255
	MS308	F4	435	74	91	113	139	172	213	263
	MS309	F1	435	273	276	278	281	284	287	290
	MS309	F2	435	65	70	74	80	85	91	98
	MS309	F3	435	212	218	224	231	238	244	250

	MS309	F4	435	0	0	25	54	59	63	69
	MS310	F1	435	175	179	182	186	189	193	197
	MS310	F2	435	63	68	74	80	87	95	103
	MS310	F3	435	193	196	199	202	206	209	212
	MS310	F4	435	70	76	82	88	95	103	111
	MS402	F1	363	251	252	254	255	256	257	259
	MS402	F2	363	218	220	222	225	227	229	231
	MS404	F1	422	107	108	108	109	109	110	110
	MS404	F2	422	149	150	150	151	152	153	154
	MS404	F3	422	192	193	194	195	196	197	198
	MS404	F4	422	103	104	104	105	105	106	106
	MS405	F1	422	200	203	206	209	212	215	219
	MS405	F2	422	40	45	50	56	63	70	79
	MS405	F3	422	82	87	92	98	104	110	116
	MS405	F4	422	272	275	277	280	283	286	289
	MS406	F1	422	144	145	147	148	150	151	153
	MS406	F2	422	161	163	164	166	168	169	171
	MS406	F3	422	134	135	137	138	139	141	142
	MS407	F1	422	241	243	246	248	251	253	256
	MS407	F2	422	118	119	120	122	123	124	125
	MS407	F3	422	62	63	63	64	65	65	66
	MS408	F1	422	164	166	167	169	171	172	174
	MS408	F2	422	156	158	159	161	162	164	166
	MS408	F3	422	89	90	91	92	93	94	94
	MS409	F1	422	235	237	240	242	245	247	249
	MS409	F2	422	184	186	188	190	191	193	195
	MS409	F3	422	195	197	199	201	203	205	207
	MS410	F2	422	159	160	161	161	162	163	164
	MS410	F3	422	215	217	219	222	224	226	228
	MS411	F1	422	83	84	86	87	88	89	91
	MS411	F2	422	136	138	140	142	144	147	149
	MS411	F3	422	149	150	152	154	155	157	158
	MS412	F1	311	146	147	147	148	149	150	150
	MS412	F2	311	209	210	211	212	213	214	215
	MS413	F1	422	149	150	152	154	155	157	158
	MS413	F2	422	246	247	248	250	251	252	253
	MS413	F3	422	255	258	260	263	265	268	271
	MS414	F1	422	229	231	234	236	238	241	243

	MS414	F2	422	125	126	128	129	130	131	133
	MS415	F1	448	184	199	215	232	250	270	292
	MS415	F2	448	267	270	272	275	278	281	283
	MS415	F3	448	158	175	193	213	236	260	288
	MS415	F4	448	181	195	211	228	246	266	287
	MS417	F1	355	190	191	192	193	194	195	196
	MS417	F2	355	100	101	101	102	102	103	103
	MS417	F3	355	183	184	185	186	187	188	189
	MS417	F4	355	191	192	193	194	195	196	197
	MS418	F1	414	233	236	240	244	247	251	255
	MS418	F2	414	179	182	184	187	190	193	196
	MS418	F3	414	273	277	281	285	290	294	299
	MS418	F4	414	211	214	217	221	224	227	231
	MS419	F1	475	233	234	235	237	238	239	240
	MS419	F2	475	82	94	108	125	143	165	190
	MS419	F3	475	367	371	374	378	382	386	390
	MS419	F4	475	142	148	154	160	166	173	180
Bradford	MS321	F1	329	26	27	27	28	28	29	29
	MS321	F2	329	20	22	23	25	27	29	31
	MS321	F3	329	44	45	46	47	48	49	50
	MS321	F4	329	115	117	120	122	124	127	130
	MS322	F1	422	262	267	273	278	284	289	295
	MS322	F2	422	41	46	51	56	62	69	77
	MS322	F3	422	109	118	127	137	148	160	173
	MS323	F1	378	114	116	119	121	123	126	128
	MS323	F2	352	98	102	106	110	115	119	124
	MS323	F3	329	145	148	151	154	157	160	163
	MS324	F1	327	44	48	53	59	64	71	78
	MS324	F2	327	251	258	265	273	280	288	296
	MS324	F3	327	168	181	191	200	210	221	232
Alliston	MS330	F1	379	189	192	195	198	201	204	207
	MS330	F2	379	120	125	131	137	143	150	156
	MS331	F1	492	264	267	270	274	277	280	284
	MS331	F2	492	142	146	150	154	159	163	168
	MS331	F5	492	136	152	171	191	214	240	268
	MS331	F6	492	177	199	223	250	281	315	353
	MS431	F1	402	94	95	97	98	100	101	103
	MS431	F2	402	121	123	125	127	128	130	132

	MS431	F3	402	72	73	74	75	76	78	79
	MS432	F1	385	141	143	145	147	150	152	154
	MS432	F2	385	183	186	189	191	194	197	200
Beeton	MS336	F2	419	115	119	123	128	132	135	139
	MS336	F3	419	75	78	80	83	86	88	90
Tottenham	MS834	F1	404	44	46	48	50	52	55	57
	MS834	F2	404	175	182	189	197	205	213	221
	MS835	F3	314	169	177	185	193	202	211	220
	MS835	F4	314	139	145	152	159	166	173	181
Penetanguishene	MS421	F1	251	200	202	204	206	208	210	212
	MS421	F3	229	88	93	99	105	111	118	125
	MS422	F1	422	100	102	104	106	108	110	113
	MS422	F2	422	277	278	280	281	283	284	285
	MS423	F1	245	165	172	178	186	193	201	209
	MS423	F3	245	222	223	224	225	226	228	229
	MS424	F1	281	22	27	32	39	46	56	67
	MS424	F2	281	109	112	116	120	125	129	133
	MS424	F3	281	110	114	118	122	126	130	135
	MS424	F4	281	34	35	37	38	39	41	42
	Fairlain DS	F2	140	47	47	47	48	48	48	48

Station and Feeder Loading – Central

The two planning parts located in the Central operating area are:

A. Brampton
B. Mississauga

List of Tables

Part A: Brampton

Table O02A - 1: Brampton Transformer Station Utilization

[redacted]

[redacted]									

Table O02A - 2: Brampton Municipal Stations Utilization

[redacted]

Table O02A - 3: Brampton TS Feeder Loading

Feeder	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Jim Yarrow (27.6 kV)								
25M1	600	246	249	251	254	257	260	263
25M3	600	167	169	171	173	175	177	179
25M4	600	254	257	260	263	266	269	272
25M5	600	195	198	200	202	204	207	209
25M6	600	220	223	225	228	231	233	236
25M7	600	257	260	263	266	269	272	275
25M8	600	160	162	163	165	167	169	171
25M9	600	13	13	13	13	13	14	14
25M10	600	227	229	232	235	237	240	243
25M11	600	307	311	314	318	321	325	329
25M12	600	156	158	160	162	163	165	167
25M13	600	230	232	235	238	240	243	246
Pleasant (27.6 kV)								
42M9	600	169	170	171	172	174	175	176
42M10	600	306	308	310	312	314	317	319
42M11	600	2	2	2	2	2	2	2
42M12	600	181	182	183	184	186	187	188
42M13	600	510	513	517	520	524	528	531
42M14	600	341	343	346	348	350	353	355
42M43	600	312	314	316	318	320	323	325
42M44	600	365	368	370	373	375	378	381
42M45	600	0	346	348	351	353	356	358
42M46	600	713	314	316	318	320	323	325
42M47	600	283	285	287	289	291	293	295
42M48	600	283	285	287	289	291	293	295
42M61	600	433	436	439	442	445	448	451
42M62	600	118	119	120	121	122	123	123
42M64	600	4	4	4	4	4	4	4
42M66	600	245	247	248	250	252	253	255
42M67	600	447	450	453	456	460	463	466
42M68	600	238	239	241	242	244	246	247
42M69	600	5	4	4	4	4	4	4
42M70	600	193	195	196	197	199	200	201
Bramalea (27.6kV)								
42M9	600	169	170	171	172	174	175	176
42M10	600	306	308	310	312	314	317	319

Feeder	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
42M11	600	2	2	2	2	2	2	2
42M12	600	181	182	183	184	186	187	188
42M13	600	510	513	517	520	524	528	531
42M14	600	341	343	346	348	350	353	355
42M43	600	312	314	316	318	320	323	325
42M44	600	365	368	370	373	375	378	381
42M45	600	0	346	348	351	353	356	358
42M46	600	713	314	316	318	320	323	325
42M47	600	283	285	287	289	291	293	295
42M48	600	283	285	287	289	291	293	295
42M61	600	433	436	439	442	445	448	451
42M62	600	118	119	120	121	122	123	123
42M64	600	4	4	4	4	4	4	4
42M66	600	245	247	248	250	252	253	255
42M67	600	447	450	453	456	460	463	466
42M68	600	238	239	241	242	244	246	247
42M69	600	5	4	4	4	4	4	4
42M70	600	193	195	196	197	199	200	201
74M2	600	333	336	339	342	346	349	353
74M3	600	197	199	201	203	205	207	209
74M4	600	319	322	325	328	331	335	338
74M5	600	132	133	134	136	137	138	140
74M6	600	290	293	296	299	302	305	308
74M9	600	159	161	163	164	166	167	169
74M10	600	258	260	263	265	268	271	273
Goreway (27.6 kV)								
136M1	600	0	0	0	0	0	0	0
136M2	600	398	400	403	405	407	410	412
136M4	600	339	341	343	345	347	349	351
136M8	600	392	394	396	398	401	403	405
136M18	380	38	38	39	39	39	39	40
136M41	600	0	208	209	211	212	213	214
136M42	600	331	333	335	337	339	341	343
136M43	600	431	434	436	439	441	444	446
136M44	600	389	391	394	396	398	401	403
136M45	600	170	171	172	173	174	175	176
136M46	600	203	204	206	207	208	209	210
136M47	600	292	294	296	298	299	301	303

Feeder	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
136M48	600	296	298	300	302	303	305	307
136M49	600	346	348	350	352	354	357	359
136M50	600	294	295	297	299	300	302	304
136M51	600	271	273	274	276	277	279	281
136M52	600	395	397	399	402	404	406	409
Pleasant (44 kV)								
42M22	600	88	88	88	88	87	87	87
42M24	600	222	222	222	222	221	221	221
42M26	600	92	92	92	92	92	91	91
Bramalea (44 kV)								
74M26	600	31	31	31	31	31	31	31
74M27	600	245	244	243	242	241	241	240
74M28	600	229	228	228	227	226	226	225
74M43	600	223	222	222	221	220	219	219
74M44	600	210	209	209	208	207	207	206
74M47	600	242	241	240	240	239	238	237
74M48	600	248	247	246	246	245	244	243
Goreway (44 kV)								
136M36	600	360	359	358	357	355	354	353
Woodbridge (44 kV)								
D6M16	600	434	207	206	206	205	204	204

Table O02A - 4: Brampton MS Feeder Loading

Station ID	Feeder ID	Rated Capacity (A)	2018 Peak (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
MS-2	2F1	350	78	78	78	78	0	0	0
	2F2	350	29	29	29	29	0	0	0
	2F3	350	152	152	152	152	0	0	0
MS-8	8F1	350	180	180	0	0	0	0	0
MS-12	12F2	630	0	0	0	0	0	0	0
	12F3	630	43	43	43	0	0	0	0
	12F5	95	33	33	33	0	0	0	0
MS-10	10F1	350	14	14	14	14	14	14	14
	10F2	350	0	0	0	0	0	0	0
	10F3	350	188	190	192	194	196	199	201
	10F4	350	69	70	70	71	72	73	74
	10F5	350	79	80	81	82	83	84	85
	10F6	600	0	0	0	0	0	0	0
MS-14	14F1	350	52	53	53	54	54	55	56
	14F3	350	208	210	212	215	217	220	222
	14F5	350	251	254	257	260	263	266	269
MS-19	19F1	350	59	60	60	60	61	61	62
	19F2	350	333	336	338	340	343	345	347
	19F3	630	17	17	17	18	18	18	18
	19F4	630	0	0	0	0	0	0	0
	19F5	630	117	118	118	119	120	121	122
	19F6	630	95	96	97	97	98	99	99
MS-20	20F1	350	134	135	136	137	138	139	140
	20F2	630	131	132	133	134	135	136	137
	20F3	630	146	147	148	149	151	152	153
	20F4	430	42	43	43	43	44	44	44
	20F5	630	0	0	0	0	0	0	0
	20F6	630	224	226	227	229	230	232	233
MS-21	21F1	630	115	116	117	118	119	120	122
	21F2	630	150	152	153	155	156	158	159
	21F3	630	1	1	1	1	1	1	1
	21F4	630	38	38	39	39	39	40	40
	21F5	630	90	91	92	93	94	94	95
MS-22	22F1	600	33	34	34	34	35	35	35
	22F2		0	0	0	0	0	0	0

	22F3	350	174	175	177	179	181	182	184
	22F4	350	140	141	142	144	145	147	148
	22F5	350	113	115	116	117	118	119	120
	22F6	600	34	34	34	35	35	35	36
	22F7	350	96	97	98	99	100	101	102
	22F8	600	60	60	61	61	62	63	63

Part B: Mississauga

Table O02B - 1: Mississauga HONI Owned Transformer Stations Utilization

Hydro One TS Stations Asset Utilization													
		TS Name	Bus	kV	Number of Feeders	10-day LTR	2018	2019	2020	2021	2022	2023	2024
SOUTH	22	Oakville	T5/T6 (E&Z)	27.6S	4	63.2	31	36	37	38	39	40	41
	46	Cooksville	T3/T4 (Q&J)	27.6S	6	86.7	54	63	65	66	68	70	71
	46	Cooksville	T1/T2 (E&Z)	27.6S	6	89.8	54.7	64	66	67	69	70	72
	67	Lorne Park	T1/T2 (B&J)	27.6S	10	152	87.6	102	105	107	110	113	116
					Total	**391.7**	**227.3**	**269**	**277**	**282**	**289**	**297**	**305**
NORTH	88	Richview	T7/T8 (B&Y)	27.6N	3	33	2.8	3	3	3	3	3	3
	88	Richview	T5/T6 (Q)	27.6N	1	16.5	0	15	16	16	16	16	16
	74	Bramalea	T1/T2 (B&Y)	27.6N	6	86.3	68.3	70	76	77	77	77	77
	C5	Erindale	T1/T2 (E&Q)	27.6N	12	191	168.8	174	188	190	190	190	190
	135	Cardiff	T1/T2(B&Q)	27.6N	10	126	113.5	117	126	128	128	128	128
					Total	**452.8**	**353.4**	**364**	**395**	**399**	**399**	**399**	**399**
EAST	74	Bramalea	T3/T4 (Q&J)	44E	4	58.7	85.6	75	81	84	86	87	87
	74	Bramalea	T5/T6 (E&Z)	44E	3	50.5	77.5	68	73	76	78	78	79
	83	Tomken	T1/T2 (B&Y)	44E	8	183	132.9	117	126	131	133	134	135
	83	Tomken	T3/T4 (Z&E)	44E	8	203	135	119	128	133	135	136	137
	D6	Woodbridg	T3/T5 (Q&E)	44E	4	50	56	49	53	55	56	57	57
					Total	**545.2**	**487**	**429**	**461**	**479**	**487**	**492**	**496**
WEST	C5	Erindale	T3/T4 (Z&Y)	44W	8	203	139.8	154	155	157	158	159	160
	C5	Erindale	T5/T6 (J&B)	44W	8	205	112.2	124	125	126	127	128	129
	R3107	Meadowval	T1/T2 (Z&E)	44W	6	201	130	143	144	146	147	148	149
	240	Churchill Meadows	T1/T2 (B&Y)	44W	8	200	111	123	123	124	125	126	127
					Total	**809**	**493**	**547**	**550**	**555**	**559**	**564**	**568**

Table O02B - 2: Mississauga MS Stations Utilization

MS Name	Supply TS	Tx	Number of Feeders	ONAF Capacity (MW)	2018 Peak (MW)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Growth to 2024 (MW)	N-1 Contingency Ratio with Developments by 2024
Mineola	46M17	1T1	2	4	2.1	53%	84%	0	84%
	46M9	1T2	2	4	2.2	55%	84%	0	84%
	46M17	1T3	2	4	2.4	60%	84%	0	84%
Dixie	46M21	2T2	1	4	1.4	35%		0	
Melton	46M12	3T1	2	4	0.8	20%	65%	0	65%
	46M11	3T2	2	4	3.2	80%	65%	0	65%
	46M11	3T3	2	4	1.2	30%	65%	0	65%
Rifle Range	46M14	4T1	3	6.6	2.2	33%	80%	0	80%
	46M13	4T2	2	6.6	3.1	47%	80%	0	80%
Birchview	67M1	5T1	2	4	2.5	63%	118%	0	118%
	67M10	5T2	2	4	2.2	55%	118%	0	118%
Orchard Heights	46M18	7T1	2	4	1.9	48%	133%	0	133%
	46M13	7T2	2	4	3.4	85%	133%	0	133%
Clarkson	67M3	8T1	2	4	1.6	40%	69%	0	69%
	67M4	8T2	2	4	2.2	55%	69%	0	69%
	67M1	8T3	2	4	1.7	43%	69%	0	69%
Cawthra	46M19	9T1	3	6.6	3.1	47%	95%	0	95%
	46M14	9T2	2	6.6	3.2	48%	95%	0	95%
Hensall	46M12	11T1	3	6.6	3.4	52%	74%	0	74%
	46M11	11T2	2	6.6	1.5	23%	74%	0	74%
Park Royal	22M48	12T1	3	6.6	4.7	71%	112%	0	112%
	67M5	12T2	2	6.6	2.7	41%	112%	0	112%
Orr	67M3	22T1	4	8.3	4.2	51%		0	
Robin	67M6	23T1	3	6.6	4.5	68%		0	
Pinetree	67M7	25T1	3	6.6	3.3	50%		0	
Parkland	67M10	26T1	4	6.6	3.4	52%		0	
Avonhead	67M3	29T1	3	6.6	1.2	18%		0	
Munden	46M9	35T1	4	6.6	3.1	47%		0	
Western	46M11	36T1	4	16.6	4.4	27%		0	
Parkwest	22M48	40T1	2	4	1	25%	35%	0	35%
	22M48	40T2	2	4	0.4	10%	35%	0	35%

MS Name	Supply TS	Tx	Number of Feeders	ONAF Capacity (MW)	2018 Peak (MW)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Growth to 2024 (MW)	N-1 Contingency Ratio with Developments by 2024
Bromsgrove	67M1	41T1	2	4	1.6	40%	70%	0	70%
	22M48	41T2	2	4	1.2	30%	70%	0	70%
Revus	46M19	42T1	2	4	2.7	68%	78%	0	78%
	46M10	42T2	2	4	0.4	10%	78%	0	78%
Stavebank	46M17	65T1	3	6.6	2.2	33%		0	
Bexhill	67M10	66T1	2	4	1.9	48%	110%	0	110%
	67M7	66T2	2	4	2.5	63%	110%	0	110%
Shawanaga	67M5	67T1	4	16.6	3	18%		0	
Briarwood	46M9	78T1	2	8.3	3.3	40%	55%	0	55%
	46M10	78T2	2	8.3	1.3	16%	55%	0	55%
McNiece	67M8	79T1	3	6.6	4.1	62%		0	
Woodlands	C5M6	13T1	3	33.3	17.4	52%	94%	3%	97%
	C5M29	13T2	3	33.3	13.9	42%	94%	3%	97%
Sheridan Park	C5M23	14T1	3	33.3	9.3	28%	43%	3%	46%
	C5M7	14T2	3	33.3	5	15%	43%	3%	46%
Summerville	83M30	15T1	2	16.6	5.1	31%	85%	3%	88%
	83M7	15T2	3	16.6	9	54%	85%	3%	88%
Kamato	83M4	17T1	4	33.3	15.9	48%			
Erinmills	C5M3	18T2	8	33.3	20.2	61%			
Rockwood	83M24	19T1	2	16.6	8	48%	77%	3%	80%
	83M29	19T2	2	16.6	4.7	28%	77%	3%	80%
Southdown	C5M7	20T1	3	33.3	0	0%	47%	3%	50%
	C5M29	20T2	3	33.3	15.6	47%	47%	3%	50%
Chinook	74M24	21T1	4	33.3	15	45%	65%	3%	68%
	D6M13	21T2	4	33.3	6.5	20%	65%	3%	68%
Stillmeadow	C5M23	24T1	3	33.3	6.4	19%	48%	3%	51%
	83M2	24T2	3	33.3	9.5	29%	48%	3%	51%
Maingate	83M28	27T1	3	33.3	11.2	34%	77%	3%	80%
	83M8	27T2	4	33.3	14.3	43%	77%	3%	80%
Orlando	74M46	28T1	3	33.3	9.9	30%	64%	3%	67%
	D6M12	28T2	3	33.3	11.3	34%	64%	3%	67%
Rogers	C5M1	30T1	3	33.3	4	12%	63%	3%	66%

MS Name	Supply TS	Tx	Number of Feeders	ONAF Capacity (MW)	2018 Peak (MW)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Growth to 2024 (MW)	N-1 Contingency Ratio with Developments by 2024
	C5M5	30T2	4	33.3	17	51%	63%	3%	66%
Rubin	83M30	31T1	4	33.3	17.3	52%	80%	3%	83%
	83M6	31T2	4	33.3	9.3	28%	80%	3%	83%
Derry	74M25	34T1	3	33.3	8.2	25%			
Malton	74M45	37T1	3	33.3	15.3	46%	61%	3%	64%
	D6M13	37T2	3	33.3	5	15%	61%	3%	64%
Bloor	83M1	38T1	3	33.3	16.1	48%	98%	3%	101%
	83M3	38T2	3	33.3	16.4	49%	98%	3%	101%
John	83M2	39T1	4	33.3	22	66%			
Shawson	74M23	43T1	3	33.3	17.2	52%	97%	3%	100%
	83M23	43T2	3	33.3	15.1	45%	97%	3%	100%
New Dixie	83M24	45T1	3	33.3	13.3	40%	72%	3%	75%
	83M29	45T2	3	33.3	10.6	32%	72%	3%	75%
City Centre N	83M1	47T1	3	33.3	13.1	39%	79%	15%	94%
	83M27	47T2	3	33.3	11.1	33%	79%	15%	94%
Rexdale	D6M12	48T1	6	33.3	25.2	76%			
Desboro	C5M1	49T1	3	33.3	17.6	53%	113%	3%	116%
	240M2	49T2	3	33.3	20	60%	113%	3%	116%
Credit Valley	C5M4	50T1	4	33.3	17.1	51%			
Thomas	240M4	52T1	3	33.3	15.6	47%	103%	3%	106%
	240M1	52T2	3	33.3	18.8	56%	103%	3%	106%
Battleford	C5M28	54T1	3	33.3	23.2	70%	108%	3%	111%
	240M1	54T2	3	33.3	12.7	38%	108%	3%	111%
Meadowvale TC	R3107M5	57T1	4	33.3	0	0%			
Argentia	C5M2	58T1	4	33.3	13	39%			
Aquitaine	R3107M8	59T1	4	33.3	20.6	62%			
Century	C5M2	60T1	4	33.3	18	54%	88%	3%	91%
	R3107M4	60T2	4	33.3	11.4	34%	88%	3%	91%
City Centre S	83M25	61T1	4	33.3	8.6	26%			
Woods	C5M30	68T1	3	33.3	15	45%	81%	15%	96%
	C5M24	68T2	4	33.3	12.1	36%	81%	15%	96%

MS Name	Supply TS	Tx	Number of Feeders	ONAF Capacity (MW)	2018 Peak (MW)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Growth to 2024 (MW)	N-1 Contingency Ratio with Developments by 2024
Chalkdene	83M5	69T1	4	33.3	19.1	57%			
Hamilton	83M26	71T1	4	33.3	22.6	68%			
Lisgar	R3107M5	82T1	3	33.3	13.6	41%	92%	3%	95%
	R3107M6	82T2	3	33.3	17.1	51%	92%	3%	95%
Confederation	C5M24	83T1	3	33.3	12.8	38%	98%	15%	113%
	C5M25	83T2	4	33.3	19.8	59%	98%	15%	113%
York	R3107M3	84T1	4	33.3	11.6	35%			
Bradley/Ridge	240M2	85T1	8	33.3	15.8	47%			
Grosbeak	240M3	88T1	3	33.3	12.3	37%	83%	3%	86%
	240M4	88T2	3	33.3	15.2	46%	83%	3%	86%
Matheson	83M6	89T1	3	33.3	11.4	34%	47%	3%	50%
	83M7	89T2	3	33.3	4.2	13%	47%	3%	50%
Winston	R3107M7	90T1	8	33.3	15.6	47%			
Mini-Derry	74M23	6T1	2	33.3	5.6	17%	17%		17%
	74M23	6T2	2	33.3	0	0%	17%		17%
Mini-Orlando	C5M27	91T1	2	33.3	9	27%	41%	59%	100%
	C5M28	91T2	2	33.3	4.8	14%	41%	59%	100%

Table O02B - 3: Mississauga TS Feeder Utilization

	Station	Feeder ID	Rated Capacity(A)	2018	2019	2020	2021	2022	2023	2024
27.6 SOUTH	Oakville	M45 (STLC)	800	220	800	800	800	800	800	800
	T5/T6	M46 (STLC)	600	0	0	0	0	0	0	0
	(E&Z)	M47	600	0	0	0	0	0	0	0
		M48	600	404	427	452	478	506	536	567
	Cooksville	M9	600	220	233	246	261	276	292	309
	T3/T4	M10	600	88	93	99	104	110	117	123
	(Q&J)	M11	600	0	163	172	182	193	204	216
		M12	600	367	153	162	172	182	192	203
		M13	600	278	294	311	329	348	369	390
		M14	600	256	271	287	303	321	339	359
	Cooksville	M17	600	244	258	273	289	306	323	342
	T1/T2	M18	600	255	270	285	302	320	338	358
	(E&Z)	M19	600	329	348	368	390	412	436	461
		M20	600	120	127	134	142	150	159	168
		M21	600	124	131	139	147	155	164	174
		M22	600	55	58	62	65	69	73	77
	Lorne Park	M1	600	88	93	99	104	110	117	123
	T1/T2	M2	600	314	332	351	372	393	416	440
	(B&J)	M3	600	216	229	242	256	271	286	303
		M4	600	235	249	263	278	294	312	330
		M5	600	129	136	144	153	162	171	181
		M6	600	193	204	216	229	242	256	271
		M7	600	182	193	204	216	228	241	255
		M8	600	116	123	130	137	145	154	163
		M9	600	235	249	263	278	294	312	330
		M10	600	248	262	278	294	311	329	348
NO 6	Richview	M4 (GTAA)	600	0	315	325	335	346	357	368

	Station	Feeder ID	Rated Capacity(A)	2018	2019	2020	2021	2022	2023	2024
	T7/T8	M5	600	56	58	60	62	64	66	68
	(B&Y)	M7	600	0	0	0	0	0	0	0
	T5/T6 (Q)	M47 (GTAA)	600	0	304	314	324	335	345	356
	Bramalea	M1 (GTAA)	600	76	231	239	246	254	262	271
	T1/T2	M7	600	230	234	242	249	257	266	274
	(B&Y)	M8	600	230	78	81	84	86	89	92
		M9	600	230	217	224	231	238	246	254
		M11	600	230	176	182	188	194	200	207
		M12	600	230	144	149	154	159	164	169
	Erindale	M31	600	325	335	346	357	369	380	393
	T1/T2	M32	600	396	409	422	435	449	464	478
	(E&Q)	M33	600	406	419	432	446	461	475	490
		M34	600	127	131	135	140	144	149	153
		M35	600	298	308	317	328	338	349	360
		M36	600	351	362	374	386	398	411	424
		M37	600	186	192	198	204	211	218	225
		M38	600	317	327	338	348	360	371	383
		M39	600	186	192	198	204	211	218	225
		M40	600	224	231	239	246	254	262	271
		M41	600	492	508	524	541	558	576	594
		M42	600	361	373	384	397	409	423	436
	Cardiff	M1	600	322	332	343	354	365	377	389
	T1/T2	M2	600	186	192	198	204	211	218	225
	(B&Q)	M3	600	222	229	236	244	252	260	268
		M4	600	365	377	389	401	414	427	441
		M5	600	356	367	379	391	404	417	430
		M6	600	55	57	59	60	62	64	66
		M7	600	327	337	348	359	371	383	395
		M8	600	34	35	36	37	39	40	41
		M9	600	178	184	190	196	202	208	215
		M10	600	288	297	307	317	327	337	348
44kV EAST	Bramalea	M23	600	614	521	533	545	557	570	583
	T3/T4	M24	600	307	314	321	329	336	344	352
	(Q&J)	M25	600	153	157	160	164	168	171	175
		M29	600	0	0	0	0	0	0	0
	T5/T6	M45	600	121	262	268	274	280	287	293
	(E&Z)	M46	600	175	267	273	279	286	292	299

	Station	Feeder ID	Rated Capacity(A)	2018	2019	2020	2021	2022	2023	2024
		M50	600	0	0	0	0	0	0	0
	Tomken	M1	600	393	402	411	421	430	440	450
	T1/T2	M2	600	284	291	297	304	311	318	326
	(B&Y)	M3	600	213	218	223	228	233	239	244
		M4	600	216	221	226	231	237	242	248
	T3/T4	M5	600	262	268	274	280	287	294	300
	(Z&E)	M6	600	331	339	346	354	363	371	379
		M7	600	68	70	71	73	74	76	78
		M8	600	167	171	175	179	183	187	191
		M23	600	0	239	245	251	256	262	268
		M24	600	488	237	243	248	254	260	266
		M25	600	0	199	204	209	214	218	224
		M26	600	383	238	244	249	255	261	267
		M27	600	0	129	132	135	138	141	144
		M28	600	262	145	149	152	156	159	163
		M29	600	0	228	233	239	244	250	256
		M30	600	608	254	260	266	272	278	284
	Woodbridge	M11	600	0	0	0	0	0	0	0
	T3/T5 (Q&E)	M12	600	535	479	490	501	513	524	536
		M13	600	173	177	181	185	189	194	198
		M14	600	0	0	0	0	0	0	0
44kV WEST	Erindale	M1	600	274	280	287	293	300	307	314
	T3/T4	M2	600	0	312	319	327	334	342	350
	(Z&Y)	M3	600	266	272	278	285	291	298	305
		M4	600	241	247	252	258	264	270	276
	T5/T6	M5	600	226	231	237	242	248	253	259
	(J&B)	M6	600	233	238	244	249	255	261	267
		M7	600	269	275	282	288	295	301	308
		M8	600	169	173	177	181	185	189	194
		M23	600	202	207	211	216	221	226	232
		M24	600	342	350	358	366	375	383	392
		M25	600	259	265	271	277	284	290	297
		M26	600	8	8	8	9	9	9	9
		M27	600	115	118	120	123	126	129	132
		M28	600	383	392	401	410	419	429	439
		M29	600	402	411	421	430	440	450	461
		M30	600	192	196	201	206	210	215	220

	Station	Feeder ID	Rated Capacity(A)	2018	2019	2020	2021	2022	2023	2024
	Meadowvale	M3	600	360	368	377	385	394	403	413
	T1/T2 (Z&E)	M4	600	475	486	497	509	520	532	544
		M5	600	179	183	187	192	196	201	205
		M6	600	226	231	237	242	248	253	259
		M7	600	393	402	411	421	430	440	450
		M8	600	288	295	301	308	315	323	330
	Churchill Meadows	M1	600	417	427	436	446	457	467	478
	T1/T2 (B&Y)	M2	600	467	478	489	500	511	523	535
		M3	600	160	164	167	171	175	179	183
		M4	600	403	412	422	431	441	452	462
		M5	600	0	0	0	0	0	0	0
		M6	600	0	0	0	0	0	0	0
		M7	600	0	0	0	0	0	0	0
		M8	600	0	0	0	0	0	0	0

Table O02B - 4: Mississauga MS Feeder Utilization

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Mineola	F1	600	81	228	214	201	189	178	167
	F2	600	212	199	188	176	166	156	147
	F3	600	182	171	161	151	142	134	126
	F4	600	146	137	129	121	114	107	101
	F5	600	98	92	87	82	77	72	68
	F6	600	234	220	207	195	183	172	162
Dixie	F4	600	188	177	166	156	147	138	130
Melton	F1	600	113	106	100	94	88	83	78
	F2	600	7	7	6	6	5	5	5
	F3	600	40	38	35	33	31	29	28
	F4	600	328	308	290	273	257	241	227
	F5	600	104	98	92	87	81	77	72
	F6	600	72	68	64	60	56	53	50
Rifle Range	F1	435	61	57	54	51	48	45	42
	F2	600	14	13	12	12	11	10	10
	F3	435	228	214	202	190	178	168	158
	F4	435	187	176	165	156	146	138	129
	F5	600	243	229	215	202	190	179	168
Birchview	F1	600	212	199	188	176	166	156	147
	F2	600	126	119	111	105	99	93	87
	F3	600	174	164	154	145	136	128	120
	F4	600	139	131	123	116	109	102	96
Orchard Heights	F1	600	170	160	150	141	133	125	118
	F2	600	107	101	95	89	84	79	74
	F3	600	183	172	162	152	143	135	127
	F4	600	313	294	277	260	245	230	217
Clarkson	F1	600	141	133	125	117	110	104	98
	F2	600	76	71	67	63	59	56	53
	F3	600	280	263	248	233	219	206	194
	F4	600	33	31	29	27	26	24	23
	F5	600	214	201	189	178	167	157	148
	F6	600	25	24	22	21	20	18	17
Cawthra	F1	435	153	144	135	127	120	113	106
	F2	435	71	207	195	183	172	162	152
	F3	435	204	192	180	170	160	150	141

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F4	435	243	229	215	202	190	179	168
	F5	435	205	193	181	171	160	151	142
Hensall	F1	420	0	94	88	83	78	74	69
	F2	420	312	293	276	260	244	230	216
	F3	420	153	144	135	127	120	113	106
	F4	420	166	156	147	138	130	122	115
	F5	420	32	30	28	27	25	24	22
Park Royal	F1	420	254	239	225	211	199	187	176
	F2	420	273	257	241	227	214	201	189
	F3	420	114	107	101	95	89	84	79
	F4	420	127	119	112	106	99	93	88
	F5	420	236	222	209	196	185	174	163
Orr	F1	600	172	162	152	143	135	127	119
	F2	600	180	169	159	150	141	132	125
	F3	600	219	206	194	182	171	161	152
	F4	600	0	0	0	0	0	0	0
Robin	F1	600	267	251	236	222	209	196	185
	F2	600	210	198	186	175	164	155	145
	F3	600	164	154	145	136	128	121	114
Pinetree	F1	600	174	164	154	145	136	128	120
	F2	600	230	216	203	191	180	169	159
	F3	600	42	186	175	165	155	146	137
Parkland	F1	600	25	24	22	21	20	18	17
	F2	600	365	343	323	304	286	269	253
	F3	600	47	150	142	133	125	118	111
	F4	600	36	34	32	30	28	26	25
Avonhead	F1	600	65	61	57	54	51	48	45
	F2	600	13	12	11	11	10	10	9
	F3	600	86	81	76	72	67	63	60
Munden	F1	435	204	192	180	170	160	150	141
	F2	435	65	61	57	54	51	48	45
	F3	435	114	107	101	95	89	84	79
	F4	600	0	0	0	0	0	0	0
Western	F1	600	136	128	120	113	106	100	94
	F2	600	43	40	38	36	34	32	30
	F3	600	153	144	135	127	120	113	106

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F4	600	190	179	168	158	149	140	131
Parkwest	F1	600	117	110	103	97	92	86	81
	F2	600	16	15	14	13	13	12	11
	F3	600	0	40	38	36	34	32	30
	F4	600	49	46	43	41	38	36	34
Bromsgrove	F1	600	79	74	70	66	62	58	55
	F2	600	146	137	129	121	114	107	101
	F3	600	66	62	58	55	52	49	46
	F4	600	108	102	96	90	85	79	75
Revus	F1	600	76	71	67	63	59	56	53
	F2	600	298	280	264	248	233	219	206
	F3	600	22	21	19	18	17	16	15
	F4	600	37	35	33	31	29	27	26
Stavebank	F1	600	0	114	107	101	95	89	84
	F2	600	119	112	105	99	93	88	82
	F3	600	179	168	158	149	140	132	124
Bexhill	F1	600	92	87	81	77	72	68	64
	F2	600	182	171	161	151	142	134	126
	F3	600	0	0	0	0	0	0	0
	F4	600	349	328	309	290	273	257	242
Shawanaga	F1	600	16	15	14	13	13	12	11
	F2	600	64	60	57	53	50	47	44
	F3	600	177	166	157	147	138	130	122
	F4	600	165	155	146	137	129	121	114
Briarwood	F1	435	313	294	277	260	245	230	217
	F2	435	139	131	123	116	109	102	96
	F4	435	116	109	103	97	91	85	80
	F5	435	72	68	64	60	56	53	50
McNiece	F1	420	133	125	118	111	104	98	92
	F2	420	125	118	111	104	98	92	87
	F3	420	304	286	269	253	238	224	210
Woodlands	F1	600	229	234	240	245	251	257	262
	F2	600	298	305	312	319	326	334	342
	F3	600	200	205	209	214	219	224	229
	F4	600	221	226	231	237	242	248	253
	F5	600	185	189	194	198	203	207	212

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F6	600	224	229	234	240	245	251	257
Sheridan Park	F1	600	74	76	77	79	81	83	85
	F2	600	85	87	89	91	93	95	97
	F3	600	223	228	233	239	244	250	256
	F4	600	74	76	77	79	81	83	85
	F5	600	61	62	64	65	67	68	70
	F6	600	73	75	76	78	80	82	84
Summerville	F1	600	139	142	145	149	152	156	159
	F2	600	73	184	188	193	197	202	206
	F4	600	361	183	187	192	196	201	205
	F5	600	22	23	23	24	24	25	25
Kamato	F1	435	210	215	220	225	230	235	241
	F2	435	108	110	113	116	118	121	124
	F3	435	197	202	206	211	216	221	226
	F4	435	148	151	155	158	162	166	170
Erinmills	F1	600	0	0	0	0	0	0	0
	F2	600	42	305	312	319	326	334	342
	F3	600	53	54	55	57	58	59	61
	F4	600	61	62	64	65	67	68	70
	F5	600	164	168	172	176	180	184	188
	F6	600	366	180	184	188	193	197	202
	F7	600	37	38	39	40	41	41	42
	F8	600	116	119	121	124	127	130	133
Rockwood	F1	600	197	202	206	211	216	221	226
	F2	600	152	155	159	163	166	170	174
	F4	600	41	42	43	44	45	46	47
	F5	600	142	145	149	152	156	159	163
Southdown	F1	600	254	260	266	272	278	285	291
	F2	600	210	215	220	225	230	235	241
	F3	600	197	202	206	211	216	221	226
	F4	600	250	256	262	268	274	280	287
	F5	600	184	188	193	197	202	206	211
	F6	600	210	215	220	225	230	235	241
Chinook	F1	600	272	278	285	291	298	305	312
	F2	600	64	65	67	69	70	72	73
	F3	600	276	282	289	295	302	309	316

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F4	600	34	35	36	36	37	38	39
	F5	600	34	35	36	36	37	38	39
	F6	600	254	260	266	272	278	285	291
	F7	600	66	68	69	71	72	74	76
	F8	600	0	0	0	0	0	0	0
Stillmeadow	F1	350	70	72	73	75	77	78	80
	F2	600	68	70	71	73	74	76	78
	F3	350	126	129	132	135	138	141	144
	F4	600	198	203	207	212	217	222	227
	F5	600	121	124	127	130	133	136	139
	F6	600	66	68	69	71	72	74	76
Maingate	F1	600	180	184	188	193	197	202	206
	F2	600	189	193	198	202	207	212	217
	F3	600	52	53	54	56	57	58	60
	F4	600	170	174	178	182	186	190	195
	F5	600	248	254	260	266	272	278	284
	F6	600	144	147	151	154	158	161	165
	F7	600	0	0	0	0	0	0	0
Orlando	F1	600	88	90	92	94	96	99	101
	F2	600	164	168	172	176	180	184	188
	F3	600	160	164	167	171	175	179	183
	F4	600	0	0	0	0	0	0	0
	F5	600	146	149	153	156	160	164	167
	F6	600	331	339	346	354	363	371	379
Rogers	F1	600	39	40	41	42	43	44	45
	F2	600	0	0	0	0	0	0	0
	F3	600	112	115	117	120	123	125	128
	F4	600	142	145	149	152	156	159	163
	F5	600	169	173	177	181	185	189	194
	F6	600	236	241	247	253	258	264	270
	F7	600	159	163	166	170	174	178	182
Rubin	F1	600	266	272	278	285	291	298	305
	F2	600	120	123	126	128	131	134	138
	F3	600	79	81	83	85	87	89	91
	F4	600	270	276	283	289	296	303	309
	F5	600	37	38	39	40	41	41	42

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F6	600	44	45	46	47	48	49	50
	F7	600	150	153	157	161	164	168	172
	F8	600	146	149	153	156	160	164	167
Derry	F1	600	62	63	65	66	68	69	71
	F2	600	252	258	264	270	276	282	289
	F3	435	132	135	138	141	145	148	151
Malton	F1	435	0	0	0	0	0	0	0
	F2	435	358	366	375	383	392	401	410
	F3	435	266	272	278	285	291	298	305
	F4	435	36	37	38	39	39	40	41
	F5	435	173	177	181	185	189	194	198
	F6	435	0	0	0	0	0	0	0
Bloor	F1	600	68	70	71	73	74	76	78
	F2	600	77	79	81	82	84	86	88
	F3	600	520	287	294	301	308	315	322
	F4	600	373	382	390	399	409	418	428
	F5	600	198	203	207	212	217	222	227
	F6	600	104	106	109	111	114	117	119
John	F1	600	243	249	254	260	266	272	279
	F2	435	137	140	143	147	150	153	157
	F3	435	194	198	203	208	212	217	222
	F4	435	283	290	296	303	310	317	324
Shawson	F1	600	253	259	265	271	277	283	290
	F2	600	258	264	270	276	283	289	296
	F3	600	210	215	220	225	230	235	241
	F4	600	223	228	233	239	244	250	256
	F5	600	157	161	164	168	172	176	180
	F6	600	244	250	255	261	267	273	280
New Dixie	F1	435	58	59	61	62	64	65	66
	F2	435	279	285	292	299	306	313	320
	F3	435	215	220	225	230	235	241	246
	F4	435	91	93	95	97	100	102	104
	F5	435	121	124	127	130	133	136	139
	F6	435	224	229	234	240	245	251	257
City Centre N	F1	435	252	258	264	270	276	282	289
	F2	435	8	8	8	9	9	9	9

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F3	435	247	253	258	264	271	277	283
	F4	435	75	77	78	80	82	84	86
	F5	435	68	70	71	73	74	76	78
	F6	435	282	288	295	302	309	316	323
Rexdale	F1	435	385	91	93	95	97	100	102
	F2	435	0	162	165	169	173	177	181
	F3	600	203	208	212	217	222	227	233
	F4	600	255	261	267	273	279	286	292
	F5	600	190	194	199	203	208	213	218
	F6	600	36	37	38	39	39	40	41
Desboro	F1	600	116	119	121	124	127	130	133
	F2	600	294	301	308	315	322	329	337
	F3	600	319	326	334	342	349	357	366
	F4	600	338	54	55	57	58	59	61
	F5	600	184	319	327	334	342	350	358
	F6	600	330	338	345	353	361	370	378
Credit Valley	F1	435	182	186	190	195	199	204	209
	F2	435	68	70	71	73	74	76	78
	F3	435	253	259	265	271	277	283	290
	F4	435	186	190	195	199	204	208	213
Thomas	F1	435	214	219	224	229	234	240	245
	F2	435	280	286	293	300	307	314	321
	F3	600	156	160	163	167	171	175	179
	F4	600	174	178	182	186	191	195	199
	F5	600	212	217	222	227	232	238	243
	F6	600	398	407	417	426	436	446	456
Battleford	F1	435	536	548	561	574	587	601	614
	F2	435	124	127	130	133	136	139	142
	F3	435	350	358	366	375	383	392	401
	F4	435	238	243	249	255	261	267	273
	F5	435	124	127	130	133	136	139	142
	F6	435	173	177	181	185	189	194	198
Meadowvale TC	F1	600	0	376	385	394	403	412	422
	F2	600	0	186	190	195	199	204	209
	F3	600	0	83	85	87	89	91	93
	F4	600	0	117	119	122	125	128	131

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Argentia	F1	435	127	130	133	136	139	142	146
	F2	435	262	268	274	280	287	294	300
	F3	600	77	79	81	82	84	86	88
	F4	435	92	94	96	98	101	103	105
Aquitaine	F1	435	148	151	155	158	162	166	170
	F2	435	263	269	275	282	288	295	301
	F3	435	209	214	219	224	229	234	240
	F4	435	241	247	252	258	264	270	276
Century	F1	600	106	108	111	113	116	119	121
	F2	600	107	109	112	115	117	120	123
	F3	600	383	392	401	410	419	429	439
	F4	600	154	158	161	165	169	173	177
	F5	600	138	141	144	148	151	155	158
	F6	600	21	21	22	22	23	24	24
	F7	435	202	207	211	216	221	226	232
	F8	435	116	119	121	124	127	130	133
City Centre S	F1	600	0	0	0	0	0	0	0
	F2	600	301	308	315	322	330	337	345
	F3	600	42	43	44	45	46	47	48
	F4	600	0	0	0	0	0	0	0
Woods	F1	435	269	275	282	288	295	301	308
	F2	435	172	176	180	384	393	402	411
	F3	435	165	369	377	386	395	404	413
	F4	435	61	62	64	65	67	68	190
	F5	435	241	247	252	258	264	270	276
	F6	600	18	18	19	19	20	220	225
	F7	435	186	190	195	199	204	208	213
Chalkdene	F1	600	217	222	227	232	238	243	249
	F2	600	100	102	105	107	110	112	115
	F3	600	279	285	292	299	306	313	320
	F4	600	189	193	198	202	207	212	217
Hamilton	F1	600	333	341	348	357	365	373	382
	F2	435	49	50	51	52	54	55	56
	F3	435	361	369	378	386	395	404	414
	F4	435	109	112	114	117	119	122	125
Lisgar	F1	600	320	327	335	343	350	359	367

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	F2	600	76	78	80	81	83	85	87
	F3	600	166	170	174	178	182	186	190
	F4	600	401	138	141	145	148	151	155
	F5	600	240	246	251	257	263	269	275
	F6	600	67	69	70	72	73	75	77
Confederation	F1	600	0	0	200	205	209	214	219
	F2	600	181	185	189	194	198	203	407
	F3	600	371	380	388	397	406	416	425
	F4	600	399	408	418	427	437	447	457
	F5	435	236	241	247	253	258	264	270
	F6	600	62	63	305	312	319	326	334
	F7	600	106	108	111	113	316	323	331
York	F1	600	161	165	168	172	176	180	185
	F2	600	180	184	188	193	197	202	206
	F3	600	64	65	67	69	70	72	73
	F4	600	87	89	91	93	95	97	100
Bradley (Ridgeway)	F1	600	0	0	0	0	0	0	0
	F2	600	134	137	140	143	147	150	154
	F3	600	131	134	137	140	143	147	150
	F4	600	105	107	110	112	115	118	120
	F5	600	76	78	80	81	83	85	87
	F6	600	4	4	4	4	4	4	5
	F7	600	184	188	193	197	202	206	211
	F8	600	0	0	0	0	0	0	0
Grosbeak	F1	435	69	71	72	74	76	77	79
	F2	600	404	413	423	433	442	453	463
	F3	435	36	37	38	39	39	40	41
	F4	435	304	311	318	325	333	341	348
	F5	435	179	183	187	192	196	201	205
	F6	435	144	147	151	154	158	161	165
Matheson	F1	600	255	261	267	273	279	286	292
	F2	435	111	114	116	119	122	124	127
	F3	600	104	106	109	111	114	117	119
	F4	600	84	86	88	90	92	94	96
	F5	600	47	48	49	50	51	53	54
	F6	435	47	48	49	50	51	53	54

Station ID		Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Winston	F1	600	38	39	40	41	42	43	44
	F2	600	36	37	38	39	39	40	41
	F3	600	197	202	206	211	216	221	226
	F4	600	61	62	64	65	67	68	70
	F5	600	0	0	0	0	0	0	0
	F6	600	113	116	118	121	124	127	130
	F7	600	0	0	0	0	0	0	0
	F8	600	197	202	206	211	216	221	226
Mini-Derry	F1	600	272	281	290	299	309	318	329
	F2	600	78	80	83	86	88	91	94
	F4	600	2	2	2	2	2	2	2
	F5	600	3	3	3	3	3	4	4
Mini-Orlando	F1	600	120	144	173	207	249	299	358
	F2	600	68	82	98	118	141	169	203
	F4	600	28	34	40	48	58	70	84
	F5	600	71	85	102	123	147	177	212

Station and Feeder Loading – West

The two planning parts located in the West operating area are:

A. Hamilton
B. St. Catharines

List of Tables

Part A: Hamilton

Table O03A - 1: Hamilton HONI Owned TS Utilization

TS & Bus Name	Number of Feeders	10-day LTR (MVA)	2018 (MVA)	Ratio of Peak to LTR (2018)	Growth (MVA) TO 2024	Ratio of Peak to LTR (2024)
Beach B1B2 (13.8kV)	8	38.5	13.3	34.6%	13.1	34.1%
Beach Y1Y2	11	38.5	24.2	62.8%	23.8	61.9%
Beach Q1Q2	12	51.0	32.1	63.0%	38.8	76.2%
Beach J1J2	11	51.0	22.4	44.0%	22.1	43.3%
Birmingham BY (13.8kV)	2	42.0	15.4	36.7%	24.5	58.4%
Birmingham QJ	12	40.9	17.6	42.9%	17.3	42.3%
Birmingham EZ	3	42.0	26.4	62.9%	32.2	76.8%
Birmingham DK	2	45.0	35.2	78.2%	35.0	77.8%
Dundas BY (27.6kV)	2	96.0	31.2	32.5%	30.8	32.0%
Dundas JQ	4	96.0	48.9	51.0%	55.1	57.4%
Elgin DK (13.8kV)	14	45.8	34.8	76.0%	35.4	77.4%
Elgin QJ	15	45.8	29.7	64.8%	38.8	84.8%
Elgin EZ	12	42.0	24.9	59.3%	25.8	61.4%
Gage ZY (13.8kV)	4	64.0	24.9	38.9%	24.8	38.7%
Gage DJ	2	73.0	15.0	20.6%	15.0	20.5%
Gage KE	7	124.0	16.5	13.3%	16.4	13.3%
Horning B1B2 (13.8kV)	11	56.8	37.5	66.0%	38.3	67.4%
Horning Q1Q2	8	56.8	33.1	58.3%	33.5	58.9%
Kenilworth EJ (13.8kV)	10	67.9	24.0	35.4%	24.5	36.0%
Kenilworth B1Y1	6	67.9	32.6	48.0%	32.1	47.3%
Lake BY (27.6kV)	6	106.0	54.6	51.5%	54.3	51.2%
Lake J1J2(13.8kV)	8	51.0	23.0	45.1%	23.6	46.2%
Lake Q1Q2(13.8kV)	11	51.0	33.2	65.1%	35.1	68.7%
Mohawk B1B2 (13.8kV)	14	42.0	37.9	90.2%	39.2	93.4%
Mohawk Y1Y2	12	42.0	36.5	86.9%	36.0	85.6%

Nebo BY (27.6kV)	4	50.8	41.9	82.5%	61.8	121.7%
Nebo QJ (13.8kV)	13	56.3	54.5	96.8%	55.1	97.9%
Newton B (13.8kV)	10	36.2	23.9	65.9%	32.7	90.3%
Newton Y	10	36.2	30.6	84.6%	31.2	86.1%
Stirton BY (13.8kV)	12	51.0	32.8	64.4%	33.2	65.2%
Stirton QZ	11	51.0	26.5	51.9%	30.1	59.1%
Winona JQ (27.6kV)	6	106.0	54.3	51.2%	58.8	55.5%

Table O03A - 2: Hamilton MS Utilization

Station Name	MS Name	Number of Feeders	Transformer Capacity (ONAN/ONAF/ ONAF-ONAF)	2018 Peak (MV A)	Ratio of 2018 Peak to Maxim um TX Rating	N-1 Continge ncy Ratio in 2018	Load of Proposed Developme nts and Annual Growth by 2024 (MVA)	N-1 Contingency Ratio with Development by 2024
Aberdeen (4.16kv)	AB-T1	3	5/6.67	2.4	35%	64%	0	N/A
	AB-T2	2	5/6.67	1.9	28%	64%	0	N/A
Baldwin (4.16kV)	BD-T1	2	7.5	2.9	39%		0	N/A
Bartonville (4.16kV)	BA-T1	5	10/13.3	4.5	34%	0%	0	0%
Central (4.16kV)	CE-T1	6	10/13.3	4.0	30%	53%	0	N/A
	CE-T2	4	10/13.3	3.0	23%	53%	0	N/A
Cope (4.16kV)	CP-T1	3	5/6.67	3.4	51%	88%	0	88%
	CP-T2	3	5/6.67	2.5	37%	88%	0	88%
	CP-T3	3	5/6.67	3.4	51%	88%	0	88%
Deerhurst (8.32kV)	DH-T1	3	7.5	1.8	24%		0	N/A
Dewitt (8.32kV)	DW-T1	2	5	0.6	12%		0	N/A
Eastmount (4.16kV)	EA-T1	2	5/6.67	2.2	33%	58%	0	58%
	EA-T2	3	5/6.67	1.7	25%	81%	0	81%
	EA-T3	3	5/6.67	3.7	55%	81%	0	81%
	EA-T4	2	5/6.67	1.5	22%	79%	0	79%
Elmwood (4.16kV)	EL-T1	3	5/6.67	2.8	42%	57%	0	57%
	EL-T2	1	5/6.67	1.0	15%	61%	0	61%
	EL-T3	3	5/6.67	3.1	46%	61%	0	61%
Galbraith (4.16kV)	GA-T1	3	5.6	1.0	18%		0	N/A

Station Name	MS Name	Number of Feeders	Transformer Capacity (ONAN/ONAF/ ONAF-ONAF)	2018 Peak (MVA)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MVA)	N-1 Contingency Ratio with Development by 2024
Highland (4.16kV)	HI-T1	2	5/6.67	1.0	15%		0	N/A
John (4.16kV)	JN-T1	2	5/6.67	3.2	48%		0	N/A
Kenilworth (4.16kV)	KE-T1	3	5/6.67	3.8	57%	108%	0	108%
	KE-T2	3	5/6.67	3.4	51%	108%	0	108%
Mohawk (4.16kV)	MK-T1	5	10/13.3	4.6	35%	63%	0	63%
	MK-T2	3	5/6.67	3.8	57%	57%	0	57%
	MK-T3	0	5/6.67	0.0	0%	57%	0	57%
Mountain (4.16kV)	MT-T1	5	10/13.3	5.4	41%	62%	0	62%
	MT-T2	3	5/6.67	2.9	43%	43%	0	43%
	MT-T3	0	5/6.67	0.0	0%	43%	0	43%
Ottawa (4.16kV)	OT-T1	3	5/6.67	2.7	40%	78%	0	78%
	OT-T2	3	5/6.67	2.5	37%	63%	0	63%
	OT-T3	2	5/6.67	1.7	25%	63%	0	63%
Parkdale (4.16kV)	PA-T1	4	10/13.3	4.9	37%	56%	0	56%
	PA-T2	3	10/13.3	2.6	20%	56%	0	56%
Spadina (4.16kV)	SP-T1	3	5/6.67	3.7	55%	103%	0	103%
	SP-T2	3	5/6.67	3.2	48%	103%	0	103%
Stroud's Lane (4.16kV)	ST-T1	2	5/6.67	2.6	39%	43%	0	N/A
	ST-T2	1	5/6.67	0.3	4%	43%	0	N/A
Wellington (4.16kV)	WL-T1	3	5/6.67	2.8	42%	85%	0	85%

Station Name	MS Name	Number of Feeders	Transformer Capacity (ONAN/ONAF/ ONAF-ONAF)	2018 Peak (MVA)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MVA)	N-1 Contingency Ratio with Development by 2024
	WL-T2	3	5/6.67	2.9	43%	76%	0	76%
	WL-T3	2	5/6.67	2.2	33%	58%	0	58%
	WL-T4	2	5/6.67	1.7	25%	58%	0	58%
Wentworth (4.16kV)	WT-T1	3	5/6.67	4.1	61%	120%	0	120%
	WT-T2	3	5/6.67	3.9	58%	81%	0	81%
	WT-T3	2	5/6.67	1.5	22%	48%	0	48%
	WT-T4	3	5/6.67	1.7	25%	48%	0	48%
Whitney (4.16kV)	WH-T1	1	5/6.67	1.1	16%	31%	0	N/A
	WH-T2	1	5/6.67	1.0	15%	31%	0	N/A
York (4.16kv)	YK-T1	2	4	1.1	28%	22%	0	N/A

Table O03A - 3: Hamilton TS Feeder Utilization

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Beach TS	B1B2	7121SC	300	57	57	57	57	57	56	56
		7131CW	300	295	294	294	293	292	291	291
		7141F	300	35	35	35	35	35	35	35
		7142F	300	35	35	35	35	35	35	35
		7211F	300	37	37	37	37	37	37	37
		7212F	300	37	37	37	37	37	37	37
		7222CW	300	294	293	292	292	291	290	289
		7231SC	300	0	0	0	0	0	0	0
	Y1Y2	7511P	300	196	196	195	195	194	194	194
		7521X	300	102	101	101	101	101	100	100
		7531X	300	52	52	52	52	52	51	51
		7532OL	300	122	121	121	121	120	120	120
		7541SC	300	207	206	206	205	205	204	204
		7542PE	300	310	309	309	308	307	306	306
		7611X	300	67	66	66	66	66	66	66
		7621X	300	103	103	103	102	102	102	102
		7622IM	300	241	240	239	239	238	238	237
		7631X	300	2	2	2	2	2	2	2
		7641P	300	126	126	125	125	125	125	124
	Q1Q2	7311B	300	254	253	253	252	251	251	250
		7321X	300	228	227	227	226	225	225	224
		7331CP	300	164	164	164	163	163	162	162
		7341X	300	64	63	63	63	63	63	63
		7342X	300	148	148	147	147	147	146	146
		7411X	300	270	270	269	268	268	267	266
		7421X	300	61	60	60	60	60	60	60
		7431CP	300	135	135	134	134	134	133	133
		7432X	300	90	90	90	89	89	89	89
		7441X	300	35	185	184	184	183	183	182
		7442AM	300	35	185	184	184	183	183	182
		7422X	300	91	91	90	90	130	130	129
	J1J2	7722X	300	199	199	198	198	197	197	196
		7731X	300	129	129	129	128	128	128	127

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		7741S	300	209	208	208	207	207	206	206
		7742X	300	0	0	0	0	0	0	0
		7812X	300	58	58	57	57	57	57	57
		7821X	300	205	204	204	203	203	202	202
		7822X	300	137	136	136	136	135	135	134
		7831BP	300	155	155	154	154	153	153	153
		7832X	300	66	66	66	66	66	66	65
		7841S	300	249	248	248	247	247	246	245
		7842X	300	0	0	0	0	0	0	0
Birmingham TS	BY	50L21	1300	325	325	425	525	525	525	525
		50L22	1300	342	342	442	542	542	542	542
	QJ	50B12	300	125	124	124	124	124	123	123
		50PG11	300	0	0	0	0	0	0	0
		50PG21	300	16	16	16	16	16	16	16
		50X22	300	141	140	140	140	139	139	139
		50X32	250	142	142	142	141	141	140	140
		50X41	300	15	14	14	14	14	14	14
		50X42	300	82	82	82	82	81	81	81
		50X51	300	37	37	37	36	36	36	36
		50X52	300	0	0	0	0	0	0	0
		50X61	300	141	141	140	140	140	139	139
		50X71	300	126	125	125	125	124	124	124
		50X81	300	166	166	166	165	165	164	164
	EZ	50DC101	1300	21	21	21	21	21	21	21
		50L11	1300	558	558	623	688	688	688	688
		50L14	1300	577	577	642	707	707	707	707
	DK	50L71	1300	736	736	736	736	736	736	736
		50L81	1300	712	712	712	712	712	712	712
Dundas TS	BY	2D2X	730	208	208	207	207	206	206	205
		2D7X	530	330	329	329	328	327	326	325

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	JQ	2D11X	566	63	63	63	63	63	62	62
		2D12X	566	218	239	241	242	243	244	245
		2D13X	566	478	506	535	565	594	600	606
		2D14X	566	305	304	303	303	302	301	300
Elgin TS	DK	5411X	300	102	101	101	101	101	100	100
		5421X	300	0	0	0	0	0	0	0
		5422X	300	72	72	72	72	71	71	71
		5431X	300	175	174	174	173	173	172	172
		5441X	300	7	7	7	7	7	7	7
		5442X	300	0	0	0	0	0	0	0
		5451X	300	173	212	216	220	225	229	234
		5452X	300	156	155	155	155	154	154	153
		5461X	300	161	160	160	159	159	159	158
		5471C	300	0	0	0	0	0	0	0
		5481X	300	176	176	175	175	174	174	173
		5412X	300	237	236	236	235	235	234	234
		5462BC	300	241	240	240	239	238	238	237
		5472X	300	114	114	114	113	113	113	113
	QJ	5221C	300	160	159	159	158	158	158	157
		5231X	250	189	213	257	302	308	315	321
		5241CU	300	98	98	98	97	97	97	97
		5251X	300	24	24	24	24	23	23	23
		5261X	300	81	83	85	86	88	90	92
		5271X	300	155	154	154	153	153	153	152
		5281X	300	0	0	0	0	0	0	0
		5301X	300	240	240	239	238	238	237	237
		5311CU	300	98	98	97	97	97	97	96
		5321X	300	141	141	141	140	140	140	139
		5331X	300	179	202	206	210	254	260	265
		5341X	300	64	63	63	63	63	63	63
		5291X	300	45	65	105	145	164	164	163
		5292X	300	45	65	85	105	124	124	124
		5272X	300	126	186	186	185	185	184	184
	EZ	5511X	300	131	130	130	130	129	129	129

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		5512HG	300	0	0	0	0	0	0	0
		5521X	300	113	112	112	112	112	111	111
		5522X	300	0	0	0	0	0	0	0
		5531SJ	300	145	144	144	144	143	143	143
		5532SJ	300	128	128	128	127	127	127	126
		5612X	300	115	115	155	194	194	193	193
		5622X	300	213	213	212	212	211	211	210
		5631X	300	63	83	103	122	122	122	122
		5632X	300	0	0	0	0	0	0	0
		5611X	300	77	77	77	76	76	76	76
		5621X	300	182	181	181	180	180	179	179
Gage TS	ZY	M13	550	77	77	77	77	77	77	77
		M16	750	199	199	199	199	199	199	199
		M17	1000	206	206	206	206	206	206	206
		M19	1000	1159	1159	1159	1159	1159	1159	1159
	DJ	M23	1000	403	403	403	403	403	403	403
		M26	1000	351	351	351	351	351	351	351
	KE	M31	1200	1	1	1	1	1	1	1
		M32	750	323	323	323	323	323	323	323
		M35	800	287	287	287	287	287	287	287
		M37	500	31	31	31	31	31	31	31
		M38	500	62	62	62	62	62	62	62
		M39	900	256	256	256	256	256	256	256
		M40	900	11	11	11	11	11	11	11
Horning TS	B1B2	421X	300	82	82	82	82	82	81	81
		431X	300	197	201	205	209	213	217	222
		441X	300	281	286	292	298	304	310	316
		451X	300	51	51	51	51	51	50	50
		461EL	300	133	133	132	132	132	131	131
		462X	300	89	89	88	88	88	88	87
		471X	300	135	135	135	134	134	134	133
		481X	300	223	222	222	221	220	220	219
		4101X	300	147	147	146	146	146	145	145

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		4111X	300	260	263	266	268	271	274	276
		4112X	300	38	38	38	38	38	38	38
	Q1Q2	4451X	300	364	372	379	387	394	402	410
		4461X	300	55	54	54	54	54	54	54
		4471X	300	85	85	85	85	85	84	84
		4481X	300	193	193	192	192	191	191	190
		4491X	300	121	121	121	120	120	120	120
		4501X	300	258	257	256	256	255	255	254
		4462SJ	300	257	256	256	255	255	254	253
		4502X	300	211	210	210	209	209	208	208
Kenilworth TS	B1Y1	M51	1200	272	272	271	270	270	269	268
		M52	1200	189	189	188	188	187	187	187
		M53	1200	450	448	447	446	445	444	443
		M61	1200	263	262	262	261	260	260	259
		M62	1200	190	190	189	189	188	188	187
		M63	1200	465	463	462	461	460	459	458
	EJ	9201O	300	121	121	121	120	120	120	119
		9211O	300	116	115	115	115	115	114	114
		9221K	300	151	151	150	150	190	189	189
		9231K	300	170	170	170	169	169	168	168
		9251N	300	135	135	135	134	134	134	133
		9271X	300	135	135	135	134	134	134	133
		9291X	300	92	92	92	92	91	91	91
		9301N	300	135	135	135	134	134	134	133
		9261N	300	134	133	133	133	132	132	132
		9281X	300	81	81	81	81	80	80	80
Lake TS	BY	111X	630	157	157	156	156	156	155	155
		121X	630	367	369	371	373	375	376	378
		131X	630	215	215	214	214	213	213	212
		141X	630	279	279	278	277	277	276	275
		151X	630	67	66	66	66	66	66	66
		161X	630	243	243	242	242	241	240	240

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
	J1J2	1311X	300	184	184	183	183	222	222	221
		1321X	300	113	112	112	112	112	111	111
		1331X	300	189	189	188	188	187	187	186
		1411X	300	102	101	101	101	101	100	100
		1412X	300	83	83	83	82	82	82	82
		1421X	240	74	74	74	74	74	73	73
		1422X	300	61	61	60	60	60	60	60
		1431X	300	216	215	215	214	214	213	213
	Q1Q2	1711X	300	138	138	137	137	137	136	136
		1712X	300	207	207	206	206	205	205	204
		1721X	300	32	32	32	32	32	32	32
		1722X	300	76	76	75	75	75	75	75
		1731X	300	105	105	104	104	104	104	103
		1811X	300	218	218	217	217	216	215	215
		1812X	300	145	145	145	144	144	144	143
		1821X	300	124	124	123	123	123	122	122
		1822X	300	143	144	161	187	204	206	208
		1831X	300	218	218	217	217	256	256	255
		1832X	300	111	112	113	113	114	114	115
Mohawk TS	B1B2	0511X	300	102	102	102	101	101	101	101
		0512X	300	68	68	68	68	67	67	67
		0521EA	300	109	109	109	108	108	108	108
		0522WL	300	109	109	109	108	108	108	108
		0531X	300	0	0	0	0	0	0	0
		0532X	300	64	64	64	64	64	64	64
		0611X	300	261	260	259	259	258	257	257
		0612X	300	87	87	86	86	86	86	86
		0621LM	300	71	71	70	70	70	70	70
		0622X	300	212	212	211	211	210	210	209
		0631WL	300	147	147	146	146	145	145	145
		0632MK	300	220	220	219	219	218	218	217
		0641X	300	54	53	53	53	53	53	53
		0642X	300	125	145	164	184	204	203	203
	Y1Y2	0711X	300	106	106	105	105	105	105	104

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		0712WL	300	106	106	105	105	105	105	104
		0721X	300	281	280	280	279	278	278	277
		0722X	300	0	0	0	0	0	0	0
		0731X	300	206	205	204	204	203	203	202
		0732EA	300	88	88	88	87	87	87	87
		0811MK	300	94	94	94	94	93	93	93
		0812X	300	283	282	282	281	280	279	279
		0821X	300	123	123	123	122	122	122	121
		0822WL	300	151	150	150	150	149	149	148
		0831M	300	144	143	143	143	142	142	142
		0832X	300	96	96	95	95	95	95	94
Nebo TS	BY	331X	630	433	469	506	544	584	601	619
		341X	630	388	420	453	486	521	537	553
		391X	566	21	76	112	128	144	146	147
		3101X	566	0	0	0	0	0	0	0
	QJ	3511X	300	233	233	232	232	231	230	230
		3512X	300	236	239	241	243	246	248	251
		3521X	300	231	231	230	230	229	228	228
		3531X	300	58	57	57	57	57	57	57
		3532X	300	107	107	106	106	106	106	105
		3541X	300	221	220	220	219	219	218	218
		3611X	300	121	121	120	120	120	119	119
		3612X	300	139	162	165	168	172	175	179
		3621X	300	252	256	260	264	268	272	276
		3631X	300	208	207	207	206	206	205	204
		3632X	300	208	207	207	206	206	205	204
		3641X	300	98	98	97	97	97	97	96
		3642X	300	294	293	292	292	291	290	289
Newton TS	B	211SL	300	107	107	106	106	106	106	105
		212X	300	251	253	254	255	256	258	259
		231X	300	19	19	19	19	19	19	19
		232X	300	172	171	171	170	170	170	169
		261SL	300	0	0	0	0	40	40	40
		262X	300	53	54	84	116	157	160	162

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		281X	300	0	0	0	0	0	0	0
		282X	300	220	220	219	219	218	217	217
		2101C	300	67	68	69	70	71	72	74
		2102L	300	0	0	0	240	242	245	247
	Y	221CA	300	110	110	109	109	109	108	108
		222X	300	256	256	255	254	254	253	253
		241X	300	311	310	309	309	308	307	306
		242X	300	133	133	133	132	132	132	131
		251A	300	185	185	185	184	184	183	183
		252X	300	227	226	226	225	224	224	223
		271X	300	156	155	155	154	154	154	153
		291X	300	178	180	182	184	227	229	232
		292X	300	118	118	118	117	117	117	117
		272X	300	137	136	136	136	135	135	135
Stirton TS	BY	8711X	250	0	0	0	0	0	0	0
		8712W	300	183	182	182	182	181	181	180
		8721X	250	217	216	216	215	215	214	214
		8722W	300	93	93	93	92	92	92	92
		8751WC	300	36	36	36	36	36	36	36
		8811X	300	16	16	16	16	16	16	16
		8831W	300	133	133	132	132	132	131	131
		8841W	300	188	188	187	187	186	186	185
		8842X	300	21	21	21	21	21	21	21
		8852X	250	202	201	201	200	240	239	238
		8862X	300	300	299	298	297	297	296	295
		8761X	300	79	79	79	79	78	78	78
	QZ	8511X	300	217	217	216	216	215	215	214
		8521S	300	166	166	165	165	165	164	164
		8531S	300	0	0	0	0	80	80	80
		8541X	300	45	45	45	45	45	44	44
		8542X	300	84	83	83	83	83	83	82
		8611S	300	200	199	199	198	198	197	197
		8621X	300	309	339	338	337	396	395	394
		8631X	300	155	155	154	154	153	153	153

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
		8641S	300	0	0	0	0	0	0	0
		8642WC	300	0	0	0	0	0	0	0
		8632X	300	0	0	0	0	0	0	0
Winona TS	JQ	W11X	566	147	147	146	146	146	145	145
		W12X	566	327	361	370	394	393	392	391
		W13X	566	200	202	204	206	208	210	212
		W14X	566	331	337	344	351	358	365	372
		W15X	566	190	192	194	196	198	200	202
		W16X	566	87	87	87	87	86	86	86

Table O03A - 4: Hamilton MS Feeder Utilization

Station ID	Feeder ID	Rated Capacity (A)	2018 Peak (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Aberdeen	AB-1	300	65	65	65	0	0	0	0
	AB-2	300	280	279	0	0	0	0	0
	AB-3	300	0	0	0	0	0	0	0
	AB-4	300	207	207	206	206	0	0	0
	AB-5	300	124	0	0	0	0	0	0
Baldwin	BD-1	530	289	289	288	0	0	0	0
	BD-2	530	131	131	131	130	0	0	0
Bartonville	BA-1	300	162	161	161	161	160	160	159
	BA-2	300	119	119	119	119	118	118	118
	BA-3	300	53	53	52	52	52	52	52
	BA-4	300	199	198	198	197	197	196	196
	BA-7	300	130	130	130	129	129	129	128
Central	CE-1	300	38	37	0	0	0	0	0
	CE-2	300	258	257	0	0	0	0	0
	CE-3	300	133	0	0	0	0	0	0
	CE-4	300	90	0	0	0	0	0	0
	CE-5	300	121	0	0	0	0	0	0
	CE-6	300	25	25	0	0	0	0	0
	CE-8	300	171	170	170	170	169	0	0
	CE-9	210	13	13	13	13	13	0	0
	CE-10	300	197	197	0	0	0	0	0
	CE-11	300	110	0	0	0	0	0	0
Cope	CP-1	300	126	126	126	125	125	125	124
	CP-2	300	238	237	237	236	235	235	234
	CP-3	300	137	136	136	136	135	135	135
	CP-4	300	106	106	105	105	105	105	104
	CP-5	300	110	110	110	109	109	109	109
	CP-6	300	160	159	159	159	158	158	157
	CP-7	300	187	187	186	186	185	185	184
	CP-8	300	92	92	92	91	91	91	91
	CP-9	300	218	217	217	216	216	215	215
Deerhurst	DH-1	300	141	140	140	140	0	0	0
	DH-2	300	57	56	56	56	56	0	0
	DH-3	300	75	74	74	0	0	0	0
Dewitt	DW-1	530	71	71	70	0	0	0	0
	DW-2	530	17	17	17	17	0	0	0

Eastmount	EA-1	300	0	0	0	0	0	0	0
	EA-2	300	138	138	138	137	137	137	136
	EA-3	300	193	192	192	191	191	190	190
	EA-4	300	76	75	75	75	75	75	75
	EA-6	300	172	172	171	171	171	170	170
	EA-7	300	138	137	137	137	136	136	136
	EA-8	300	213	212	212	211	211	210	210
	EA-9	300	188	188	187	187	186	186	185
	EA-10	300	61	60	60	60	60	60	60
	EA-11	300	162	161	161	160	160	160	159
Elmwood	EL-2	300	121	121	120	120	120	119	119
	EL-3	300	115	115	114	114	114	113	113
	EL-4	300	175	174	174	173	173	172	172
	EL-7	300	139	139	139	138	138	138	137
	EL-8	300	152	152	152	151	151	151	150
	EL-9	300	83	83	83	83	82	82	82
	EL-10	300	217	216	215	215	214	214	213
Galbraith	GA-1	210	42	42	42	42	0	0	0
	GA-2	210	102	102	101	101	101	0	0
	GA-3	210	0	0	0	0	0	0	0
Highland	HI-1	300	80	0	0	0	0	0	0
	HI-2	300	76	76	0	0	0	0	0
John	JN-1	530	402	401	400	399	0	0	0
	JN-2	530	89	89	89	0	0	0	0
Kenilworth	KE-1	300	238	238	237	237	236	235	235
	KE-2	300	128	128	128	127	127	127	126
	KE-3	300	189	188	188	187	187	186	186
	KE-4	300	211	210	209	209	208	208	207
	KE-5	300	87	87	87	86	86	86	86
	KE-6	300	200	199	199	198	198	197	197
Mohawk	MK-1	300	211	210	210	209	208	208	207
	MK-2	300	156	155	155	155	154	154	153
	MK-3	300	186	186	185	185	184	184	183
	MK-5	300	56	56	56	56	56	55	55
	MK-6	300	119	119	118	118	118	118	117
	MK-9	300	142	141	141	140	140	140	139
	MK-10	300	216	215	215	214	214	213	213
	MK-11	300	197	196	196	195	195	194	194
Mountain	MT-2	300	111	110	110	110	109	109	109
	MT-3	300	190	190	189	189	188	188	187

	MT-4	300	208	208	207	207	206	206	205
	MT-5	300	151	150	150	150	149	149	149
	MT-6	300	134	134	134	133	133	133	132
	MT-9	300	207	207	206	206	205	204	204
	MT-10	300	217	216	216	215	215	214	214
	MT-11	300	0	0	0	0	0	0	0
Ottawa	OT-1	300	79	78	78	78	78	78	77
	OT-2	300	158	157	157	157	156	156	156
	OT-3	300	164	163	163	163	162	162	161
	OT-4	300	217	216	216	215	214	214	213
	OT-5	300	143	142	142	142	141	141	141
	OT-6	300	8	8	8	8	8	8	8
	OT-7	300	150	149	149	148	148	148	147
	OT-8	300	111	111	110	110	110	110	109
Parkdale	PA-1	300	143	143	142	142	142	141	141
	PA-2	300	190	190	190	189	189	188	188
	PA-3	300	202	202	201	201	200	200	199
	PA-4	300	180	180	179	179	178	178	177
	PA-5	300	152	151	151	151	150	150	149
	PA-6	300	177	177	176	176	175	175	174
	PA-7	300	67	67	67	67	67	66	66
Spadina	SP-1	300	175	175	175	174	174	173	173
	SP-2	300	139	139	139	138	138	138	137
	SP-3	300	224	223	222	222	221	221	220
	SP-4	300	112	112	111	111	111	111	110
	SP-5	300	191	190	190	189	189	188	188
	SP-6	300	173	173	173	172	172	171	171
Stroud's Lane	ST-3	300	327	0	0	0	0	0	0
	ST-4	300	30	30	0	0	0	0	0
	ST-6	300	44	0	0	0	0	0	0
Wellington	WL-1	300	117	116	116	116	116	115	115
	WL-2	300	194	193	193	192	192	191	191
	WL-3	300	101	101	101	101	100	100	100
	WL-4	300	145	145	144	144	144	143	143
	WL-5	300	107	106	106	106	106	105	105
	WL-6	300	178	177	177	177	176	176	175
	WL-8	300	144	144	144	143	143	143	142
	WL-9	300	185	185	184	184	183	183	183
	WL-10	300	91	91	91	90	90	90	90
	WL-11	300	164	164	163	163	162	162	162

Wentworth	WT-1	300	139	139	138	138	138	137	137
	WT-2	300	237	237	236	236	235	234	234
	WT-3	300	225	225	224	224	223	223	222
	WT-4	300	187	187	186	186	185	185	184
	WT-5	300	239	239	238	238	237	236	236
	WT-6	300	143	143	142	142	142	141	141
	WT-8	300	74	74	73	73	73	73	73
	WT-9	300	151	151	151	150	150	150	149
	WT-10	300	120	120	119	119	119	119	118
	WT-11	300	59	59	59	59	59	58	58
	WT-12	300	67	67	67	67	67	66	66
Whitney	WH-2	300	165	165	0	0	0	0	0
	WH-6	300	98	0	0	0	0	0	0
York	YK-1	530	124	124	0	0	0	0	0
	YK-2	270	37	0	0	0	0	0	0

Part B: St. Catharines

Table O03B - 1: St.Catharines TS Utilization

TS & Bus Name	Number of Feeders	10-day LTR (MVA)	2018 (MVA)	Ratio of Peak to LTR (2018)	Growth (MVA) TO 2024	Ratio of Peak to LTR (2024)
Bunting J1J2 (13.8kV)	5	42.1	23.3	55.3%	23.5	55.8%
Bunting Q1Q2	5	42.1	28.2	66.9%	28.3	67.2%
Carlton HK (13.8kV)	8	53.0	39.1	73.8%	38.3	72.3%
Carlton BY	5	55.5	52.1	93.8%	51.4	92.6%
Glendale BJ (13.8kV)	4	46.0	22.0	47.9%	21.9	47.6%
Glendale DQ	4	46.0	24.6	53.5%	24.1	52.5%
Glendale EY	4	19.8	16.0	80.7%	15.6	78.8%
Vansickle BY (13.8kV)	6	54.0	30.2	56.0%	29.7	55.0%
Vansickle JQ	4	54.0	23.6	43.7%	24.7	45.8%

Table O03B - 2: St. Catharines TS Feeder Utilization

Station ID	Bus ID	Feeder ID	Rated Capacity (A)	2018 Peak (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Bunting TS	J1J2	BUM55	525	223	252	251	251	250	249	248
		BUM56	525	241	240	240	239	238	237	236
		BUM57	525	51	51	51	51	50	50	50
		BUM61	566	270	269	268	267	266	266	265
		BUM62	525	380	379	377	376	375	374	373
	Q1Q2	BUM75	525	375	374	373	371	370	369	368
		BUM76	525	179	179	178	177	177	176	176
		BUM77	566	450	449	447	446	444	443	441
		BUM81	525	71	71	70	70	70	70	69
		BUM82	525	167	177	186	185	195	194	194
Carlton TS	HK	A1	300	105	105	104	104	104	103	103
		A2	300	110	110	109	109	109	108	108
		A3	300	122	122	121	121	120	120	120
		A4	300	200	199	199	198	197	197	196
		A6	300	184	184	183	183	182	181	181
		CTM7	566	210	209	209	208	207	207	206
		CTM17	525	476	474	473	471	470	468	467
		CTM18	525	505	503	501	500	498	496	495
	BY	CTM10	525	460	459	457	456	454	453	451
		CTM11	525	486	484	483	481	480	478	476
		CTM12	525	525	523	522	520	518	516	515
		CTM20	525	312	326	325	324	323	322	321
		CTM25	525	395	394	393	391	390	389	388
Glendale TS	BJ	GLM31	566	243	243	243	243	243	243	243
		GLM32	566	239	239	239	239	239	239	239
		GLM33	566	238	238	238	238	238	238	238
		GLM34	566	235	235	235	235	235	235	235
	DQ	GLM5	566	358	357	356	355	354	353	351
		GLM8	566	154	153	153	152	152	151	151
		GLM23	566	360	359	358	356	355	354	353

		GLM24	566	136	136	135	135	135	134	134
	EY	GLM6	566	213	213	212	211	211	210	209
		GLM9	566	62	62	62	62	62	62	62
		GLM14	566	252	252	251	250	249	248	248
		GLM16	566	148	148	147	147	146	146	145
Vansickle TS	BY	VSM41	525	398	397	395	394	393	391	390
		VSM42	525	198	197	196	196	195	194	194
		VSM43	525	264	263	262	262	261	260	259
		VSM51	525	219	218	217	216	216	215	214
		VSM52	525	375	374	373	371	370	369	368
		VSM53	525	157	159	159	158	158	157	157
	JQ	VSM71	566	56	56	56	56	56	55	55
		VSM72	566	391	390	388	387	386	385	383
		VSM81	566	253	252	251	251	250	249	248
		VSM82	566	319	388	387	386	384	383	382

Station and Feeder Loading – Southwest

The two planning parts located in the Southwest operating area are:

A. Guelph
B. Rockwood

List of Tables

Part A: Guelph

Table O04A - 1: Guelph TS Utilization

TS and Bus	10-day LTR (MW)	2018 Actual (MW)	Growth to 2024 (MW)	Ratio of Peak to LTR (2018)	Growth TO 2024 (MW)	Ratio of Peak to LTR (2024)
Campbell TS -T1/T2	91	83.5	87.7	91.7%	87.7	96.4%
Campbell TS -T3/T4	56	51.6	61.0	92.2%	61.0	108.9%
Cedar TS - T1/T2	103	67.3	66.7	65.3%	66.7	64.7%
Cedar TS - T7/T8	40	35.6	35.3	89.1%	35.3	88.2%
Hanlon TS	43	26.9	28.2	62.4%	28.2	65.7%
Arlen MTS	45	24.4	28.0	54.3%	28.0	62.3%

Table O04A - 2: Guelph TS Utilization

Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Arlen MTS (MW)								
7356F11	600	226	229	232	235	239	242	244
7356F12	600	74	75	76	77	78	79	80
7356F13	600	293	296	301	305	309	313	317
7356F14	600	427	432	439	444	451	457	462
7356F21	600	96	97	99	100	101	103	104
7356F22	600	383	387	393	399	404	410	414
7356F23	600	0	0	0	0	0	0	0
7356F24	600	150	152	154	156	158	160	162
Campbell TS - T1/T2 (MW)								
36M11	600	306	307	309	311	313	314	315
36M12	600	323	324	326	328	330	331	332
36M13	600	382	383	386	388	390	392	393
36M14	600	442	444	447	449	452	453	454
36M21	600	373	374	377	379	381	383	383
36M22	600	428	429	433	435	437	439	440
36M23	600	361	362	365	367	369	370	371
36M24	600	381	382	385	387	389	391	392
36M31	600	388	389	392	394	396	398	399
36M32	600	343	344	347	348	350	352	353
36M33	600	300	301	303	305	306	308	308
36M34	600	402	403	406	408	411	412	413
36M41	600	340	341	344	345	347	349	350
36M42	600	457	459	462	464	467	469	470
36M43	600	360	361	364	366	368	369	370
36M44	600	490	492	495	498	501	503	504
Campbell TS - T3/T4 (MW)								
36M51	600	311	316	323	330	337	343	349
36M52	600	352	358	366	373	381	389	395
36M53	600	388	395	404	412	420	428	435
36M54	600	447	455	465	474	484	493	502
36M61	600	291	296	303	309	315	321	327
36M62	600	382	389	397	405	414	422	429
36M63	600	387	394	403	410	419	427	434
36M64	600	355	361	369	377	384	392	398

Cedar TS - T1/T2 (MW)								
5M11	600	180	180	180	180	180	180	179
5M12	600	280	279	280	280	280	279	278
5M13	600	306	305	306	306	306	305	304
5M14	600	327	326	327	327	327	326	325
5M21	600	322	321	322	322	322	321	320
5M22	600	294	293	294	294	294	293	292
5M23	600	0	0	0	0	0	0	0
5M24	600	254	253	254	254	254	253	252
5M51	600	300	299	300	300	300	299	298
5M52	600	151	151	151	151	151	151	150
5M53	600	0	0	0	0	0	0	0
5M54	600	272	271	272	272	272	271	270
5M61	600	0	0	0	0	0	0	0
5M62	600	399	398	399	399	399	398	396
5M63	600	376	375	376	376	376	375	374
5M64	600	414	413	414	414	414	413	411
Cedar TS - T7/T8 (MW)								
5M71	600	256	255	256	256	256	255	254
5M72	600	144	144	144	144	144	144	143
5M73	600	367	366	367	367	367	366	365
5M74	600	291	290	291	291	291	290	289
5M81	600	292	291	292	292	292	291	290
5M82	600	0	0	0	0	0	0	0
5M83	600	198	198	198	198	198	198	197
5M84	600	328	327	328	328	328	327	326
Hanlon TS (MW)								
127M11	600	378	379	382	383	386	387	388
127M12	600	320	321	323	325	326	328	328
127M13	600	132	132	133	134	135	135	135
127M14	600	120	120	121	122	122	123	123
127M21	600	154	154	155	156	157	158	158
127M22	600	292	293	295	296	298	299	300
127M23	600	314	315	317	318	320	321	322
127M24	600	150	150	151	152	153	154	154

Part B: Rockwood

Table O04B - 1: Rockwood MS Utilization

MS Name	Number of Feeders	Transformer Capacity (ONAN/ONAF/ONAF-ONAF) (MW)	2018 Peak (MW)	Ratio of 2018 Peak to Maximum TX Rating	N-1 Contingency Ratio in 2018	Load of Proposed Developments and Annual Growth by 2024 (MW)	N-1 Contingency Ratio with Developments by 2024
MS#1	3	8.3	2.3	28.2%	64.5%	2.9	79.0%
MS#2	3	6.3	3.0	47.8%	85.0%	3.6	104.0%

Table O04B - 2: Rockwood MS Feeder Utilization

Feeder ID	Rated Capacity (A)	2018 (A)	2019 (A)	2020 (A)	2021 (A)	2022 (A)	2023 (A)	2024 (A)
Rockwood MS #1 (MW)								
F11	600	378	382	386	389	393	397	401
F12	600	320	323	326	330	333	336	339
F13	600	0	0	0	0	0	0	0
Rockwood MS #2 (MW)								
F1	600	292	295	298	301	304	307	309
F2	600	314	317	320	323	327	330	333
F3	600	0	0	0	0	0	0	0

Appendix P

Historical Capital Expenditures

Alectra Utilities

Distribution System Plan (2020-2024)

APPENDIX P – HISTORICAL CAPITAL EXPENDITURE

This section provides a snapshot of Alectra Utilities' capital expenditures over a 10-year period, including five historical years (i.e. 2015-2019) and five forecast years (i.e. 2020-2024). It also provides explanatory notes on: (i) year over year comparison during the historical period from 2015 to 2019, and (ii) forecast versus historical expenditures by the OEB-defined investment category. This is Alectra Utilities' first Distribution System Plan as a consolidated utility. In light of this fact, it is important to note that information regarding historical expenditures of Alectra Utilities predecessor utilities is provided in this exhibit for the sole purpose to comply with the OEB Filing Requirements (i.e. Section 5.4.2 of Chapter 2 of the Filing Requirement). The historical expenditure information that Alectra Utilities has provided should not be used to assess and compare Alectra Utilities proposed 2020-2024 capital expenditure plan. Each of Alectra Utilities' predecessor corporations was a separate and independent entity that was exercising their individual decision making through different management and Board of Directors, which were unrelated to each other. Furthermore, each of the predecessor companies had their own priorities and objectives, which resulted in different capital budgets and plans. As such, no conclusions should be drawn about Alectra Utilities' proposed capital plan as a consolidated utility on the basis of historical spending.

Table P01 - 1: System Access Historical and Planned Expenditures for Consolidated Alectra Utilities and Predecessor Utilities

System Access ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Central North										
Network Metering	6.9	1.8								
Customer Connections	6.6	-0.3								
Road Authority & Transit Projects	1.5	3.9								
Transmitter Related Upgrades	0.0	0.0								
Central South										
Network Metering	4.2	3.3								
Customer Connections	8.1	8.1								
Road Authority & Transit Projects	0.0	0.5								
Transmitter Related Upgrades	0.0	0.0								
East										
Network Metering	3.4	1.8								
Customer Connections	14.8	13.7								
Road Authority & Transit Projects	7.4	7.3								
Transmitter Related Upgrades	0.0	0.0								
West										
Network Metering	2.3	2.1								
Customer Connections	3.6	9.7								
Road Authority & Transit Projects	1.3	2.6								
Transmitter Related Upgrades	0.0	0.0								
Alectra Utilities										
Network Metering			11.7	10.3						
Customer Connections			26.5	24.8						
Road Authority & Transit Projects			23.2	30.8						
Transmitter Related Upgrades			0.0	0.0						

System Access ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Guelph										
Network Metering	1.2	0.4	0.5	0.5						
Customer Connections	0.3	0.6	0.5	0.4						
Road Authority & Transit Projects	-0.7	0.1	0.2	0.2						
Transmitter Related Upgrades	0.0	0.0	0.0	0.0						
Consolidated Alectra Utilities										
Network Metering	18.1	9.4	12.2	10.8	14.3	14.8	14.3	10.2	11.6	12.2
Customer Connections	33.3	31.8	26.9	25.2	34.7	31.4	33.1	34.8	36.3	37.7
Road Authority & Transit Projects	9.6	14.4	23.5	31.0	27.9	19.7	17.3	18.2	19.2	20.3
Transmitter Related Upgrades	0.0	0.0	0.0	0.0	0.5	0.6	2.2	0.0	0.0	0.0
Total	**61.0**	**55.6**	**62.6**	**67.0**	**77.4**	**66.5**	**66.9**	**63.2**	**67.1**	**70.2**

1

Table P01 - 2: System Renewal Historical and Planned Expenditures for Consolidated Alectra Utilities and Predecessor Utilities

System Renewal ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Central North										
Overhead Asset Renewal	4.4	1.5								
Reactive Capital	1.6	1.8								
Rear-lot Conversion	0.0	0.0								
Substation Renewal	0.3	2.3								
Transformer Renewal	0.4	0.2								
Underground Asset Renewal	3.1	1.4								
Other System Renewal	0.0	0.0								
Central South										
Overhead Asset Renewal	8.1	10.5								
Reactive Capital	0.3	0.3								
Rear-lot Conversion	0.0	0.0								
Substation Renewal	7.2	5.2								
Transformer Renewal	12.2	8.5								
Underground Asset Renewal	16.9	15.9								
Other System Renewal	0.0	0.0								
East										
Overhead Asset Renewal	8.4	10.2								
Reactive Capital	11.2	8.4								
Rear-lot Conversion	3.3	2.8								
Substation Renewal	2.0	2.8								
Transformer Renewal	1.6	1.5								
Underground Asset Renewal	20.8	16.4								
Other System Renewal	0.0	0.0								
West										
Overhead Asset Renewal	10.8	10.6								
Reactive Capital	3.4	3.9								
Rear-lot Conversion	0.7	1.8								
Substation Renewal	0.0	0.2								
Transformer Renewal	0.2	0.3								
Underground Asset Renewal	2.2	6.1								
Other System Renewal	0.0	0.0								

System Renewal ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Alectra Utilities										
Overhead Asset Renewal			40.3	36.7						
Reactive Capital			15.3	20.1						
Rear-lot Conversion			3.4	0.0						
Substation Renewal			9.1	10.2						
Transformer Renewal			11.0	13.5						
Underground Asset Renewal			47.6	42.8						
Other System Renewal			1.6	1.5						
Guelph										
Overhead Asset Renewal	1.5	2.2	2.6	2.8						
Reactive Capital	0.1	0.2	0.2	0.5						
Rear-lot Conversion	0.0	0.0	0.0	0.1						
Substation Renewal	0.0	0.0	0.0	0.2						
Transformer Renewal	0.3	0.4	0.5	0.5						
Underground Asset Renewal	1.3	3.5	4.1	0.8						
Other System Renewal	0.0	0.0	0.0	0.0						
Consolidated Alectra Utilities										
Overhead Asset Renewal	33.2	35.1	43.0	39.5	45.4	34.3	34.7	39.4	30.9	37.6
Reactive Capital	16.7	14.6	15.6	20.5	17.2	18.8	19.2	19.6	20.0	20.4
Rear-lot Conversion	4.0	4.6	3.4	0.0	5.1	4.8	1.2	1.2	4.2	8.5
Substation Renewal	9.6	10.6	9.1	10.4	5.0	12.8	4.4	2.8	3.2	5.5
Transformer Renewal	14.7	10.9	11.5	14.0	12.3	5.5	6.3	7.0	7.4	7.8
Underground Asset Renewal	44.3	43.3	51.8	43.6	45.5	59.1	77.4	81.4	88.5	95.5
Other System Renewal	0.0	0.0	1.6	1.5	1.6	1.7	1.7	1.8	1.9	1.9
Total	**122.5**	**119.1**	**136.0**	**129.5**	**132.1**	**137.0**	**144.8**	**153.2**	**156.1**	**177.3**

1

Table P01 - 3: System Service Historical and Planned Expenditures for Consolidated Alectra Utilities and Predecessor Utilities

System Service ($MM)	Actual Expenditure		Bridge			Planned Expenditure				
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Central North										
SCADA & Automation	0.3	0.4								
Capacity (Lines)	5.8	3.9								
Capacity (Stations)	0.1	0.0								
System Control, Communications & Performance	0.0	0.0								
Safety & Security	0.0	0.0								
Distributed Energy Resources (DER) Integration	0.0	0.0								
Central South										
SCADA & Automation	3.1	2.9								
Capacity (Lines)	3.9	1.9								
Capacity (Stations)	2.0	2.6								
System Control, Communications & Performance	0.0	0.0								
Safety & Security	0.0	0.0								
Distributed Energy Resources (DER) Integration	0.0	0.0								
East										
SCADA & Automation	1.2	1.6								
Capacity (Lines)	6.8	10.6								
Capacity (Stations)	12.0	13.5								
System Control, Communications & Performance	2.9	1.4								
Safety & Security	0.2	0.3								
Distributed Energy Resources (DER) Integration	0.0	0.0								
West										
SCADA & Automation	0.0	0.0								
Capacity (Lines)	3.1	1.3								
Capacity (Stations)	0.0	0.0								
System Control, Communications & Performance	1.5	0.1								
Safety & Security	1.0	-0.2								
Distributed Energy Resources (DER) Integration	0.0	0.0								

System Service ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Alectra Utilities										
SCADA & Automation			5.6	4.1						
Capacity (Lines)			22.7	12.9						
Capacity (Stations)			10.3	2.4						
System Control, Communications & Performance			2.7	2.8						
Safety & Security			1.2	0.9						
Distributed Energy Resources (DER) Integration			0.0	0.0						
Guelph										
SCADA & Automation	0.2	0.4	0.4	0.4						
Capacity (Lines)	1.5	0.9	1.1	0.5						
Capacity (Stations)	2.9	1.5	0.0	0.0						
System Control, Communications & Performance	0.3	0.3	0.2	0.3						
Safety & Security	0.0	0.0	0.0	0.0						
Distributed Energy Resources (DER) Integration	0.0	0.0	0.0	0.0						
Consolidated Alectra Utilities										
SCADA & Automation	4.9	5.3	6.0	4.5	2.8	3.4	3.6	3.7	3.8	4.7
Capacity (Lines)	21.2	18.6	23.8	13.4	8.0	21.1	24.0	23.9	26.4	14.8
Capacity (Stations)	17.0	17.6	10.3	2.4	2.7	0.8	0.8	0.8	5.2	12.0
System Control, Communications & Performance	4.7	1.7	2.9	3.1	5.9	6.6	5.8	4.7	4.1	2.8
Safety & Security	1.2	0.1	1.2	0.9	3.2	5.4	2.0	2.0	2.0	2.0
Distributed Energy Resources (DER) Integration	0.0	0.0	0.0	0.0	0.9	0.7	0.7	0.9	0.9	0.9
Total	**49.0**	**43.3**	**44.2**	**24.3**	**23.5**	**38.0**	**36.9**	**36.0**	**42.4**	**37.2**

1

Table P01 - 4: General Plant Historical and Planned Expenditures for Consolidated Alectra Utilities and Predecessor Utilities

General Plant ($MM)	Actual Expenditure		Bridge			Planned Expenditure				
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Central North										
Facilities Management	0.3	0.2								
Information Technology	1.1	0.5								
Tools, Shop and Garage Equipment	0.1	0.1								
Fleet Renewal	2.1	-0.3								
Connection and Cost Recovery Agreements	7.7	0.0								
Other General Plant	0.4	0.0								
Central South										
Facilities Management	1.9	1.0								
Information Technology	4.9	1.5								
Tools, Shop and Garage Equipment	0.3	0.2								
Fleet Renewal	2.5	1.6								
Connection and Cost Recovery Agreements	40.5	0.0								
Other General Plant	0.0	0.0								
East										
Facilities Management	4.2	0.5								
Information Technology	14.9	5.5								
Tools, Shop and Garage Equipment	0.3	0.4								
Fleet Renewal	1.7	1.8								
Connection and Cost Recovery Agreements	0.0	0.9								
Other General Plant	0.9	0.7								
West										
Facilities Management	5.0	3.0								
Information Technology	3.3	1.1								
Tools, Shop and Garage Equipment	0.4	0.3								
Fleet Renewal	0.7	0.6								
Connection and Cost Recovery Agreements	6.6	-0.5								
Other General Plant	0.1	0.4								

General Plant ($MM)	Actual Expenditure				Bridge		Planned Expenditure			
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Alectra Utilities										
Facilities Management			4.5	1.4						
Information Technology			4.4	4.7						
Tools, Shop and Garage Equipment			0.8	0.7						
Fleet Renewal			3.1	6.2						
Connection and Cost Recovery Agreements			0.0	6.8						
Other General Plant			3.8	2.6						
Guelph										
Facilities Management	0.2	0.1	0.7	0.0						
Information Technology	0.6	0.5	0.6	0.1						
Tools, Shop and Garage Equipment	0.1	0.1	0.1	0.1						
Fleet Renewal	0.6	0.6	0.1	0.5						
Connection and Cost Recovery Agreements	0.0	0.0	0.0	0.0						
Other General Plant	0.0	0.0	0.0	0.0						
Consolidated Alectra Utilities										
Facilities Management	11.6	4.8	5.2	1.4	3.7	4.2	2.6	2.9	4.6	3.5
Information Technology	24.8	9.2	5.0	4.8	10.2	15.1	18.2	19.8	12.3	8.4
Tools, Shop and Garage Equipment	1.2	1.1	0.9	0.7	1.7	1.3	1.3	1.3	1.3	1.3
Fleet Renewal	7.5	4.3	3.2	6.7	8.5	8.9	9.5	9.9	10.3	10.2
Connection and Cost Recovery Agreements	54.8	0.4	0.0	6.8	1.0	8.7	1.6	0.0	0.5	0.0
Other General Plant	1.4	1.1	3.8	2.6	1.1	1.1	1.2	1.2	1.2	1.3
Total	**101.3**	**20.8**	**18.1**	**23.0**	**26.2**	**39.4**	**34.4**	**35.1**	**30.2**	**24.7**

1