MILTON HYDRO DISTRIBUTION INC.

EXHIBIT 2

RATE BASE

EXHIBIT 2 – RATE BASE

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RATE BASE

2.1. Overview

The rate base used for the purpose of determining the 2023 Test Year revenue requirement in this Application is calculated in accordance with the *Filing Requirements for Electricity Distribution Rate Applications - 2021 Edition for 2022 Rate Applications - Chapter 2 Cost of Service,* dated June 24, 2021 ("Chapter 2 Filing Requirements"). In accordance with the Filing Requirements, Milton Hydro Distribution Inc. ("Milton Hydro") has calculated the 2023 Test Year Rate Base as an average of the net capital balances at the beginning and the end of the 2023 Test Year plus a working capital allowance ("WCA"), which is 7.5% of the sum of the Cost of Power ("COP") and controllable expenses.

Milton Hydro has not completed a lead-lag study to support a different rate and submits this Application using the default working capital allowance rate of 7.5%. The use of a 7.5% rate is consistent with the Ontario Energy Board's ("OEB") letter dated June 3, 2015 and the Chapter 2 Filing Requirements as issued by the OEB.

Net Capital Assets include in-service assets that are associated with activities that enable the conveyance of electricity for distribution purposes less accumulated depreciation and contributed capital from third parties. For purposes of this Exhibit, Distribution Assets refer to those assets that are most directly related to the distribution system, such as poles, overhead and underground lines, and transformers. General Plant refers to assets that are not part of the distribution system and are used to support day to day business and operations activities such as: computer hardware and software; fleet; buildings; and furnitures and fixtures. Capital Assets include Property, Plant and Equipment ("PP&E") and Intangible Assets; these are referred to as "Capital" or "Fixed Assets" throughout this evidence. Milton Hydro has not applied for, nor received, any Incremental Capital Module ("ICM") adjustments.

Milton Hydro has completed the required Appendix 2-BA, Fixed Asset Continuity Schedules, for the period 2016 Actual to the 2023 Test Year, as set out in Table 2-4 through to Table 2-11.

Controllable expenses include operations and maintenance, billing and collecting, community relations and administration expenses. Milton Hydro has provided its Rate Base calculations for the years 2016 OEB Approved, 2016 Actual, 2017 Actual, 2018 Actual, 2019 Actual, 2020 Actual, 2021 Actual, 2022 Bridge Year, and 2023 Test Year in Table 2-1 below.

2.2. RATE BASE

Milton Hydro has calculated its 2023 Rate Base as $113,581,019, an increase over the 2016 OEB Approved Rate Base of $88,574,495. This increase in Rate Base of $25,006,524 is principally attributable to an increase in the Average Net Book Value of Capital Assets of $25,684,730, partially offset by a decrease in the Working Capital Allowance of $678,206, resulting from the decrease in Working Capital of $9,042,751.

2.2.1. Major Spare Parts and Standby Equipment

The rate base underlying the 2023 Test Year includes the historical years up to and including 2021, with forecasts of net fixed assets for the 2022 Bridge Year and 2023 Test Year. Net fixed assets are calculated on a mid-year average basis, plus a working capital allowance. Included in the net fixed assets is an adjustment for Major Spare Parts and Standby Equipment ("MSP&SE") to recognize the $610,000 benefit to rate payers for Milton Hydro's investment in MSP&SE.

Milton Hydro has identified MSP&SE in its inventory and has accounted for this as property, plant and equipment capital assets as it is expected that:

a) the items are not being held to be consumed in the ordinary production process or rendering of services;

b) the items have a longer period of future economic benefit as compared to inventory items;

c) the items form an integral part of the original distribution plant by enhancing the system reliability of the original distribution plant; and

d) they embody future economic benefits corresponding to the expectation they will be placed in service.

Milton Hydro has ascertained that the MSP&SE items should be included in rate base in this application as customers are receiving value from Milton Hydro as it is able to use the MSP&SE to repair its system and restore power to customers more quickly than it would otherwise be able to had it not maintained such items in its inventory.

Milton Hydro has MSP&SE on hand at the end of 2021, and it is planning to have MSP&SE on hand going forward, therefore the amounts have been factored into rate base for both 2022 and

2023. Amounts were not incorporated into years prior to 2022 since such amounts were not previously incorporated into rates nor approved by OEB in rate base. Treatment of MSP&SE has been identified as a change to methodology from previous applications in Exhibit 1, sub- section 1.4.11.

It is assumed that the net book value of MSP&SE remains constant in future years for rate making purposes. The assumption provides for the additions to the gross fixed asset amount each year minus net disposals offset and the gross book value remains at a constant level. It is also assumed that accumulated depreciation remains at zero at the end of each year due to slow but gradual turn-over of MSP&SE . The effect is that the net book value of MSP&SE remains constant, year over year. It is also assumed that are no differences between accounting income and taxable income with respect to MSP&SE.

2.2.2. Bringing Disallowed Space into Rate Base

In the EB-2015-0089 proceeding, Milton Hydro sought approval to include the cost of its new Head Office and Operations building in rate base. Certain aspects of this request were challenged due to some areas of the building not being fully utilized or being deemed to be in excess of requirements. The OEB determined that the space purchased and renovated exceeded reasonable requirements over the planning horizon and disallowed certain portions of the building from being included in rate base.

Milton Hydro’s current and future space requirements have changed since the OEB disallowed a portion of building space in 2016. In this application, Milton Hydro provides information on the current building space utilization and on future renovation plans to provide sufficient space for staff, Attachment 2-1 Bringing Disallowed Space into Rate Base Justification. Consistent with this space utilization, Milton Hydro is requesting that the previously disallowed space be brought back into rate base effective January 1, 2023 as it is "used and useful" and provides a benefit to customers.

Table 2-1 Summary of Rate Base

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Gross Fixed Assets Opening	$140,241,610	$135,106,748	$142,207,090	$144,583,525	$151,105,896	$159,504,624	$165,075,566	$171,522,832	$182,809,837
Gross Fixed Assets Closing	$147,600,343	$142,207,090	$144,583,525	$151,105,896	$159,504,624	$165,075,566	$170,093,630	$182,809,837	$191,319,676
Average Gross Fixed Assets	**$143,920,977**	**$138,656,919**	**$143,395,308**	**$147,844,711**	**$155,305,260**	**$162,290,095**	**$167,584,598**	**$177,166,334**	**$187,064,756**
Accumulated Depreciation Opening	$62,893,029	$60,988,131	$63,651,514	$64,182,812	$66,455,485	$69,359,191	$72,273,693	$75,702,258	$79,893,749
Accumulated Depreciation Closing	$66,269,728	$63,651,514	$64,182,812	$66,455,485	$69,359,191	$72,273,693	$75,516,462	$79,893,749	$84,187,108
Average Accumulated Depreciation	**$64,581,379**	**$62,319,823**	**$63,917,163**	**$65,319,149**	**$67,907,338**	**$70,816,442**	**$73,895,078**	**$77,798,004**	**$82,040,429**
Average Net Book Value	**$79,339,598**	**$76,337,097**	**$79,478,145**	**$82,525,562**	**$87,397,922**	**$91,473,653**	**$93,689,520**	**$99,368,331**	**$105,024,328**
Working Capital	$123,131,962	$123,923,428	$111,804,057	$112,108,486	$115,014,696	$106,118,600	$104,140,416	$114,522,037	$114,089,211
Working Capital Allowance %	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Working Capital Allowance	**$9,234,897**	**$9,294,257**	**$8,385,304**	**$8,408,136**	**$8,626,102**	**$7,958,895**	**$7,810,531**	**$8,589,153**	**$8,556,691**
Rate Base	$88,574,495	$85,631,354	$87,863,449	$90,933,698	$96,024,024	$99,432,548	$101,500,051	$107,957,484	$113,581,019

Table 2-1-1 Reconciliation of the Net book Value of Fixed Assets Between the 2021 Closing Balance and the 2022 Opening Balance

Description	Original 2021 Closing Balance	Adjustment	2022 Opening Balance
Gross Fixed Assets	$170,093,630		$170,093,630
Add Back: Building Gross Fixed Assets Disallowed in 2016 COS		$1,429,202	$1,429,202
Gross Fixed Assets	**$170,093,630**	**$1,429,202**	**$171,522,832**
Accumulated Depreciation	$75,516,462		$75,516,462
Add Back: Building Accumulated Depreciation Disallowed in 2016 COS		$185,796	$185,796
Accumulated Depreciation	**$75,516,462**	**$185,796**	**$75,702,258**
Net Book Value	**$94,577,168**	**$1,243,406**	**$95,820,574**

Table 2-1-1 above provides the reconciliation of the net book value of fixed assets between the 2021 closing and 2022 opening balances. Portions of the building at 2002 Chisholm drive were disallowed from the 2016 OEB approved rate base. The fixed asset continuity schedules for the historical years 2016 to 2021 exclude these costs in the Average Net Book Value of Capital Assets. Milton Hydro has included these costs in the Average Net Book Value of Capital Assets starting in the 2022 Bridge Year, as Milton Hydro is making a proposal to incorporate its entire building into rate base in 2023.

Milton Hydro has provided a summary of its calculations of the COP and Controllable Costs used in the calculations for determining Working Capital for the years 2016 OEB Approved, 2016 Actual, 2017 Actual, 2018 Actual, 2019 Actual, 2020 Actual, 2021 Actual, 2022 Bridge Year, and 2023 Test Year in Table below. Further details of Milton Hydro's calculation of its COP calculations are provided in Table 2-25. The 2022 Bridge Year is based on 12 months of forecast data. Milton Hydro has used the electricity prices as per the Regulated Price Plan Price Report issued April 22, 2021 for both the 2022 Bridge Year and the 2023 Test Year. Milton Hydro will adjust the 2023 Test Year price for electricity once the October 2022 Price Report is issued.

Table 2-2 Summary of Working Capital Calculation

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Cost of Power	$113,559,514	$114,269,832	$102,862,811	$102,620,246	$104,932,738	$95,541,894	$92,030,478	$101,667,369	$98,955,674
Operations	$1,993,286	$2,048,998	$1,897,672	$1,968,811	$2,083,159	$2,152,220	$2,787,520	$2,603,643	$3,803,779
Maintenance	$1,583,125	$1,748,350	$1,437,233	$1,804,161	$1,890,242	$1,728,590	$1,960,504	$1,688,242	$1,568,935
Billing & Collecting	$1,924,409	$1,823,188	$1,928,847	$1,786,132	$1,783,154	$1,877,132	$1,852,684	$2,092,792	$2,191,670
Community Relations	$20,071	$8,680	$14,094	$10,120	$9,650	$17,500	$8,094	$94,100	$115,837
Admin & General	$4,051,557	$4,024,379	$3,663,400	$3,919,016	$4,315,753	$4,801,264	$5,501,136	$6,375,891	$7,453,317
Working Capital	**$123,131,962**	**$123,923,427**	**$111,804,057**	**$112,108,486**	**$115,014,696**	**$106,118,600**	**$104,140,416**	**$114,522,037**	**$114,089,211**

2.3. Variance Analysis of Rate Base

The following Table 2-3 sets out Milton Hydro’s rate base and working capital calculations for the 2016 OEB Approved, 2016 Actual, 2017 Actual, 2018 Actual, 2019 Actual, 2020 Actual, 2021 Actual, 2022 Bridge Year, and 2023 Test Year, and the following variances:

- 2023 Test Year against 2022 Bridge Year;
- 2022 Bridge Year against 2021 Actual;
- 2021 Actual against 2020 Actual;
- 2020 Actual against 2019 Actual;
- 2019 Actual against 2018 Actual;
- 2018 Actual against 2017 Actual;
- 2017 Actual against 2016 Actual; and
- 2016 Actual against 2016 OEB Approved.

Table 2-3 Rate Base Variances

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Average Gross Fixed Assets	$143,920,977	$138,656,919	$143,395,308	$147,844,711	$155,305,260	$162,290,095	$167,584,598	$177,166,334	$187,064,756
Average Accumulated Depreciation	$64,581,379	$62,319,823	$63,917,163	$65,319,149	$67,907,338	$70,816,442	$73,895,078	$77,798,004	$82,040,429
Average Net Book Value	$79,339,598	$76,337,097	$79,478,145	$82,525,562	$87,397,922	$91,473,653	$93,689,520	$99,368,331	$105,024,328
Working Capital	$123,131,962	$123,923,428	$111,804,057	$112,108,486	$115,014,696	$106,118,600	$104,140,416	$114,522,037	$114,089,211
Working Cap Allowance %	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Working Cap Allowance	**$9,234,897**	**$9,294,257**	$8,385,304	$8,408,136	**$8,626,102**	**$7,958,895**	**$7,810,531**	**$8,589,153**	**$8,556,691**
Rate Base	**$88,574,495**	**$85,631,354**	**$87,863,449**	**$90,933,698**	**$96,024,024**	**$99,432,548**	**$101,500,051**	**$107,957,484**	**$113,581,019**

Milton Hydro has calculated the materiality threshold on its rate base to be 123,857 for 2023 in accordance with the Filing Requirements. This calculation is summarized in Exhibit 1 Table 1-6. Please refer to the explanation in Exhibit 1.4.7 in regards to the materiality threshold.

Milton Hydro offers the following comments in respect of the relevant variances identified above:

2023 Test Year vs. 2022 Bridge Year:

Description	2023 Test Year	2022 Bridge Year	Variance from 2022
Average Gross Fixed Assets	$187,064,75	$177,166,33	$9,898,422
Average Accumulated Depreciation	$82,040,429	$77,798,004	$4,242,425
Average Net Book Value	**$105,024,32**	**$99,368,331**	**$5,655,997**
Working Capital	$114,089,211	$114,522,03	($432,826)
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$8,556,691**	**$8,589,153**	**($32,462)**
Rate Base	**$113,581,01**	**$107,957,48**	**$5,623,535**

As shown above, the total rate base in the 2023 Test Year is forecast to be $113,581,019. Average net fixed assets account for $105,024,328 of this total. The WCA totals $8,556,691; of which $7,421,676, or 86.74%, is related to COP expenses.

Rate base for the 2023 Test Year is forecasted to be $5,623,535 higher than the 2022 Bridge Year. The increase is primarily related to higher net fixed asset additions from capital additions in 2023 and a higher WCA due to higher forecasted COP expenses in 2023.

2022 Bridge Year vs. 2021 Actual:

Description	2022 Bridge Year	2021 Actual	Variance from 2021
Average Gross Fixed Assets	$177,166,334	$167,584,598	$9,581,737
Average Accumulated Depreciation	$77,798,004	$73,895,078	$3,902,926
Average Net Book Value	**$99,368,331**	**$93,689,520**	**$5,678,811**
Working Capital	$114,522,037	$104,140,416	$10,381,621
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$8,589,153**	**$7,810,531**	**$778,622**
Rate Base	**$107,957,484**	**$101,500,051**	**$6,457,432**

The total rate base for the 2022 Bridge Year is forecasted to be $107,957,484, or $6,457,432 higher than the 2021 Actual of $101,500,051. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2022, offset by lower WCA due to lower forecasted COP expenses in 2022.

2021 Actual vs. 2020 Actual:

Description	2021 Actual	2020 Actual	Variance from 2020
Average Gross Fixed Assets	$167,584,598	$162,290,095	$5,294,503
Average Accumulated Depreciation	$73,895,078	$70,816,442	$3,078,636
Average Net Book Value	**$93,689,520**	**$91,473,653**	**$2,215,867**
Working Capital	$104,140,416	$106,118,600	($1,978,184)
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$7,810,531**	**$7,958,895**	**($148,364)**
Rate Base	**$101,500,051**	**$99,432,548**	**$2,067,503**

The total rate base for the 2021 Actual was $101,500,051, or $2,067,503 higher than the 2020 Actual of $99,432,548. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2021 and higher WCA due to higher forecasted COP expenses in 2021.

2020 Actual vs. 2019 Actual:

Description	2020 Actual	2019 Actual	Variance from 2019
Average Gross Fixed Assets	$162,290,095	$155,305,260	$6,984,835
Average Accumulated Depreciation	$70,816,442	$67,907,338	$2,909,104
Average Net Book Value	**$91,473,653**	**$87,397,922**	**$4,075,731**
Working Capital	$106,118,600	$115,014,696	($8,896,096)
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$7,958,895**	**$8,626,102**	**($667,207)**
Rate Base	**$99,432,548**	**$96,024,024**	**$3,408,524**

The total rate base for the 2020 Actual was $99,432,548, or $3,408,524 higher than the 2019 Actual of $96,024,024. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2020, partially offset by lower WCA due to lower forecasted COP expenses corresponding to the introduction of the Ontario Energy Rebate ("OER") in November 2019.

2019 Actual vs. 2018 Actual:

Description	2019 Actual	2018 Actual	Variance from 2018
Average Gross Fixed Assets	$155,305,260	$147,844,711	$7,460,550
Average Accumulated Depreciation	$67,907,338	$65,319,149	$2,588,190
Average Net Book Value	**$87,397,922**	**$82,525,562**	**$4,872,360**
Working Capital	$115,014,696	$112,108,486	$2,906,210
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$8,626,102**	**$8,408,136**	**$217,966**
Rate Base	**$96,024,024**	**$90,933,698**	**$5,090,326**

The total rate base for the 2019 Actual was $96,024,024, or $5,090,326 higher than the 2018 Actual of $90,933,698. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2019 and higher WCA due to higher forecasted COP expenses in 2019.

2018 Actual vs. 2017 Actual:

Description	2018 Actual	2017 Actual	Variance from 2017
Average Gross Fixed Assets	$147,844,711	$143,395,308	$4,449,403
Average Accumulated Depreciation	$65,319,149	$63,917,163	$1,401,986
Average Net Book Value	**$82,525,562**	**$79,478,145**	**$3,047,418**
Working Capital	$112,108,486	$111,804,057	$304,429
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$8,408,136**	**$8,385,304**	**$22,832**
Rate Base	**$90,933,698**	**$87,863,449**	**$3,070,250**

The total rate base for the 2018 Actual was $90,933,698, or $3,070,250 higher than the 2017 Actual of $87,863,449. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2018 and higher WCA due to higher forecasted COP expenses in 2018.

2017 Actual vs. 2016 Actual:

Description	2017 Actual	2016 Actual	Variance from 2016
Average Gross Fixed Assets	$143,395,308	$138,656,919	$4,738,389
Average Accumulated Depreciation	$63,917,163	$62,319,823	$1,597,341
Average Net Book Value	**$79,478,145**	**$76,337,097**	**$3,141,048**
Working Capital	$111,804,057	$123,923,428	($12,119,371
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$8,385,304**	**$9,294,257**	**($908,953)**
Rate Base	**$87,863,449**	**$85,631,354**	**$2,232,095**

The total rate base for the 2017 Actual was $87,863,449, or $2,232,095 higher than the 2016 Actual of $85,631,354. The increase is primarily attributable to higher net fixed asset additions from capital additions in 2017, partially offset by lower WCA due to lower forecasted COP expenses in 2017.

2016 Actual vs. 2016 OEB Approved:

Description	2016 Actual	2016 OEB Approved	Variance from 2016 OEB
Average Gross Fixed Assets	$138,656,919	$143,920,977	($5,264,058)
Average Accumulated Depreciation	$62,319,823	$64,581,379	($2,261,556)
Average Net Book Value	**$76,337,097**	**$79,339,598**	**($3,002,502)**
Working Capital	$123,923,428	$123,131,962	$791,466
Working Cap Allowance %	7.5%	7.5%	
Working Cap Allowance	**$9,294,257**	**$9,234,897**	**$59,360**
Rate Base	**$85,631,354**	**$88,574,495**	**($2,943,142)**

The total rate base for the 2016 Actual was $85,631,354, or $2,943,142 lower than the 2016 OEB Approved of $88,574,495. The decrease is primarily attributable to lower net fixed asset additions from capital additions in 2016 Actual, partially offset by higher WCA due to higher forecasted COP expenses in 2016 Actual.

2.4. Fixed Assets Continuity Schedules

Opening and closing balances of gross assets and accumulated depreciation correspond to the fixed asset continuity statements. The net book value balances, excluding construction work in progress, are the balances included in the rate base calculation.

Milton Hydro has completed the Appendix 2-BA as required in the Filing Requirements for each of 2016 OEB Approved, 2016 Actual, 2017 Actual, 2018 Actual, 2019 Actual, 2020 Actual, 2021 Actual, 2022 Bridge Year, and 2023 Test Year in Table 2-4 to Table 2-11.

The Capital Cost Allowance (“CCA") class for fixed assets agrees with the CCA Class used for tax purposes in Milton Hydro’s tax returns.

Upon the date of IFRS adoption, customer contributions are no longer recorded in Account 1995 Contributions & Grants, but are recorded in Account 2440, Deferred Revenue and amortized to revenue over the service life of the related asset. Additionally, historical amounts recorded in Account 1995 prior to the transition year are to be netted against the assets in Property, Plant and Equipment ("PP&E") that they relate to and no longer accounted separately as an offset to PP&E. Milton Hydro has included Account 2440 in the continuity schedules to track contributed capital forecast for the 2022 Bridge Year and the 2023 Test Year. Milton Hydro has included the amortization that is considered revenue for accounting periods as depreciation in Uniform System of Accounts ("USoA") 2440 in its continuity schedules.

Depreciation is explained in further detail in the “Capitalization Policy” section of this Exhibit and Exhibit 4.6 Depreciation, Amortization and Depletion.

Table 2-4 Appendix 2-BA 2016 Actual

Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	**OEB Account**	**Description**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Net Book Value**
47	1609	Capital Contributions Paid	$122,349			$122,349	$7,642	$3,059	$—	$10,701	$111,648
12	1611	Computer Software (Formally known as Account 1925)	$1,209,822	$330,483		$1,540,305	$769,052	$191,003	$—	$960,055	$580,250
N/A	1805	Land	$69,883			$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment <50 kV	$1,516,192			$1,516,192	$1,472,775	$15,275	$—	$1,488,050	$28,142
47	1830	Poles, Towers & Fixtures	$32,124,753	$1,648,808	($220,820)	$33,552,741	$11,003,800	$572,679	($115,088)	$11,461,391	$22,091,350
47	1835	Overhead Conductors & Devices	$23,668,495	$837,639	($61,776)	$24,444,358	$12,931,306	$305,344	($49,387)	$13,187,263	$11,257,095
47	1840	Underground Conduit	$25,637,522	$1,598,185	$—	$27,235,707	$8,080,913	$594,670		$8,675,583	$18,560,124
47	1845	Underground Conductors & Devices	$20,724,595	$1,314,963	($27,291)	$22,012,267	$8,598,741	$383,063	($4,186)	$8,977,618	$13,034,648
47	1850	Line Transformers	$40,880,487	$1,940,950	($382,344)	$42,439,093	$18,977,402	$751,400	($261,733)	$19,467,069	$22,972,025
47	1855	Services (Overhead & Underground)	$11,117,850	$743,376		$11,861,226	$2,115,341	$272,684	$—	$2,388,025	$9,473,202
47	1860	Meters (Smart Meters)	$12,038,045	$792,384	($35,637)	$12,794,792	$6,187,563	$894,650	($24,180)	$7,058,033	$5,736,759
N/A	1905	Land	$4,040,000			$4,040,000	$—	$—	$—	$—	$4,040,000
47	1908	Buildings & Fixtures	$8,943,661	$1,299,480		$10,243,141	$89,442	$178,873	$—	$268,315	$9,974,826
	1908	Buidling disallowed in 2016 COS	($1,429,202)			($1,429,202)	($14,292)	($28,584)	$—	($42,876)	($1,386,326)
13	1910	Leasehold Improvements	$377,009			$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture & Equipment (10 years)	$1,052,845	$66,356		$1,119,201	$695,583	$51,923	$—	$747,506	$371,696
10	1920	Computer Equipment - Hardware	$2,024,487	$80,109		$2,104,597	$1,714,656	$108,879	$—	$1,823,535	$281,062
10	1930	Transportation Equipment	$2,886,093	$480,681	($159,645)	$3,207,129	$1,424,286	$199,155	($159,645)	$1,463,796	$1,743,334
8	1935	Stores Equipment	$517,825	$7,460		$525,285	$197,643	$20,108	$—	$217,752	$307,533
8	1940	Tools, Shop & Garage Equipment	$446,359	$25,577		$471,936	$384,675	$19,725	$—	$404,399	$67,537
8	1945	Measurement & Testing Equipment	$126,480			$126,480	$77,088	$—	$—	$77,088	$49,393
8	1955	Communications Equipment	$544,264	$79,731		$623,995	$200,060	$41,573	$—	$241,633	$382,362
47	1980	System Supervisor Equipment	$128,952	$74,692		$203,644	$53,344	$8,317	$—	$61,661	$141,983
47	1990	Other Tangible Property	$133,004			$133,004	$60,307	$14,468	$—	$74,775	$58,229
47	1995	Contributions & Grants	($47,115,668)			($47,115,668)	($14,218,365)	($1,106,498)	$—	($15,324,863)	($31,790,805)
47	2440	Deferred Revenue	($6,679,355)	($3,333,020)		($10,012,375)	($197,840)	($214,162)	$—	($412,002)	($9,600,373)
		Sub-Total	**$135,106,748**	**$7,987,855**	**($887,514)**	**$142,207,090**	**$60,988,131**	**$3,277,602**	**($614,219)**	**$63,651,514**	**$78,555,576**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($199,155)		
8		Less: Tools							($19,725)		
2440		Less: Capital contributions - Distribution							$214,162		
							Net Depreciation		**$3,272,885**		

Table 2-5 Appendix 2-BA 2017 Actual

Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	OEB Account	Description	Opening Balance	Additions	Disposals	Closing Balance	Opening Balance	Additions	Disposals	Closing Balance	Net Book Value
47	1609	Capital Contributions Paid	$122,349			$122,349	$10,701	$3,059	$—	$13,760	$108,589
12	1611	Computer Software (Formally known as Account 1925)	$1,540,305	$487,432		$2,027,738	$960,055	$249,705	$—	$1,209,760	$817,977
N/A	1805	Land	$69,883			$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment <50 kV	$1,516,192		($61,179)	$1,455,012	$1,488,050	$11,196	($61,179)	$1,438,067	$16,946
47	1830	Poles, Towers & Fixtures	$33,552,741	$3,385,402	($307,414)	$36,630,728	$11,461,391	$1,767,753	($152,754)	$13,076,390	$23,554,338
47	1835	Overhead Conductors & Devices	$24,444,358	($1,496,975)	($191,776)	$22,755,608	$13,187,263	($848,378)	($173,890)	$12,164,995	$10,590,613
47	1840	Underground Conduit	$27,235,707	$1,182,959	($238)	$28,418,428	$8,675,583	$631,006	($238)	$9,306,351	$19,112,077
47	1845	Underground Conductors & Devices	$22,012,267	$950,594	($132,456)	$22,830,405	$8,977,618	$412,848	($114,284)	$9,276,182	$13,554,223
47	1850	Line Transformers	$42,439,093	$1,598,855	($1,312,255)	$42,725,694	$19,467,069	$787,707	($1,026,378)	$19,228,397	$23,497,297
47	1855	Services (Overhead & Underground)	$11,861,226	$646,435	($173)	$12,507,488	$2,388,025	$291,401	($62)	$2,679,363	$9,828,125
47	1860	Meters (Smart Meters)	$12,794,792	$1,031,568	($1,629,744)	$12,196,616	$7,058,033	$779,471	($1,316,916)	$6,520,587	$5,676,028
N/A	1905	Land	$4,040,000			$4,040,000	$—	$—	$—	$—	$4,040,000
47	1908	Buildings & Fixtures	$10,243,141	$74,555		$10,317,696	$268,315	$207,204	$—	$475,519	$9,842,177
	1908	Buidling disallowed in 2016 COS	($1,429,202)			($1,429,202)	($42,876)	($28,584)	$—	($71,460)	($1,357,742)
13	1910	Leasehold Improvements	$377,009			$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture & Equipment (10 years)	$1,119,201	$5,773		$1,124,974	$747,506	$29,010	$—	$776,516	$348,458
10	1920	Computer Equipment - Hardware	$2,104,597	$70,635		$2,175,232	$1,823,535	$112,986	$—	$1,936,520	$238,711
10	1930	Transportation Equipment	$3,207,129	$117,645	($32,927)	$3,291,847	$1,463,796	$230,038	($32,927)	$1,660,907	$1,630,940
8	1935	Stores Equipment	$525,285	$6,000		$531,285	$217,752	$20,669	$—	$238,421	$292,864
8	1940	Tools, Shop & Garage Equipment	$471,936	$30,928		$502,864	$404,399	$10,793	$—	$415,192	$87,671
8	1945	Measurement & Testing Equipment	$126,480			$126,480	$77,088	$10,824	$—	$87,911	$38,569
8	1955	Communications Equipment	$623,995	$13,232		$637,227	$241,633	$72,588	$—	$314,221	$323,006
47	1980	System Supervisor Equipment	$203,644	$819,075		$1,022,719	$61,661	$44,847	$—	$106,508	$916,211
47	1990	Other Tangible Property	$133,004			$133,004	$74,775	$14,468	$—	$89,243	$43,761
47	1995	Contributions & Grants	($47,115,668)			($47,115,668)	($15,324,863)	($1,105,481)	$—	($16,430,344)	($30,685,324)
47	2440	Deferred Revenue	($10,012,375)	($2,879,515)		($12,891,890)	($412,002)	($295,202)	$—	($707,204)	($12,184,686)
		Sub-Total	**$142,207,090**	**$6,044,598**	**($3,668,163)**	**$144,583,525**	**$63,651,514**	**$3,409,927**	**($2,878,629)**	**$64,182,812**	**$80,400,713**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($230,038)		
8		Less: Tools							($10,793)		
8		Less: Measurement & Testing Equipment							($10,824)		
2440		Less: Capital contributions - Distribution							$295,202		
							Net Depreciation		**$3,453,474**		

Table 2-6 Appendix 2-BA 2018 Actual
Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	OEB Account	Description	Opening Balance	Additions	Disposals	Closing Balance	Opening Balance	Additions	Disposals	Closing Balance	Net Book Value
47	1609	Capital Contributions Paid	$122,349			$122,349	$13,760	$3,059	$—	$16,819	$105,531
12	1611	Computer Software (Formally known as Account 1925)	$2,027,738	$550,748		$2,578,486	$1,209,760	$302,989	$—	$1,512,750	$1,065,736
N/A	1805	Land	$69,883			$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment <50 kV	$1,455,012	$980		$1,455,992	$1,438,067	$10,887	$—	$1,448,953	$7,039
47	1830	Poles, Towers & Fixtures	$36,630,728	$1,678,286	($281,492)	$38,027,523	$13,076,390	$628,353	($155,746)	$13,548,997	$24,478,526
47	1835	Overhead Conductors & Devices	$22,755,608	$1,008,942	($71,224)	$23,693,325	$12,164,995	$340,070	($50,386)	$12,454,680	$11,238,646
47	1840	Underground Conduit	$28,418,428	$1,480,577	($11,456)	$29,887,549	$9,306,351	$660,886	($11,456)	$9,955,781	$19,931,768
47	1845	Underground Conductors & Devices	$22,830,405	$887,635	$20,619	$23,738,660	$9,276,182	$433,167	($6,144)	$9,703,205	$14,035,455
47	1850	Line Transformers	$42,725,694	$2,149,076	($695,758)	$44,179,011	$19,228,397	$826,576	($502,287)	$19,552,687	$24,626,325
47	1855	Services (Overhead & Underground)	$12,507,488	$845,519	($5,410)	$13,347,597	$2,679,363	$306,995	($545)	$2,985,813	$10,361,784
47	1860	Meters (Smart Meters)	$12,196,616	$1,486,195	($431,475)	$13,251,336	$6,520,587	$830,170	($345,496)	$7,005,261	$6,246,075
N/A	1905	Land	$4,040,000			$4,040,000	$—	$—	$—	$—	$4,040,000
47	1908	Buildings & Fixtures	$10,317,696	$55,832		$10,373,528	$475,519	$207,304	$—	$682,822	$9,690,705
	1908	Building disallowed in 2016 COS	($1,429,202)			($1,429,202)	($71,460)	($28,584)	$—	($100,044)	($1,329,158)
13	1910	Leasehold Improvements	$377,009			$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture & Equipment (10 years)	$1,124,974	$6,682		$1,131,656	$776,516	$52,889	$—	$829,405	$302,250
10	1920	Computer Equipment - Hardware	$2,175,232	$81,671		$2,256,903	$1,936,520	$105,695	$—	$2,042,216	$214,687
10	1930	Transportation Equipment	$3,291,847	$459,485	($305,484)	$3,445,848	$1,660,907	$254,123	($305,484)	$1,609,546	$1,836,302
8	1935	Stores Equipment	$531,285	$8,476		$539,762	$238,421	$21,272	$—	$259,693	$280,068
8	1940	Tools, Shop & Garage Equipment	$502,864	$143,258		$646,121	$415,192	$19,121	$—	$434,313	$211,808
8	1945	Measurement & Testing Equipment	$126,480	$43,455		$169,936	$87,911	$12,541	$—	$100,452	$69,484
8	1955	Communications Equipment	$637,227			$637,227	$314,221	$46,505	$—	$360,727	$276,500
47	1980	System Supervisor Equipment	$1,022,719	$337,550		$1,360,269	$106,508	$75,940	$—	$182,448	$1,177,820
47	1990	Other Tangible Property	$133,004			$133,004	$89,243	$14,468	$—	$103,712	$29,293
47	1995	Contributions & Grants	($47,115,668)			($47,115,668)	($16,430,344)	($1,105,235)	$—	($17,535,580)	($29,580,088)
47	2440	Deferred Revenue	($12,891,890)	($2,920,318)		($15,812,208)	($707,204)	($368,975)	$—	($1,076,179)	($14,736,029)
		Sub-Total	**$144,583,525**	**$8,304,051**	**($1,781,680)**	**$151,105,896**	**$64,182,812**	**$3,650,218**	**($1,377,545)**	**$66,455,485**	**$84,650,411**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($254,123)		
8		Less: Tools							($19,121)		
8		Less: Measurement & Testing Equipment							($12,541)		
2440		Less: Capital contributions - Distribution							$368,975		
							Net Depreciation		**$3,733,407**		

Table 2-7 Appendix 2-BA 2019 Actual

Fixed Asset Continuity Schedule

CCA Class	OEB Account	Description	Cost: Opening Balance	Cost: Additions	Cost: Disposals	Cost: Closing Balance	Accumulated Depreciation: Opening Balance	Accumulated Depreciation: Additions	Accumulated Depreciation: Disposals	Accumulated Depreciation: Closing Balance	Net Book Value
47	1609	Capital Contributions Paid	$122,349	$1,964,992		$2,087,341	$16,819	$27,621	$—	$44,440	$2,042,901
12	1611	Computer Software (Formally known as Account 1925)	$2,578,486	$207,348		$2,785,834	$1,512,750	$360,286	$—	$1,873,036	$912,798
N/A	1805	Land	$69,883			$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment <50 kV	$1,455,992			$1,455,992	$1,448,953	$2,492	$—	$1,451,445	$4,547
47	1830	Poles, Towers & Fixtures	$38,027,523	$953,574	($87,135)	$38,893,962	$13,548,997	$653,147	($66,900)	$14,135,244	$24,758,718
47	1835	Overhead Conductors & Devices	$23,693,325	$836,727	($50,011)	$24,480,042	$12,454,680	$410,189	($55,402)	$12,809,467	$11,670,575
47	1840	Underground Conduit	$29,887,549	$1,909,353	$—	$31,796,902	$9,955,781	$706,008	$—	$10,661,789	$21,135,113
47	1845	Underground Conductors & Devices	$23,738,660	$1,261,979	($52,597)	$24,948,042	$9,703,205	$466,044	($41,695)	$10,127,554	$14,820,488
47	1850	Line Transformers	$44,179,011	$1,593,486	($493,038)	$45,279,459	$19,552,687	$802,673	($310,926)	$20,044,434	$25,235,025
47	1855	Services (Overhead & Underground)	$13,347,597	$587,882	($244)	$13,935,236	$2,985,813	$327,991	$—	$3,313,804	$10,621,432
47	1860	Meters (Smart Meters)	$13,251,336	$1,215,553	($575,158)	$13,891,731	$7,005,261	$894,093	($496,931)	$7,402,423	$6,489,307
N/A	1905	Land	$4,040,000			$4,040,000	$—	$—	$—	$—	$4,040,000
47	1908	Buildings & Fixtures	$10,373,528	$364,220		$10,737,748	$682,822	$216,235	$—	$899,057	$9,838,691
	1908	Building disallowed in 2016 COS	($1,429,202)			($1,429,202)	($100,044)	($28,584)	$—	($128,628)	($1,300,574)
13	1910	Leasehold Improvements	$377,009			$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture & Equipment (10 years)	$1,131,656			$1,131,656	$829,405	$50,385	$—	$879,791	$251,865
10	1920	Computer Equipment - Hardware	$2,256,903	$106,498		$2,363,401	$2,042,216	$95,606	$—	$2,137,822	$225,580
10	1930	Transportation Equipment	$3,445,848	$134,104	($78,435)	$3,501,517	$1,609,546	$269,919	($75,852)	$1,803,613	$1,697,904
8	1935	Stores Equipment	$539,762	$26,414		$566,175	$259,693	$22,726	$—	$282,420	$283,755
8	1940	Tools, Shop & Garage Equipment	$646,121	$52,594		$698,716	$434,313	$28,430	$—	$462,743	$235,972
8	1945	Measurement & Testing Equipment	$169,936	$826		$170,762	$100,452	$14,185	$—	$114,637	$56,125
8	1955	Communications Equipment	$637,227	$13,627		$650,854	$360,727	$44,262	$—	$404,988	$245,866
47	1980	System Supervisor Equipment	$1,360,269	$536,793	($5,265)	$1,891,796	$182,448	$111,589	($1,931)	$292,106	$1,599,690
47	1990	Other Tangible Property	$133,004			$133,004	$103,712	$14,468	$—	$118,180	$14,824
47	1995	Contributions & Grants	($47,115,668)			($47,115,668)	($17,535,580)	($1,105,133)	$—	($18,640,713)	($28,474,955)
47	2440	Deferred Revenue	($15,812,208)	($2,025,360)		($17,837,568)	($1,076,179)	($431,291)	$—	($1,507,470)	($16,330,098)
		Sub-Total	**$151,105,896**	**$9,740,610**	**($1,341,882)**	**$159,504,624**	**$66,455,485**	**$3,953,343**	**($1,049,637)**	**$69,359,191**	**$90,145,433**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($269,919)		
8		Less: Tools							($28,430)		
8		Less: Measurement & Testing Equipment							($14,185)		
2440		Less: Capital contributions - Distribution							$431,291		
							Net Depreciation		**$4,072,100**		

Table 2-8 Appendix 2-BA 2020 Actual
Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	**OEB Account**	**Description**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Net Book Value**
47	1609	Capital Contributions Paid	$2,087,341	$115,892		$2,203,233	$44,440	$55,118	$—	$99,557	$2,103,676
12	1611	Computer Software (Formally known as Account 1925)	$2,785,834	$70,826		$2,856,660	$1,873,036	$357,116	$—	$2,230,152	$626,507
N/A	1805	Land	$69,883			$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment <50 kV	$1,455,992			$1,455,992	$1,451,445	$2,222	$—	$1,453,667	$2,325
47	1830	Poles, Towers & Fixtures	$38,893,962	$2,434,491	($299,495)	$41,028,957	$14,135,244	$687,777	($116,468)	$14,706,553	$26,322,405
47	1835	Overhead Conductors & Devices	$24,480,042	$1,913,635	($140,671)	$26,253,006	$12,809,467	$417,749	($85,563)	$13,141,653	$13,111,352
47	1840	Underground Conduit	$31,796,902	$740,115	$—	$32,537,017	$10,661,789	$736,830	$—	$11,398,619	$21,138,398
47	1845	Underground Conductors & Devices	$24,948,042	$611,441	($59,200)	$25,500,283	$10,127,554	$485,384	($52,506)	$10,560,432	$14,939,851
47	1850	Line Transformers	$45,279,459	$1,780,282	($545,694)	$46,514,047	$20,044,434	$898,507	($382,674)	$20,560,267	$25,953,780
47	1855	Services (Overhead & Underground)	$13,935,236	$373,374	($302)	$14,308,308	$3,313,804	$339,519	($123)	$3,653,200	$10,655,107
47	1860	Meters (Smart Meters)	$13,891,731	$1,280,000	($786,527)	$14,385,203	$7,402,423	$869,290	($569,695)	$7,702,019	$6,683,184
N/A	1905	Land	$4,040,000			$4,040,000	$—	$—	$—	$—	$4,040,000
47	1908	Buildings & Fixtures	$10,737,748	$30,135		$10,767,883	$899,057	$216,897	$—	$1,115,955	$9,651,929
	1908	Building disallowed in 2016 COS	($1,429,202)			($1,429,202)	($128,628)	($28,584)	$—	($157,212)	($1,271,990)
13	1910	Leasehold Improvements	$377,009			$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture & Equipment (10 years)	$1,131,656	$2,685		$1,134,341	$879,791	$50,165	$—	$929,955	$204,386
10	1920	Computer Equipment - Hardware	$2,363,401	$83,786		$2,447,187	$2,137,822	$89,373	$—	$2,227,195	$219,993
10	1930	Transportation Equipment	$3,501,517			$3,501,517	$1,803,613	$273,819	$—	$2,077,432	$1,424,085
8	1935	Stores Equipment	$566,175	$9,743		$575,918	$282,420	$24,233	$—	$306,652	$269,266
8	1940	Tools, Shop & Garage Equipment	$698,716	$18,043		$716,759	$462,743	$31,837	$—	$494,580	$222,179
8	1945	Measurement & Testing Equipment	$170,762			$170,762	$114,637	$14,027	$—	$128,664	$42,098
8	1955	Communications Equipment	$650,854	$9,108		$659,961	$404,988	$45,493	$—	$450,481	$209,480
47	1980	System Supervisor Equipment	$1,891,796	$232,323		$2,124,119	$292,106	$133,252	$—	$425,359	$1,698,760
47	1990	Other Tangible Property	$133,004			$133,004	$118,180	$11,029	$—	$129,209	$3,795
47	1995	Contributions & Grants	($47,115,668)			($47,115,668)	($18,640,713)	($1,105,078)	$—	($19,745,790)	($27,369,877)
47	2440	Deferred Revenue	($17,837,568)	($2,303,048)		($20,140,616)	($1,507,470)	($484,446)	$—	($1,991,915)	($18,148,700)
		Sub-Total	**$159,504,624**	**$7,402,830**	**($1,831,889)**	**$165,075,566**	**$69,359,191**	**$4,121,530**	**($1,207,029)**	**$72,273,693**	**$92,801,873**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($273,819)		
8		Less: Tools							($31,837)		
8		Less: Measurement & Testing Equipment							($14,027)		
2440		Less: Capital contributions - Distribution							$484,446		
							Net Depreciation		**$4,286,293**		

Table 2-9 Appendix 2-BA 2021 Actual
Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	OEB Account	Description	Opening Balance	Additions	Disposals	Closing Balance	Opening Balance	Additions	Disposals	Closing Balance	Net Book Value
25	1609	Capital Contributions Paid (Other Intangible Assets)	$2,203,233	($194,227)	$—	$2,009,006	$99,557	$50,073		$149,630	$1,859,376
5	1611	Computer Software	$2,856,660	$69,824	$—	$2,926,484	$2,230,152	$294,969		$2,525,121	$401,362
N/A	1805	Land	$69,883		$—	$69,883	$—			$—	$69,883
47	1820	Distribution Station Equipment Normally Primary below 50 kV	$1,455,992		$—	$1,455,992	$1,453,667	$932		$1,454,599	$1,393
47	1830	Poles, Towers and Fixtures	$41,028,957	$1,352,817	($489,475)	$41,892,299	$14,706,553	$720,071	($205,117)	$15,221,507	$26,670,793
47	1835	Overhead Conductors and Devices	$26,253,006	$776,302	($65,070)	$26,964,238	$13,141,653	$447,099	($50,899)	$13,537,853	$13,426,384
47	1840	Underground Conduit	$32,537,017	$1,551,133	$—	$34,088,150	$11,398,619	$762,721		$12,161,340	$21,926,810
47	1845	Underground Conductors and Devices	$25,500,283	$999,088	($64,750)	$26,434,621	$10,560,432	$507,926	($60,748)	$11,007,610	$15,427,011
47	1850	Line Transformers	$46,514,047	$1,862,645	($544,214)	$47,832,478	$20,560,267	$937,124	($400,263)	$21,097,128	$26,735,350
47	1855	Services	$14,308,308	$727,844	($1,285)	$15,034,867	$3,653,200	$352,822	($34)	$4,005,988	$11,028,878
47	1860	Meters	$14,385,203	$1,172,186	($252,729)	$15,304,660	$7,702,019	$890,184	($181,413)	$8,410,790	$6,893,870
N/A	1905	Land	$4,040,000		$—	$4,040,000	$—			$—	$4,040,000
1b	1908	Building and Fixtures	$10,767,883		$—	$10,767,883	$1,115,955	$216,897		$1,332,852	$9,435,032
	1908	Building disallowed in 2016 COS	($1,429,202)			($1,429,202)	($157,212)	($28,584)		($185,796)	($1,243,406)
13	1910	Leasehold Improvements	$377,009		$—	$377,009	$377,009			$377,009	$—
8	1915	Office Furniture and Equipment	$1,134,341		$—	$1,134,341	$929,955	$46,056		$976,011	$158,330
10	1930	Transportation Equipment	$3,501,517	$68,707	($17,763)	$3,552,461	$2,077,432	$256,725	($17,763)	$2,316,394	$1,236,067
8	1935	Stores Equipment	$575,918		$—	$575,918	$306,652	$24,639		$331,291	$244,627
8	1940	Tools, Shop and Garage Equipment	$716,759	$39,554	$—	$756,313	$494,580	$34,369		$528,949	$227,364
8	1945	Measurement and Testing Equipment	$170,762		$—	$170,762	$128,664	$11,064		$139,728	$31,034
8	1955	Communication Equipment	$659,961	$13,139	$—	$673,100	$450,481	$45,429		$495,910	$177,190
8	1980	System Supervisory Equipment	$2,124,119	$259,425	$—	$2,383,544	$425,359	$148,676		$574,035	$1,809,509
47	1990	Other Tangible Property	$133,004		$—	$133,004	$129,209	$3,795		$133,004	$—
0	1995	Contributions and Grants	($47,115,668)		$—	($47,115,668)	($19,745,790)	($1,101,129)		($20,846,919)	($26,268,748)
	1330	Major Spare Parts	$—	$610,000	$—	$610,000	$—	$—	$—	$—	$610,000
		Sub-Total	**$165,075,566**	**$6,453,350**	**($1,435,286)**	**$170,093,630**	**$72,273,693**	**$4,159,006**	**($916,237)**	**$75,516,462**	**$94,577,168**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($256,725)		
8		Less: Tools							($34,369)		
8		Less: Measurement & Testing Equipment							($11,064)		
2440		Less: Capital contributions - Distribution							$548,596		
							Net Depreciation		**$4,405,444**		

Table 2-10 Appendix 2-BA 2022 Bridge Year

Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	OEB Account	Description	Opening Balance	Additions	Disposals	Closing Balance	Opening Balance	Additions	Disposals	Closing Balance	Net Book Value
25	1609	Capital Contributions Paid (Other Intangible Assets)	$2,009,006	$—	$—	$2,009,006	$149,630	$50,073	$—	$199,703	$1,809,303
5	1611	Computer Software	$2,926,484	$547,060	$—	$3,473,544	$2,525,121	$263,251	$—	$2,788,372	$685,172
N/A	1805	Land	$69,883	$—	$—	$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment Normally Primary below 50 kV	$1,455,992	$—	$—	$1,455,992	$1,454,599	$934	$—	$1,455,533	$460
47	1830	Poles, Towers and Fixtures	$41,892,299	$2,123,772	($650,000)	$43,366,072	$15,221,507	$758,391	($300,000)	$15,679,898	$27,686,173
47	1835	Overhead Conductors and Devices	$26,964,238	$1,959,548	$—	$28,923,786	$13,537,853	$478,207	$—	$14,016,060	$14,907,726
47	1840	Underground Conduit	$34,088,150	$1,667,581	$—	$35,755,731	$12,161,340	$803,552	$—	$12,964,892	$22,790,839
47	1845	Underground Conductors and Devices	$26,434,621	$1,115,865	$—	$27,550,486	$11,007,610	$539,020	$—	$11,546,629	$16,003,857
47	1850	Line Transformers	$47,832,478	$2,187,208	$—	$50,019,686	$21,097,128	$986,386	$—	$22,083,514	$27,936,172
47	1855	Services	$15,034,867	$776,762	$—	$15,811,629	$4,005,988	$371,366	$—	$4,377,354	$11,434,274
47	1860	Meters	$15,304,660	$2,820,676	$—	$18,125,335	$8,410,790	$1,019,722	$—	$9,430,512	$8,694,823
N/A	1905	Land	$4,040,000	$—	$—	$4,040,000	$—	$—	$—	$—	$4,040,000
1b	1908	Buildings and Fixtures	$10,767,883	$593,000	$—	$11,360,883	$1,332,852	$222,827	$—	$1,555,679	$9,805,204
13	1910	Leasehold Improvements	$377,009	$—	$—	$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture and Equipment	$1,134,341	$—	$—	$1,134,341	$976,011	$42,168	$—	$1,018,179	$116,162
50	1920	Computer Equipment Hardware	$2,539,334	$117,500	$—	$2,656,834	$2,312,939	$91,634	$—	$2,404,573	$252,262
10	1930	Transportation Equipment	$3,552,461	$751,500	$—	$4,303,961	$2,316,394	$290,228	$—	$2,606,622	$1,697,339
8	1935	Stores Equipment	$575,918	$20,000	$—	$595,918	$331,291	$25,472	$—	$356,763	$239,155
8	1940	Tools, Shop and Garage Equipment	$756,313	$30,000	$—	$786,313	$528,949	$37,298	$—	$566,247	$220,066
8	1945	Measurement and Testing Equipment	$170,762	$—	$—	$170,762	$139,728	$6,481	$—	$146,209	$24,553
8	1955	Communication Equipment	$673,100	$—	$—	$673,100	$495,910	$44,574	$—	$540,484	$132,616
8	1980	System Supervisory Equipment	$2,383,544	$235,352	$—	$2,618,896	$574,035	$165,163	$—	$739,198	$1,879,698
47	1990	Other Tangible Property	$133,004	$—	$—	$133,004	$133,004	$—	$—	$133,004	$—
0	1995	Contributions and Grants	($47,115,668)	$—	$—	($47,115,668)	($20,846,919)	($1,101,130)	$—	($21,948,049)	($25,167,619)
	1330	Major Spare Parts	$610,000	$15,250	$—	$625,250	$—	$15,250	$—	$15,250	$610,000
	2440	Capital contributions - Distribution	($23,087,850)	($3,024,069)	$—	($26,111,919)	($2,540,511)	($619,375)	$—	($3,159,886)	($22,952,033)
		Sub-Total	**$171,522,832**	**$11,937,005**	**($650,000)**	**$182,809,837**	**$75,702,258**	**$4,491,491**	**($300,000)**	**$79,893,749**	**$102,916,088**
		Less :Fully Allocated Depreciation									
10		Less: Transportation							($290,228)		
8		Less: Tools							($37,298)		
2440		Less: Capital contributions - Distribution							$619,375		
							Net Depreciation		**$4,783,340**		

Table 2-11 Appendix 2-BA 2023 Test Year
Fixed Asset Continuity Schedule

			Cost				Accumulated Depreciation				
CCA Class	**OEB Account**	**Description**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Opening Balance**	**Additions**	**Disposals**	**Closing Balance**	**Net Book Value**
25	1609	Capital Contributions Paid (Other Intangible Assets)	$2,009,006	$—	$—	$2,009,006	$199,703	$50,073	$—	$249,776	$1,759,230
5	1611	Computer Software	$3,473,544	$551,440	$—	$4,024,984	$2,788,372	$284,063	$—	$3,072,435	$952,549
N/A	1805	Land	$69,883	$—	$—	$69,883	$—	$—	$—	$—	$69,883
47	1820	Distribution Station Equipment Normally Primary below 50 kV	$1,455,992	$200,000	$—	$1,655,992	$1,455,533	$2,684	$—	$1,458,216	$197,776
47	1830	Poles, Towers and Fixtures	$43,366,072	$2,130,999	($650,000)	$44,847,071	$15,679,898	$805,667	($300,000)	$16,185,565	$28,661,506
47	1835	Overhead Conductors and Devices	$28,923,786	$1,187,072	$—	$30,110,858	$14,016,060	$513,169	$—	$14,529,229	$15,581,629
47	1840	Underground Conduit	$35,755,731	$245,000	$—	$36,000,731	$12,964,892	$826,993	$—	$13,791,884	$22,208,847
47	1845	Underground Conductors and Devices	$27,550,486	$837,913	$—	$28,388,400	$11,546,629	$563,344	$—	$12,109,973	$16,278,426
47	1850	Line Transformers	$50,019,686	$2,183,080	$—	$52,202,766	$22,083,514	$1,038,712	$—	$23,122,226	$29,080,540
47	1855	Services	$15,811,629	$371,654	$—	$16,183,283	$4,377,354	$385,721	$—	$4,763,076	$11,420,207
47	1860	Meters	$18,125,335	$2,439,924	$—	$20,565,259	$9,430,512	$891,510	$—	$10,322,022	$10,243,237
N/A	1905	Land	$4,040,000	$—	$—	$4,040,000	$—	$—	$—	$—	$4,040,000
1b	1908	Buildings and Fixtures	$11,360,883	$519,000	$—	$11,879,883	$1,555,679	$233,947	$—	$1,789,626	$10,090,257
13	1910	Leasehold Improvements	$377,009	$—	$—	$377,009	$377,009	$—	$—	$377,009	$—
8	1915	Office Furniture and Equipment	$1,134,341	$—	$—	$1,134,341	$1,018,179	$42,168	$—	$1,060,346	$73,994
50	1920	Computer Equipment Hardware	$2,656,834	$94,500	$—	$2,751,334	$2,404,573	$97,604	$—	$2,502,176	$249,158
10	1930	Transportation Equipment	$4,303,961	$451,000	$—	$4,754,961	$2,606,622	$324,363	$—	$2,930,986	$1,823,976
8	1935	Stores Equipment	$595,918	$30,000	$—	$625,918	$356,763	$27,555	$—	$384,319	$241,600
8	1940	Tools, Shop and Garage Equipment	$786,313	$45,000	$—	$831,313	$566,247	$40,452	$—	$606,698	$224,615
8	1945	Measurement and Testing Equipment	$170,762	$—	$—	$170,762	$146,209	$4,546	$—	$150,754	$20,008
8	1955	Communication Equipment	$673,100	$—	$—	$673,100	$540,484	$43,583	$—	$584,067	$89,033
8	1980	System Supervisory Equipment	$2,618,896	$397,393	$—	$3,016,289	$739,198	$186,255	$—	$925,452	$2,090,837
47	1990	Other Tangible Property	$133,004	$—	$—	$133,004	$133,004	$—	$—	$133,004	$—
0	1995	Contributions and Grants	($47,115,668)	$—	$—	($47,115,668)	($21,948,049)	($1,095,885)	$—	($23,043,934)	($24,071,734)
	1330	Major Spare Parts	$625,250	$15,250	$—	$640,500	$15,250	$15,250	$—	$30,500	$610,000
	2440	Capital contributions - Distribution	($26,111,919)	($2,539,386)	$—	($28,651,305)	($3,159,886)	($688,413)	$—	($3,848,299)	($24,803,006)
		Sub-Total	**$182,809,837**	**$9,159,839**	**($650,000)**	**$191,319,676**	**$79,893,749**	**$4,593,359**	**($300,000)**	**$84,187,108**	**$107,132,568**
		Less: Fully Allocated Depreciation									
10		Less: Transportation							($324,363)		
8		Less: Tools							($40,452)		
2440		Less: Capital contributions - Distribution							$688,413		
							Net Depreciation		**$4,916,957**		

2.5. Gross Assets – Property Plant and Equipment And Accumulated Depreciation

2.5.1. Breakdown by Function

Table 2-12 below categorizes Milton Hydro's assets into four categories; distribution plant, general plant, contributions and grants, and Work-in-Process ("WIP"). In accordance with the USoA, Milton Hydro has included gross assets as follows:

- Distribution plant asset accounts include USoA 1805 to 1860 - these account includes assets such as substation equipment, poles, wires, transformers and meters;

- General plant asset accounts include USoA 1905 to 1990, USoA 1609, and USoA 1611 - these account includes assets such as buildings, computer software and hardware, transportation equipment, and tools;

- Contributions and grants includes USoA account 1995 Canadian Generally Accepted Accounting Principles ("CGAAP") or Modified International Financial Reporting Standards ("MIFRS") and 2440 International Financial Reporting Standards ("IFRS") – these account includes all contributions in aid of capital that Milton Hydro has received or forecasted to be received as per the Distribution System Code ("DSC"); and

- WIP – this account includes all costs related to assets that are not considered in-service as of December 31st of the applicable fiscal year. Costs are transferred out of WIP and into the appropriate category above once designated in-service in the field. Milton Hydro has recorded WIP for the 2022 Bridge Year and the 2023 Test Year. The Enterprise Planning System project is forecasted to begin in the 2022 Bridge Year and be in service in 2024. Distribution system projects are expected to be in service in the year the capital is spent resulting in no change to WIP.

Table 2-12 Gross Asset Breakdown by Function ('000's)

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Distribution Plant	$11,061	$9,301	$8,380	$10,391	$10,065	$10,116	$11,080	$10,857	$9,993
General Plant	$896	$2,252	$899	$1,998	$1,774	$242	($91)	$2,329	$2,413
Contributions and Grants	($3,808)	($3,333)	($2,880)	($2,920)	($2,025)	($2,303)	($2,947)	($3,024)	($2,539)
Gross Asset Expenditures	**$8,149**	**$8,220**	**$6,399**	**$9,469**	**$9,814**	**$8,055**	**$8,041**	**$10,162**	**$9,866**
Change in WIP	$461	$232	$354	$1,165	$73	$652	$1,588	($1,775)	$706
Gross Assets in Service	**$7,688**	**$7,988**	**$6,045**	**$8,304**	**$9,741**	**$7,403**	**$6,453**	**$11,937**	**$9,160**

2.5.2. Breakdown by Major Plant Account

Table 2-13 below provides a detailed breakdown by major plant account for each operationalized plant item and the variance from the previous year. Each plant item is accompanied by a description in accordance with the Board's USoA, including the 2023 Test Year. Milton Hydro has also included a breakdown of accumulated amortization in the same format in Table 2-14.

Table 2-13 Gross Assets - Detailed Breakdown by Major Plant Function & Variances

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Distribution Assets									
1805-Land	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883
1820-Dist Station Equip - Normally Primary below 50 kV	$1,516,192	$1,516,192	$1,455,012	$1,455,992	$1,455,992	$1,455,992	$1,455,992	$1,455,992	$1,655,992
1830-Poles, Towers and Fixtures	$34,382,028	$33,552,741	$36,630,728	$38,027,523	$38,893,962	$41,028,957	$41,892,299	$43,366,072	$44,847,071
1835-Overhead Conductors and Devices	$25,838,905	$24,444,358	$22,755,608	$23,693,325	$24,480,042	$26,253,006	$26,964,238	$28,923,786	$30,110,858
1840-Underground Conduit	$29,199,978	$27,235,707	$28,418,428	$29,887,549	$31,796,902	$32,537,017	$34,088,150	$35,755,731	$36,000,731
1845-Underground Conductors and Devices	$20,665,087	$22,012,267	$22,830,405	$23,738,660	$24,948,042	$25,500,283	$26,434,621	$27,550,486	$28,388,400
1850-Line Transformers	$39,899,395	$42,439,093	$42,725,694	$44,179,011	$45,279,459	$46,514,047	$47,832,478	$50,019,686	$52,202,766
1855-Services	$16,506,215	$11,861,226	$12,507,488	$13,347,597	$13,935,236	$14,308,308	$15,034,867	$15,811,629	$16,183,283
1860-Meters	$12,205,146	$12,794,792	$12,196,616	$13,251,336	$13,891,731	$14,385,203	$15,304,660	$18,125,335	$20,565,259
Gross Distribution Assets	**$180,282,829**	**$175,926,258**	**$179,589,862**	**$187,650,877**	**$194,751,249**	**$202,052,696**	**$209,077,188**	**$221,078,601**	**$230,024,243**
General Plant									
1609-Capital Contributions - Paid	$122,349	$122,349	$122,349	$122,349	$2,087,341	$2,203,233	$2,009,006	$2,009,006	$2,009,006
1611-Computer Software	$696,813	$1,540,305	$2,027,738	$2,578,486	$2,785,834	$2,856,660	$2,926,484	$3,473,544	$4,024,984
1905-Land	$4,072,786	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000
1908-Buildings and Fixtures	$10,460,000	$10,243,141	$10,317,696	$10,373,528	$10,737,748	$10,767,883	$10,767,883	$11,360,883	$11,879,883
1908-Building disallowed in 2016 COS	($1,429,202)	($1,429,202)	($1,429,202)	($1,429,202)	($1,429,202)	($1,429,202)	($1,429,202)		
1910-Leasehold Improvements	$—	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009
1920-Computer Equipment - Hardware	$2,096,765	$2,104,597	$2,175,232	$2,256,903	$2,363,401	$2,447,187	$2,539,334	$2,656,834	$2,751,334
1925-Computer Software	$697,333	$—	$—	$—	$—	$—	$—	$—	$—
1915-Office Furniture and Equipment	$1,114,886	$1,119,201	$1,124,974	$1,131,656	$1,131,656	$1,134,341	$1,134,341	$1,134,341	$1,134,341
1930-Transportation Equipment	$3,746,857	$3,207,129	$3,291,847	$3,445,848	$3,501,517	$3,501,517	$3,552,461	$4,303,961	$4,754,961
1935-Stores Equipment	$403,345	$525,285	$531,285	$539,762	$566,175	$575,918	$575,918	$595,918	$625,918
1940-Tools, Shop and Garage Equipment	$478,545	$471,936	$502,864	$646,121	$698,716	$716,759	$756,313	$786,313	$831,313
1945-Measurement and Testing Equipment	$126,481	$126,480	$126,480	$169,936	$170,762	$170,762	$170,762	$170,762	$170,762
1955-Communication Equipment	$1,434,020	$623,995	$637,227	$637,227	$650,854	$659,961	$673,100	$673,100	$673,100
1980-System Supervisory Equipment	$122,172	$203,644	$1,022,719	$1,360,269	$1,891,796	$2,124,119	$2,383,544	$2,618,896	$3,016,289
1990-Other Tangible Property	$133,004	$133,004	$133,004	$133,004	$133,004	$133,004	$133,004	$133,004	$133,004

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
1330-Major Spare Parts	$—	$—	$—	$—	$—	$—	$610,000	$625,250	$640,500
Gross General Plant	**$24,276,154**	**$23,408,874**	**$25,001,221**	**$26,382,895**	**$29,706,612**	**$30,279,153**	**$31,219,959**	**$34,958,823**	**$37,062,406**
Contributions and Grants									
1995-Contributions and Grants - Credit	($56,958,639)	($47,115,668)	($47,115,668)	($47,115,668)	($47,115,668)	($47,115,668)	($47,115,668)	($47,115,668)	($47,115,668)
2440-Deferred Revenue	$—	($10,012,375)	($12,891,890)	($15,812,208)	($17,837,568)	($20,140,616)	($23,087,850)	($26,111,919)	($28,651,305)
Gross Contributions and Grants	**($56,958,639)**	**($57,128,043)**	**($60,007,558)**	**($62,927,876)**	**($64,953,236)**	**($67,256,284)**	**($70,203,518)**	**($73,227,587)**	**($75,766,973)**
Gross assets for rate base	**$147,600,344**	**$142,207,090**	**$144,583,525**	**$151,105,896**	**$159,504,624**	**$165,075,566**	**$170,093,630**	**$182,809,837**	**$191,319,676**

Table 2-14 Accumulated Depreciation - Detailed Breakdown by Major Plant Function & Variances

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Distribution Assets									
1820-Dist Station Equip - Normally Primary below 50 kV	$1,495,786	$1,488,050	$1,438,067	$1,448,953	$1,451,445	$1,453,667	$1,454,599	$1,455,533	$1,458,216
1830-Poles, Towers and Fixtures	$11,438,695	$11,461,391	$13,076,390	$13,548,997	$14,135,244	$14,706,553	$15,221,507	$15,679,898	$16,185,565
1835-Overhead Conductors and Devices	$13,485,379	$13,187,263	$12,164,995	$12,454,680	$12,809,467	$13,141,653	$13,537,853	$14,016,060	$14,529,229
1840-Underground Conduit	$9,437,288	$8,675,583	$9,306,351	$9,955,781	$10,661,789	$11,398,619	$12,161,340	$12,964,892	$13,791,884
1845-Underground Conductors and Devices	$8,333,072	$8,977,618	$9,276,182	$9,703,205	$10,127,554	$10,560,432	$11,007,610	$11,546,629	$12,109,973
1850-Line Transformers	$19,491,284	$19,467,069	$19,228,397	$19,552,687	$20,044,434	$20,560,267	$21,097,128	$22,083,514	$23,122,226
1855-Services	$4,467,166	$2,388,025	$2,679,363	$2,985,813	$3,313,804	$3,653,200	$4,005,988	$4,377,354	$4,763,076
1860-Meters	$6,925,067	$7,058,033	$6,520,587	$7,005,261	$7,402,423	$7,702,019	$8,410,790	$9,430,512	$10,322,022
Gross Distribution Assets	**$75,073,737**	**$72,703,031**	**$73,690,332**	**$76,655,376**	**$79,946,160**	**$83,176,410**	**$86,896,815**	**$91,554,393**	**$96,282,192**
General Plant									
1609-Capital Contributions - Paid	$10,701	$10,701	$13,760	$16,819	$44,440	$99,557	$149,630	$199,703	$249,776
1611-Computer Software	$294,822	$960,055	$1,209,760	$1,512,750	$1,873,036	$2,230,152	$2,525,121	$2,788,372	$3,072,435
1908-Buildings and Fixtures	$313,800	$268,315	$404,059	$682,822	$899,057	$1,115,955	$1,332,852	$1,555,679	$1,789,626
1908-Building disallowed in 2016 COS	($42,876)	($42,876)	($71,460)	($100,044)	($128,628)	($157,212)	($185,796)		
1910-Leasehold Improvements	$—	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009	$377,009

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
1920-Computer Equipment - Hardware	$1,820,082	$1,823,535	$1,936,520	$2,042,216	$2,137,822	$2,227,195	$2,312,939	$2,404,573	$2,502,176
1925-Computer Software	$662,496	$—	$—	$—	$—	$—	$—	$—	$—
1915-Office Furniture and Equipment	$697,674	$747,506	$776,516	$829,405	$879,791	$929,955	$976,011	$1,018,179	$1,060,346
1930-Transportation Equipment	$1,845,072	$1,463,796	$1,660,907	$1,609,546	$1,803,613	$2,077,432	$2,316,394	$2,606,622	$2,930,986
1935-Stores Equipment	$206,056	$217,752	$238,421	$259,693	$282,420	$306,652	$331,291	$356,763	$384,319
1940-Tools, Shop and Garage Equipment	$415,888	$404,399	$415,192	$434,313	$462,743	$494,580	$528,949	$566,247	$606,698
1945-Measurement and Testing Equipment	$62,110	$77,088	$87,911	$100,452	$114,637	$128,664	$139,728	$146,209	$150,754
1955-Communication Equipment	$348,804	$241,633	$314,221	$360,727	$404,988	$450,481	$495,910	$540,484	$584,067
1980-System Supervisory Equipment	$58,493	$61,661	$106,508	$182,448	$292,106	$425,359	$574,035	$739,198	$925,452
1990-Other Tangible Property	$73,608	$74,775	$89,243	$103,712	$118,180	$129,209	$133,004	$133,004	$133,004
1330-Major Spare Parts	$—	$—	$—	$—	$—	$—	$—	$15,250	$30,500
Gross General Plant	**$6,766,730**	**$6,685,348**	**$7,558,569**	**$8,411,868**	**$9,561,214**	**$10,834,989**	**$12,007,078**	**$13,447,292**	**$14,797,149**
Contributions and Grants									
1995-Contributions and Grants - Credit	($15,570,740)	($15,324,863)	($16,430,344)	($17,535,580)	($18,640,713)	($19,745,790)	($20,846,919)	($21,948,049)	($23,043,934)
2440-Deferred Revenue	$—	($412,002)	($707,204)	($1,076,179)	($1,507,470)	($1,991,915)	($2,540,511)	($3,159,886)	($3,848,299)
Gross Contributions and Grants	**($15,570,740)**	**($15,736,865)**	**($17,137,549)**	**($18,611,758)**	**($20,148,182)**	**($21,737,706)**	**($23,387,431)**	**($25,107,935)**	**($26,892,233)**
Accumulated Amortization for Rate Base	**$66,269,727**	**$63,651,514**	**$64,111,352**	**$66,455,485**	**$69,359,191**	**$72,273,693**	**$75,516,462**	**$79,893,749**	**$84,187,108**

Table 2-15 Net Assets - Detailed Breakdown by Major Plant Function & Variances

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Distribution Assets									
1805-Land	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883	$69,883
1820-Dist Station Equip - Normally Primary below 50 kV	$20,406	$28,142	$16,946	$7,039	$4,547	$2,325	$1,393	$460	$197,776
1830-Poles, Towers and Fixtures	$22,943,333	$22,091,350	$23,554,338	$24,478,526	$24,758,718	$26,322,405	$26,670,793	$27,686,173	$28,661,506
1835-Overhead Conductors and Devices	$12,353,526	$11,257,095	$10,590,613	$11,238,646	$11,670,575	$13,111,352	$13,426,384	$14,907,726	$15,581,629
1840-Underground Conduit	$19,762,690	$18,560,124	$19,112,077	$19,931,768	$21,135,113	$21,138,398	$21,926,810	$22,790,839	$22,208,847
1845-Underground Conductors and Devices	$12,332,015	$13,034,648	$13,554,223	$14,035,455	$14,820,488	$14,939,851	$15,427,011	$16,003,857	$16,278,426
1850-Line Transformers	$20,408,111	$22,972,025	$23,497,297	$24,626,325	$25,235,025	$25,953,780	$26,735,350	$27,936,172	$29,080,540
1855-Services	$12,039,049	$9,473,202	$9,828,125	$10,361,784	$10,621,432	$10,655,107	$11,028,878	$11,434,274	$11,420,207
1860-Meters	$5,280,079	$5,736,759	$5,676,028	$6,246,075	$6,489,307	$6,683,184	$6,893,870	$8,694,823	$10,243,237
Gross Distribution Assets	**$105,209,092**	**$103,223,227**	**$105,899,529**	**$110,995,501**	**$114,805,088**	**$118,876,287**	**$122,180,374**	**$129,524,208**	**$133,742,051**
General Plant									
1609-Capital Contributions - Paid	$111,648	$111,648	$108,589	$105,531	$2,042,901	$2,103,676	$1,859,376	$1,809,303	$1,759,230
1611-Computer Software	$401,991	$580,250	$817,977	$1,065,736	$912,798	$626,507	$401,362	$685,172	$952,549
1905-Land	$4,072,786	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000	$4,040,000
1908-Buildings and Fixtures	$10,146,200	$9,974,826	$9,913,637	$9,690,705	$9,838,691	$9,651,929	$9,435,032	$9,805,204	$10,090,257
1908-Building disallowed in 2016 COS	($1,386,326)	($1,386,326)	($1,357,742)	($1,329,158)	($1,300,574)	($1,271,990)	($1,243,406)	$—	$—
1920-Computer Equipment - Hardware	$276,683	$281,062	$238,711	$214,687	$225,580	$219,993	$226,396	$252,262	$249,158
1925-Computer Software	$34,837	$—	$—	$—	$—	$—	$—	$—	$—
1915-Office Furniture and Equipment	$417,212	$371,696	$348,458	$302,250	$251,865	$204,386	$158,330	$116,162	$73,994
1930-Transportation Equipment	$1,901,785	$1,743,334	$1,630,940	$1,836,302	$1,697,904	$1,424,085	$1,236,067	$1,697,339	$1,823,976
1935-Stores Equipment	$197,289	$307,533	$292,864	$280,068	$283,755	$269,266	$244,627	$239,155	$241,600
1940-Tools, Shop and Garage Equipment	$62,657	$67,537	$87,671	$211,808	$235,972	$222,179	$227,364	$220,066	$224,615
1945-Measurement and Testing Equipment	$64,371	$49,393	$38,569	$69,484	$56,125	$42,098	$31,034	$24,553	$20,008
1950-Power Operated Equipment	$—	$—	$—	$—	$—	$—	$—	$—	$—
1955-Communication Equipment	$1,085,216	$382,362	$323,006	$276,500	$245,866	$209,480	$177,190	$132,616	$89,033
1980-System Supervisory Equipment	$63,679	$141,983	$916,211	$1,177,820	$1,599,690	$1,698,760	$1,809,509	$1,879,698	$2,090,837
1990-Other Tangible Property	$59,396	$58,229	$43,761	$29,293	$14,824	$3,795	$—	$—	$—
1330-Major Spare Parts	$—	$—	$—	$—	$—	$—	$610,000	$610,000	$610,000
Gross General Plant	**$17,509,424**	**$16,723,526**	**$17,442,653**	**$17,971,027**	**$20,145,398**	**$19,444,164**	**$19,212,881**	**$21,511,531**	**$22,265,256**
Contributions and Grants									
1995-Contributions and Grants - Credit	($41,387,899)	($31,790,805)	($30,685,324)	($29,580,088)	($28,474,955)	($27,369,877)	($26,268,748)	($25,167,619)	($24,071,734)
2440-Deferred Revenue	$—	($9,600,373)	($12,184,686)	($14,736,029)	($16,330,098)	($18,148,700)	($20,547,338)	($22,952,033)	($24,803,006)
Gross Contributions and Grants	**($41,387,899)**	**($41,391,177)**	**($42,870,009)**	**($44,316,118)**	**($44,805,053)**	**($45,518,578)**	**($46,816,087)**	**($48,119,651)**	**($48,874,740)**
Net Assets for Rate Base	**$81,330,617**	**$78,555,576**	**$80,472,173**	**$84,650,411**	**$90,145,433**	**$92,801,873**	**$94,577,168**	**$102,916,088**	**$107,132,568**

2.6. Variance Analysis on Gross Assets

The tables below provide the variances from year to year; for the purposes of the variance analysis assets are categorized as Distribution Assets and General Plant for explanations. Milton Hydro collects a capital contribution on municipal and regional road work and subdivision development which accounts for the change. Capital contributions are not included in the Distribution Plant or the General Plant totals. Capital contributions are set out as a separate line items in each of the tables below.

Table 2-16 (2016 Actual vs. 2016 OEB Approved)

Description	2016 Actual	2016 OEB Approved	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,516,192	$1,516,192	$—
1830-Poles, Towers and Fixtures	$33,552,741	$34,382,028	($829,287)
1835-Overhead Conductors and Devices	$24,444,358	$25,838,905	($1,394,547)
1840-Underground Conduit	$27,235,707	$29,199,978	($1,964,271)
1845-Underground Conductors and Devices	$22,012,267	$20,665,087	$1,347,180
1850-Line Transformers	$42,439,093	$39,899,395	$2,539,698
1855-Services	$11,861,226	$16,506,215	($4,644,989)
1860-Meters	$12,794,792	$12,205,146	$589,646
Gross Distribution Assets	**$175,926,258**	**$180,282,829**	**($4,356,571)**
General Plant			
1609-Capital Contributions - Paid	$122,349	$122,349	
1611-Computer Software	$1,540,305	$696,813	$843,492
1905-Land	$4,040,000	$4,072,786	($32,786)
1908-Buildings and Fixtures	$10,243,141	$10,460,000	($216,859)
1910-Leasehold Improvements	$377,009	$—	$377,009
1920-Computer Equipment - Hardware	$2,104,597	$2,096,765	$7,832
1925-Computer Software	$—	$697,333	($697,333)
1915-Office Furniture and Equipment	$1,119,201	$1,114,886	$4,315
1930-Transportation Equipment	$3,207,129	$3,746,857	($539,728)
1935-Stores Equipment	$525,285	$403,345	$121,940
1940-Tools, Shop and Garage Equipment	$471,936	$478,545	($6,609)
1945-Measurement and Testing Equipment	$126,480	$126,481	($1)
1955-Communication Equipment	$623,995	$1,434,020	($810,025)
1980-System Supervisory Equipment	$203,644	$122,172	$81,472
1990-Other Tangible Property	$133,004	$133,004	$—
Gross General Plant	**$23,408,874**	**$24,276,154**	**($867,280)**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($56,958,639)	$9,842,971
2440-Deferred Revenue	($10,012,375)	$—	($10,012,375)
Gross Contributions and Grants	**($57,128,043)**	**($56,958,639)**	**($169,404)**
Gross assets for rate base	**$142,207,090**	**$147,600,344**	**($5,393,254)**

Gross Assets were lower by $5,393,254 from 2016 Actual to 2016 OEB Approved, primarily due to: (i) Lower distribution assets additions (net of disposals) of $4,356,571 corresponding to lower System Access expenditures such as customer driven projects (e.g. upgrades, new connections), deferral of Britannia Road widening to 2021; (ii) lower general plant additions (net of disposals) of $867,280 primarily attributable to: deferral of the replacement of a single bucket truck and boom aerial truck to 2017 and 2018, respectively, lower communication equipment related to the deferral of the WiMax communication tower, and the deferral of switch automation and Supervisory Control and Data Acquisition ("SCADA") tools to 2017; and (iii) higher contributions and grants of $169,404 due to system access investments driven by customers funded investments.

1 **Table 2-17 (2017 Actual vs. 2016 Actual)**

Description	2017 Actual	2016 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,012	$1,516,192	($61,180)
1830-Poles, Towers and Fixtures	$36,630,728	$33,552,741	$3,077,987
1835-Overhead Conductors and Devices	$22,755,608	$24,444,358	($1,688,750)
1840-Underground Conduit	$28,418,428	$27,235,707	$1,182,721
1845-Underground Conductors and Devices	$22,830,405	$22,012,267	$818,138
1850-Line Transformers	$42,725,694	$42,439,093	$286,601
1855-Services	$12,507,488	$11,861,226	$646,262
1860-Meters	$12,196,616	$12,794,792	($598,176)
Gross Distribution Assets	**$179,589,862**	**$175,926,258**	**$3,663,604**
General Plant			
1609-Capital Contributions - Paid	$122,349	$122,349	$—
1611-Computer Software	$2,027,738	$1,540,305	$487,433
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$10,317,696	$10,243,141	$74,555
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,175,232	$2,104,597	$70,635
1915-Office Furniture and Equipment	$1,124,974	$1,119,201	$5,773
1930-Transportation Equipment	$3,291,847	$3,207,129	$84,718
1935-Stores Equipment	$531,285	$525,285	$6,000
1940-Tools, Shop and Garage Equipment	$502,864	$471,936	$30,928
1945-Measurement and Testing Equipment	$126,480	$126,480	$—
1955-Communication Equipment	$637,227	$623,995	$13,232
1980-System Supervisory Equipment	$1,022,719	$203,644	$819,075
1990-Other Tangible Property	$133,004	$133,004	$—
Gross General Plant	**$25,001,221**	**$23,408,874**	**$1,592,347**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($12,891,890)	($10,012,375)	($2,879,515)
Gross Contributions and Grants	**($60,007,558)**	**($57,128,043)**	**($2,879,515)**
Gross assets for rate base	**$144,583,525**	**$142,207,090**	**$2,376,435**

Gross Assets increased by $2,376,435 from 2017 Actual to 2016 Actual, primarily due to: (i) Distribution assets additions (net of disposals) of $3,663,604 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, city road widening work, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $1,592,347 are primarily attributable to: investment in wireless SCADA systems to monitor and control field devices; replacement of lightweight vehicles; software purchases to manage the IT infrastructure and to support operations and administrative processes; partially offset by (iii) Contributions and grants of $2,879,515 driven by system access investments driven by customers funded investments.

Table 2-18 (2018 Actual vs. 2017 Actual)

Description	2018 Actual	2017 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,992	$1,455,012	$980
1830-Poles, Towers and Fixtures	$38,027,523	$36,630,728	$1,396,795
1835-Overhead Conductors and Devices	$23,693,325	$22,755,608	$937,717
1840-Underground Conduit	$29,887,549	$28,418,428	$1,469,121
1845-Underground Conductors and Devices	$23,738,660	$22,830,405	$908,255
1850-Line Transformers	$44,179,011	$42,725,694	$1,453,317
1855-Services	$13,347,597	$12,507,488	$840,109
1860-Meters	$13,251,336	$12,196,616	$1,054,720
Gross Distribution Assets	**$187,650,877**	**$179,589,862**	**$8,061,015**
General Plant			
1609-Capital Contributions - Paid	$122,349	$122,349	$—
1611-Computer Software	$2,578,486	$2,027,738	$550,748
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$10,373,528	$10,317,696	$55,832
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,256,903	$2,175,232	$81,671
1915-Office Furniture and Equipment	$1,131,656	$1,124,974	$6,682
1930-Transportation Equipment	$3,445,848	$3,291,847	$154,001
1935-Stores Equipment	$539,762	$531,285	$8,477
1940-Tools, Shop and Garage Equipment	$646,121	$502,864	$143,257
1945-Measurement and Testing Equipment	$169,936	$126,480	$43,456
1955-Communication Equipment	$637,227	$637,227	$—
1980-System Supervisory Equipment	$1,360,269	$1,022,719	$337,550
1990-Other Tangible Property	$133,004	$133,004	$—
Gross General Plant	**$26,382,895**	**$25,001,221**	**$1,381,674**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($15,812,208)	($12,891,890)	($2,920,318)
Gross Contributions and Grants	**($62,927,876)**	**($60,007,558)**	**($2,920,318)**
Gross assets for rate base	**$151,105,896**	**$144,583,525**	**$6,522,371**

Gross Assets increased by $6,522,371 from 2018 Actual to 2017 Actual, primarily due to: (i) Distribution assets additions (net of disposals) of $8,061,015 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections, relocation services), subdivision development, meter replacement and installation of new metering assets, city road widening work, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, outage detection equipment, replacement of damaged equipment due to adverse weather, distribution system automation tools, the start of the new feeder installation from Tremaine TS to support load growth; and (ii) general plant additions (net of disposals) of $1,381,674 primarily attributable to: replacement of Boom Derrick truck; software purchases to manage the IT infrastructure and to support operations and administrative processes, CYME power engineering software, investment in a standby generator for the office and operations centre; partially offset by (iii) contributions and grants of $2,920,318 driven by system access investments driven by customers funded investments.

Table 2-19 (2019 Actual vs. 2018 Actual)

Description	2019 Actual	2018 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,992	$1,455,992	$—
1830-Poles, Towers and Fixtures	$38,893,962	$38,027,523	$866,439
1835-Overhead Conductors and Devices	$24,480,042	$23,693,325	$786,717
1840-Underground Conduit	$31,796,902	$29,887,549	$1,909,353
1845-Underground Conductors and Devices	$24,948,042	$23,738,660	$1,209,382
1850-Line Transformers	$45,279,459	$44,179,011	$1,100,448
1855-Services	$13,935,236	$13,347,597	$587,639
1860-Meters	$13,891,731	$13,251,336	$640,395
Gross Distribution Assets	**$194,751,249**	**$187,650,877**	**$7,100,372**
General Plant			
1609-Capital Contributions - Paid	$2,087,341	$122,349	$1,964,992
1611-Computer Software	$2,785,834	$2,578,486	$207,348
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$10,737,748	$10,373,528	$364,220
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,363,401	$2,256,903	$106,498
1915-Office Furniture and Equipment	$1,131,656	$1,131,656	$—
1930-Transportation Equipment	$3,501,517	$3,445,848	$55,669
1935-Stores Equipment	$566,175	$539,762	$26,413
1940-Tools, Shop and Garage Equipment	$698,716	$646,121	$52,595
1945-Measurement and Testing Equipment	$170,762	$169,936	$826
1955-Communication Equipment	$650,854	$637,227	$13,627
1980-System Supervisory Equipment	$1,891,796	$1,360,269	$531,527
1990-Other Tangible Property	$133,004	$133,004	$—
Gross General Plant	**$29,706,612**	**$26,382,895**	**$3,323,717**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($17,837,568)	($15,812,208)	($2,025,360)
Gross Contributions and Grants	**($64,953,236)**	**($62,927,876)**	**($2,025,360)**
Gross assets for rate base	**$159,504,624**	**$151,105,896**	**$8,398,728**

Gross Assets increased by $8,398,728 from 2019 Actual to 2018 Actual, primarily due to: (i) Distribution assets additions (net of disposals) of $7,100,372 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, city road widening work at Britannia, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $3,323,717 primarily attributable to: capital contributions paid to Hydro One to install feeders at Tremaine TS to support load growth, replacement of lightweight vehicles; software purchases to manage the IT infrastructure and to support operations and administrative processes; partially offset by (iii) Contributions and grants of $2,025,360 driven by system access investments driven by customers funded investments.

Table 2-20 (2020 Actual vs. 2019 Actual)

Description	2020 Actual	2019 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,992	$1,455,992	$—
1830-Poles, Towers and Fixtures	$41,028,957	$38,893,962	$2,134,995
1835-Overhead Conductors and Devices	$26,253,006	$24,480,042	$1,772,964
1840-Underground Conduit	$32,537,017	$31,796,902	$740,115
1845-Underground Conductors and Devices	$25,500,283	$24,948,042	$552,241
1850-Line Transformers	$46,514,047	$45,279,459	$1,234,588
1855-Services	$14,308,308	$13,935,236	$373,072
1860-Meters	$14,385,203	$13,891,731	$493,472
Gross Distribution Assets	**$202,052,696**	**$194,751,249**	**$7,301,447**
General Plant			
1609-Capital Contributions - Paid	$2,203,233	$2,087,341	$115,892
1611-Computer Software	$2,856,660	$2,785,834	$70,826
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$10,767,883	$10,737,748	$30,135
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,447,187	$2,363,401	$83,786
1915-Office Furniture and Equipment	$1,134,341	$1,131,656	$2,685
1930-Transportation Equipment	$3,501,517	$3,501,517	$—
1935-Stores Equipment	$575,918	$566,175	$9,743
1940-Tools, Shop and Garage Equipment	$716,759	$698,716	$18,043
1945-Measurement and Testing Equipment	$170,762	$170,762	$—
1955-Communication Equipment	$659,961	$650,854	$9,107
1980-System Supervisory Equipment	$2,124,119	$1,891,796	$232,323
1990-Other Tangible Property	$133,004	$133,004	$—
Gross General Plant	**$30,279,153**	**$29,706,612**	**$572,541**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($20,140,616)	($17,837,568)	($2,303,048)
Gross Contributions and Grants	**($67,256,284)**	**($64,953,236)**	**($2,303,048)**
Gross assets for rate base	**$165,075,566**	**$159,504,624**	**$5,570,942**

Gross Assets increased by $5,570,942 from 2020 Actual to 2019 Actual, primarily due to: (i) Distribution assets additions (net of disposals) of $7,301,447 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, city road reconstruction work at Britannia and Tremaine, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $572,541 primarily attributable to: replacement of lightweight vehicles; software purchases to manage the IT infrastructure and to support operations and administrative processes, investments in the building at 200 Chisholm Road, major tools and equipment to support field operations; partially offset by (iii) Contributions and grants of $2,303,048 driven by system access investments driven by customers funded investments.

Table 2-21 (2021 Actual vs. 2020 Actual)

Description	2021 Actual	2020 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,992	$1,455,992	$—
1830-Poles, Towers and Fixtures	$41,892,299	$41,028,957	$863,342
1835-Overhead Conductors and Devices	$26,964,238	$26,253,006	$711,232
1840-Underground Conduit	$34,088,150	$32,537,017	$1,551,133
1845-Underground Conductors and Devices	$26,434,621	$25,500,283	$934,338
1850-Line Transformers	$47,832,478	$46,514,047	$1,318,431
1855-Services	$15,034,867	$14,308,308	$726,559
1860-Meters	$15,304,660	$14,385,203	$919,457
Gross Distribution Assets	**$209,077,188**	**$202,052,696**	**$7,024,492**
General Plant			
1609-Capital Contributions - Paid	$2,009,006	$2,203,233	($194,227)
1611-Computer Software	$2,926,484	$2,856,660	$69,824
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$10,767,883	$10,767,883	$—
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,539,334	$2,447,187	$92,147
1915-Office Furniture and Equipment	$1,134,341	$1,134,341	$—
1930-Transportation Equipment	$3,552,461	$3,501,517	$50,944
1935-Stores Equipment	$575,918	$575,918	$—
1940-Tools, Shop and Garage Equipment	$756,313	$716,759	$39,554
1945-Measurement and Testing Equipment	$170,762	$170,762	$—
1955-Communication Equipment	$673,100	$659,961	$13,139
1980-System Supervisory Equipment	$2,383,544	$2,124,119	$259,425
1990-Other Tangible Property	$133,004	$133,004	$—
1330-Major Spare Parts	$610,000	$—	$610,000
Gross General Plant	**$31,219,959**	**$30,279,153**	**$940,806**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($23,087,850)	($20,140,616)	($2,947,234)
Gross Contributions and Grants	**($70,203,518)**	**($67,256,284)**	**($2,947,234)**
Gross assets for rate base	**$170,093,630**	**$165,075,566**	**$5,018,064**

Gross Assets increased by $5,018,064 from 2021 Actual to 2020 Actual, primarily due to: (i) Distribution assets additions (net of disposals) of $7,024,492 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, road construction work at Britannia, road construction work at Fifth and Main, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $940,806 primarily attributable to: replacement of lightweight vehicles; software purchases to manage the IT infrastructure and to support operations and administrative processes, major tools and equipment to support field operations; partially offset by (iii) Contributions and grants of $2,947,234 driven by system access investments driven by customers funded investments.

Table 2-22 (2022 Bridge Year vs. 2021 Actual)

Description	2022 Bridge Year	2021 Actual	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,455,992	$1,455,992	$—
1830-Poles, Towers and Fixtures	$43,366,072	$41,892,299	$1,473,773
1835-Overhead Conductors and Devices	$28,923,786	$26,964,238	$1,959,548
1840-Underground Conduit	$35,755,731	$34,088,150	$1,667,581
1845-Underground Conductors and Devices	$27,550,486	$26,434,621	$1,115,865
1850-Line Transformers	$50,019,686	$47,832,478	$2,187,208
1855-Services	$15,811,629	$15,034,867	$776,762
1860-Meters	$18,125,335	$15,304,660	$2,820,675
Gross Distribution Assets	**$221,078,601**	**$209,077,188**	**$12,001,413**
General Plant			
1609-Capital Contributions - Paid	$2,009,006	$2,009,006	$—
1611-Computer Software	$3,473,544	$2,926,484	$547,060
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$11,360,883	$10,767,883	$593,000
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,656,834	$2,539,334	$117,500
1915-Office Furniture and Equipment	$1,134,341	$1,134,341	$—
1930-Transportation Equipment	$4,303,961	$3,552,461	$751,500
1935-Stores Equipment	$595,918	$575,918	$20,000
1940-Tools, Shop and Garage Equipment	$786,313	$756,313	$30,000
1945-Measurement and Testing Equipment	$170,762	$170,762	$—
1955-Communication Equipment	$673,100	$673,100	$—
1980-System Supervisory Equipment	$2,618,896	$2,383,544	$235,352
1990-Other Tangible Property	$133,004	$133,004	$—
1330-Major Spare Parts	$625,250	$610,000	$15,250
Gross General Plant	**$34,958,823**	**$31,219,959**	**$3,738,864**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($26,111,919)	($23,087,850)	($3,024,069)
Gross Contributions and Grants	**($73,227,587)**	**($70,203,518)**	**($3,024,069)**
Gross assets for rate base	**$182,809,837**	**$170,093,630**	**$12,716,207**

Gross Assets increased by $12,716,207 from 2022 Bridge Year to 2021 Actual, primarily due to:

• Distribution assets additions (net of disposals) of $12,001,413 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, 13.8kV conversion and regulator replacement program, pole and line relocation work at Britannia, pole line construction at Derry Road and Fifth Line, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $3,738,864 primarily attributable to: replacement of a lightweight vehicle, replacement of squirt boom ariel truck, replacement of a backyard RBD/ tension machine, facility investments to construct the Control Room, Human Resource Information System to support the management of human capital, omni-channel platform to enhance the customer experience, and an Enterprise service ticketing system to automate and structure the information technology support process, software purchases to manage the IT infrastructure and to support operations and administrative processes; partially offset by (iii) Contributions and grants of $3,024,069 driven by system access investments driven by customers funded investments.

Table 2-23 (2023 Test Year vs. 2022 Bridge Year)

Description	2023 Test Year	2022 Bridge Year	Variance ($) - increase/ (decrease)
Distribution Assets			
1805-Land	$69,883	$69,883	$—
1820-Dist Station Equip - Normally Primary below 50 kV	$1,655,992	$1,455,992	$200,000
1830-Poles, Towers and Fixtures	$44,847,071	$43,366,072	$1,480,999
1835-Overhead Conductors and Devices	$30,110,858	$28,923,786	$1,187,072
1840-Underground Conduit	$36,000,731	$35,755,731	$245,000
1845-Underground Conductors and Devices	$28,388,400	$27,550,486	$837,914
1850-Line Transformers	$52,202,766	$50,019,686	$2,183,080
1855-Services	$16,183,283	$15,811,629	$371,654
1860-Meters	$20,565,259	$18,125,335	$2,439,924
Gross Distribution Assets	**$230,024,243**	**$221,078,601**	**$8,945,642**
General Plant			
1609-Capital Contributions - Paid	$2,009,006	$2,009,006	$—
1611-Computer Software	$4,024,984	$3,473,544	$551,440
1905-Land	$4,040,000	$4,040,000	$—
1908-Buildings and Fixtures	$11,879,883	$11,360,883	$519,000
1910-Leasehold Improvements	$377,009	$377,009	$—
1920-Computer Equipment - Hardware	$2,751,334	$2,656,834	$94,500
1915-Office Furniture and Equipment	$1,134,341	$1,134,341	$—
1930-Transportation Equipment	$4,754,961	$4,303,961	$451,000
1935-Stores Equipment	$625,918	$595,918	$30,000
1940-Tools, Shop and Garage Equipment	$831,313	$786,313	$45,000
1945-Measurement and Testing Equipment	$170,762	$170,762	$—
1955-Communication Equipment	$673,100	$673,100	$—
1980-System Supervisory Equipment	$3,016,289	$2,618,896	$397,393
1990-Other Tangible Property	$133,004	$133,004	$—
1330-Major Spare Parts	$640,500	$625,250	$15,250
Gross General Plant	**$37,062,406**	**$34,958,823**	**$2,103,583**
Contributions and Grants			
1995-Contributions and Grants - Credit	($47,115,668)	($47,115,668)	$—
2440-Deferred Revenue	($28,651,305)	($26,111,919)	($2,539,386)
Gross Contributions and Grants	**($75,766,973)**	**($73,227,587)**	**($2,539,386)**
Gross assets for rate base	**$191,319,676**	**$182,809,837**	**$8,509,839**

Gross Assets increased by $8,509,839 from 2023 Test Year to 2022 Bridge Year, primarily due to: (i) Distribution assets additions (net of disposals) of $8,945,642 correspond to investments driven by System Access, System Renewal, and System Service projects. These investments include customer driven projects (e.g. upgrades, new connections), subdivision development, meter replacement, city road widening work, road construction work, replacement of end-of-life distribution assets (e.g. poles, primary and secondary cables, switchgear, transformers), distribution system renewal projects to mitigate reliability resulting from asset failures and outages, system automation tools; and (ii) General plant additions (net of disposals) of $2,103,583 primarily attributable to: replacement of a Sprinter Cargo van, replacement of lightweight vehicles, replacement of a single bucket truck, facility investments to transform the 200 Chisholm property to support the growth of new hires expected in the five-year planning period, investment in process automation tools and platforms to explore and exploit technology capabilities to support and achieve process efficiencies, software purchases to manage the IT infrastructure and to support operations and administrative processes; partially offset by (iii) Contributions and grants of $2,539,386 driven by system access investments driven by customers funded investments.

2.7. SUMMARY OF INCREMENTAL CAPITAL MODULE ADJUSTMENT

Milton Hydro confirms that it has not applied for nor received any Incremental Capital Module ("ICM") adjustments as part of a previous Incentive Rate-setting Mechanism ("IRM") application.

RECONCILIATION OF CONTINUITY STATEMENTS TO CALCULATE DEPRECIATION EXPENSES

Milton Hydro confirms that the depreciation expenses in the fixed asset continuity statements reconcile to the calculated depreciation expenses under EXHIBIT 4.6 and are presented by account. As such there are no reconciling items between the fixed asset continuity statements in this Exhibit and the calculated depreciation expense in EXHIBIT 4.6.

2.8. WORKING CAPITAL CALCULATION

2.8.1. Overview

The Filing Requirements permit applicants to take one of two approaches for the calculation of the allowance for working capital: the default value of 7.5% Allowance or the filing of a lead/lag study. Using the 7.5% Allowance, the WCA is calculated to be 7.5% of the sum of COP and controllable expenses (Operations, Maintenance, Billing and Collecting, Community Relations, Administration and General). Milton Hydro did not conduct a lead lag study and is using the default value of 7.5% working capital allowance. The use of a 7.5% rate is consistent with the OEB's letter dated June 3, 2015 and the Chapter 2 Filing Requirements as issued by the OEB.

The working capital allowance for the 2023 Test Year is based upon 7.5% of the COP and controllable expenses.

Table 2-24 below provides a summary of Milton Hydro's COP and controllable expenses used to calculate working capital allowance for the 2016 OEB Approved, 2016 Actual, 2017 Actual, 2018 Actual, 2019 Actual, 2020 Actual, 2021 Actual, 2022 Bridge Year, and 2023 Test Year.

Table 2-24 Summary of Working Capital Allowance

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year	Variance 2016 OEB Approved
Cost of Power	$113,559,514	$114,269,832	$102,862,811	$102,620,246	$104,932,738	$95,541,894	$92,030,478	$101,667,369	$98,955,674	$(14,603,840)
Operations	$1,993,286	$2,048,998	$1,897,672	$1,968,811	$2,083,159	$2,152,220	$2,787,520	$2,603,643	$3,803,779	$1,810,493
Maintenance	$1,583,125	$1,748,350	$1,437,233	$1,804,161	$1,890,242	$1,728,590	$1,960,504	$1,688,242	$1,568,935	$(14,190)
Billing & Collecting	$1,924,409	$1,823,188	$1,928,847	$1,786,132	$1,783,154	$1,877,132	$1,852,684	$2,092,792	$2,191,670	$267,261
Community Relations	$20,071	$8,680	$14,094	$10,120	$9,650	$17,500	$8,094	$94,100	$115,837	$95,766
Administration & General Exp.	$4,051,557	$4,024,379	$3,663,400	$3,919,016	$4,315,753	$4,801,264	$5,501,136	$6,375,891	$7,453,317	$3,401,760
Working Capital	**$123,131,962**	**$123,923,427**	**$111,804,057**	**$112,108,486**	**$115,014,696**	**$106,118,600**	**$104,140,416**	**$114,522,037**	**$114,089,212**	**$(9,042,750)**

The 2023 Test Year working capital has decreased $9,042,750, or 7.9%, relative to the 2016 OEB Approved year; principally attributable to: (i) the decrease in COP which comprises 86.7% of the work capital balance of $14,603,840; partially offset by (ii) increases in controllable expenses of $5,561,090.

The 2023 Test Year working capital allowance has decreased $678,206, or 7.3%, relative to the 2016 OEB Approved year, principally attributable to: (i) the decrease in COP of $1,095,288; partially offset by (ii) increases in controllable expenses of $417,082.

2.8.2. COST OF POWER CALCULATIONS

Milton Hydro has calculated COP for the 2023 Test Year based upon the 2023 load forecast, adjusted for the impact of Conservation and Demand Management activities and in accordance with the Board's Filing Requirements. A summary of the total COP is provided in the Table below.

Table 2-25 Cost of Power Summary

Description	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Power Purchased	$96,458,249	$96,592,280	$86,483,481	$85,966,522	$90,271,828	$106,379,318	$92,119,820	$92,378,197	$89,828,880
Less Ontario Electricity Rebate (OER)	$0	$0	$0		$(1,733,427)	$(27,867,823)	$(18,195,106)	$(10,216,596	$(9,900,029)
Total Cost of Power net of OER	**$96,458,249**	**$96,592,280**	**$86,483,481**	**$85,966,522**	**$88,538,401**	**$78,511,495**	**$73,924,714**	**$82,161,601**	**$79,928,851**
Wholesale Market Service/RRP	$5,409,171	$5,346,254	$4,433,209	$3,696,507	$3,601,796	$3,617,474	$3,682,563	$3,695,650	$3,579,866
Network	$6,060,184	$6,530,405	$6,069,672	$6,322,309	$6,225,489	$6,643,167	$7,494,040	$8,278,870	$8,082,798
Connection	$4,750,218	$5,172,065	$5,000,077	$5,805,075	$5,737,954	$5,929,562	$6,081,246	$6,195,357	$6,047,380
LV Charges	$535,000	$286,930	$527,760	$557,000	$556,605	$562,853	$567,299	$1,047,432	$1,022,129
Smart Meter Entity Charge	$346,693	$341,897	$348,611	$272,833	$272,493	$277,343	$280,616	$288,459	$294,650
Total Cost of Power	**$113,559,514**	**$114,269,831**	**$102,862,810**	**$102,620,246**	**$104,932,738**	**$95,541,894**	**$92,030,478**	**$101,667,369**	**$98,955,674**

2.8.3. Commodity Prices

In accordance with the Filing Requirements, the commodity price estimate used to calculate COP was determined in a way that bases the split between Regulated Price Plan ("RPP") and non-RPP customers on actual data and uses the most current RPP price.

The RPP and non-RPP price was obtained from the Regulated Price Plan Price Report for the period of November 1, 2021 to October 31, 2022 published by the OEB October 21, 2021. For the purposes of calculating the 2023 Test Year, Milton Hydro has used an estimate of $0.10354 per kWh for RPP customers. For non-RPP customers, Milton Hydro has used $0.10253 per kWh which includes $0.03375 per kWh for the Wholesale Electricity Price and $0.06878 per kWh for Global Adjustment charges.

Milton Hydro understands that the commodity charge will be updated to reflect any changes to commodity prices that may become available prior to the approval of its Application.

2.8.4. Regulatory Charges

The Wholesale Market Service ("WMS") Charges for the 2023 Test Year were calculated based on the OEB Decision and Rate Order corrected December 16, 2021 EB-2021-0042, effective

January 1, 2022, which retains the Rural Rate Protection Charge at $0.0005 per kWh, the WMS Rate currently at $0.0030 per kWh, and the Capacity Based Recovery Rate at $0.0004 per kWh; all to remain effective January 1, 2023 as well. The Wholesale Market Service Costs have been very stable for a number of years so it was determined that no change is required for 2023. These rates were applied to the forecasted power purchases for the 2023 Test Year.

2.8.5. Network and Connection Charges

Milton Hydro incurs Network and Connection charges from the IESO, Hydro One, and Oakville Hydro. For the purposes of determining the wholesale Transmission Network and Connection cost for the 2023 Test Year, Milton Hydro used the 2022 Retail Transmission Service Rates ("RTSR") by class multiplied by the 2023 forecasted billing determinants. Milton Hydro will update its Network and Connection Charges on its Draft Rate Order if there are more current RTSRs available when the OEB renders its decision.

2.8.6. Low Voltage Charges

Milton Hydro incurs low voltage charges from Hydro One, and Oakville Hydro. For the purposes of determining the wholesale Low Voltage charges for the 2023 Test Year, Milton Hydro used the 2022 OEB approved Low Voltage Service Rates ("LVSR") by class multiplied by the 2023 forecasted billing determinants.Milton Hydro will update its Low Voltage Charges on its Draft Rate Order if there are more current LVSRs available when the OEB renders its decision.

2.8.7. Smart Meter Entity Charges

On March 1, 2018, the OEB issued a Decision and Order (EB-2017-0290) approving a Smart Metering Entity ("SME") charge of $0.57 per month for Residential and General Service < 50 kW customers effective 2018 to 2022. Milton Hydro has reflected a Smart Metering charge of $0.57 per month in this Application and will update the charge if a decision on 2023 SME charges is rendered in time before this decision.

The following table provides a summary of the COP calculation for the 2023 Test Year.

Table 2-26 Appendices 2-ZB - Cost of Power Calculation

		2023 Test Year	RPP		2023 Test Year	non-RPP		Total
Electricity Commodity Class per Load Forecast	Units	Volume	Rate	$	Volume	Rate	$	$
Residential	kWh	360,691,030		$37,345,949	6,233,354		$210,376	
General Service < 50 kW	kWh	83,995,008		$8,696,843	7,298,818		$246,335	
General Service 50 - 999 kW	kWh	21,346,101		$2,210,175	207,992,048		$7,019,732	
General Service 1000 - 4999 kW	kWh	—		$—	107,005,701		$3,611,442	
Large Users	kWh	—		$—	131,524,694		$4,438,958	
Street Lights	kWh	—		$—	5,269,960		$177,861	
Unmetered/Scattered	kWh	1,108,261		$114,749	—		$—	
Sentinel Lights	kWh	139,941		$14,489	—		$—	
SUB-TOTAL				**$48,382,206**			**$15,704,704**	**$64,086,911**
Global Adjustment non-RPP Class per Load Forecast	Units	Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh			$—			$428,730	
General Service < 50 kW	kWh			$—			$502,013	
General Service 50 - 999 kW	0			$—			$14,038,212	
General Service 1000 - 4999 kW	0			$—			$4,811,824	
Large Users	0			$—			$5,598,722	
Street Lights	0			$—			$362,468	
Unmetered/Scattered	0			$—			$—	
Sentinel Lights	0			$—			$—	
SUB-TOTAL				**$—**			**$25,741,969**	**$25,741,969**
Transmission -Network Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh	360,691,030	$0.0090	$3,246,219	6,233,354	$0.0090	$56,100	
General Service < 50 kW	kWh	83,995,008	$0.0081	$680,360	7,298,818	$0.0081	$59,120	
General Service 50 - 999 kW	kW	55,403	$3.6525	$202,358	539,833	$3.6525	$1,971,740	
General Service 1000 - 4999 kW	kW	—	$0.0000	$—	225,594	$3.5922	$810,378	
Large Users	kW	—	$0.0000	$—	260,034	$3.8900	$1,011,533	
Street Lights	kW	—	$2.4736	$—	14,179	$2.4736	$35,073	
Unmetered/Scattered	kWh	1,108,261	$0.0081	$8,977	—	$0.0000	$—	
Sentinel Lights	kW	378	$2.4866	$940	—	$0.0000	$—	
SUB-TOTAL		**445,850,080**		**$4,138,854**	**14,571,812**		**$3,943,945**	**$8,082,798**
Transmission - Connection Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh	360,691,030	$0.0067	$2,416,630	6,233,354	$0.0067	$41,763	
General Service < 50 kW	kWh	83,995,008	$0.0060	$503,970	7,298,818	$0.0060	$43,793	
General Service 50 - 999 kW	kW	55,403	$2.7264	$151,050	539,833	$2.7264	$1,471,800	
General Service 1000 - 4999 kW	kW	—	$0.0000	$—	225,594	$2.6821	$605,065	
Large Users	kW	—	$0.0000	$—	260,034	$2.9994	$779,946	
Street Lights	kW	—	$1.8340	$—	14,179	$1.8340	$26,004	
Unmetered/Scattered	kWh	1,108,261	$0.0060	$6,650	—	$0.0000	$—	
Sentinel Lights	kW	378	$1.8726	$708	—	$0.0000	$—	
SUB-TOTAL		**445,850,080**		**$3,079,007**	**14,571,812**		**$2,968,373**	**$6,047,380**
Wholesale Market Service Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total

		2023 Test Year	RPP		2023 Test Year	non-RPP		Total
Residential	kWh	360,691,030	$0.0030	$1,082,073	6,233,354	$0.0030	$18,700	
General Service < 50 kW	kWh	83,995,008	$0.0030	$251,985	7,298,818	$0.0030	$21,896	
General Service 50 - 999 kW	kWh	21,346,101	$0.0030	$64,038	207,992,048	$0.0030	$623,976	
General Service 1000 - 4999 kW	kWh	—	$0.0030	$—	107,005,701	$0.0030	$321,017	
Large Users	kWh	—	$0.0030	$—	131,524,694	$0.0030	$394,574	
Street Lights	kWh	—	$0.0030	$—	5,269,960	$0.0030	$15,810	
Unmetered/Scattered	kWh	1,108,261	$0.0030	$3,325	—	$0.0030	$—	
Sentinel Lights	kWh	139,941	$0.0030	$420	—	$0.0030	$—	
SUB-TOTAL		**467,280,341**		**$1,401,841**	**465,324,575**		**$1,395,974**	**$2,797,815**

Class A CBR Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh			$—	—	$0.0000	$—	
General Service < 50 kW	kWh			$—	—	$0.0000	$—	
General Service 50 - 999 kW	kWh			$—	10,024,604	$0.0002	$1,627	
General Service 1000 - 4999 kW	kWh			$—	104,207,401	$0.0002	$17,804	
Large Users	kWh			$—	131,524,694	$0.0002	$21,579	
Street Lights	kWh			$—	—	$0.0000	$—	
Unmetered/Scattered	kWh			$—	—	$0.0000	$—	
Sentinel Lights	kWh			$—	—	$0.0000	$—	
SUB-TOTAL				**$—**	**245,756,699**		**$41,010**	**$41,010**

Class B CBR Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh	360,691,030	$0.0004	$144,276	6,233,354	$0.0004	$2,493	
General Service < 50 kW	kWh	83,995,008	$0.0004	$33,598	7,298,818	$0.0004	$2,920	
General Service 50 - 999 kW	kWh	21,346,101	$0.0004	$8,538	197,967,444	$0.0004	$79,187	
General Service 1000 - 4999 kW	kWh	—	$0.0004	$—	2,798,300	$0.0004	$1,119	
Large Users	kWh	—	$0.0004	$—	—	$0.0004	$—	
Street Lights	kWh	—	$0.0004	$—	5,269,960	$0.0004	$2,108	
Unmetered/Scattered	kWh	1,108,261	$0.0004	$443	—	$0.0004	$—	
Sentinel Lights	kWh	139,941	$0.0004	$56	—	$0.0004	$—	
SUB-TOTAL		**467,280,341**		**$186,912**	**219,567,876**		**$87,827**	**$274,739**

RRRP Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh	360,691,030	$0.0005	$180,346	6,233,354	$0.0005	$3,117	
General Service < 50 kW	kWh	83,995,008	$0.0005	$41,998	7,298,818	$0.0005	$3,649	
General Service 50 - 999 kW	kWh	21,346,101	$0.0005	$10,673	207,992,048	$0.0005	$103,996	
General Service 1000 - 4999 kW	kWh	—	$0.0005	$—	107,005,701	$0.0005	$53,503	
Large Users	kWh	—	$0.0005	$—	131,524,694	$0.0005	$65,762	
Street Lights	kWh	—	$0.0005	$—	5,269,960	$0.0005	$2,635	
Unmetered/Scattered	kWh	1,108,261	$0.0005	$554	—	$0.0005	$—	
Sentinel Lights	kWh	139,941	$0.0005	$70	—	$0.0005	$—	
SUB-TOTAL				**$233,640**			**$232,662**	**$466,302**

Low Voltage - No TLF adjustment Class per Load Forecast		Volume	Rate	$	Volume	Rate	$	Total
Residential	kWh	347,654,005	$0.0012	$417,185	6,008,052	$0.0012	$7,210	
General Service < 50 kW	kWh	80,959,044	$0.0010	$80,959	7,035,006	$0.0010	$7,035	
General Service 50 - 999 kW	kW	55,403	$0.4570	$25,319	539,833	$0.4570	$246,704	
General Service 1000 - 4999 kW	kW	—	$0.0000	$—	225,594	$0.4496	$101,427	
Large Users	kW	—	$0.0000	$—	260,034	$0.5028	$130,745	
Street Lights	kW	—	$0.3074	$—	14,179	$0.3074	$4,359	
Unmetered/Scattered	kWh	1,068,203	$0.0010	$1,068	—	$0.0010	$—	
Sentinel Lights	kW	378	$0.3139	$119	—	$0.3139	$—	

SUB-TOTAL				**$524,650**			**$497,479**	**$1,022,129**
Residential				$—			$—	
General Service < 50 kW				$—			$—	
General Service 50 - 999 kW				$—			$—	
General Service 1000 - 4999 kW				$—			$—	
Large Users				$—			$—	
Street Lights				$—			$—	
Unmetered/Scattered				$—			$—	
Sentinel Lights				$—			$—	
SUB-TOTAL				**$—**			**$—**	**$—**
Smart Meter Entity Charge Class per Load Forecast		**Customers**	**Rate**	**$**	**Customers**	**Rate**	**$**	**Total**
Residential		39,407	$0.5700	$269,541	681	$0.5700	$4,658	$274,199
General Service < 50 kW		2,751	$0.5700	$18,816	239	$0.5700	$1,635	$20,451
SUB-TOTAL				**$288,357**			**$6,293**	**$294,650**
SUB- TOTAL				**$58,235,468**			**$50,620,236**	**$108,855,703**
OER CREDIT	0.17			($9,900,029)				($9,900,029)
TOTAL				**$48,335,438**			**$50,620,236**	**$98,955,674**
					Less Distribution Revenue			—
					Total Cost of Power Net of OER			**$98,955,674**

2.9. TREATMENT OF STRANDED ASSETS RELATED TO SMART METER DEPLOYMENT

On February 11, 2011 the OEB issued its Decision and Order on Milton Hydro's 2011 Cost of Service Application (EB-2010-0137) which included Milton Hydro's recovery of costs associated with stranded meters. Accordingly, Milton Hydro is not seeking recovery of stranded meter costs in this application.

Since stranded meter costs were recovered in a previous Cost of Service filing, Milton Hydro has not filed Appendix 2-S Stranded Meter Treatment.

2.10. CAPITAL EXPENDITURES

2.10.1. Distribution System Plan

In accordance with the Chapter 2 Filing Requirements, Milton Hydro is filing its consolidated Distribution System Plan ("DSP") as a stand-alone and self-sufficient document as Attachment 2-2 of Exhibit 2. Milton Hydro has prepared its DSP in accordance with the OEB's Filing Requirements For Electricity Distribution Rate Applications – 2021 Edition for 2022 Rate

Applications - Chapter 5 Consolidated Distribution System Plan dated June 24, 2021 (the "DSP Filing Requirements") as part of this Application. This DSP is organized using the same section headings indicated in the DSP Filing Requirements.

The DSP incorporates matters pertaining to third party and customer consultations, regional planning, asset management and renewable energy generation. All categories of system investments, including System Renewal, System Access, System Service, and General Plant have been addressed and consolidated in Milton Hydro's capital expenditure plan. Milton Hydro provided historical spending by material capital project in the categories mentioned for 2016 – 2021 Historical Actual, 2022 Bridge and 2023 Test Years.

REQUIRED INFORMATION

Summary of Capital Expenditures

Milton Hydro has completed Appendix 2-AB Capital Expenditure Summary presenting six historical years 2016 to 2021, 2022 Bridge Year and 2023 Test Year as well as five years of planned capital expenditures for 2023 to 2027. Historical years are categorized to the best of Milton Hydro's efforts. Table 2-27 below provides the Appendix 2-AB.

The annual capital expenditures include all new spending that is in service in the fiscal period. Costs for projects that are considered WIP at the end of a fiscal year are not captured in the year spent, but rather capitalized in the year the asset comes into service. The variance between the annual capital expenditure totals in the table and the total 'additions' in the continuity schedules are those applicable to WIP and contributed capital. Milton Hydro has not recorded any WIP for the 2022 Bridge Year and the 2023 Test Year as all projects are expected to be in service in the year the capital is spent.

The following information provides a brief outline of the outputs of the asset management and capital expenditure planning process that have affected capital expenditures in each of the four main major categories and overall allocation of the capital budget.

System Access

System Access investments are modifications (including asset relocation) to the distribution system that a distributor is obligated to perform to provide a customer (including a generator customer) or group of customers with access to electricity services via the distribution system.

Spending is driven by customer connection needs, third-party infrastructure needs requiring mandatory utility relocation, and mandated revenue metering and service obligations.

- Developer works – continued high growth in the Town of Milton requiring new customer connections, primarily subdivisions

- Halton Region/Town of Milton works – primarily plant relocations for road widening work

- Mandated service obligations – connection of new services

Spending within this investment category is mandatory.

System Renewal

System Renewal investments involve replacing and/or refurbishing system assets to extend the original service life of the assets and thereby maintain the ability of the distribution system to provide customers with electricity services. This includes the replacement of end-of-use assets, and assets in deteriorating condition (including high failure risk assets and/or asset failure).

- Planned proactive pole and meter replacement programs

- Asset Condition Assessment driven work and assets that are high failure risk

- Reactive work - assets that have been damaged and require replacement such as poles and pad mounted equipment hit by vehicles or assets damaged due to storms (high winds, lightning).

Spending within this investment category is primarily mandatory, although the timing and priority of projects is at times discretionary. Delays or postponement in this category leads to a change from partially mandatory to mandatory.

System Service

System Service investments are modifications to a distributor's distribution system to ensure the distribution system continues to meet operational objectives (such as reliability, grid flexibility and Distributed Energy Resource integration), while addressing anticipated future customer electricity service requirements. Examples include operational technologies and grid modernization. Projects in this category are driven by the distributor's expectations that evolving customer use of the system may create system capacity constraints or otherwise adversely impact operations and the delivery of quality distribution services.

- System constraints – line extensions and feeder interconnections to accommodate grid load growth

- System operational objectives – projects to maintain system reliability and efficiency, and implementation of Milton Hydro's SCADA and automation program

Spending within this investment category is non-mandatory, in terms of both initiating a project and determining the priority and timing of project-related expenditures.

General Plant

General Plant investments are modifications, replacements or additions to a distributor's assets that are not part of its distribution system including land and buildings, tools and equipment, rolling stock and electronic devices and software used to support day to day business and operations activities. They include investments to meet the facilities, fleet, office systems and IT needs of Milton Hydro.

- Vehicles and Major Equipment – replacement or addition of new vehicles or major pieces of equipment

- Information Technology – hardware and software

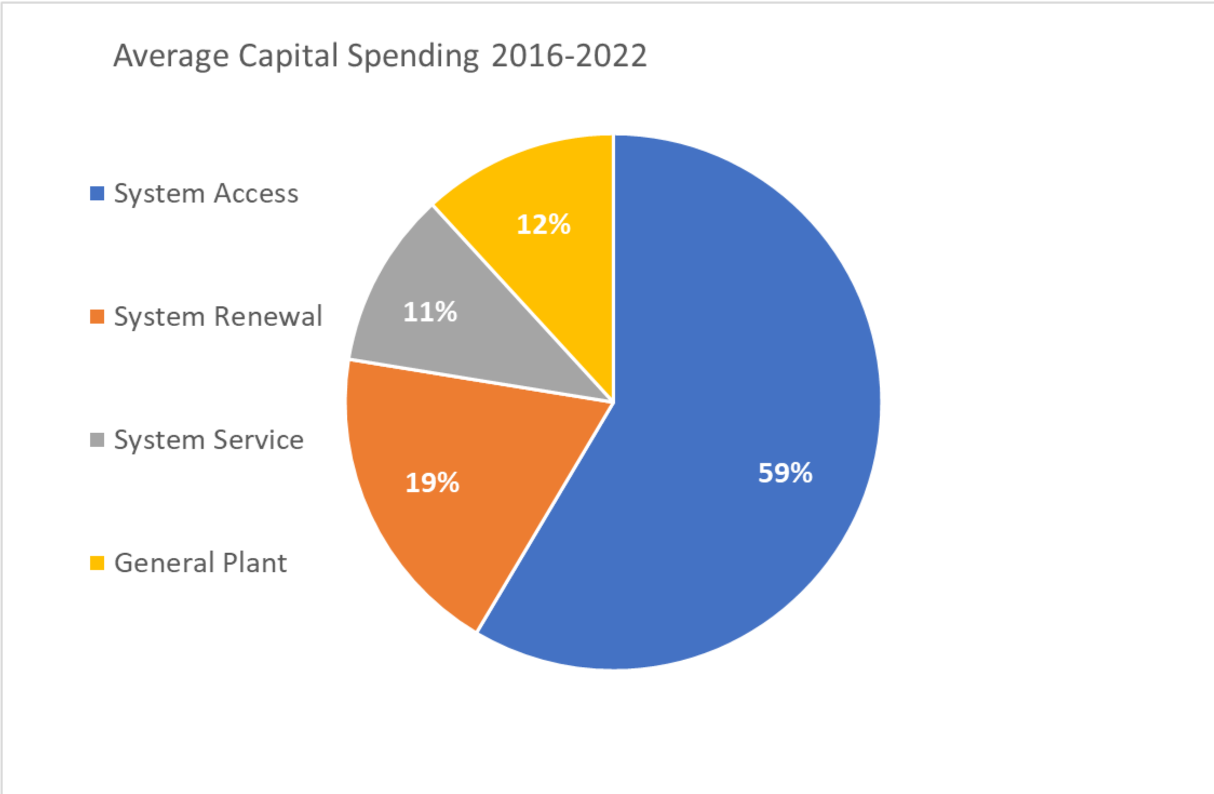
- Non-system Physical plant – building repairs, office furniture and equipment, capital contributions

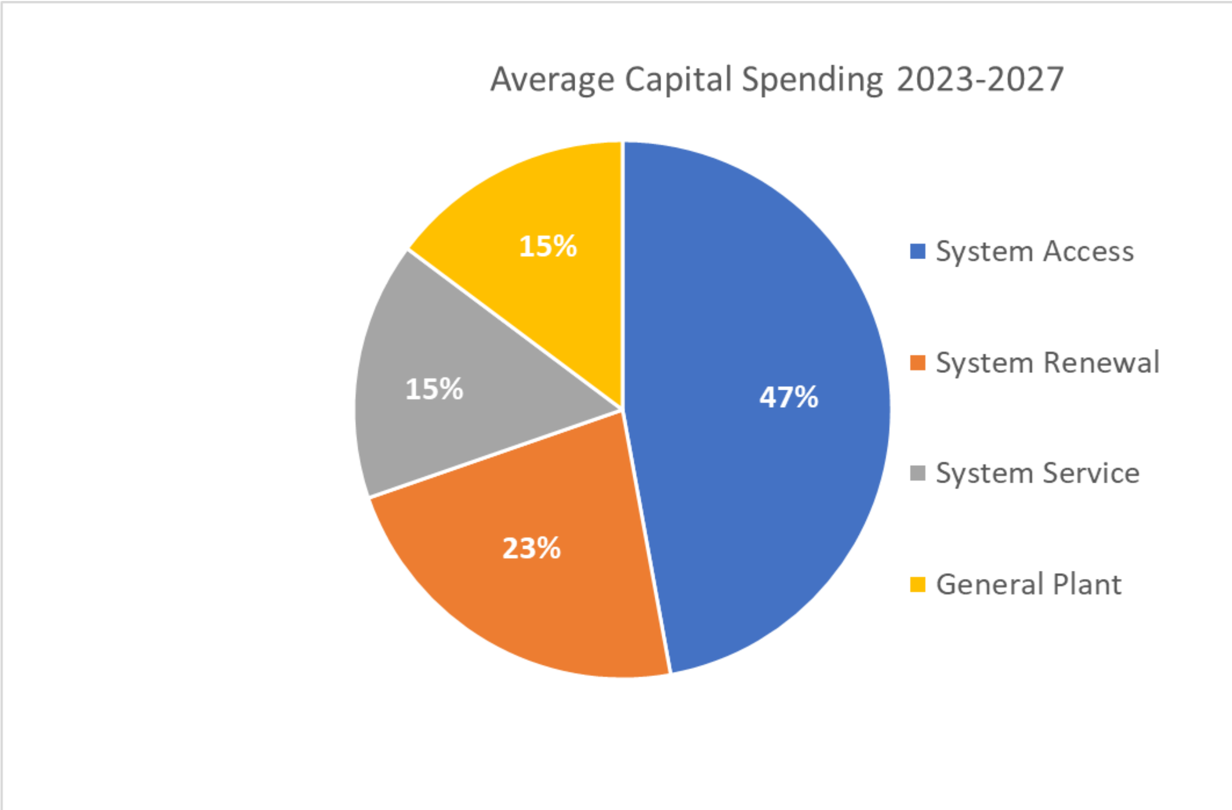
The majority of spending within this investment category is non-mandatory.

In 2001, the Town of Milton had a population of 32,800 and by 2016, the population more than tripled to 110,128. Since 2016, population growth continued at a slower rate of 25% (138,000 in 2021); by 2031, Milton is projected to house 187,000, (36% increase over 2021).

To accommodate this growth, Milton Hydro's System Access planning, historically and going forward, represents a large portion of Capital expenditures.

Figure 2.1 Cumulative Gross Capital Expenditures Historical and Bridge





Recognizing the shift of more modest growth, Milton Hydro has adjusted its planning and reduced its allocated capital funding for System Access (on average $1.1M) and increased its investments in:

- System Renewal driven by the Asset Condition Assessment

- System Service to enhance its automation capabilities driven by Customer priorities

- General Plant investments such as a system control room to provide better operational support that enables faster outage response time and shorter durations and IT investments to promote efficiency, better data management and better customer communications.

Table 2-27 Capital Expenditure Summary – 2016 to 2027 – Appendix 2-AB

CATEGORY	Historical Period (previous plan1 & actual)																					Forecast Period (planned)				
	2016			2017			2018			2019			2020			2021			2022			2023	2024	2025	2026	2027
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var					
	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000		%	$ '000				
System Access	$7,068	$6,934	$—	$8,092	$5,350	$—	$6,212	$6,339	$—	$6,411	$5,972	$—	$6,878	$7,291	$—	$8,236	$8,730	$—	$5,977			$5,612	$5,308	$4,342	$6,576	$5,511
System Renewal	$2,473	$1,747	$—	$1,821	$1,810	$—	$1,790	$2,310	$—	$1,800	$1,662	$—	$1,725	$2,179	$—	$3,656	$1,972	$—	$3,462			$2,670	$2,520	$2,575	$2,630	$2,687
System Service	$1,520	$620	($1)	$1,225	$1,220	$—	$1,350	$1,742	$—	$1,350	$2,431	$1	$1,500	$646	($1)	$835	$378	($1)	$1,418			$1,711	$1,880	$1,784	$1,807	$1,829
General Plant	$896	$2,252	$2	$701	$899	$—	$711	$1,998	$2	$676	$1,774	$2	$696	$242	($1)	$932	($91)	($1)	$2,329			$2,413	$1,735	$1,595	$1,076	$1,757
TOTAL EXPENDITURE	**$11,957**	**$11,553**	**$—**	**$11,839**	**$9,279**	**$—**	**$10,063**	**$12,389**	**$—**	**$10,237**	**$11,839**	**$—**	**$10,799**	**$10,358**	**$—**	**$13,659**	**$10,988**	**$—**	**$13,186**			**$12,406**	**$11,443**	**$10,295**	**$12,089**	**$11,784**
Capital Contributions	($3,808)	($3,333)	$—	($3,323)	($2,880)	$—	($2,118)	($2,920)	$—	($2,181)	($2,025)	$—	($4,793)	($2,303)	($1)	($4,660)	($2,947)	$—	($3,024)			($2,539)	($2,473)	($2,137)	($2,877)	($2,542)
Net Capital Expenditures	**$8,149**	**$8,220**	**$—**	**$8,516**	**$6,399**	**$—**	**$7,945**	**$9,469**	**$—**	**$8,056**	**$9,814**	**$—**	**$6,006**	**$8,055**	**$—**	**$8,999**	**$8,041**	**$—**	**$10,162**			**$9,866**	**$8,971**	**$8,158**	**$9,212**	**$9,242**
System O&M	**$3,812**	**$3,797**	**$—**	**$3,576**	**$3,335**	**$—**	**$3,863**	**$3,773**	**$—**	**$3,996**	**$3,973**	**$—**	**$3,923**	**$3,881**	**$—**	**$3,963**	**$4,748**	**$—**	**$4,292**			**$5,373**	**$5,832**	**$5,988**	**$6,219**	**$6,406**

2.10.2. Variance of Year over Year Category Spending

An analysis of year over year trending for historical costs within the DSP categories is as follows.

Table 2-28 2016 Actual vs. 2016 OEB Approved ($000s):

Description	2016 Actual	2016 OEB Approved	Variance
System Access	$6,934	$7,068	($134)
System Renewal	$1,747	$2,473	($726)
System Service	$620	$1,520	($900)
General Plant	$2,252	$896	$1,356
Total Capital Expenditure	**$11,553**	**$11,957**	**($404)**
Capital Contributions	($3,333)	($3,808)	$475
Net Capital Expenditures	**$8,220**	**$8,149**	**$71**

2016 actual gross CAPEX were $404,000 lower than 2016 OEB Approved and net capital expenditures were $71,000 higher.

System Access

2016 Actual System Access expenditures were $134,000 lower than 2016 OEB Approved, primarily due to cost decreases due to the fewer customer driven projects (upgrades, new connections, etc.) and the delay of road improvement and widening projects performed by the Town and Region.

System Renewal

2016 Actual System Renewal expenditures were $726,000 lower than 2016 OEB Approved, primarily to: (i) cost decreases of $506,298 due to fewer unexpected equipment failures than planned, which resulted in less reactive overheard and underground rebuild projects; and (ii) cost decreases of $212,463 associated with fewer reactive pole replacements.

System Service

2016 Actual System Service expenditures were $900,000 lower than 2016 OEB Approved, primarily due to the cost decreases of $759,609 associated with the one year delay of the WiMAX Automation projects (switches and fault indicators).

General Plant

2016 Actual General Plant expenditures were $1,356,000 higher than 2016 OEB Approved, primarily due to additional funds of $1,299,480 which were necessary to complete construction of Head Office building at 200 Chisholm Drive.

Table 2-29 2017 Actual vs. 2016 Actual ($000s):

Description	2017 Actual	2016 Actual	Variance
System Access	$5,350	$6,934	($1,584)
System Renewal	$1,810	$1,747	$63
System Service	$1,220	$620	$600
General Plant	$899	$2,252	($1,353)
Total Capital Expenditure	**$9,279**	**$11,553**	**($2,274)**
Capital Contributions	($2,880)	($3,333)	$453
Net Capital Expenditures	**$6,399**	**$8,220**	**($1,821)**

2017 actual gross CAPEX were $2,274,000 lower than 2016 actual and net CAPEX were $1,821,000 lower.

System Access

2017 Actual System Access expenditures were $1,584,000 lower than 2016 Actual, primarily due to: (i) cost decreases of $1,219,971 in third-party support resulting from the Town and Region executing fewer road improvement and widening projects, requiring the relocation of Milton Hydro assets; and (ii) cost decreases of $369,536 due to fewer new customer connections.

System Renewal

2017 Actual System Renewal expenditures were consistent to the 2016 Actual expenditures.

System Service

2017 Actual System Service expenditures were $600,000 higher than 2016 Actual, primarily due to: (i) cost increases of $676,494 associated with the installation of the WiMAX communication tower, which included automated switches with remote monitor and control capability and intelligent remote monitored fault indicators; (ii) cost increases of $255,974 in Milton Hydro's investment in the Outage Management System ("OMS"), a tool to facilitate Burlington Hydro delivery of system control room services with outage analysis, automated outage map and twitter capability; partially offset by (iii) cost decreases of $329,890 in planned voltage conversion or line extension projects.

General Plant

2017 Actual General Plant expenditures were $1,353,000 lower than 2016 Actual, primarily due to cost increases of $1,224,925 associated with building and office renovations being addressed in 2016.

Table 2-30 2018 Actual vs. 2017 Actual ($000s):

Description	2018 Actual	2017 Actual	Variance
System Access	$6,339	$5,350	$989
System Renewal	$2,310	$1,810	$500
System Service	$1,742	$1,220	$522
General Plant	$1,998	$899	$1,099
Total Capital Expenditure	**$12,389**	**$9,279**	**$3,110**
Capital Contributions	($2,920)	($2,880)	($40)
Net Capital Expenditures	**$9,469**	**$6,399**	**$3,070**

2018 actual gross CAPEX were $3,110,000 higher than 2017 actual and net capital expenditures were $3,070,000 higher.

System Access

2018 Actual System Access expenditures were $989,000 higher than 2017 Actual, primarily due to: (i) cost increases of $755,000 associated with increased subdivision work; and (ii) cost increases of $298,000 due to an increase in new customer connections.

System Renewal

2018 Actual System Renewal expenditures were $500,000 higher than 2017 Actual, primarily due to: (i) cost increases of $291,000 associated with damage and overhead replacement work on a critical pole line due to a windstorm (adverse weather); and (ii) cost increases of $185,000 associated with the replacement of 12 high value poles. High unit cost due to various reasons (taller with more circuits, rock drilling, extra flagging, etc.).

System Service

2018 Actual System Service expenditures were $522,000 higher than 2017 Actual, primarily due to cost increases of $587,094 associated with Milton Hydro completing a planned pole line extension on Tremaine Rd. and a new Pole Line from Burnhamthorpe Road to Louis St Laurent Avenue.

General Plant

2018 Actual General Plant expenditures were $1,099,000 higher than 2017 Actual, primarily due to cost increases of $1,000,000 associated with capital contributions paid to Hydro One for two breakers at Tremaine Transformer Station ("TS").

Table 2-31 2019 Actual vs. 2018 Actual ($000s):

Description	2019 Actual	2018 Actual	Variance
System Access	$5,972	$6,339	($367)
System Renewal	$1,662	$2,310	($648)
System Service	$2,431	$1,742	$689
General Plant	$1,774	$1,998	($224)
Total Capital Expenditure	**$11,839**	**$12,389**	**($550)**
Capital Contributions	($2,025)	($2,920)	$895
Net Capital Expenditures	**$9,814**	**$9,469**	**$345**

2019 actual gross capital expenditures were $550,000 lower than 2018 actual and net capital expenditures were $345,000 higher.

System Access

2019 Actual System Access expenditures were $367,000 lower than 2018 Actual, primarily due to: (i) cost decreases of $216,000 associated with the meter reverification program identifying fewer meters needing replacement; and (ii) cost decreases of $96,000 due to fewer Customer Connections requested.

System Renewal

2019 Actual System Renewal expenditures were $648,000 lower than 2018 Actual, primarily due to: (i) costs of $291,000 associated with reactive repair work in 2018 as a result of a windstorm, which were not required in 2019; (ii) costs of $154,000 associated with reactive overhead rebuild projects in 2018, which were not required in 2019; and (iii) cost savings in 2019 of $146,000 due to meters for the replacement program taken from spares inventory.

System Service

2019 Actual System Service expenditures were $689,000 higher than 2018 Actual, primarily due to: (i) cost increases of $1,638,874 associated with work performed by Milton Hydro in 2019 on the underground Egress Project, for two feeders connecting to Tremaine TS; partially offset by (ii) lower costs of $755,657 due to no planned system extension projects in 2019; and (iii) lower costs of $193,995 due to fewer switch installations, as resources were directed to Egress Project.

General Plant

2019 Actual General Plant expenditures were $224,000 lower than 2018 Actual, primarily due to the purchase of a standby generator for $188,690 in 2018.

Table 2-32 2020 Actual vs. 2019 Actual ($000s):

Description	2020 Actual	2019 Actual	Variance
System Access	$7,291	$5,972	$1,319
System Renewal	$2,179	$1,662	$517
System Service	$646	$2,431	($1,785)
General Plant	$242	$1,774	($1,532)
Total Capital Expenditure	**$10,358**	**$11,839**	**($1,481)**
Capital Contributions	($2,303)	($2,025)	($278)
Net Capital Expenditures	**$8,055**	**$9,814**	**($1,759)**

2020 actual gross capital expenditures were $1,481,000 lower than 2019 actual and net capital expenditures were $1,759,000 lower.

System Access

2020 Actual System Access expenditures were $1,319,000 higher than 2019 Actual, primarily due to: (i) cost increases of $2,125,654 associated with road widening projects requiring relocation of plant by the Town and Region, (ii) cost increases of $375,422 due to more meters required resulting from the meter reverification program and expired seals; partially offset by (iii) cost decreases of $1,063,105 due to less subdivision work in 2020.

System Renewal

2020 Actual System Renewal expenditures were $517,000 higher than 2019 Actual, primarily due to: (i) costs increases of $390,000 associated with the replenishing of Milton Hydro's meter spares inventory; and (ii) costs increases of $136,210 associated with the installation of a transformer foundation. The transformer was previously installed on a vault and the structural integrity was starting to fail.

System Service

2020 Actual System Service expenditures were $1,785,000 lower than 2019 Actual, primarily due to: (i) $1,424,000 more spend in 2019 than 2020 associated with Tremaine TS Feeder Egress work (ii) Milton Hydro completed three fewer automation projects in 2020, amounting to $582,000. It was the first year of COVID-19 lockdown where field crews had to work separate from one another and most of the effort was to keep the existing system functioning, which meant a reduction in capital projects; partially offset by (iii) cost increases of $153,000 associated with the purchase of a voltage regulator in 2020 for a future project.

General Plant

2020 Actual General Plant expenditures were $1,532,000 lower than 2019 Actual, primarily due to: (i) reduction of $1,000,000 due to no required additional capital contributions to Hydro One for the Tremaine TS breakers; and (ii) costs of $334,085 in 2019 for the completion of building renovations projects, which included the remediating warehouse floor, repairing the geothermal and building heating system, and enhancing security.

Table 2-33 2021 Actual vs. 2020 Actual ($000s):

Description	2021 Actual	2020 Actual	Variance
System Access	$8,730	$7,291	$1,439
System Renewal	$1,972	$2,179	($207)
System Service	$378	$646	($268)
General Plant	($91)	$242	($333)
Total Capital Expenditure	**$10,989**	**$10,358**	**$631**
Capital Contributions	($2,947)	($2,303)	($644)
Net Capital Expenditures	**$8,042**	**$8,055**	**($13)**

2021 actual gross capital expenditures were $631,000 higher than 2020 actual and net capital expenditures were $13,000 lower.

System Access

2021 Actual System Access expenditures were $1,439,000 higher than 2020 Actual, primarily due to cost increases of $1,368,000 in subdivision work.

System Renewal

2021 Actual System Renewal expenditures were $207,000 lower than 2020 Actual, primarily due to: (i) cost decreases of $317,000 associated with Reactive Overhead Replacement; partially offset by (ii) cost increases of $130,000 associated with Reactive Underground Replacement.

System Service

2021 Actual System Service expenditures were $268,000 lower than 2020 Actual, primarily due to cost decreases of $214,615 due to the Tremaine TS Feeder Egress work being completed in 2020.

General Plant

2021 Actual General Plant expenditures were $333,000 lower than 2020 Actual, primarily due to a refund for $360,000 received from Hydro One for its capital contribution.

Table 2-34 2022 Bridge Year vs. 2021 Actual ($000s)

Description	2022 Bridge	2021 Actual	Variance
System Access	$5,977	$8,730	($2,753)
System Renewal	$3,462	$1,972	$1,490
System Service	$1,418	$378	$1,040
General Plant	$2,329	($91)	$2,420
Total Capital Expenditure	**$13,186**	**$10,989**	**$2,197**
Capital Contributions	($3,024)	($2,947)	($77)
Net Capital Expenditures	**$10,162**	**$8,042**	**$2,120**

2022 planned gross capital expenditures are $2,198,000 higher than 2021 actual and net capital expenditures are $2,120,000 higher.

System Access

2022 Bridge Year System Access expenditures are expected to be $2,753,000 lower than 2021 Actual, primarily due to: (i) anticipated cost decreases of $1,039,000 associated with less subdivision work. The Growth Projection Analysis, completed by GSAI, forecasts approximately 1,000 services connections each year (2022-2027). The actual expenditures can vary year over year depending on when the assets are capitalized from a developer; (ii) anticipated cost decreases of $1,155,000 associated with a decrease in customer connections, with a work projection aligned with historical spending; and (iii) anticipated cost decreases of $488,000 due to less road authority work resulting from the number of planned projects by the Town and Region.

System Renewal

2022 Bridge Year System Renewal expenditures are expected to be $1,490,000 higher than 2021 Actual, primarily due to: (i) anticipated cost increases of $1,220,000 associated with an increase in meter replacements netted from the verification program, based on meter installation dates; and (ii) in 2018, a significant windstorm damaged plant requiring emergency repairs to part of a pole line that holds two significant circuits; the remaining portion of that pole line is at end-of-life and requires rebuilding for $385,000.

System Service

2022 Bridge Year System Service expenditures are expected to be $1,040,000 higher than 2021 Actual, primarily due to: (i) anticipated cost increases of $666,000 associated with two system expansion projects: 13.8kV to 27.6kV conversion project and new pole line with two circuits; and (ii) anticipated cost increases of $280,000 associated with the installation of an additional automated overhead switch and switchgear.

General Plant

2022 Bridge Year General Plant expenditures are expected to be $2,420,000 higher than 2021 Actual, primarily due to: (i) anticipated cost increases of $721,000 due to Milton Hydro's investment in Information Technology systems to facilitate improved resource management and communications, including an ERP Planning System (see Exhibit 2, Attachment 2-2 DSP); (ii) anticipated cost increases of $683,000 associated with investments in rolling fleet based upon vehicle condition assessments on Lightweight Vehicle, Single Bucket Truck and a Backyard RBD/Tension Machine; (iii) anticipated cost increases of $530,000 associated with the construction of a system control room (see Exhibit 2, Attachment 2-2 DSP); and (iv) anticipated cost increases of $459,000 related to various software investments including the omni-channel Platform, Human Resource Information System and Enterprise Service Ticketing.

Table 2-35 2023 Test Year vs. 2022 Bridge Year ($000s):

Description	2023 Test	2022 Bridge	Variance
System Access	$5,612	$5,977	($365)
System Renewal	$2,670	$3,462	($792)
System Service	$1,711	$1,418	$293
General Plant	$2,413	$2,329	$84
Total Capital Expenditure	**$12,406**	**$13,186**	**($780)**
Capital Contributions	($2,539)	($3,024)	$485
Net Capital Expenditures	**$9,867**	**$10,162**	**($295)**

2023 planned gross capital expenditures are $780,000 lower than 2022 planned and net capital expenditures are $296,000 lower.

System Access

2023 Test Year System Access expenditures are expected to be $365,000 lower than the 2022 Bridge Year, primarily attributable to cost increases of $384,000 associated with plans identified by the Town and the Region for road work.

System Renewal

2023 Test Year System Renewal expenditures are expected to be $792,000 lower than the 2022 Bridge Year, primarily due to: (i) lower expenditures of $380,000 in 2023 compared to 2022 as Milton Hydro is anticipating fewer meter replacements due to its replacement efforts in 2022; and (ii) lower expenditures due to the completion of the overhead rebuild (First Line to Lower Base Line) in 2022, with no expected costs in 2023.

System Service

2023 Test Year System Service expenditures are expected to be $293,000 higher than the 2022 Bridge Year, primarily due to: (i) anticipated cost increases of $703,000 associated with Milton Hydro's plan for three additional switchgears and two overhead switches; partially offset by (ii) lower spend of $424,000 associated with the completion of the 13.8kV to 27.6kV conversion project in 2022.

General Plant

2023 Test Year System Renewal expenditures were consistent with the 2022 Bridge Year.

The following Table 2-36 sets out the capital expenditures and trend for the DSP forecast period of 2023 to 2027 – see also Exhibit 2, Attachment 2-2 DSP, Appendix A.

For detailed material projects that make up each of the capital expenditure categories, see DSP Table 49 DSP Planned Capital Expenditures 2023-2027

Table 2-36 Capital Expenditures & Trend for DSP 2023 to 2027 ($000)

Description	2023	2023 (%)	2024	2024 (%)	2025	2025 (%)	2026	2026 (%)	2027	2027 (%)	Average	Average (%)
System Access	$5,612	45.2%	$5,308	46.4%	$4,342	42.2%	$6,576	54.4%	$5,511	46.8%	$5,470	47.1%
System Renewal	$2,670	21.5%	$2,520	22.0%	$2,575	25.0%	$2,630	21.8%	$2,687	22.8%	$2,616	22.5%
System Service	$1,711	13.8%	$1,880	16.4%	$1,784	17.3%	$1,807	14.9%	$1,829	15.5%	$1,802	15.5%
General Plant	$2,413	19.5%	$1,735	15.2%	$1,595	15.5%	$1,076	8.9%	$1,757	14.9%	$1,715	14.8%
Total Capital Expenditure	**$12,406**	**100.0%**	**$11,443**	**100.0%**	**$10,296**	**100.0%**	**$12,089**	**100.0%**	**$11,784**	**100.0%**	**$11,603**	**100.0%**
Capital Contributions	($2,539)		($2,473)		($2,137)		($2,877)		($2,542)		($2,514)	
Net Capital Expenditures	**$9,867**		**$8,970**		**$8,159**		**$9,212**		**$9,242**		**$9,089**	

System Access

The investments are externally driven and generally non-discretionary. Timing of investment is driven by the needs of the external parties. Large projects, such as road widening projects require large amounts of capital and other resources. This category, which makes up 42% to 54% of total capital expenditures, will generally have priority in capital budget allocation. The increase in 2026 reflects planned road works by Halton Region and the Town of Milton.

System Renewal

A long term proactive investment program is required for pole assets. This need has been reflected in the increase of spending in this category over the period of the DSP. Other spending in this category will be for discrete projects and will be determined on the basis of ongoing system asset performance. Future expenditures ranging from $2,520,000 to $2,687,000 have been identified in this category for renewal needs and unanticipated asset failure. Category spending remains relatively stable during the forecast period and does not detract from the other investment categories.

System Service

A continued investment in Milton Hydro’s smart grid program is warranted and reflects customer preferences. Investments will maintain steady improvement in system automation.

Category spending remains relatively stable during the forecast period and does not detract from the other investment categories.

General Plant

General plant investment reflects additional investments in an ERP in 2023 (which goes into service in 2024), $2,413,000. In 2026, spending decreases to $1,076,000 as a result of fewer investments in rolling stock. The remaining years maintain a stable rate of spending. The projected spend includes investments in rolling stock, computer hardware and software and other equipment and tools that support the effective delivery of electrical distribution services.

The following Table 2-37 is a historical summary of Capital Projects, 2016-2021, as well as projects for the 2022 Bridge year and 2023 Test year.

Table 2-37 Appendix 2-AA (Summary of Capital Projects)

Projects	2016	2017	2018	2019	2020	2021	2022	2023
Reporting Basis								
System Access								
Subdivisions	$3,738,426	$3,078,183	$3,833,284	$3,264,302	$2,201,198	$3,568,738	$2,530,000	$2,530,000
Bronte St Widening from LSL to Britannia	$270,880							
Steeles Ave Widen Martin to Industrial	$862,290							
GO Transit Layover Facility OH to UG	$154,296							
Sauve St, 610, Condos	$108,939							
8399 8449 Lawson Rd	$142,506							
Derry Rd Santa Maria Correct Encroachment		$143,884						
Bronte St North, 104, 800A	$106,195							
Wheelabrator Way Pole Line Relocation			$107,749					
Britannia Rd Widening Tremaine to Bronte				$525,540				
Britannia Rd Reconstruction JSP to 407					$2,174,472			
Tremaine Rd Steeles Ave to 3 Sideroad					$572,838			
Region Halton Britannia, RR25 to JSP Relocation Ph1						$647,399		
Region Halton Britannia, RR25 to JSP Relocation Ph2							$559,052	
Town of Milton - Main St. , JSP to Fifth Line						$533,575		
Town of Milton - Bronte St., Main to Steeles						$854,087	$909,321	
Town of Milton - 3 Side Rd, Tremaine to Peru						$44,995		
Derry Rd, JSP to Fifth Line, new pole line, 2 circuits							$149,764	
Fifth Line - 401 to Derry							$153,440	
Fifth Line - Derry to Britannia								$950,000
Steeles Avenue - Regional Rd 25 to Trafalgar Rd.								$291,747
Appleby Line - Derry North								$145,823
Other Third Party Contracts (Roads)	$80,703	$303,548	$98,779	$10,917	$77,067			
LTLT Assets Purchased		$218,047						

Projects	2016	2017	2018	2019	2020	2021	2022	2023
Customer Connections	$1,048,570	$679,034	$977,229	$880,846	$1,009,115	$2,083,082	$928,109	$946,671
Meters - New Industrial/Commercial			$250,808	$371,366	$225,175	$478,558	$306,490	$306,490
Mesh Equipment - New Installs	$149,710	$140,108	$413,927	$341,944	$240,423			
Mandated Meter Replacements	$61,574	$519,459	$436,817	$220,881	$596,303	$340,360	$441,055	$441,055
Miscellaneous Roads	$209,615	$268,020	$220,566	$356,324	$194,058	$179,621		
Sub-Total	**$6,933,702**	**$5,350,283**	**$6,339,159**	**$5,972,120**	**$7,290,648**	**$8,730,415**	**$5,977,231**	**$5,611,786**
System Renewal								
Porcelain to Polymer Insulator Replacement Program	$104,814	$113,765	$199,970	$175,145	$160,810	$29,419	$73,416	$73,416
Wood Pole Replacement Program	$287,537	$211,838	$397,369	$437,867	$303,779	$152,495	$712,687	$720,000
Derry Rd - Tremaine to Guelph Line Pre conversion (13.8kV to 27.6kV)	$272,009							
Sixth Line Nass. N of 20 Sdrd Rebuild	$534,340							
Highside Dr and Ridge Dr Primary UG Rebuild	$152,343							
25 Sideroad, East of Fifth Line Rebuild		$288,162						
Tremaine Rd S of Britannia, Rebuild		$129,074						
Macarthur Dr UG Rebuild		$261,867						
UG TX Chisholm Dr, 161,TX2701 foundation					$136,210			
Overhead Rebuild/ First Line No Lower Base Line							$385,000	
Replace Regulator at MS7								$200,000
Switchgear Replacement Program						$102,316	$254,768	
Reactive Overhead Replacement	$145,622	$157,530	$171,351	$325,639	$531,613	$214,870		
Reactive Underground Replacement	$55,499	$249,170	$328,308	$327,803	$214,117	$343,844		
Miscellaneous Overhead Replacements	$100,886	$148,132	$298,879	$205,200	$230,557	$287,846	$330,994	$330,994
Miscellaneous Undergroud Replacements	$6,403	$115,972	$233,013	$204,599	$153,450	$111,043	$258,596	$280,000
Meter Spares	$53,296	$53,063	$48,815	($146,424)	$243,696	$372,889		
Overhead Transformer Spares	$11,837	($31,254)	$24,371	($30,344)	$36,793	$76,787		
Undergroung Transformer Spares	$22,507	$62,799	$97,646	$66,585	$71,810	$103,946		
Meter Replacements, defective	$—	$49,771	$93,269	$96,263	$96,038	$176,350	$100,000	$100,000
Meter Replacement Program							$1,220,286	$839,892
Storm Damage Replacements May 4 2018			$291,497					
Audible fault indicators - new, various locations			$125,690					
Meter Room Upgrades - Cell Modems							$126,013	$125,656
Sub-Total	**$1,747,093**	**$1,809,889**	**$2,310,178**	**$1,662,333**	**$2,178,874**	**$1,971,805**	**$3,461,761**	**$2,669,958**
System Service								
Derry Rd Pole Line Extention Trafalgar to 8th Line	$111,746							
New Tremaine Rd Stringing, 1 Circuit	$106,040							
Bronte Meadows Conversion to 27.6kV	$112,105							
Tremaine Rd, new Pole Line Burnhamthorpe to Louis St Laurent			$587,094					
JSP Pole LIne Extention to Campbellville Rd			$168,563					
13.8kV to 27.6kV MS4-F2 Feeder Conversion & Regulator Installation							$423,670	
Tremaine TS, UG Egress for 2 feeders and contribution for 2 breakers				$1,638,874	$214,615			
Tremaine M2 Voltage Regulator					$152,677			
Tremaine, 14 Side Rd to Steeles, add 2nd circuit							$59,821	
Fifth Line, Yukon to Derry, new Pole Line, 2 circuits							$242,074	
Fifh Side Rd, Tremaine to Dublin, rebuild and add circuit							$104,845	
Boston Church JSP to 5 Side Rd								$350,698

Projects	2016	2017	2018	2019	2020	2021	2022	2023
Communication Infrastructure	$135,689							
Automation	$102,496	$778,990	$756,281	$676,925	$94,881	$196,224	$477,362	$1,180,637
Scada/OMS	$51,895	$307,869	$229,577	$116,251	$183,741	$181,072	$110,000	$179,957
Miscellaneous		$133,073		($1,312)				
Sub-Total	**$619,970**	**$1,219,931**	**$1,741,515**	**$2,430,738**	**$645,914**	**$377,296**	**$1,417,772**	**$1,711,292**
General Plant								
Building - 200 Chisholm	$1,299,480	$74,555	$55,832	$364,220	$30,135	$40,000	$93,000	$119,000
Building - Control Room							$500,000	
Building - Renewal/Renovations 2nd Flr								$400,000
Tremaine TS, contribution for 2 breakers			$1,000,000	$1,000,000		($359,680)		
Office Equipment, Misc Stores, tools	$66,356				$34,272			
Major Tools - Standby Generator, etc			$188,690					
Computer Hardware - Server, projector, toughbooks	$80,109	$70,635		$106,498	$83,786	$92,176	$87,500	$94,500
Computer Hardware - Control Room							$30,000	
Software - licenses		$183,363	$75,087	$52,216	$66,514	$67,647	$32,500	$30,000
Software - Elster Project			$50,852					
Software -MV 90 Upgrade							$15,000	
Software - CIS Northstar Automation Platform							$50,000	
Software - OMNI Channel Platform							$105,990	
Software - Human Resource Info System							$132,330	
Software - Enterprise Service Ticketing							$155,240	
Software - FSR financial statement reporting tool								$60,000
Software - Accounts payable three-way match tool								$45,000
Software - Revenue Dollar and Statistical Data Warehouse								$25,000
Software - FME for GIS								$15,000
Wimax/Scadamates		$226,684					$56,000	$56,000
ServiewCom	$118,750							
GIS Portable/online Maps /CYME Gateway	$79,130		$168,471					
Robotic Process Automation Phase 1 - Discovery								$120,000
Robotic Process Automation Phase 2 - Implementation								$200,440
Enterprise Resouce Planning System							$269,815	$721,593
Backyard RBD/Tension Machine							$280,000	
Freightliner Posi Plus 42'	$330,500							
Single Bucket Truck							$225,000	$395,000
Boom Derrick			$459,485					
Vehicles - Leightweight	$150,181	$117,645		$134,104		$68,707	$246,500	$56,000
Miscellaneous	$127,377	$226,063		$116,817	$27,786		$50,000	$75,000
Sub-Total	**$2,251,883**	**$898,945**	**$1,998,417**	**$1,773,855**	**$242,492**	**($91,149)**	**$2,328,875**	**$2,412,533**
Miscellaneous								
Total	**$11,552,649**	**$9,279,048**	**$12,389,270**	**$11,839,046**	**$10,357,929**	**$10,988,366**	**$13,185,639**	**$12,405,569**
Less Renewable Generation Facility Assets and Other Non-Rate-Regulated Utility Assets (input as negative)								
Total	**$11,552,649**	**$9,279,048**	**$12,389,270**	**$11,839,046**	**$10,357,929**	**$10,988,366**	**$13,185,639**	**$12,405,569**

2.11. Treatment of Projects

2.11.1. Life Cycle Greater than One Year

Milton Hydro's accounting policy is to include projects in Fixed Assets when they are completed. Capital projects which are not yet completed are included in WIP. Capital projects with a life cycle greater than one year will be carried over from one year to the next in WIP. Once completed, expenditures are removed from WIP and capitalized to fixed assets at which point they begin depreciating.

2.11.2. Treatment of Cost of Funds

Milton Hydro's accounting policy is to expense borrowing costs. It does not capitalize interest on capital projects unless they meet the IFRS criteria of a qualifying asset which is defined in the Report of the Board EB-2008-0408 Transition to International Financial Reporting Standards, June 28, 2009 as "an asset that necessarily takes a substantial period of time to get ready for its intended use or sale." Milton Hydro does not have any capitalized borrowing costs forecast in the 2023 Test Year.

2.11.3. Components of Other Capital Expenditures

Milton Hydro does not have other capital expenditures, such as non-distribution activities, for which it needs to provide components.

2.12. CAPITALIZATION POLICY

2.12.1 Capitalization Policy Overview

Milton Hydro's current capitalization practices and principles are based on IFRS and guidelines set out by the Ontario Energy Board, where applicable. Milton Hydro converted to IFRS January 1, 2015 and as such the capitalization policy in effect for the 2022 Bridge Year and 2023 Test Year is compliant with MIFRS.

Milton Hydro reviewed its capitalization practices in anticipation of transitioning to IFRS; componentization of assets, depreciation changes and overheads were the focus of the review in light of the July 17, 2012 Board letter indicating that changes to depreciation expense and capitalization policies were required in 2013. Milton Hydro confirms that the changes to its capitalization of expenditures are consistent with the Board's regulatory accounting policies as set out for MIFRS as contained in the *Report of the Board, Transition to International Financial Reporting Standards*, EB-2008-0408, the Kinectrics Report dated July 8, 2010, and the APH, effective January 1, 2013. Milton Hydro's external auditors have also deemed Milton Hydro's capitalization policy, including the overhead policy, to align with IFRS standards. Milton Hydro has not changed its capitalization policy since its last rebasing application.

PP&E includes expenditures that are directly attributable to the acquisition of the asset. The cost of self-constructed assets includes the cost of materials, direct labour and other costs directly attributable to bringing the asset to a working condition for its intended use.

Assets with a cost in excess of $1,000 and expected to provide future economic benefit greater than one year will be capitalized. Expenditures that create a physical betterment or improvement of an asset will be capitalized.

2.12.2. Guidelines for Capitalization

Capital Assets include property, plant, and equipment that are held for use in the production or supply of goods and services and provide a benefit lasting beyond one year. Capital expenditures also include the improvement or "betterment" of existing assets. Intangible assets are also considered capital assets and are defined as assets that lack physical substance. They include goodwill, patents, copyrights and computer software.

A betterment is a cost which enhances the service potential of a capital asset and/or increases its value, and is therefore capitalized. A betterment includes expenditures which increase the capacity of the asset, lower associated operating costs of the asset, improve the quality of output or extend the asset's useful life. A betterment does not include general maintenance- related actions that seek to sustain an asset's current value.

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

2.12.3. Capitalization by Component

When parts or components of an item of property, plant and equipment have different useful lives, they are accounted for as individual items (major components) of property, plant and equipment. Component costs must be significant in relation to the total cost of the item and depreciated separately over the component's useful life. Components are those which: a) are significant in relation to the total cost of the item; and b) have different depreciation methods or useful life.

Components with similar useful lives and depreciation methods are grouped in determining the depreciation charge. Parts of the item that are not individually significant (remainder of the items) are combined and categorized as a single component best suited for the sum of the parts.

2.12.4. Depreciation

Depreciation is recognized on a straight-line basis over the estimated useful life of each significant identifiable component of an item of property, plant and equipment. Land and Land Rights are not depreciated. Construction in progress assets are not depreciated until the project is complete and in service.

Milton Hydro has used the principles in the Kinectrics Report as its basis for determining the estimated service life of assets. Asset depreciation begins in the year when it is available for use, in addition to when it is in the location and condition necessary for it to be capable of operating in the manner intended. For rate setting purposes, in the first year of service, depreciation is calculated using the half year rule in accordance with the Board's Filing Requirements. Depreciation of an asset ceases when the asset is retired from active use, sold or is fully depreciated.

2.13. Overhead Policy

Milton Hydro's overhead policy has been reviewed by its external auditors and has been deemed IFRS compliant.

Milton Hydro has not changed its overhead policy since the last rebasing application

Included in Milton Hydro's labour costs are those costs that are generally considered labour 'burden'. Milton Hydro's burden costs include employer paid fringe and statutory benefits such as vacation, statutory holidays, sick time, Canada Pension Plan ("CPP"), Employment Insurance ("EI"), OMERS pension contributions, health care and other employee benefits. Burden rates are forecasted by employee group (e.g. inside, outside) and are set-up in Milton Hydro's payroll system accordingly. Through the timesheet process, employees track their hours by work order or account number which designates whether the work is expensed or capitalized. Labour costs, including burden, are then directly charged to a specific project by employee based on the work executed in the field.

2.14. Stores, Inventory and Purchasing

The costs of this function are related to the labour associated with employees issuing material. Employees allocate their time directly to O&M and capital through the time sheet process by work order. Labour costs associated with capital must be directly attributable to a specific capital project.

2.15. Fleet Costs

The Fleet burden pool includes costs associated with maintaining Milton Hydro's fleet of pick-up trucks, bucket trucks with aerial devices, radial boom derrick trucks and trailers. These costs include fuel costs, repairs, parts, insurance, depreciation and all other items of expense necessary to keep the fleet in service. A fleet rate is determined on an annual basis for each vehicle type by using the hours determined in the budget process and allocation of the estimated budgeted allowable fleet costs. When a vehicle is used for a capital project, a fleet rate is charged based on the type of vehicle used multiplied by hourly usage of the vehicle. These costs are expensed or capitalized directly to the specific project through the timesheet process by work order.

2.16. Capitalization of Overhead

2.16.1. Overview

As discussed above in the "Capitalization Policy Overview" section, Milton Hydro transitioned to IFRS, effective January 1, 2015. Under the guidance of KPMG, the corporation's auditor, Milton Hydro incorporated setup the burden rates in its financial management system. Through the timesheet process, employees track their hours by work order or account number which designates whether the work is expensed or capitalized. Timesheets are reviewed and approved by functional leaders to ensure the costs included in capital are deemed directly attributable to bringing an asset to the location and condition as designed. As outlined in Section

2.13 above, burden rates are forecasted by employee group (e.g. inside, outside) and are set-up in Milton Hydro's payroll system accordingly.

Table 2-38 provided below, which is consistent with Board Appendix 2-D, has been completed to show Milton Hydro's Operations, Maintenance and Administration ("OM&A") costs prior to, and after, the allocation of costs for the Engineering and Operations/Fleet Administration Departments, and Employee Benefits to capital construction projects.

The methodology for calculating and applying burden rates has not changed since Milton Hydro's 2016 Cost of Service application (EB-2015-0089).

2.16.2. Burden Rates

Table 2-39 below summarizes the historical and forecasted overhead rates related to the capitalization of costs on self-constructed assets. The rates are changed and updated periodically to reflect actual costs or changed circumstances.

Milton Hydro has two types of overhead costs that are capitalized: (i) Fleet - charged on a $/hr. basis; and (ii) Engineering and Operations supervisors - charged on a % basis. Milton Hydro also capitalizes payroll benefits for applicable employees; however, these costs are directly allocated to capital through a burden rate in the payroll system. Milton Hydro has budgeted payroll benefits and a resulting overhead percentage and these are attached to the employee within the payroll system. Thus, the benefits are attached to each employee hour and directly charged to Capital, Operations, Maintenance, Administration or Recoverable as applicable.

As described previously, Milton Hydro does not allocate any indirect costs associated with Finance, Information Systems Technology, or the Administration department to capital.

Table 2-38 Overhead Expense (2-D)

OM&A Before Capitalization	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Administration	$5,856,248	$5,606,341	$5,715,268	$6,108,557	$6,695,896	$7,361,914	$8,715,112	$9,923,190
Operation Costs	$1,804,179	$1,457,335	$1,895,514	$2,042,561	$1,958,499	$1,665,488	$1,753,325	$1,834,232
Operation Fleet	$476,294	$548,024	$526,048	$535,394	$556,051	$584,654	$554,402	$565,490
Direct Labour Engineering/Operations	$3,352,003	$3,471,060	$3,223,927	$3,219,449	$3,240,508	$3,936,672	$4,206,852	$5,240,250
Total OM&A Before Capitalization	**$11,488,724**	**$11,082,760**	**$11,360,757**	**$11,905,961**	**$12,450,955**	**$13,548,728**	**$15,229,691**	**$17,563,162**

Capitalized OM&A	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Employee Labour and Benefits	$1,586,606	$1,853,725	$1,661,052	$1,587,586	$1,596,323	$1,253,050	$2,025,750	$2,073,366
Fleet /Truck Time	$248,523	$287,789	$211,464	$236,417	$277,926	$185,740	$349,273	$356,258
Total Capitalized OM&A	**$1,835,128**	**$2,141,514**	**$1,872,517**	**$1,824,003**	**$1,874,248**	**$1,438,790**	**$2,375,023**	**$2,429,625**

% of Capitalized OM&A	**16.0%**	**19.3%**	**16.5%**	**15.3%**	**15.1%**	**10.6%**	**15.6%**	**13.8%**

Total Cost OM&A	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Administration	$5,856,248	$5,606,341	$5,715,268	$6,108,557	$6,695,896	$7,361,914	$8,715,112	$9,923,190
Operation Costs	$217,574	($396,390)	$234,461	$454,975	$362,177	$412,438	($272,424)	($239,134)
Operation Fleet	$227,771	$260,235	$314,584	$298,977	$278,125	$398,913	$205,129	$209,231
Direct Labour Engineering/Operations	$3,352,003	$3,471,060	$3,223,927	$3,219,449	$3,240,508	$3,936,672	$4,206,852	$5,240,250
Total OM&A Before Capitalization	**$9,653,596**	**$8,941,246**	**$9,488,240**	**$10,081,958**	**$10,576,706**	**$12,109,938**	**$12,854,668**	**$15,133,537**

Table 2-39 Overhead Rates

Description	Unit	2016 OEB Approved	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Bridge Year	2023 Test Year
Burden Rates:										
Payroll Benefits - O/S Union	Lineman Direct Labor $$	72.0%	72.0%	99.0%	99.0%	99.0%	99.0%	99.0%	85.6%	86.2%
Payroll Benefits - I/S Union	Lineman Direct Labor $$	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	24.0%	26.6%	26.9%
Overhead Rates:										
Engineering / Operations	Lineman Direct Labor $$	30.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	29.2%	29.2%
Digger Derrick	Direct cost to Job	$80.00	$80.00	$80.00	$82.00	$82.00	$82.00	$82.00	$82.90	$91.07
Single Bucket	Direct cost to Job	$27.00	$27.00	$30.00	$35.00	$35.00	$35.00	$35.00	$42.68	$46.89
Pick up	Direct cost to Job	$11.00	$11.00	$12.00	$12.00	$12.00	$12.00	$12.00	$24.39	$26.79
Double Bucket	Direct cost to Job	$56.00	$56.00	$60.00	$61.00	$61.00	$61.00	$61.00	$61.88	$67.98
Lightweight Vehicles	Direct cost to Job	$11.00	$11.00	$12.00	$12.00	$12.00	$12.00	$12.00	$14.27	$15.27

COSTS OF ELIGIBLE INVESTMENTS FOR THE CONNECTION OF QUALIFYING GENERATION FACILITIES

Milton Hydro has not incurred any costs for the connection of qualifying generation facilities.

2.17. POLICY OPTIONS FOR THE FUNDING OF CAPITAL

On September 18, 2014, the Board released *Report of the Board New Policy Options for the Funding of Capital Investments: The Advanced Capital Module* and in it the Board has established a mechanism to assist distributors in aligning capital expenditure timing and prioritization with rate predictability and smoothing:

The review and approval of business cases for incremental capital requests that are subject to the criteria of materiality, need and prudence are advanced to coincide with the distributor's cost of service application. To distinguish this from the Incremental Capital Module ("ICM"), this mechanism is named the Advanced Capital Module ("ACM").

Advancing the reviews of eligible discrete capital projects, included as part of a distributor's Distribution System Plan and scheduled to go into service during the IR term, is expected to facilitate enhanced pacing and smoothing of rate impacts, as the distributor, the Board and other stakeholders will be examining the capital projects over the five-year horizon of the DSP.

Milton Hydro has a discrete capital project within the five-year horizon that it believes would be potentially eligible for this new policy option; however, as it is too early in the investment planning process to make an adequate business case for an investment and meet all the criteria of an ACM, Milton Hydro is not requesting approval for an ACM mechanism in this rate application.

Specifically, Milton Hydro has incorporated capital expenditures relating to a new Enterprise Resource Planning ("EPR") system in 2022 and 2023. However, the new ERP system is not expected to go into service until 2024. That being said, Milton Hydro has not included any in-service capital costs in its 2023 Test Year, nor have any costs been included in 2023 rate base. Milton Hydro is not requesting any rate relief at this time, since the new ERP system will not be used and useful in 2023.

Milton Hydro has however included its preliminary capital expenditures for its ERP system in both of 2023 and 2024 of its DSP. Once Milton Hydro has developed its business case justifying the investment, and it knows what the expenditures are for the new ERP system. The Company will determine if it is eligible to apply for an Incremental Capital Module ("ICM") in conjunction with its 2024 IRM Rate Application. If Milton Hydro determines that it is eligible and meets the criteria to file for an ICM, Milton Hydro will make an application for an ICM along with its 2024 IRM Rate Application.

2.18. ADDITION OF ICM ASSETS TO RATE BASE

Milton Hydro has not applied for approval of ICM Assets and therefore has no such assets added to its rate base.

2.19. SERVICE QUALITY AND RELIABILITY PERFORMANCE

Milton Hydro follows the OEB's Reporting and Record Keeping Requirements Guideline to report its service quality indicators annually. In accordance with the Filing Requirements, Table 2-40 is provided below and is consistent with Board Appendix 2-G, Service Quality Indicators. The table provides the performance measurements for the last six (6) historical years – 2016 through 2021.

Milton Hydro's service quality performance consistently exceeds the OEB's approved standards as set out in the 2006 Electricity Distribution Rate Handbook, Chapter 15 – Service Quality Regulation.

Overall, Loss of Supply was the leading contributor to SAIDI over the six-year period with Defective Equipment being the leading contributor excluding Loss of Supply. Adverse Weather was the leading contributor to SAIFI including and excluding Loss of Supply. Milton Hydro had one Major Event in 2018 due to Adverse Weather that had a significant impact to SAIDI. Foreign Interference and defective equipment caused two major outages in the urban core in 2020, contributing to higher SAIDI and SAIFI results. Adverse Weather was also the leading contributor to both SAIDI and SAIFI in 2021 due to two wind storms in December 2021. Milton Hydro has no control over the increase in the number of and severity of weather related events and the damage such events may cause to Milton Hydro's distribution system and to the supply of electricity to its customers.

Milton Hydro continues to make appropriate capital investments in the automation of its system through the installation of fault indicators that communicate to the SCADA system and the installation of remotely controlled switches. The information from these devices as well as the remote control capability of switches enable Milton Hydro to reduce the number of customers impacted by power outages through the remote operation of its equipment. Milton Hydro's proposed in-house control room will help reduce the outage duration and number of impacted customers by having an active outage management, faster outage response, reduction of outage area by sectionalization and improvement in operational safety. This is in alignment with customer preferences and feedback from customer engagement to reduce outages (time and duration), increase reliability and be ‘future ready’.

Table 2-40 Appendix 2-G (Service Reliability and Quality)

Index	Excluding Loss of Supply and Major Event Days						Including Major Event Days, Excluding Loss of Supply						Including Los of Supply, Excluding Major Event Days						Including Loss of Supply and Major Event Days					
	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021
SAIDI	0.74	0.61	0.74	0.33	1.52	0.75	0.74	0.61	2.87	0.33	1.52	0.75	0.81	1.07	0.88	0.37	1.60	0.75	0.81	1.07	3.00	0.37	1.60	0.75
SAIFI	0.59	0.49	0.83	0.58	1.15	0.57	0.59	0.49	1.69	0.58	1.15	0.57	0.72	0.78	0.97	0.83	1.67	0.57	0.72	0.78	1.83	0.83	1.67	0.57
6 Year Historical Average																								
SAIDI						0.782						1.137						0.913						1.267
SAIFI						0.702						0.845						0.925						1.068

Service Quality							
Indicator	**OEB Min Standard**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Low Voltage Connections	90%	99.60%	96.76%	96.76%	99.88%	100.00%	100.00%
High Voltage Connections	90%	N/A	N/A	N/A	N/A	N/A	N/A
Telephone Accessibility	65%	96.70%	96.52%	96.52%	84.44%	73.17%	76.20%
Appointments Met	90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Written Response to Enquires	80%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Emergency Urban Response	80%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Emergency Rural Response	80%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Telephone Call Abandon Rate	10%	1.60%	1.64%	1.64%	0.68%	1.05%	0.56%
Appointment Scheduling	90%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Rescheduling a Missed Appointment	100%	N/A	N/A	N/A	N/A	N/A	N/A
Reconnection Performance Standard	85%	100.00%	100.00%	100.00%	99.32%	100.00%	100.00%

EXHIBIT 2

ATTACHMENT 2-1

BRINGING DISALLOWED SPACE INTO RATE BASE JUSTIFICATION

Milton Hydro
Bringing Disallowed Space Into Rate Base

1.0 Background

Milton Hydro's Head Office and Operations building at 200 Chisholm Drive consists of two main areas. These are, Office & Administration space and Warehouse & Operations space. The size of these respective areas and the outdoor storage area is as follows:

Table 1-1 Overview of 200 Chisholm Drive Facility Space

Area	Square Feet (sq. ft.)	Description
Office and Administration	32,800	- Blue shaded area below in Figure 1-1
Operations and Warehouse	59,028	- Green shaded area below in Figure 1-1
Total Indoor Space	**91,826**	
Outdoor Storage Space	29,000	
Total Space (a)	**120,828**	

(a) Excluding parking and landscaped space

In the EB-2015-0089 proceeding, Milton Hydro sought approval to include the cost of its new Head Office and Operations building in its rate base. Certain aspects of this request were challenged due to some areas of the building not being fully utilized or being deemed to be in excess of requirements. The OEB determined that the space purchased and renovated exceeded reasonable requirements over the planning horizon, and as a result, disallowed certain portions of the building from being included in rate base. These disallowances are summarized in Table 1-2:

Table 1-2 Summary of Disallowed Costs

	Area	# Square Feet	$ Amount
1	Unrenovated Mezzanine (Office & Administration)	5,160	314,922
2	Renovated Excess Office (Office & Administration)	1,640	360,800
3	Inside Storage (Warehouse & Operations)	36,000	753,480*
			$1,429,202
	* Capital cost differential between inside storage and outside storage was calculated to be $20.93 per sq. ft. This translates into a rate base value of $753,480 (36,000 sq./ft. x $20.93 sq/ft)		

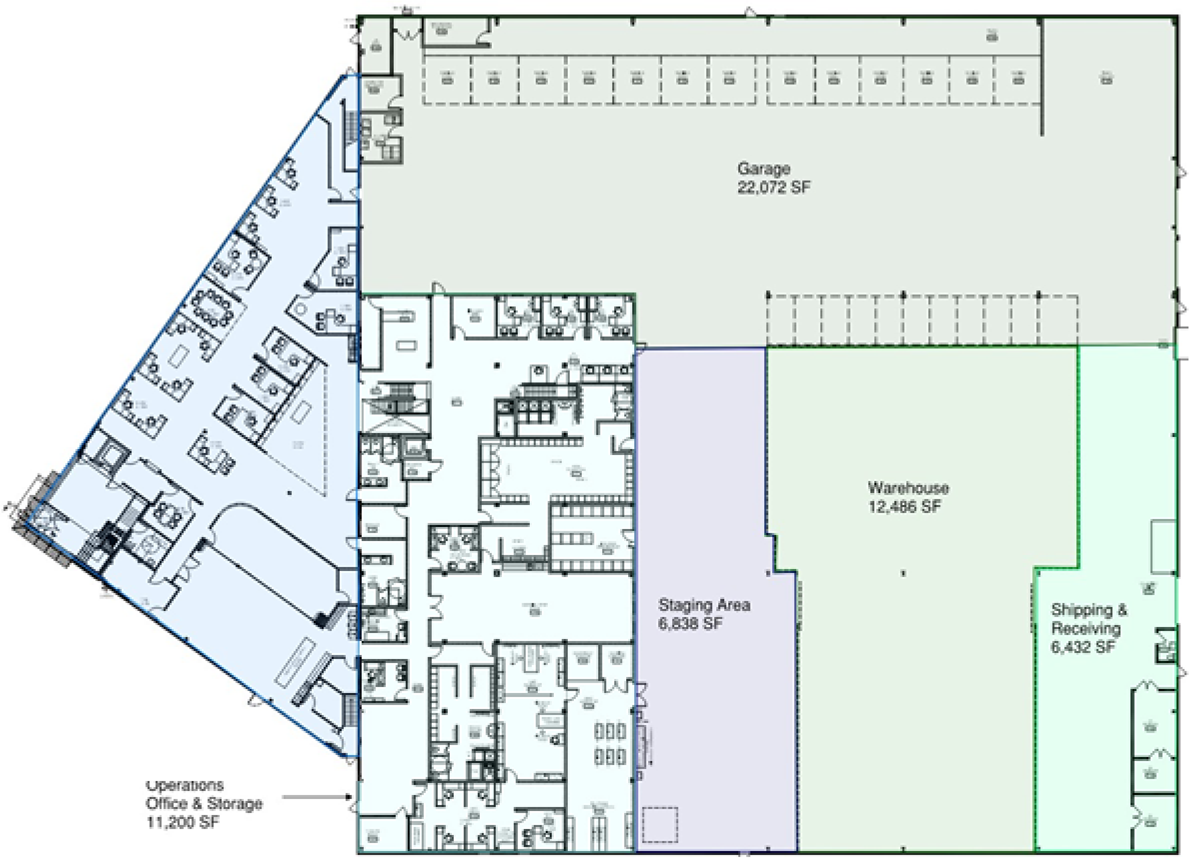
Since the conclusion of the EB-2015-0089 proceeding, Milton Hydro's requirements and utilization of the building have evolved to meet the current and future needs of the utility and its customers. With reconfiguration and renovations, the disallowed Office & Administration space will be functional and used to serve customer needs. The Operations & Warehouse space is currently configured to meet work requirements with a portion of the previously disallowed space having been re-purposed from the initial layout. A key regulatory principle for the inclusion of assets in rate base is that the asset in question must be available for use or be fit or available for use to provide service to utility customers.[1] As such, Milton Hydro is seeking to include the previously disallowed costs in rate base effective January 1, 2023.

[1] EB-2020-0290, Decision and Order, November 15, 2021.

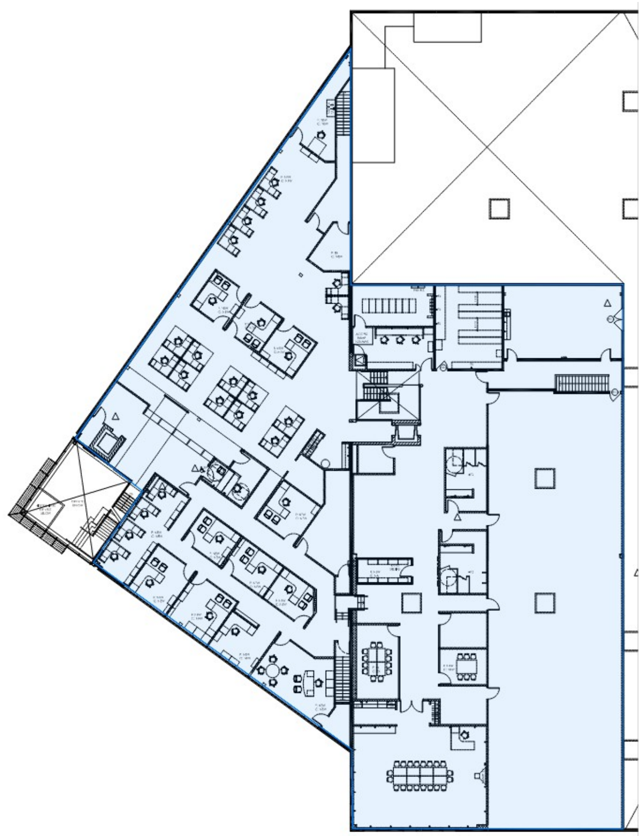
The current floor plan of the building as is provided in the following Figure 1-1:

Figure 1-1 Current Floor Plan

First Floor



Second Floor



2.0 Implementation of EB-2015-0089 Findings

Consistent with the OEB's Decision and Order, Milton Hydro excluded the noted assets from its rate base and the final rate order reflected their removal. Hence, for the 2016-2022 period Milton Hydro has not recovered the Depreciation Expense associated with the disallowed building and has not earned a return on the invested funds. The following Table 1-3 summarizes the Building Cost removed from rate base and the associated Depreciation Expense up to December 31, 2022:

Table 1-3 Head Office and Operations Building – Costs Disallowed

	Actual 2016	Actual 2017	Actual 2018	Actual 2019	Actual 2020	Actual 2021	Projected 2022
Opening Book Value	1,414,910*	1,386,326	1,357,742	1,329,158	1,300,574	1,271,990	1,243,406
Less: Depreciation Expense	(28,584)	(28,584)	(28,584)	(28,584)	(28,584)	(28,584)	(28,584)
Closing Book Value	1,386,326	1,357,742	1,329,158	1,300,574	1,271,990	1,243,406	1,214,822

*There was $14,292 of Depreciation Expense associated with these assets in 2015

The Net Book Value of the previously disallowed building costs is projected to be $1,214,822 as at December 31, 2022. This is the amount that Milton Hydro, in this application, is seeking approval to bring back into its rate base effective January 1, 2023.

3.0 Rationale for Inclusion in Rate Base

Since 2016, the current and future use of space has changed as Milton Hydro has adapted to the new facility and has been learning to optimize building features and workflow. In addition, Milton Hydro is experiencing customer and staff growth and there is a commensurate need to modify the building to accommodate this growth. In light of this, Milton Hydro commissioned the commercial real estate firm Cresa to undertake a Strategic Facility Plan to determine the optimal use of the building in light of identified needs and growth. This report is provided as Exhibit 2, Attachment 2-1 - Distribution System Plan, Appendix I - Cresa Strategic Facilities Plan. The plan developed by Cresa focusses on the use of the 32,800 sq. ft. Office & Administration space. In addition, Cresa documented the use of the 59,028 sq. ft. of Operations and Warehouse space which includes Garage, Operations, Warehouse (indoor storage), Material Logistics Staging and Shipping & Receiving functions.

The following Table 1-4 provides a reference point for the approved sq. ft. per Office & Administration employee that was approved in 2016:

Table 1-4 2016 Office & Administration Space

Description	Approved 2016
# Employees in Office & Administration Space (per Undertaking J2.4)	42
Sq. Ft. Approved for Office & Administration Space	26,000
# Sq. Ft. per Employee	619

In 2023, 56 offices/workstations will be required in the Office & Administration space (excluding the Control Room). Based on the 2016 ratio of 619 sq. ft. of space approved per employee, the requirement for 2023 would be 34,664 sq. feet of space. This represents a theoretical incremental space requirement of 8,664 sq. ft. Milton Hydro realizes that there is common space that is utilized by the incremental offices/workstations and that through planning and optimization of space configuration the theoretical space requirement can be reduced. Through consultation with Cresa, who prepared the Strategic Facility Plan, [redacted]

The following sections identify the specific areas that are requested to be in rate base effective January 1, 2023. Overall, in the Office & Administration area, Milton Hydro is requesting to bring into rate base the net book value of 6,800 sq. ft. of space (5,160 sq. ft. finished mezzanine + 1,640 sq. ft. previous excess space that is now being used for provision of electricity service).

[redacted]

[redacted]

3.2 Office & Administration (excluding mezzanine) 1,640 Square Feet

With minor reconfiguration and renovation, the existing Office & Administration space can be arranged to improve utilization and add workstations/meeting rooms. Phase I of the Cresa report will include renovations to space [redacted] and include 2 meeting rooms, 3 collaborative spaces and additional hoteling space for operations. This will help to accommodate the additional FTE's anticipated for 2023 and also create space for modest growth over the

[2] $1,214,822 / $1,429,202 = 85% X $314,922 = $267,684

subsequent IRM period. The additional workstations and meeting/collaboration rooms will fully utilize the 1,640 sq. ft. of space that was previously deemed to be excess.

Figure 1-2 above shows the utilization of space and the additional workstations and meeting/collaboration rooms (in green, red and orange).

As described above, the previously excess office space will be fully utilized effective January 1, 2023. As such, Milton Hydro is requesting that the depreciated value of this space (e.g. net book value) in the amount of $306,680[3] be brought into rate base effective January 1, 2023.

3.3 Capital Cost Consequence of the Use of Inside Storage as an Outside Storage Equivalent

Prior to purchasing the current Head Office and Operations property at 200 Chisholm Drive., Milton Hydro had identified that 65,000 sq. ft. of outside storage would be required. The property at 200 Chisholm Drive. has 29,000 of outside storage space and 59,028 sq. ft of inside Operations & Warehouse space. In the 2016 Decision, 36,000 sq. ft. of the Warehouse & Operations space was "deemed" to be used for storage of items that would otherwise be stored outside. Hence, this has been referred to as "premium" storage space as the cost of storing items inside was calculated as being higher to that of outside storage.

The EB-2015-0089 Decision attributed 23,000 sq. ft. space to Operations, leaving the remaining 36,000 sq. ft. as "deemed" to be used as storage space for inventory items that would have otherwise been stored outside if there was the space. It is noted that as compared to the initially identified requirement of 65,000 sq. ft. there is 36,000 sq ft. less outside storage at 200 Chisholm Drive. Essentially, the remaining warehouse space after deducting 23,000 sq. ft. for Operations was "deemed" to be used for outside storage. It is important to note that in the Initial space requirements, Milton Hydro identified Operations space requirements of 37,000.

The initially identified need for 65,000 sq. ft. of external storage space (prior to purchasing the 200 Chisholm Drive property) never materialized. Milton Hydro has managed to efficiently utilize its 29,000 sq. ft of outside storage area to accommodate inventory items that are not affected by weather. Its' current inside inventory storage area is approximately 12,500 sq. ft. It is necessary for most of this inventory to be stored inside as it needs to be sheltered from adverse weather. This inventory consists of items such as Submersible & Vault Room Transformers, Meters, Switch and Viper Control Boxes, and Inline switches & fuses. There are approximately 3,200 sq. ft of indoor inventory space used to store inventory that by its nature could be stored outdoors; however, the majority of this inventory consists of items such as Wire and Cable and there are benefits from being stored inside as it reduces handling time & increases safety with the use of overhead cranes and provides ready access for preparation and staging when needed. In addition, a select few transformers would be considered as indoor inventory readily available in the event of an after hours emergency. In both cases the approaches allow for minimal

[3] $1,214,822 / $1,429,202 = 85% X $360,800 = $306,680

equipment and resources to prepare for transportation to jobsites. There is value of all inventory being stored indoors benefitting the efficiency of materials flow as well as benefits to safer work practices. Milton Hydro's total outside and inside inventory storage area is 41,500 sq. ft.

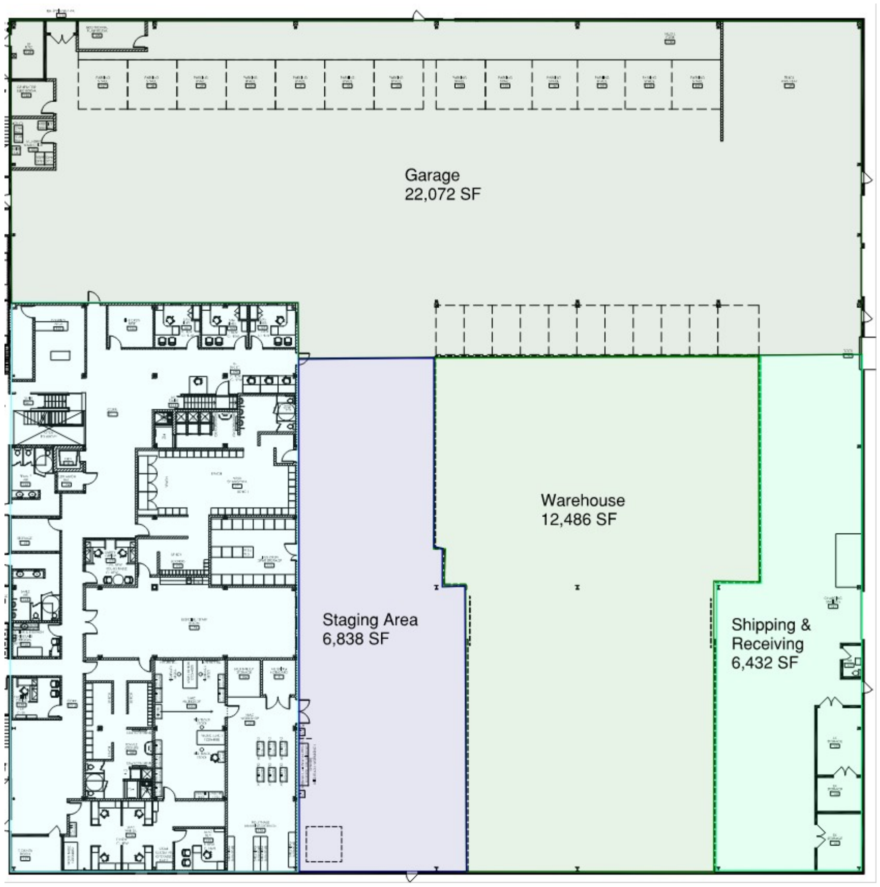
As discussed, Milton Hydro's inventory storage requirements are less than identified in EB-2015-0089. However, there are other areas that Milton Hydro requires for operations that were not specifically identified in the 2016 rate proceeding. These areas and the associated space utilized are summarized in Table 1-5.

Table 1-5 Utilization of Warehouse & Operations Space

#	Area Description	Approx. Square Feet
1	Garage	22,072
2	Operations Offices & Meter Shop	11,200
3	Material Staging Area	6,838
4	Warehouse Inventory Storage	12,486
5	Shipping & Receiving	6,432
Total		**59,028**

The location of these areas is identified in the following Figure 1-3

Figure 1-3 Current Warehouse & Operations Space Utilization



35115459.1

A description of the functionality of each of the warehouse space areas is as follows:

3.3.1 Garage

The garage consists of 22 service/parking bays and is used for vehicle charging and as a vehicle/equipment (e.g. mobile generator) staging area. It also includes a washing station, tool area and electronic waste disposal area.

3.3.2 Operations Offices and Meter Shop

This area includes of the following:

- Meter Shop (e.g. Workstations, Lab, Staging, Data-pull, Office),
- Offices for Operations Supervision,
- Office for Supervisor, Health & Safety
- Office for Manager, Supply Chain & Facilities
- Swing space Power Line Technicians,
- Meeting rooms (e.g. Storm Room), and
- Rubber cover-up storage room
- Locker/change rooms, and
- First Aid Room

3.3.3 Material Staging Area

This area is used for segregation and staging of assigned project materials to ensure all goods are readily available for a given project/work order. In addition, a small inventory of commonly used components needed for after hour emergencies is maintained in this area.

3.2.4 Warehouse Inventory Storage

This area is used to store and safeguard commonly used inventory items necessary for operations, maintenance and capital work programs. It is necessary for most of this inventory to be stored inside as it needs to be sheltered from adverse weather. Also, with 3rd party contractors onsite and within the Milton Hydro facility, there is a need to ensure high value components are kept secure and always accounted for. This area consists of a fenced-in secure area with multi-level racking and shelving for efficient storage and retrieval of inventory items.

Inventory stored within the secure warehouse includes high turnover items, high value items that are considered easily handled (i.e. Meters, Fuses, etc.), critical or unique components with a specific customer application (i.e. transformer for Milton Hospital), consumables (i.e. hardware). A portion of the cable and wire spools inventory is stored indoors to ensure that this material is readily available to distribute to crews. Also, some transformers are stored inside so as to be readily available in the event of an after hours emergency. This approach allows for efficiency of equipment and resources to prepare for material for transportation to jobsites. Although approximately 3,200 sq.ft. of the inventory stored indoors by its nature could potentially be stored outdoors if there was room, Milton Hydro has found a way to add value and efficiency and safer work practices by storing the materials indoors. This is significantly less than the 36,000 square feet of space that was deemed to be "premium" indoor storage space in the EB-2015-0089 proceeding and for reasons noted above there are operational advantages to storing the inventory inside.

3.2.5 Shipping and Receiving

This area is used to manage incoming deliveries of inventory and other purchases. The space consists of a loading dock for goods inbound via transport trailer and drive-up docks for overhead crane loading and unloading. The area also provides space for issuing and loading job-site material to Milton Hydro crews and 3rd party contractors.

As described above, the previously disallowed 36,000 sq. ft. "premium" indoor storage space was not entirely required to accommodate the lack of outside storage. The Warehouse & Operations space has been re-purposed (from that "deemed" to be storage) to more accurately align with Milton Hydro's operations and space requirements for various tasks and is currently fully utilized. As such, Milton Hydro is requesting that the depreciated value of this space (e.g. net book value) in the amount of $640,458 be brought into rate base effective January 1, 2023[4].

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[4] $1,214,822 / $1,429,202 = 85% X $753,480 = $640,458

EXHIBIT 2

ATTACHMENT 2-2
DISTRIBUTION SYSTEM PLAN

Milton Hydro

Distribution System Plan

2023-2027

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INTRODUCTION

Milton Hydro Distribution Inc. ("MHDI" or "Milton Hydro") is an electricity distributor licensed by the Ontario Energy Board (OEB). In accordance with its Distribution License ED-2003-0014, Milton Hydro is responsible for distributing electricity to more than 42,000 businesses and residential customers within the Town of Milton. Milton Hydro is a wholly-owned subsidiary of Milton Hydro Holdings Inc., which is owned by the Town of Milton. Milton Hydro has been providing safe, reliable, and affordable electricity service for more than a century. This is MHDI's second consolidated Distribution System Plan ("DSP") prepared in accordance with Chapter 5 of the OEB's Filing Requirements for Electricity Distribution Rate Applications, dated June 24, 2021. This DSP provides information covering a twelve-year period, comprising of an historical period and a forecast period. The historical period is the seven years of the DSP duration, covering the 2016-2021 historical period and the 2022 bridge year. The forecast period is the last five years of the DSP duration, consisting of five forecast years, beginning with the 2023 test year.

Milton Hydro is supplied electricity from four Hydro One owned and operated transformer stations and one Oakville Hydro owned and operated transformer station, at voltages of 44kV and 27.6kV. MHDI is transmission connected at two of the five transformer stations and is considered a partially embedded distributor. Milton Hydro supplies electricity at three voltage levels, 27.6kV, 13.8kV, and 8.32kV. MHDI utilizes distribution assets including three-phase and single-phase circuits, transformers, poles and four distribution substations. The key industrial sectors in Milton are automotive, advanced manufacturing, distribution and food production. The OEB regulates the distribution rates charged and the energy delivery system performance standards.

Milton Hydro serves a mixed urban/rural community, which has experienced exponential growth since 2000, with continued growth projected beyond 2031. MHDI is required to expand and reinforce its distribution system to:

- Meet the growing demand of new and existing customers in its service territory
- Ensure safe and reliable provision of electricity
- Respond to customers' evolving needs, e.g., DERs
- Ensure the system is digitally enabled and is 'future ready'

MHDI is responsible for maintaining distribution and infrastructure assets deployed over 371 square kilometers: 285 square kilometers of rural service area and 83 square kilometers of urban service area. These assets include 784 circuit kilometers of overhead lines and 2,030 circuit kilometers of underground lines (data as of December 31, 2021).

As a reputable and conscientious electricity provider, Milton Hydro Corporate Objectives are aligned with customer expectations, regulatory requirements and best business practices.

MILTON HYDRO CORPORATE OBJECTIVES

1. Safety
2. Reliability in electricity delivery
3. Stakeholder consultation
4. Financial integrity and accountability
5. Regulatory compliance

Milton Hydro takes a progressive approach to its business. Strategic planning [1] has led to four key objectives. These objectives are intended to fortify Milton Hydro as a desired and trusted electricity supplier. Each objective can be applied to capital investments proposed within this DSP.

Objectives	Why this is Important
1. Build a future ready company that is scalable & sustainable	- Motivated, agile and capable workforce for effective execution with sufficient depth to de-risk employee loss - Quickly meet evolving market dynamics (technology, energy transition, regulatory) - Sound business practices and processes optimized for efficiency to effectively service the growth requirements of Milton - Technology footprint to modernize and enhance business practices to make data driven decisions - Demonstrate leadership in electrification of assets and fleet (Net Zero)
2. Build a customer centric organization	- Meeting evolving customer needs and expectations to drive higher customer satisfaction - Improving customer capabilities and automation for enhanced customer interactions and timely information (preferred platform engagement) - Ensuring that service quality (availability/reliability) is maximized - Improving communications on various media platforms for timely and relevant information sharing
3. Maximize value using an	- Understanding customer experiences from an enterprise journey perspective and improving the overall experience from end-to-end

[1] Exhibit 1, Section 1.2.4 Strategic Themes for Milton Hydro 2.0

Objectives	Why this is Important
enterprise approach	- Reducing errors or issues associated with undefined accountability and improving customer experience and operational excellence - Reducing siloed decision-making and shift to a sound, overall decision-making approach
4. Drive profitable and sustainable growth	- Maximizing the financial capability and efficiency of the company to increase value for ratepayers and the shareholder - Minimizing risks to safety, financial loss, service quality risks or any material risk factors

Milton Hydro's DSP is designed to support the four key OEB objectives from the OEB "Report of the Board – A Renewed Regulatory Framework for Electricity":

1. Operational effectiveness
2. Customer Focus
3. Financial Performance
4. Public Policy Responsiveness

Milton Hydro's DSP was developed for the 2023 to 2027 period using its asset management and capital expenditure planning processes. The DSP documents the practices, policies and processes that are in-place to ensure that investment decisions support MHDI's and its customers' desired outcomes in a cost-effective manner, and provide value to the utility and its customers.

The DSP integrates information that results in an optimal investment plan and aligns with public policy objectives taking into consideration:

- System expansion
- System renewal
- Regional planning
- Renewable generation
- Smart grid
- Customer value and preference

MHDI has adopted good utility practices of the electricity distribution industry. This includes adhering to the OEB's Distribution System Code that sets out good utility practices, minimum performance standards for electricity distribution systems in Ontario, and minimum inspection requirements for distribution equipment. Consistent with good practices, MHDI maintains its equipment in safe and reliable working order, and upgrades or replaces its equipment in conjunction with government and regulatory customer centered themes (e.g., smart grid development).

In developing the long-term DSP, MHDI's objective is to ensure that the future distribution system is designed to safely deliver quality and reliable power, balancing customers' cost and service expectations to the extent possible, while optimizing asset lifetime cost with preventative maintenance and end-of life replacement.

To determine investment needs of the distribution system, MHDI considers performance-related asset information including, but not limited to, reliability data, asset age and condition, loading, customer connection requirements and system configuration.

In 2021, MHDI engaged Kinectrics Inc. to complete an Asset Condition Assessment ("ACA") study, providing input for the DSP development. The ACA produced a quantifiable evaluation of key assets, which was used to support System Renewal investments.

MHDI's DSP demonstrates prudence in controlling costs through appropriate optimization, prioritization and pacing of capital-related expenditures.

5.2 Distribution System Plan

MHDI's DSP has been prepared in accordance with Chapter 5 of Filing Requirements for Electricity Transmission and Distribution Applications ("DS Plan Filing Requirements").

MHDI has organized the required information using the section headings in the DS Plan Filing Requirements. Investment projects and activities have been grouped into one of the four OEB defined investment categories listed below, based on the 'trigger' driver of the expenditure:

System Access - investments are modifications (including asset relocation) to the distribution system that MHDI is obligated to perform in order to provide a customer (including a generator customer) or group of customers with access to electricity services via MHDI's distribution system.

System Renewal - investments involve replacing system assets to extend the original service life of the assets and thereby maintain the ability of MHDI's distribution system to provide customers with electricity services.

System Service - investments are modifications to MHDI's distribution system to ensure it continues to meet MHDI operational objectives, while addressing anticipated future customer electricity service requirements.

General Plant - investments are modifications, replacements or additions to MHDI's assets that are not part of the distribution system; including land and buildings; tools and equipment; fleet and electronic devices and software used to support business and operations.

The electric distribution system is capital intensive in nature. Prudent capital investments and maintenance plans are essential to ensure the sustainability of the distribution network. MHDI's DSP documents the practices, policies and processes that are in-place to ensure that decisions on capital investments and maintenance plans support MHDI's desired outcomes in a cost-effective manner and provides value to the customer.

This DSP describes the capital and maintenance activities that MHDI has completed in the 2016 – 2021 period, capital plans for 2022, and capital plans for the 2023 – 2027 forecast period.

5.2.1 Distribution System Plan Overview

This section provides a high-level overview of the information filed in the DSP.

5.2.1A Key elements of the DSP that Affect its Rates Proposal

Milton Hydro expects that the operational and service requirements driving its capital expenditures, and found within its DSP, will generally remain consistent through the 2023 to 2027 planning window. The projected expenditures for 2023 and going forward reflect the spending needs of an electric power distribution utility serving a growing customer base, with a diverse collection of physical assets. Specific investment category requirements are:

- System Access spending due to customer service requests, 3rd party infrastructure development requirements and mandated service obligations
- System Renewal investments required to replace assets at end-of-life due to failure or risk of failure, substandard performance, functional obsolescence
- System Service investments that promote enhanced reliability and the continual growth and development of MHDI's Smart Grid capabilities
- General plant investments to meet the needs in areas such as facilities, fleet and IT

A summary of Milton Hydro's proposed capital investments for the 2023 – 2027 forecast period is provided in Table 1.

Table 1. Net Capital Expenditures Forecast

OEB Investment Category	Capital Expenditures Forecast ($'000) *					Average Annual Investment	% of Annual Investment
	2023	2024	2025	2026	2027	2023 - 2027	2023 – 2027
System Access	$5,612	$5,308	$4,342	$6,576	$5.511	$5,470	47%
System Renewal	$2,670	$2,520	$2,575	$2,630	$2,687	$2,616	23%
System Service	$1,711	$1,880	$1,784	$1,807	$1,829	$1,802	15%
General Plant	$2,413	$1,735	$1,595	$1,076	$1,757	$1,715	15%
Gross Total	$12,406	$11,443	$10,295	$12,089	$11,784	$11,603	100%
Capital contributions	$2,539	$2,473	$2,137	$2,877	$2.542	$2,514	22%
Net Capital Expenditures	$9,866	$8,971	$8,158	$9,212	$9,242	$9,090	81%

** Note: Numbers are rounded to the nearest $'000. Detailed values are captured in Exhibit 2AB.*

Table 2. Capital Expenditures 2023

OEB Investment Category	2023 Investment ($'000) *	% of Annual Investment	Average Annual Investment ($'000)*	% of Annual Investment
	2023	2023	2023 – 2027	2023 - 2027
System Access	$5,612	45%	$5,470	47%
System Renewal	$2,670	22%	$2,616	23%
System Service	$1,711	14%	$1,802	15%
General Plant	$2,413	19%	$1,715	15%
Total	$12,406	100%	$11,603	100%

** Note: Numbers are rounded to the nearest $'000. Detailed values are captured in Exhibit 2AB.*

From Table 1 and Table 2, it can be seen that the major driver of Milton Hydro's capital expenditures over the forecast period will be System Access and System Renewal driven investments.

The following section highlights some of the factors influencing the proposed spend by OEB Investment Category. More detailed project information is provided in the Capital Expenditures section ***(5.4.2).***

System Access

System Access projects are primarily driven by customer connection needs and 3rd party infrastructure needs requiring mandatory plant relocation.

Milton Hydro's proposed System Access investments are driven by three primary project types:

1. New Subdivisions
2. Customer Connection (other than new subdivisions)
3. Roadway Relocations

New Subdivisions are the single largest proposed investment in the System Access category. In 2023, this investment represents a connection of approximately 1,000 new residential units.

DSP impact: Forecast customer growth will be accommodated through System Access investments.

Customer Connections represents more than 100 new connections in 2023, ranging from individual stand-alone residential connections to new industrial/commercial customers requiring dedicated three phase transformation. This category also includes costs relating to the meter reverification and the proactive meter replacement program.

DSP impact: Forecast customer growth will be accommodated through System Access investments.

Roadway Relocations are primarily driven by the Region of Halton and the Town of Milton and in 2023, the Town of Milton and Region of Halton have identified three projects requiring Milton Hydro investments to relocate its distribution infrastructure. Regional Road projects of varying scope are proposed for the remaining 2024 – 2027 forecast period and depend on externally driven Town and Region schedules.

Town of Milton Road Projects – A multi-year schedule (2021-2027) has been published by the Town and is reflected in MHDI's capital projects. A link to the Town of Milton Road Projects has been included in ***Appendix B – Links.***

Halton Region Road Projects – A multi-year schedule (2021-2030) has been published by the Region and is reflected in Milton Hydro's capital projects. A link to the Halton Region Road Projects has been included in ***Appendix B – Links.***

DSP impact: Current road project schedules have varying annual impact on System Access spending in the DSP. Future changes to the road schedule, within the period of the DSP, may require reallocation of resources to System Access spending from other capital investments.

BUSINESS CONDITIONS

The Town of Milton has seen steady growth in Industrial, Commercial and Institutional (ICI) activities. Milton is still building out and has been identified as an Urban Growth Centre; as such ICI and residential development is expected to continue. For example, the Milton Education Village is proposed community investment that could expand the urban boundary – a 400 acre integrated neighbourhood that would include a university campus, an innovation centre, the Milton Velodrome, a transit hub, student and residential housing.

DSP impact: Steady growth is addressed through System Access and System Service investments.

POPULATION GROWTH

System Access projects are intimately tied to the growth being experienced by the Town of Milton. According to Statistics Canada, the Town of Milton is considered one of the fastest growing municipalities in Canada[2]. Milton Hydro uses various inputs from the Region of Halton and the Town of Milton when trying to understand and forecast its needs to support the municipality and the broader community it serves. Historically, these growth projections have been ambitious, and Milton Hydro has budgeted accordingly. To support prudent planning for this DSP, Milton Hydro retained GSAI to conduct an independent growth study.

Evaluating data from these reports and past population growth, against actual historical customer growth, alongside the pace of that growth, Milton Hydro has budgeted for 1,000 connections/year for 2023-2027.

Table 3. Population and Customer Growth

	2011	2016	Growth over previous 5 years	2021	Growth over past 5 years
Population	87,000	110,128	27%	132,979	21%
Number of Customers	30,485	36,818	21%	42,270	15%

[2] Canada's fastest growing and decreasing municipalities from 2016 to 2021

PROJECTED GROWTH ANALYSIS STUDY

In September 2021, MHDI retained a third-party expert, GSAI, to undertake a growth study to determine residential and employment growth in Milton from 2022 – 2027 [see ***Appendix G GSAI Projected Growth Analysis Study (2021)***]. GSAI gathered and assessed data from multiple, reputable and reliable resources that had both forward looking/planning data: Regional Municipality of Halton and The Town of Milton (various reports and infrastructure planning); and historical data: Statistics Canada, Town of Milton Building Permit Data and Region of Halton Employment Survey. Additionally, GSAI met with key senior planning and building staff regarding growth trends in the Town of Milton. The refined growth projections for MHDI were compiled based upon GSAI's practical experience on growth timing trends working as planning consultants.

The study acknowledges that the further out in time it projects, the accuracy wanes; however, it's prediction for total units in 2022 and 2023, aligns to Milton Hydro's budgeted customer connections (1,000/year).

Table 4 details the GSAI projected population, housing and employment growth the Town of Milton can expect to 2027.

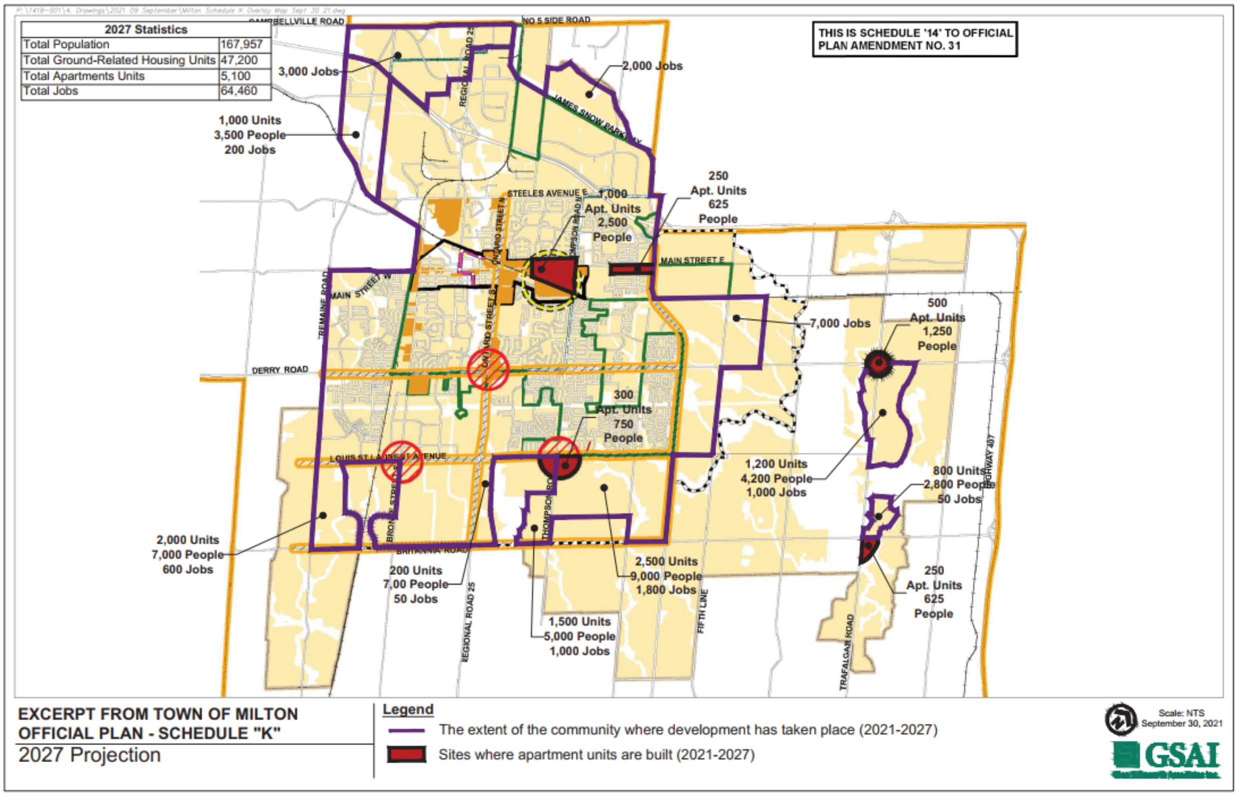
Table 4. Town of Milton Total Cumulative Population, Housing, Apartment and Jobs 2016 to 2027

	2016	2021	2027
Total Population	111,000	130,000*	167,950
Total Ground Related Housing Units	32,690	38,000	47,200
Total Apartment Units	1,825	2,800	5,100
Total Jobs	32,000	47,760	64,460

** GSAI's population predication was off by 2% from Stats Canada 2021 data.*

Figure 1 further demonstrates the level of growth the Town of Milton can expect to 2027.

Figure 1 – Town of Milton Projected Growth in 2027



HALTON REGION OFFICIAL PLAN

The Halton Region Official Plan (ROP) is currently under review. Regional Official Plan Amendment ("ROPA") 48 was adopted in November 2021 and a Preferred Growth Concept was presented (draft report February 2022).

The Planning Act requires that the Official Plan be reviewed every five years to reflect changes in the community, the vision for the Region and ensure that the Official Plan remains aligned with Provincial policies. It helps define and provide direction on urban structure, such as Urban Growth Centres, Major Transit Station Area, Regional Nodes and employment areas.

A stated goal in the ROP is to encourage and ensure the conservation and wise economic use of energy and to minimize adverse effects caused by its provision. A key Regional objective is to take an active part in decisions regarding the planning and development of utility corridors. The link to the complete Halton Region Official Plan is in ***Appendix B – Links***.

TOWN OF MILTON COUNCIL-STAFF WORK PLAN 2020-2023

The 2020-2023 Council-Staff Work Plan sets the long-term vision for the future of Milton. The plan sets a road map for how the Town of Milton plans to continue to accommodate growth, while ensuring the financial sustainability of the municipality and the community. The Town of Milton Official Plan (OPA31) requires all utilities to be placed underground, except on major arterial streets.

A link to the Town of Milton Council-Staff Work Plan has been included in ***Appendix B – Links***.

Figure 2 – Local Municipalities in Halton Region

Milton Hydro is aware of and monitors other stakeholders that have interest in or frame the Town of Milton's growth. These include:

- Ontario Places To Grow Act (A Place To Grow – August 2020)
- Milton Major Transit Station Area & Mobility Hub Study (2020)
- Metrolinx Rapid Transit

Links to these reports are located in ***Appendix B – Links***. These reports all indicate strong and sustained growth in population, housing and commercial beyond the timeframe of this DSP.

DSP impact: Growth study projections have been incorporated in forecast System Access and System Service investments.

System Renewal

MHDI replaces its distribution assets that are at or near end-of-life through System Renewal investments. An asset's age and deteriorating asset condition affect reliability performance.

Milton Hydro's proposed System Renewal investments are driven by three primary project types:

1. Overhead Distribution Replacements
2. Underground Distribution Replacements
3. Meter Replacement Program

These three project types reflect the need to proactively manage the replacement of key assets that are at or near end of life. Replacement plans ensure that planning objectives related to reliability, customer satisfaction and operating cost control are achieved.

Overhead Distribution Replacement includes Pole Replacement, Porcelain Insulator replacement and Reactive Overhead Replacement of defective/damaged equipment programs.

Pole Replacements refer to replacing individual poles that are found to be at the end of their useful service life. In 2021, MHDI conducted an Asset Condition Assessment study. The results of this study were used to support budgeting for the number of poles to be replaced.

Porcelain Insulator/Switch Replacements refer to replacing porcelain insulators, that are end of life, with polymeric insulators. When porcelain insulators reach end of life, it can result in unsafe conditions. A multi-year program has been developed to pace the replacement of end-of life porcelain insulators.

Reactive replacement of defective/damaged overhead distribution equipment refers to emergency replacement work-of distribution assets due to unexpected failure and other external causes (i.e., storms, foreign interference, etc.).

Underground Distribution Replacement Program includes Reactive UG Replacement of defective/damaged equipment. Reactive replacement of defective/damaged underground distribution equipment refers to emergency replacement work of distribution assets due to unexpected failure and other external causes (i.e., pad mounted equipment hit by vehicles and transformers that are run to failure, etc.).

The ***Meter Replacement Program*** includes Proactive Meter Replacements and Meter Room Upgrades - Cell Modems.

Proactive Meter Replacement refers to replacing individual meters that are found to be at the end of their useful life and have communication issues. Generally, these consist of meters greater than 15 years in age.

Meter Room Upgrades refers to replacing land lines and obsolete cell modems in meter rooms with new cell modems and meters.

DSP Impact: It is recognized that System Renewal investments are non-mandatory and annual program spending is a trade-off between the risk of outages due to equipment failure and maintaining current levels of reliability. In this DSP, System Renewal spending is paced throughout the forecast period of the DSP to ensure the replacement of end-of-life assets in a timely and cost-effective manner that MHDI believes will maintain current levels of reliability.

System Service

System Service investments are made to ensure the distribution system continues to meet operational objectives while addressing current and future customer and regulatory requirements. These investments help to maintain and improve reliability and safety measures associated with the distribution system and improve operational system efficiencies. Milton Hydro continues to make System Service investments that enhance reliability and promote the growth and development of MHDI's Smart Grid capabilities.

System Service investments are categorized into two primary project types:

- System Automation Investments
- System Expansion Investments

System Automation Investments refers to SCADA/OMS functionality improvements and the deployment of automated switches, grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR) and enhanced SCADA capabilities throughout Milton Hydro's service territory. The ability to remotely operate and monitor the distribution system will help to maintain and improve reliability and safety measures associated with the distribution system and improve operational system efficiencies. As a result of ***Customer Engagement (elaborated on in Section 5.4A),*** investments in System Service were increased to enhance reliability and Milton Hydro's ability to respond to system events.

Milton Hydro's automation efforts are in line with the Ministry of Energy objectives with respect to smart grid development. Continued Smart grid development enhances MHDI's ability to provide a variety of energy services, including conservation and demand management, and distributed generation, in support of provincial energy policy and community energy plans.

System Expansion Investments also include projects that provide additional capacity to accommodate load growth that would otherwise constrain the ability of the distribution system to provide consistent and reliable service.

DSP impact: System Service investments have increased over historical levels as a result of continued efforts to develop Smart grid functionality in consideration of customer preferences and provincial energy policies and objectives.

General Plant

General Plant investments are investments that are not part of the distribution system. These investments meet the needs in areas such as Building Services, Fleet and IT. Most General Plant needs involve the replacement of existing assets.

Over the period of the DSP, Milton Hydro proposes to invest in the following categories:

- Building and Office Equipment
- Fleet
- Stores and Major Tools
- IT Hardware and Software

Building and Office Equipment – MHDI engaged a third party to conduct a Strategic Facilities Plan for its head office building and operations facility. The study concluded that the layout configuration was inefficient and inadequate to accommodate new staffing requirements; the Customer Service area is not readily accessible for walk-in customers; and window replacements were necessary. MHDI recognizes a phased approach is needed to address these issues and maintain paced spends. A Building Renovations Business Case is located in ***Appendix A***.

Fleet spends are timed to replace units at end-of-life. Over the life of this DSP period, MHDI will invest approximately $2.7M in fleet vehicles. This investment is evenly paced over four of the five years; 2026 has less spends based upon the economic end-of–life assessment and fewer vehicle replacement needs. Stores and tool investments reflect basic annual expenditures to maintain existing performance.

The ***IT Hardware and Software*** budget maintains a balanced pace of licensing and hardware maintenance purchases and cyber security enhancements. In addition to these operational costs, Milton Hydro is investing in a new ERP system so that staff can work more effectively and efficiently. The existing system requires manual workaround processes that encumber staff and produces poor information to support mandatory reporting requirements. An upgrade to the current system was explored, but it does not provide value for the cost, nor does it address the many issues faced on a daily basis. A full ERP Business Case is located in ***Appendix A***.

DSP Impact: An increase in spending compared to historical levels that will enhance the functionality and life of the head office and operations facility, replace an ageing fleet and implement new IT systems that will enable better performance and accuracy, while eliminating manual work processes.

Summary

Summary of Investment Category Key Elements and their impact on DSP spending pace are shown below:

Table 5. Summary of Key Elements and DSP Impact

Key Element	DSP Area of influence	DSP Pace Impact
New Connections	System Access	Paced over 2023-2027 period subject to external drivers
Replacement of end-of-life plant	System Renewal	Evenly paced over 2023-2027 period
System Automation	System Service	Evenly paced over 2023-2027 period
Fleet and IT investments	General Plant	Higher spending in 2023 due to investment in ERP system

5.2.1B Consideration of Customers' Preferences and Expectations

Milton Hydro regularly engages with its customers through a variety of forums (detailed in Exhibit 1, subsection 1.7 Customer Engagement). Recognizing that the Town of Milton hosts a dynamic, technologically savvy customer base, Milton Hydro has expanded its communication outlets to evolve with the community's ongoing digital transformation taking an Omni-channel Communications approach.

Milton Hydro has implemented a multipronged social media strategy that has steady growth in activity and number of customers.

- Twitter has been helpful in communicating outages and restorations with customers.
- LinkedIn has supported Milton Hydro's workforce expansion and developed company culture and industry exposure.
- Facebook has opened conversation with community influencers.

Emails are being used for consistent and timely communications, as well as targeting specific customers for relevant information.

The website links Milton Hydro's Operating Management System Twitter notifications to the homepage to inform customers of outages and restorations in real-time. The website is currently under redevelopment and in future will include a live chat feature connected to customer service, as well as information on billings, conservation tips, government programs and electrical safety.

Milton Hydro also deploys communications using a GlobeNewsWire press release service.

Milton Hydro continues to maintain its successful communications program using traditional media including customized Northstar outage greetings, personalized letters, bill inserts/onserts and door hangers, and its Customer Service team.

Milton Hydro is also engaging with its customers through community engagement activities, such as volunteering personal time to run a local food drive, participating in the town's Santa Clause Parade promoting safety by handing out colouring books and pencils to children, and partnered with the Halton Regional Police and the Tiger Jeet Singh Foundation to donate toys and essential items as part of the 'Miracle on Main' initiative.

All of these communications and engagements are intended to foster an open relationship between customers and Milton Hydro.

Specific to customers' preferences and expectations, Milton Hydro conducted its biennial Customer Survey with UtilityPulse (fall 2021), where 402 customers were surveyed. The survey represented 85% Residential and 15% Commercial, providing a confidence level of 95% (+/- 4.9%).

Milton Hydro customers count on MHDI to deliver consistent, reliable electricity at an appropriate cost. Customers also expect good customer service, proactive communications and timely issue resolution. MHDI operates with diligence to meet its customers' expectations.

WHAT MHDI CUSTOMERS THINK

93%	Milton Hydro Customers think that Milton Hydro	Provides consistent reliable energy
92%		Quickly handles outages
89%		Delivers on its service commitments
89%		Standard of reliability meets expectations
88%		is Trusted and Trustworthy
87%		Efficiently manages the network
86%		Has accurate billing
85%		Keeps its promises
85%		is Customer-focused
85%		is Socially responsible
80%		Pro-actively communicates changes and issues

Within the UtilityPulse survey, customers clearly articulated what they thought Milton Hydro's Priority Planning should be for the next five years:

Table 6. Customer Top 5 Planning Priorities

Priority	'very high + high priority'
1. Maintaining and upgrading equipment to ensure a safe and reliable electricity supply	94%
2. Investing to ensure that more frequent and severe weather events will cause less damage to distribution system	88%
3. Preventing data breaches and system disruptions due to cyber attack	88%
4. Investing more in the electricity grid to reduce outages	86%
5. Reducing response times to outages	86%

Regular customer engagement helps MHDI keep a pulse on what its customers want, need and expect from its electricity utility. Listening to its customers and being customer centric is foundational in MHDI's decision making process at all levels. The development of this Distribtuion System Plan for planning period (2023-2027) is no exception.

Milton Hydro engaged Decision Partners to undertake customer engagement activities for the purpose of developing its capital and operating plans. Decision Partners delivered a three Phase program: Phase I – Foundational Customer Research with a smaller number of customers but in an open, in-depth process designed to discover customers' needs, values, interests, and priorities; and Phase II – Broader Customer Engagement, designed to broaden the engagement to include all customers. The program concluded with the development of a ***Customer Engagement Summary Report*** (Phase III) ***– see Appendix J***.

Phase I – Foundational Customer Research

1. The Customer Engagement Process uses Decision Partners' proven, science-informed, evidence-based Mental Modeling Insight™ (MMI).
2. MMI research interviews were conducted with 25 Milton Hydro customers.
3. The purpose was to discover customers' needs, values, interests, and priorities as related to planning.
4. It provided the opportunity to obtain in-depth feedback using conversational, open-ended questions.
5. It was designed to allow for unanticipated topics and priorities to emerge.

This research provided preliminary qualitative indicators of Interviewees' preferences and priorities.

Phase II – Broader Customer Engagement

- Work was conducted in two parts: open web survery primarily designed to engage Residential Customers and a Larger Customer webinar (customers from all classes above GS<50).
- Both the web survey and webinar presented information about proposed capital planning and OM&A spending, presenting projects and information most relevant to each audience.
- The web survey was conducted between October 8 and November 11, 2021. A total of 4,178 customers opened the survey and answered at least one question, and 2,845 customers answered all survey questions; of these, 98% were Residential Customers.
- 366 Larger Commercial/Industrial Customers were invited to the Larger Customer webinar conducted on November 3, 2021; 17 participants, representing 15 different companies (i.e., customers) attended.

In general, customer feedback reinforces Milton Hydro's Business Planning priorities derived from MHDI's mission statement:

> *Mission Statement – Provide safe, reliable, stable delivery of electricity and associated services to our growing community at an appropriate cost.*

Milton Hydro addresses its customer preferences and expectations through:

- its diligent approach to capital planning that paces investments to maintain a reliable and safe distribution system;
- addressing and minimize cyber security risks;
- hardening the grid to withstand severe weather events, through with its pole replacement program;
- investing in technology that allows operations to more effectively the reduce number outages and outage response time.

Per prudent and responsible business management, Milton Hydro also responds to customer expectations by identifying areas for improved efficiency, productivity and minimizing rate impacts.

MHDI's proposed 2023-2027 DSP represents the appropriate level of investment needed to deliver on the commitments of Milton Hydro's mission and address customers' top priorities of maintaining a robust and resilient distribution system, while meeting the needs of customers today and preparing future readiness.

MHDI provides further detail in ***Section 5.4.A*** on how customer engagement activities were conducted, the feedback received and how this information is reflected in the proposed capital expenditure plan.

5.2.1C Sources of Cost Savings

MHDI planning and investment processes follow good utility practices and are executed through the DSP. Good utility practices have inherent cost efficiencies through sound decision making, thoughtful compromises, right timing and optimum expenditure levels. The following are the examples of cost efficiencies that are expected to be achieved:

- Proactive maintenance and replacement of plant will reduce reactive maintenance costs (including overtime reactive costs outside regular business hours) and maintain existing customer reliability levels. This will have a beneficial impact on the cost of outages to customers. A structured program will also smooth out financial rate impacts in an effort to avoid disruptive rate spikes to address the volume of plant reaching end of life.
- Use of the GIS to capture/access plant attribute data (e.g., nameplate data, condition, inspection/maintenance histories, etc.) aids in cost control through optimization of the asset's lifecycle.
- Prudent investment in distribution automation (e.g., remotely operated switches), as part of MHDI's Smart Grid development, improves day to day switching operations and has a positive impact on improving outage restoration times thereby mitigating customer outage costs. Truck rolls are reduced through remote switching capability.
- Customer service improved through reduction of outage calls as a result of outage texting capability.
- MHDI is working on a project to determine max/min of inventory levels based on turnover and lead time requirements. This could result in reduced levels of inventory and related costs.
- Working with GridSmartCity on initiatives that could realize improvements in procurement documentation and service agreements/contracts will optimize vendor pricing and quality of goods and services.
- MHDI has an ongoing voltage conversion program. Over time, this program will convert all MHDI 13.8kV supplied load to 27.6kV supplied load. Conversion to 27.6kV will result in lower line losses, standardization of equipment, reduced station transformer losses, reduced maintenance needs for 13.8kV assets and other benefits that improve the efficiency of the distribution system.
- The use of cellular modems reduces the cost to the customer for MV-90 meter reads. Modem usage will eliminate the need for MHDI site visits to manually read the MV-90 meter.

5.2.1D Period covered by the Distribution System Plan

For the purposes of this DSP, 2016 to 2021 is the historical period, 2022 is the Bridge Year, 2023 is the Test Year and the forecast period is for 2024 to 2027.

5.2.1E Vintage of the Information

The information generally used throughout the DSP is based on available information established mid-2021 and should be considered as current. Specific variances from this time frame are as noted. MHDI statistics are based on 2020 RRR filings with 2021 data updates where available.

5.2.1F MHDI Asset Management Process

This is the second DSP filed by MHDI. Previous information with respect to MHDI's Asset Management processes was filed in MHDI's 2016 COS application, along with MHDI's 2016-2020 DSP. Since then, Milton Hydro has updated its ***Asset Management Plan***, located in ***Appendix D***.

In 2021, MHDI engaged Kinectrics Inc. to conduct an Asset Condition Assessment of its key distribution assets. The assessment resulted in a quantifiable evaluation of asset condition and refinement of existing asset replacement programs.

Since the last DSP filed, there have been no changes to Milton Hydro's asset management process.

5.2.1G Contingent Activities/Events Affecting the Distribution System Plan

There are a number of ongoing and future activities in the MHDI service areas that may/will impact on capital project prioritization and spending as outlined in the DSP.

CUSTOMER CONNECTIONS

The number and timing of new connections is dependent on customer location and service requirements. Best estimates for annual customer connections (subdivision development) investments have been provided.

ROAD PROJECTS

Both the Region and Town are expected to require road works within the forecast period of the DSP that have not been detailed at this time. MHDI will be required to react to schedule additions/changes as they occur during the period of the DSP. The road authorities are required to give as little as six months' notice to MHDI for work that could affect MHDI plant.

RURAL INTERNET/BROADBAND

The Supporting Broadband and Infrastructure Expansion Act, 2021, regulation: O. Reg. 842/21 (Electricity Infrastructure (Part VI.1 of the Act)) came into force on January 1, 2022. This new regulation is expected to increase the volume of work needed to accommodate broadband providers, including make-ready work on pole lines. The impact on Milton Hydro is unknown at this time. It is likely to add additional spending within the System Access category. This DSP has been created using historical levels of telecom activity.

GTA WEST – INTEGRATED REGIONAL RESOURCE PLAN (IRRP), JULY 2021

The previous Regional Planning cycle resulted in an IRRP being issued in April 2015. The IRRP determined that there was need for new transformation facilities (Halton TS2) to service Milton Hydro load growth by 2020. Since that time, updated load forecasts indicated that the station could be deferred to 2022. As part of the ongoing planning cycle, an updated IRRP was issued in July 2021 that assumed the need for Halton TS2 remained at 2022 based on historical forecast information.

Recent discussions between Hydro One and Milton Hydro determined that the station could be further deferred to past the 2027 timeframe. Halton TS2 can be considered a holdover far term need from the previous planning cycle. The other near and medium term recommendations in the 2021 IRRP are not affected by the change in the Halton TS2 in-service date.

A link to the July 2021 IRRP has been included in ***Appendix B – Links***.

This DSP assumes that there will be no investment needs for Halton TS2 during the 2023-2027 forecast period. The forecasted load growth will be supplied by

- a continuation of the Oakville Hydro contract from Glenorchy MTS
- new supply from Halton Hills Hydro Halton Hills MTS
- upsized capacity on Hydro One Palermo TS

With this additional capacity and prudent planning, the need for Halton TS2 can be deferred beyond 2027.

PALERMO TS REBUILD

The 2021 GTA West IRRP identified the need to replace the Palermo TS transformers which will reach end-of-life in 2025. The IRRP concluded that the cost of upsizing Palermo TS when its transformers reach end-of-life in 2025 is substantially more cost-effective than the alternative of refurbishing Palermo TS like-for-like. The incremental cost for this is seen as the optimized Regional Planning solution driven by end-of-life needs. This solution was not driven by MHDI needs for additional capacity out of Palermo TS. The additional capacity at the station would be available to load customers on a first-come first-served basis as per Transmission System Code.

Once station capacity has increased, MHDI would seek to add new load to the station over time, subject to the available capacity, like any other load customer. Hydro One has indicated that a capital contribution may be required to address the incremental costs of increasing Palermo TS capacity. Per the Transmission System Code, as the station upgrade and associated cost is driven by end-of-life needs and not specific increased capacity needs by MHDI, MHDI takes the position that no capital contribution should be required to access the available capacity.

The DSP assumes there will be no capital contribution required from MHDI due to the incremental increase in capacity solution that addresses the Palermo TS end-of-life status.

METER REVERIFICATION

MHDI is required to have its electronic type meters tested to ensure compliance with Measurement Canada standards. MHDI completed its initial compliance sampling on its smart meter population and group sampling results have staggered the seal expiry dates over the next five years; Milton Hydro plans to reverify approximately 1000 meters annually.

The majority of the meters identified will be eligible for seal extension sampling the year prior to its expiry date. Any meter groups not successfully sample tested at that time will have to be removed from service before their seal expires.

The DSP assumes that the meters will successfully pass reverification testing.

5.2.1H Grid modernization, DER and Climate Change investments

GRID MODERNIZATION

Over the 2023-2027 forecast period Milton Hydro will continue to invest in the deployment of automated switches and grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR) throughout MHDI's service territory. The ability to remotely operate and monitor the distribution system will help to maintain and improve reliability and safety measures associated with the distribution system and improve operational system efficiencies. Additional automated switches and FLISR capabilities will have a positive impact on improving outage restoration times thereby mitigating customer outages. Automation efforts enhance MHDI's ability to respond to system events and maintain a focus on the needs of Milton Hydro's customers.

Milton Hydro's automation efforts will strive to satisfy the government's smart grid development expectations. Continued Smart grid development enhances MHDI's ability to provide a variety of energy services, including conservation and demand management, and distributed generation, in support of provincial energy policy and community energy plans.

DERs

There are no specific investments over the period of the DSP required to connect distributed energy resources. Existing plant capacity deemed adequate to connect known plans for DERs in MHDI's service territory.

CLIMATE CHANGE ADAPTATION

There are no specific capital investments over the period of the DSP related to climate change adaptation that would harden and/or improve the resiliency of the distribution system. MHDI plant will continue to be installed according to the latest CSA, IEEE and industry standards. It is expected that climate change impacts will be incorporated into the ongoing evolution of construction and material standards. From an operating perspective, MHDI continues to enhance its preventative maintenance practices in the area of vegetation management to mitigate the impacts of severe wind and storm events. The tree trimming program has been set at a 3-year cycle to minimize outage impacts due to severe weather-related vegetation contact with overhead lines.

5.2.2 Coordinated Planning with Third Parties

5.2.2A Description of Third Party Consultations

Milton Hydro serves the Town of Milton, a municipality expecting to see significant growth through to 2051. As the Local Distribution Company (LDC), Milton Hydro consults with various stakeholders to ensure their input is taken into consideration when developing the DSP; stakeholders include:

- Customers
- Town of Milton and Region of Halton
- Development Community
- Broadband Service Providers
- Hydro One (the local Transmitter)
- Independent Electricity System Operator (IESO and former OPA roles)

Consultation

CUSTOMER CONSULTATION

Customers' Preferences and Expectations is described in Section ***5.2.1 B***. Customer Engagement is described in Section ***5.4 A***.

TOWN OF MILTON AND REGION OF HALTON CONSULTATION

Milton Hydro regularly consults with the Town of Milton and the Region of Halton. It's an on-going and open dialogue that is critical to community growth and long-term planning and ensuring that the growth is properly supported with services. Examples of the consultation process include:

PUBLIC UTILITIES COORDINATING COMMITTEE (PUCC)

The PUCC is comprised of stakeholders from the municipal and regional governments, MHDI and other local utilities such as gas, cable and communication companies. PUCC meetings are held semi-annually and are used by stakeholders to review existing and proposed Right of Way (ROW) projects. These projects may be stand-alone projects (such as a road widening to accommodate increasing traffic volumes) or a coordinated effort in response to some other driver (such as new infrastructure to accommodate a specific residential development). This group coordinates the various activities required by the member stakeholders to ensure effective project planning and construction phases. These meetings were paused as a result of the pandemic; a virtual meeting was held October 2021.

DRAFT PLAN AND ZONING AMENDMENTS

Milton Hydro regularly receives Draft Plan and Zoning Amendment proposals to provide comments where appropriate and to act as a notification of the status of future projects.

ANNUAL CONSULTATION

The Town of Milton and Region of Halton provide project plans to Milton Hydro for incorporation into its internal planning. These plans can be for the current/upcoming year or longer term and include:

- Specific development plans, projects and proposed timing
- Infrastructure plans – scope and timing of road widening's, water/wastewater and other infrastructure works
- Official Plans – Regional and Town Official Plans

SPECIFIC CONSULTATION

Milton Hydro often consults with the local governments for specific issues, both formally and informally, e.g., economic development could inquire about capacity to accommodate large customers at a specific location.

Beyond planning consultations, many projects require more active conversations during project implementation between MHDI and staff or consulting firms on behalf of the local governments.

As a growing community, these types of projects are a major component of the focus within the Town of Milton and impact Milton Hydro's DSP.

DEVELOPMENT COMMUNITY CONSULTATION

Milton's anticipated growth is a plethora of opportunity for the development community. Milton Hydro engages directly with the Developers to ensure the growing community is properly serviced.

OFFICIAL PLANS

The Official Plans for Milton are an important tool that guide development and support developer discussions as to staging and project milestones. Milton Hydro uses this information, in combination with more project specific data, to help formulate a response within the DSP.

DRAFT PLAN CIRCULATIONS AND APPROVALS

Developers share draft plans during the approval process that provides detailed information about specific subdivisions. Milton Hydro is able to review and comment during this process for a continuous flow of information that supports planning, understanding of schedule, subdivision supply requirements and the number of individual connections projected by the developer.

DEVELOPER CONSULTATION

As required, Milton Hydro will consult with the development community on specific development related issues. These issues can range from financial obligations under Milton Hydro's Conditions of Service and the OEB's Distribution System Code, to technical specifications for new subdivision installations. These discussions can be in the form of personal meetings or email correspondence.

PROJECT SPECIFIC

Project specific discussions are more operational and can be initiated by either the developer or Milton Hydro. The ultimate goal of these discussions is to ensure both entities are meeting their respective obligations and deliverables to ensure the subdivision is energized on time, and the individual residences are connected on schedule. Discussions ranging from temporary subdivision supply points to servicing layouts.

BROADBAND SERVICE PROVIDERS

When the PUCC was meeting, Milton Hydro regularly consulted and collaborated with the local Broadband Service Providers for the benefit of the community. Since the beginning of the Covid-19 pandemic, engagement has been on an as-needed, when-needed basis.

In response to regulation O. Reg. 842/21 (Electricity Infrastructure (Part VI.1 of the Act)), Milton Hydro reached out to all the local Broadband Service Providers to re-engage and reaffirm the collaborative nature of the relationship and willingness to work together.

Each service provider operates in its own manner and has different needs. All service providers are satisfied with MHDI's timely responses to requests for joint use and permit applications. Some look forward to regular meetings, while others are satisfied with meeting on an ad-hoc, as needed basis. None have specific plans at this time that would impact MHDI's capital planning.

HYDRO ONE CONSULTATION

Hydro One (HONI) is the transmitter that supplies Milton Hydro. Milton Hydro receives power from four HONI supply points. Most of Milton Hydro's interactions with HONI are related to operational issues relating to HONI supply points. The notable exception is MHDI's and HONI's joint participation in the GTA West Region (Group 1) Regional Planning Process. In addition to HONI and MHDI, the Regional Planning consultation process included the following regional distributors:

- Burlington Hydro Inc.
- Alectra Utilities
- Halton Hills Hydro Inc.
- Hydro One Networks Inc.
- Oakville Hydro Electricity Distribution Inc.

The outcome of the GTA West Regional Planning process is an Integrated Regional Resource Plan (IRRP). The IESO released its GTA West (Peel/Halton) IRRP in July 2021 and is discussed further in the Final Deliverables of the Consultation Process (***5.2.2 B***).

On an operational basis, MHDI meets with Hydro One twice per year in HONI hosted distributor sessions.

Milton Hydro consulted with HONI in relation to this DSP and Halton TS2. These discussions resulted in the consensus that Halton TS2 can be deferred until after 2027 based upon alternative available supply. The projected community growth, associated the load growth requirements for the Town of Milton can be satisfied by prudent planning and additional supply capacity from Oakville Hydro's Glenorchy MTS, new supply from Halton Hills Hydro's Halton Hills MTS and an upsized Palermo TS.

Continuous monitoring and consultations with HONI throughout this forecast period will ensure adequate supply and confirm project needs and timing (current projected in-service date revised to Q2 2033 per second cycle RIP).

HYDRO ONE LARGE CUSTOMER CONFERENCE

The Large Customer Conference is held annually and provides an opportunity for an exchange of information between HONI and local utilities. It provides an opportunity to review system concerns, pending changes to the transmission system and the possible impact on local distributors. The last one was held in March 2019 and has not been held since as a result of the Covid-19 pandemic.

HYDRO ONE CUSTOMER CONFERENCE TO DISCUSS THE ANNUAL OUTAGE PLAN

The annual HONI Customer Conference provides an opportunity to coordinate any outage requirements and therefore minimize interruptions and multiple switching operations. The last one was held in November 2019 and has not been held since as a result of the Covid-19 pandemic.

DAILY OPERATIONS

On a continual basis, Milton Hydro coordinates system requirements with Hydro One. This ranges from daily operational needs to information exchanges at the system planning level.

OAKVILLE HYDRO CONSULTATION

Oakville Hydro supplies power to Milton Hydro from its Glenorchy MTS. On a daily basis, Milton Hydro coordinates with Oakville Hydro all operational activities at Glenorchy MTS. On a weekly basis, Oakville Hydro provides Milton Hydro operational measures associated with the supply from Glenorchy MTS.

On an ongoing basis, Milton Hydro provides any relevant information regarding projected loads and operational changes and solicits feedback to confirm acceptance of any proposed system changes or resolve any concerns those changes may generate.

Milton Hydro also consulted with Oakville Hydro in relation to this DSP to ensure availability of capacity for additional load.

HALTON HILLS HYDRO CONSULTATION

Consultations with Halton Hills Hydro Inc (HHHI) for power supply were initiated in 2021. The discussions started with CEOs and were then assigned to a technical level to assess feasibility. A quote for design engineering, which will lead to an Offer to Connect, has been received. This design will ensure that access to supply from Halton Hills MTS will be ready when needed to meet load growth anticipated in this DSP period.

INDEPENDENT ELECTRICITY SYSTEM OPERATOR CONSULTATION

Milton Hydro consults with the IESO for the GTA West Region (Group 1) Regional Planning process. The IESO also participates in the Hydro One Regional Infrastructure Plan (RIP) technical working group.

Regional Planning

Regional Planning is conducted as per the OEB framework outlined in the Transmission System Code and Distribution System Code.

For planning purposes, Milton Hydro is in the GTA West region (Peel/Halton). The GTA West region was previously divided into two sub-regions; the Northwest Sub-Region and the Southwest Sub-Region. With recent planning, these two sub-regions are now referenced as a single region.

Milton Hydro is also embedded in the Kitchener-Waterloo-Cambridge-Guelph Region.

REGIONAL ELECTRICITY PLANNING - PEEL/HALTON (GTA WEST) REGION

Planning activities for the GTA West Region are led by the IESO. A Needs Assessment Report - GTA West was completed May 2019 to support the next planning cycle, and the GTA West Region (Group 1) Integrated Regional Resource Plan (IRRP) was released July 2021.

The Needs Assessment report identified that the existing T3 and T4 transformers at Palermo TS will reach end-of-life in 2025. Palermo TS is fully utilized, with no remaining capacity for growth. Tremaine TS is also expected to exceed capacity in 2033. Both of these transformer stations feed Milton Hydro. The IRRP recommends upsizing the Palermo TS transformers to deal with the end-of-life issues, as well as load growth.

The previous Regional Planning cycle resulted in an IRRP being issued in April 2015. The IRRP determined that there was need for new transformation facilities to service Milton Hydro load growth by 2020. Since that time updated load forecasts indicated that the station, Halton TS2, could be deferred to 2022.

As part of the second planning cycle, an updated IRRP was issued in July 2021 that assumed the need for Halton TS2 remained at 2022 based on historical forecast information. Consultations led to the deferral of the station till 2027 as submitted in the Hydro One Transmission System Plan as part of case EB-2021-0110.

As previously discussed in the Hydro One consultation, continued consultations have since led to the consensus that the station can be deferred beyond 2027. Halton TS2 can be considered a holdover near term need from the previous planning cycle. The other near- and medium-term recommendations in the 2021 IRRP are not affected by the change in the Halton TS2 in-service date.

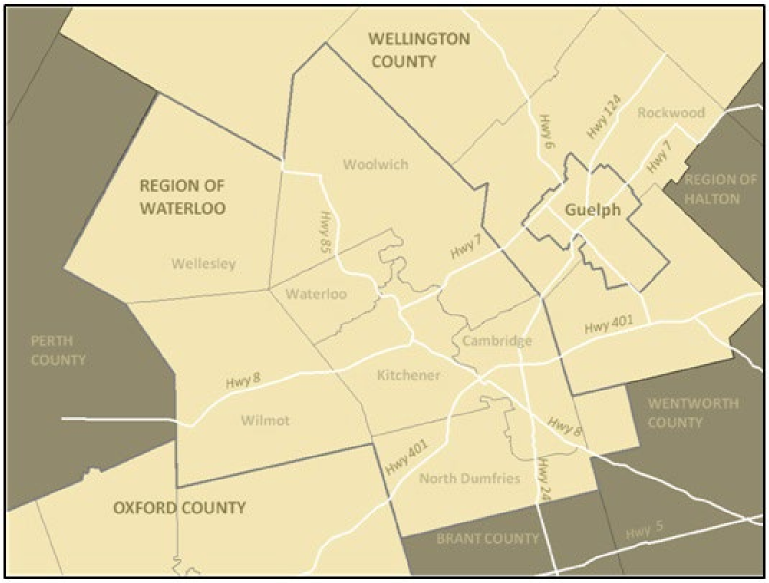
A ***Hydro One Regional Planning Status letter*** is located in ***Appendix H***.

Figure 3 – GTA West

KITCHENER-WATERLOO-CAMBRIDGE-GUELPH INTEGRATED REGIONAL RESOURCE PLAN

Milton Hydro is an embedded LDC served by Fergus TS, located in the Kitchener-Waterloo-Cambridge-Guelph (KWCG) Region. An Integrated Regional Resource Plan was completed May 2021. In this plan, there are no identified projects related to Fergus TS in the near- to medium-term, nor long term.

Figure 4 – Kitchener-Waterloo-Cambridge-Guelph



Impact on DSP

Milton Hydro's DSP has been informed and partially shaped by the consultation with the Town of Milton and Region of Halton. MHDI has incorporated both infrastructure plans (see ***Appendix B – Links***) and development projections (***Appendix B – Links***, Halton Region Official Plan, growth projections, Figure 1 through Figure 5) into its proposed System Access capital budget.

MHDI has incorporated the Development Community's input into the DSP to ensure adequate resources for subdivision developments. Municipal input combined with inputs received from the Development Community provide a robust picture of the future growth needs.

At this time, there are no impacts to MHDI's capital plans resulting from consultation with the local broadband service providers.

The GTA West Regional planning and Hydro One consultation:

- Hydro One has reassured Milton Hydro that Palermo TS's T3 and T4 transformers reaching end-of-life in 2025 will not impact service.
- Hydro One's future upsized Palermo TS will enable Milton Hydro to access more capacity from the larger sized TS.
- Halton TS2 has been deferred beyond 2027 and has no impact to the DSP.

For the forecast period, there is no impact on Milton Hydro's DSP arising from the consultation with Oakville Hydro.

The consultation with Halton Hills Hydro has led to the agreement for additional future supply during this DSP period.

Specific to Regional Planning, there is no impact to the DSP resulting from the Kitchener-Waterloo-Cambridge-Guelph IRRP.

5.2.2B Final Deliverables of the Consultation Process

Regional Planning

The GTA West Regional Infrastructure Plan was published January 2016. The study integrated load growth projections, bulk system needs, relevant community plans, FIT and other generation uptake, as well as local constraints to ensure that system adequacy needs arising from assessment of projected load growth are appropriately captured. The study determined that a new transformer station (Halton TS2) was required by 2020 to meet load growth in Milton Hydro service area.

Hydro One completed a Needs Assessment Report - GTA West, May 2019 as part of the next planning cycle. A Scoping Assessment Outcome Report Summary was published August 2019, recommending an IRRP be completed for the GTA West Region. The IRRP was completed and published July 2021. Within the report's appendices, it indicated that Halton TS2 would be in-service in 2022. Further consultation and updating of the load forecast led to the TS being deferred to 2027 as submitted in the Hydro One Transmission System Plan submitted as part of case EB-2021-0110. As a result of MHDI's DSP, a growth study and load forecast assessment were completed. The results were shared with HONI. A consensus was reached to defer Halton TS2 beyond 2027. The actual load consumption compared to the projections, as well as the additional supply mixes, will be closely monitored to ensure adequate supply is available to the Town of Milton, and planned timing for engineering, construction and commissioning of Halton TS2.

Milton Hydro is an embedded LDC served by Fergus TS, which is located in the Kitchener-Waterloo-Cambridge-Guelph (KWCG) Region. An Integrated Regional Resource Plan was completed May 2021. In this plan, there are no identified projects related to Fergus TS in the near-to medium-term, nor long term.

REGIONAL PLANNING DOCUMENTS

Appendix B –Links

- HONI GTA West Needs Assessment Report, May 2019
- IESO GTA West Scoping Assessment Outcome Report August 2019

- IESO Northwest KWCG IRRP May 2021
- IESO IRRP July 2021
- HONI GTA West RIP report 2022

5.2.2C Material Documents used in the Consultation Process

As part of the IRRP consultation process, MHDI provided the IESO a Consolidated GTA West Planning Forecast v3 load forecast. This has since been updated and provided to HONI and IESO.

Transformer Station (Non-Coincident Peaks)	Forecast (MW)									
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Halton TS	118.7	111.4	120.5	127.7	131.5	135.3	136.6	136.1	139.6	139.3
Palermo TS	24.9	22.7	22.5	22.7	22.6	22.5	40.4	41.7	43.1	44.5
Tremaine TS	64.4	37.3	38.2	38.6	38.3	38.4	38.4	38.6	38.4	38.2
Glenorchy MTS	20.8	37.9	43.4	40.1	40.4	39.7	39.9	40.0	39.8	40.1
Halton Hills MTS				12.5	16.0	21.0	9.5	12.0	16.5	24.5
Fergus TS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

On May 6, 2021, a Peel/Halton (GTAW) Integrated Regional Resource Plan (IRRP) Engagement Webinar was held. Renewable generation was discussed; however, not much emphasis was placed into the solution of the system mix. It was determined that “the estimate was sufficient to rule out generation/non-wires options since they were orders of magnitude more expensive than the required wires solutions”.

Discussions during that webinar also included a number of wires options to address future needs, including upsizing Palermo TS.

Milton Hydro was engaged with the IESO for a project to install a flow battery; however it was cancelled in 2021.

5.2.2D REG Investments - IESO Comment Letter

MHDI has not proposed any REG investments during the 5-year DSP period, and as such, no letter from the IESO is required.

5.2.3 Performance Measurement for Continuous Improvement

5.2.3A Metrics used to Monitor Distribution System Planning Performance

MHDI has been and continues to be, focused on maintaining the adequacy, reliability and quality of service to its distribution customers. MHDI reviews plan performance on an ongoing basis through various mechanisms such as:

- Customer Oriented Performance
- Cost Efficiency and Effectiveness
- Asset/System Operations Performance

Customer Oriented Performance

Customer oriented performance metrics are noted as follows:

- Biennial customer survey
- Service Reliability
- Power Quality
- O&M cost per customer/Customers per employee
- Bill impacts
- Billing Accuracy

CUSTOMER ORIENTED PERFORMANCE - BIENNIAL CUSTOMER SURVEY

On a biennial basis, MHDI undertakes customer satisfaction surveys to obtain feedback on the overall value of service offered to customers. Customers (residential and commercial) are engaged to provide high level feedback on their perceptions of MHDI performance and where they think MHDI could improve service. The survey incorporates a number of performance metric aspects of OEB proceeding EB-2010-0379 Report of the Board: Scorecard Approach, specifically those related to Customer Satisfaction and Service Quality. MHDI's target is to maintain an "A" rating or better for the following survey metrics:

- Customer Care
- Company Image
- Management Operations

CUSTOMER ORIENTED PERFORMANCE - SERVICE RELIABILITY

MHDI monitors and relies on its monthly Service Quality and reliability Indices (SQIs) as a means of measuring system performance. MHDI's Commitment to Stakeholders ***(Appendix C)*** is to ensure “highest standards of performance and business excellence for the safe, reliable provision of service”.

MHDI also tracks the cause of outages from which MHDI is able to determine whether corrective action is required to prevent or reduce similar occurrences.

Service reliability is monitored on a regular basis. All Trouble Reports are reviewed by the VP Distribution Services. Meetings and discussions are held to review issues of an exceptional nature.

The previous five-year rolling average for SAIDI and SAIFI (excluding loss of supply and major event days) are used as default targets for reliability performance expectations in the current year. SAIDI and SAIFI are defined as:

$$\textbf{SAIDI}\text{ (System Average Interruption Duration Index)} = \frac{\text{Total Customer-Hours of Interruptions}}{\text{Total Customers Served}}$$

$$\textbf{SAIFI}\text{ (System Average Interruption Frequency Index)} = \frac{\text{Total Customer Interruptions}}{\text{Total Customers Served}}$$

These indices provide MHDI with an annual measure of its service performance for internal benchmarking and for comparisons with other distributors. In accordance with Section 7.3.2 of the OEB Electricity Distribution Rate Handbook, MHDI records and reports SAIDI and SAIFI figures annually.

Outages are classified according to cause code, as per OEB reporting requirements, to provide further insight into the root cause of the outage.

Table 7. Interruption Causes

Code	Cause of Interruption
0	Unknown/Other Customer interruptions with no apparent cause that contributed to the outage.
1	Scheduled Outage Customer interruptions due to the disconnection at a selected time for the purpose of construction or preventive maintenance.
2	Loss of Supply Customer interruptions due to problems associated with assets owned and/or operated by another party, and/or in the bulk electricity supply system. For this purpose, the bulk

Code	Cause of Interruption
	electricity supply system is distinguished from the distributor’s system based on ownership demarcation.
3	Tree Contacts Customer interruptions caused by faults resulting from tree contact with energized circuits.
4	Lightning Customer interruptions due to lightning striking the distribution system, resulting in an insulation breakdown and/or flash-overs.
5	Defective Equipment Customer interruptions resulting from distributor equipment failures due to deterioration from age, incorrect maintenance, or imminent failures detected by maintenance.
6	Adverse Weather Customer interruptions resulting from rain, ice storms, snow, winds, extreme temperatures, freezing rain, frost, or other extreme weather conditions (exclusive of Code 3 and Code 4 events).
7	Adverse Environment Customer interruptions due to distributor equipment being subject to abnormal environments, such as salt spray, industrial contamination, humidity, corrosion, vibration, fire, or flowing.
8	Human Element Customer interruptions due to the interface of distributor staff with the distribution system.
9	Foreign Interference Customer interruptions beyond the control of the distributor, such as those caused by animals, vehicles, dig-ins, vandalism, sabotage, and foreign objects.
10	Major Event Customer interruptions due to a Major Event. These interruptions should also be counted under the actual Cause of Interruption listed above.

Tracking outage performance by cause code provides valuable information on specific outage causes that need to be addressed to improve negative trending. As with the reliability indices, the past five-year historical performance range is used as a target and results outside this range indicate positive or negative trending. The five-year average in each cause code is used as a minimum target for the current year.

CUSTOMER ORIENTED PERFORMANCE - POWER QUALITY

MHDI monitors system level power quality issues and responds to customer specific concerns.

SYSTEM LEVEL POWER QUALITY

At the system level, MHDI monitors primary system voltages to ensure that values are in compliance with Canadian Standards Association (CSA) standard C235-19 Preferred Voltage Levels for AC systems up to 50 000 V. At the system level, MHDI coordinates system values with Hydro One and Oakville Hydro to ensure that the power quality at MHDI’s five supply points (four Hydro One supply points and one Oakville Hydro supply point) are in compliance with the applicable standards. At the primary level, allowable deviation from nominal voltage is +/-6%.

CUSTOMER SPECIFIC POWER QUALITY

Normal Voltage Levels - As with the system voltages, MHDI designs its secondary system to meet the applicable CSA C235- voltage standards. In particular, the secondary distribution system is designed to deliver voltages at the customer Service Entrance within the Normal Operating range. In situations where the operating voltage levels violate the CSA standard, MHDI will investigate to determine the cause of the voltage issue and resolve the problem. If the voltage problem is a result of MHDI owned equipment, MHDI assumes the responsibility for correcting the issue. If the voltage problem is result of the customers owned equipment or installation, MHDI will support the customer’s efforts to identify and resolve the issue. The target for this metric is to remain within acceptable voltage levels per CSA C235-83 standard.

Customer Specific Power Quality – MHDI responds to customer specific power quality issues on an as required basis. Power quality issues can range from momentary under and over (transient) voltages to harmonic related problems. These issues are typically separate from issues associated with normal operating voltage levels. When a customer raises concerns about a power quality issue, MHDI will investigate the concern with the ultimate goal of identifying the issue and responding to the customers concerns. Should the power quality issue be a result of MHDI’s system, MHDI will resolve the issue; however, it has been MHDI’s experience that most customer specific transient voltage concerns are a result of customer equipment or the customer’s electrical infrastructure. Issues ranging from undersized secondary cables to compressor induced voltage dips are examples of issues that have been identified by MHDI. Once the issue is identified, MHDI will consult with the customer to ensure there is a common understanding regarding the source of the problem, and, when appropriate, help determine next steps. To date, MHDI has not experienced issues in this area. Going forward, MHDI will continue to monitor and determine if it necessary to establish an annual target for this metric.

CUSTOMER ORIENTED PERFORMANCE – OM&A COST PER CUSTOMER/CUSTOMERS PER EMPLOYEE

MHDI tracks and compares their OM&A cost per customer and Customers per employee to the Ontario Industry averages of LDCs. MHDI strives to be cost efficient with respect to comparator LDC groups.

Over the historical period, MHDI has compared this metric with respect to OM&A expenses relative to the other Region of Halton LDCs and Milton Hydro's Peer Group as defined in the Pacific Economic Group ("PEG") study as Mid-Size GTA Medium-High & High Undergrounding (Benchmarking the Costs of Ontario Power Distributors, March 20, 2008. Over time, this grouping has decreased in number due to mergers and acquisitions of LDCs since 2008 (e.g., merger of Horizon Utilities, Powerstream, Enersource to become Alectra Inc., which now includes Guelph Hydro) such that they are no longer in the Mid-Size GTA grouping.

As of the development of this DSP, the peer group that MHDI currently compares to consists of the following LDCs:

- Brantford Power
- Burlington Hydro*
- Energy+ Inc. (Cambridge and North Dumfries)
- Halton Hills Hydro*
- Kitchener-Wilmot Hydro
- Milton Hydro*
- Newmarket Taye Hydro
- Oakville Hydro Electricity Distribution*
- Oshawa PUC Networks
- Waterloo North Hydro

* Halton Region municipalities

Over the historical period, MHDI has strived to obtain top half standing in the peer group with respect to these metrics.

Small LDCs are considered to be those with less than 30,000 customers. Milton Hydro is considered a large LDC with greater than 42,000 customers.

Going forward, it is MHDI's intent to compare OM&A cost per customer/Customers per employee performance in the forecast period with other Large Distributors and that may result in additional changes to the peer group listed above. MHDI intends to maintain the top-half standing target for peer group comparison in the forecast period.

CUSTOMER ORIENTED PERFORMANCE - BILL IMPACTS

Approximately 80% of a typical residential customer's bill is due to factors outside the control of the LDC (i.e., Electricity, Transmission, Debt Retirement, Market Charges, Global Adjustment, etc.). Notwithstanding that, surveys indicate that it is the overall cost of the bill, not the individual components, that are of concern to the customer. MHDI's target for this measure is for rate impacts in residential and general service classes to remain within OEB rate mitigation guidelines.

CUSTOMER ORIENTED PERFORMANCE - BILLING ACCURACY

Billing related issues have been identified as a key identifier of customer satisfaction. Billing is one of the principal forms of communication with the customer. MHDI's target for this measurement is to maintain a minimum of 98% accuracy per OEB guidelines.

Cost Efficiency and Effectiveness

Cost efficiency and effectiveness metrics are noted as follows:

- Planning Quality
- DS Plan Implementation

COST EFFICIENCY AND EFFECTIVENESS – PLANNING QUALITY

MHDI considers several factors when assessing distribution system Planning Quality including:

- Plan Input
- Plan Management
- Budgetary Performance

Plan Input – In addition to third party consultation (see Description of the consultations (***5.2.2 A***), MHDI consults internally, obtaining feedback from field crews to ensure technical plans incorporate input from an operational perspective. Every job is jointly reviewed by Engineering and Operations staff that plan and execute the work.

Plan Management – During the budget year, joint bi-weekly meetings are held with Engineering and Operations staff to review the project schedule. At these meetings, project updates/schedules are reviewed and any required program spending/scheduling corrections are addressed. In conjunctions with these meetings, the VP Distribution Services reviews the budget to reconcile and manage any required program changes.

Budgetary Performance - To assist in managing the capital and operating budgets, MHDI collects data that summarizes the transactions against workorders, and the budgets used to create the workorders, so Milton Hydro can evaluate financial performance on a regular basis. Milton Hydro reviews the budget vs. actual capital and operating spending on a regular basis at both the material project and program spending level.

At a corporate level, capital and operating expenditures are reviewed regularly to ensure they are on budget and on schedule. Expenditure summary reports are provided to the MHDI Board on a periodic basis.

MHDI monitors and reports budgetary performance based on the standard OEB categories: System Access, System Renewal, System Service and General Plant.

COST EFFICIENCY AND EFFECTIVENESS – DS PLAN IMPLEMENTATION

MHDI monitors projects and programs included in the DSP. On an annual basis, MHDI calculates for that year and on a cumulative basis for the five years of the DSP, its actual capital spending compared to the approved capital budget. This helps identify any issues in the DSP investment planning process that need to be addressed for the next iteration of the DSP. MHDI's target for this measure is that DSP actual spending to be within 10% of approved DSP capital budget.

Asset/System Operations Performance

Asset/System operations performance metrics are noted as follows:

- Safety
- Reg. 22/04
- System Losses
- Feeder Loading
- Renewed Regulatory Framework for Electricity ("RRFE") Performance Scorecard

ASSET/SYSTEM OPERATIONS PERFORMANCE – SAFETY

Maintaining a high level of employee safety is a key corporate objective. Safety is monitored on an ongoing basis. Monthly safety meetings are held where teams review incurred incidents, safety updates are provided, and warnings and findings are shared, along with review regular environmental safety and question-and-answer sessions. Specific issues within work groups are also addressed. Regular crew visits are conducted to ensure teams are working safely with the right tools and equipment, and appropriate safety precautions are in effect. Findings are relayed to the supervisor and/or during safety meetings and documents filed. The Joint Health and Safety committee meets quarterly.

MHDI Executive and the Board of Directors are provided regular summaries of incidents and accidents, and any safety related incidents requiring additional information and discussion at the Board level are provided as warranted by the specific incident.

MHDI has adopted the ESA Serious Electrical Incident Index (SEII) as a performance benchmark for non-occupational safety incidents involving MHDI plant.

ASSET/SYSTEM OPERATIONS PERFORMANCE – REG. 22/04

As with every other Ontario distributor, MHDI's design, construction, inspection and maintenance practices are audited on a yearly basis as required by Ontario Regulation 22/04. The utility can be deemed to be in one of three performance categories:

1. In compliance
2. Needs improvement
3. Not in compliance

MHDI's target is to remain 'in compliance' in all categories being audited.

ASSET/SYSTEM OPERATIONS PERFORMANCE – FEEDER LOADING

As part of MHDI's design and operating philosophy, the 27.6kV, 13.8kV and 8.32kV feeders are loaded to 50% of capacity to ensure that contingency situations can be addressed with the minimal amount of service interruption to the customer. Feeder loading is collected and reviewed monthly. The feeder loading indicates the effectiveness of MHDI's asset utilization planning and contingency capability. MHDI's target for this measure is that normal feeder loading is not to exceed 50% capacity and emergency feeder loading is not to exceed 100% capacity.

ASSET/SYSTEM OPERATIONS PERFORMANCE – SYSTEM LOSSES

System design and operation is managed such that system losses are maintained within OEB thresholds as defined in the OEB Practices Relating to Management of System Losses. Losses are monitored to ensure that the OEB threshold of 5% is not exceeded.

ASSET/SYSTEM OPERATIONS PERFORMANCE – RENEWED REGULATORY FRAMEWORK FOR ELECTRICITY ("RRFE") PERFORMANCE SCORECARD

The OEB RRFE performance scorecard is reviewed annually to ensure performance trending aligns with regulatory targets. Underperformance trending would result in measures being taken to realign performance trending with expectations.

A summary of performance targets referred to throughout the DSP period are shown in Table 8:

Table 8. DSP Performance Targets

Performance Indicator	Targets				
	2023	2024	2025	2026	2027
Customer Care	A	A	A	A	A
Company Image	A	A	A	A	A
Management Operations	A	A	A	A	A

Performance Indicator	Targets				
	2023	2024	2025	2026	2027
Reliability (SAIFI)*	0.67	0.67	0.67	0.67	0.67
Reliability (SAIDI)*	0.84	0.84	0.84	0.84	0.84
System Level Power Quality	<=+/- 6%	<=+/- 6%	<=+/- 6%	<=+/- 6%	<=+/- 6%
Customer Specific Power Quality -Voltage	Within normal limits	Within normal limits	Within normal limits	Within normal limits	Within normal limits
Customer Specific Power Quality – Transient and Harmonics	Monitor for issues	Monitor for issues	Monitor for issues	Monitor for issues	Monitor for issues
OM&A/Customer	Top half peer group	Top half peer group	Top half peer group	Top half peer group	Top half peer group
Employees/Customer	Top half peer group	Top half peer group	Top half peer group	Top half peer group	Top half peer group
Billing Accuracy	98%	98%	98%	98%	98%
Billing Impact	Annual rates subject to OEB approval (within mitigation guidelines)				
DSP Progress Variance	<=+/- 10%	<=+/- 10%	<=+/- 10%	<=+/- 10%	<=+/- 10%
Safety	ESA SEII = 0	ESA SEII = 0	ESA SEII = 0	ESA SEII = 0	ESA SEII = 0
ESA Reg 22/04	0 Non-compliance	0 Non-compliance	0 Non-compliance	0 Non-compliance	0 Non-compliance
Feeder loading (Normal)	Peak demand <= 50% capacity	Peak demand <= 50% capacity	Peak demand <= 50% capacity	Peak demand <= 50% capacity	Peak demand <= 50% capacity
Feeder loading (Emergency)	Peak demand <= 100% capacity	Peak demand <= 100% capacity	Peak demand <= 100% capacity	Peak demand <= 100% capacity	Peak demand <= 100% capacity
System Losses	<5%	<5%	<5%	<5%	<5%

* 2023 – 2027 SAIDI and SAIFI targets to be based on 2017 – 2021 5-year average for MHDI – no LOS or MEDs

Annual performance variances that are not within target ranges or meet minimal performance thresholds result in senior management review of performance cause that may result in changes to immediate or future plans to direct future performance back to target levels.

5.2.3B Unit Cost Metrics

Unit cost metrics for the 2017 – 2021 period are presented below as per prescribed format of Chapter 5 Filing Requirements. 2021 cost metrics are either in line with or less than the previous 5-year average.

Table 9. Cost Metrics 2017-2021

Metric Category	Metric	Measures	
		2021	2017-2021 Average
Cost	Total Cost per Customer[1]	$322	$349
	Total Cost per km of Line[2]	$4,811	$5,169
	Total Cost per MW[3]	$71,181	$78,422
CAPEX	Total CAPEX per Customer	$209	$251
	Total CAPEX per km of Line	$3,124	$3,720
O&M	Total O&M per Customer	$113	$98
	Total O&M per km of Line	$1,687	$1,450

Table 9 Notes:

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

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

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

Explanatory Notes on Adverse Deviations
Metric Name: O&M
O&M increased in 2021 due to primarily due to an increase in maintenance activity in 2021 compared to previous years.
Metric Name:
N/A
Metric Name:
N/A

5.2.3C Summary of Historical Performance

CUSTOMER ORIENTED PERFORMANCE

- Biennial customer survey

- Service Reliability
- Power Quality
- O&M cost per customer/Customers per employee
- Bill impacts
- Billing Accuracy

CUSTOMER ORIENTED PERFORMANCE - BIENNIAL CUSTOMER SURVEY

Key customer survey results for the 2016 – 2022 period, that provide Ontario comparisons, are shown in Table 10.

Table 10. Customer Survey Results Comparison

	2017 Milton	2017 Ontario Average	2019 Milton	2019 Ontario Average	2021 Milton	2021 Ontario Average
Customer Care	B+	C+	A	B+	B+	B+
Company Image	A	B	A	A	A	A
Management Operations	A	A	A	A	A	A
Customer Centric Engagement Index (CCEI)	82%	74%	87%	83%	85%	83%
Customer Experience Performance Index (CEPI)	84%	80%	88%	86%	87%	84%

The survey results indicate a positive and consistent customer perception of MHDI in key performance categories. In 2017 and 2019, MHDI scored higher than Ontario benchmarks in almost all of the performance categories and was on-par in 2021. High CCEI and CEPI numbers reflect customer satisfaction in their relationship with MHDI. Mid-2021, a communications coordinator was hired to improve customer outreach and engagement. MHDI anticipates that the proactive communications, website enhancements and other engagement initiatives will support continued positive customer perception in future surveys.

CUSTOMER ORIENTED PERFORMANCE - SERVICE RELIABILITY

The history of all interruptions categorized by interruptions excluding loss of supply and interruptions and Major Events are shown in Table 11:

Table 11. MHDI Interruption History

Year	All interruptions	All interruptions excluding loss of supply	All interruptions excluding loss of supply & MEDs
2016	26,755	21,952	21,592
2017	29,470	18,396	18,396
2018	71,993	66,406	32,692
2019	33,725	23,507	23,507
2020	68,256	46,688	46,688
2021	23,878	23,878	23,878

Service reliability statistics are compiled monthly.

Total interruptions were high in 2018 and 2020 compared to other years primarily due to higher number of customers impacted by defective equipment related outages. Equipment outages affecting MHDI plant (i.e., riser poles, primary UG cable) near supply transformer stations can have a significant customer impact similar to Loss of Supply.

MED Outage Summary

MHDI Major Events are determined in accordance with OEB RRR definition (i.e., unpredictable and beyond the control of the distributor). MHDI specifically uses the IEEE Standard 1366 methodology for determining a MED. MED outage since the last Cost of Service filing are outlined in Table 12:

Table 12. Historical MED Outage Summary

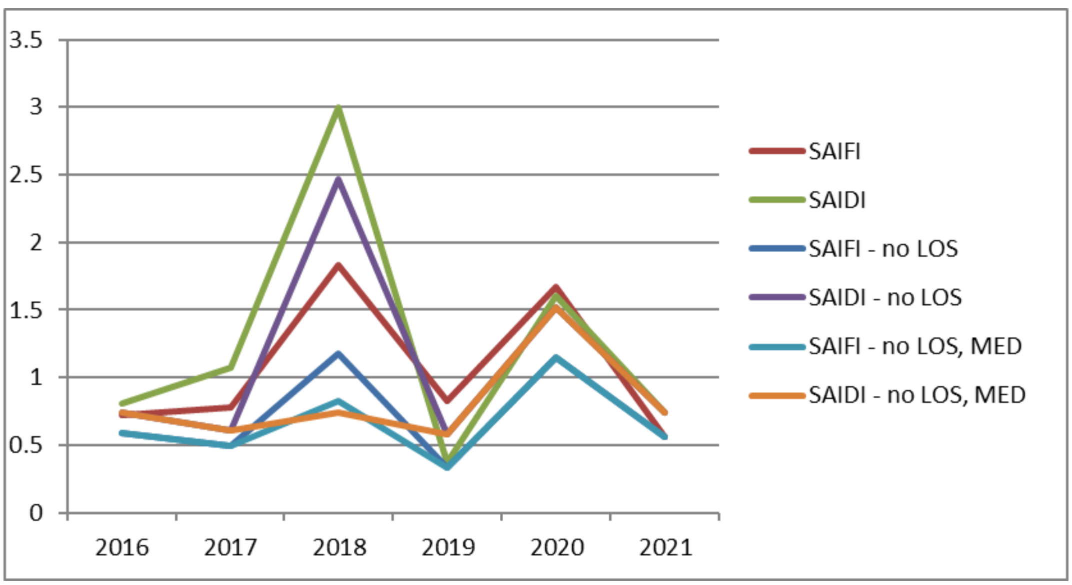
Year	Date	Cust	% of base	MED event
2016	-	-	-	No MEDs
2017	-	-	-	No MEDs
2018	May 4	33,630	86%	Adverse Weather – Wind Storm
2019	-	-	-	No MEDs
2020	-	-	-	No MEDs
2021	-	-	-	No MEDs

MHDI's SAIFI and SAIDI statistics for the 2016 – 2021 historical period are shown in Table 13:

Table 13. Reliability Statistics 2016 – 2021

Year	SAIFI	SAIDI	SAIFI - no LOS	SAIDI - no LOS	SAIFI - no LOS, MED	SAIDI - no LOS, MED
2016	0.72	0.81	0.59	0.74	0.59	0.74
2017	0.78	1.07	0.49	0.61	0.49	0.61
2018	1.83	3.00	1.18	2.47	0.83	0.74
2019	0.83	0.37	0.33	0.58	0.33	0.58
2020	1.67	1.6	1.15	1.52	1.15	1.52
2021	0.56	0.74	0.56	0.74	0.56	0.74

Figure 5 – Reliability Statistics 2016 – 2021



The reliability statistics indicate a relatively stable trending over the historical period except for 2018 and 2020. Over half of the customer interruptions experienced in 2018 were due to Loss of Supply and a MED event. The remaining 2018 outage statistics indicate that customers experienced higher frequency of outages, but of similar duration compared to the previous historical years.

Approximately a third of the customer interruptions experienced in 2020 were due to Loss of Supply. The remaining 2020 outage statistics indicate that customers experienced higher incidences of outages, compared to historical years, related to foreign interference, defective equipment, tree contacts and adverse weather.

Overall, Loss of Supply was the leading contributor to SAIDI over the six year period with Defective Equipment being the leading contributor excluding Loss of Supply. Historical outage causes are listed in Table 14. Adverse Weather was the leading contributor to SAIFI including and excluding Loss of Supply. Milton Hydro had one Major Event in 2018 due to Adverse Weather that had a significant impact to SAIDI and Adverse Weather was also the leading contributor to both SAIDI and SAIFI in 2021 due to two wind storms in December 2021. Tables 15, 16, 17 and 18 show the impacts of the different contributors to SAIDI and SAIFI.

Table 14. Outage Causes 2016 – 2021

Code	Primary Cause	2016	2017	2018	2019	2020	2021	Average
0	Unknown/ Other	18	10	10	7	7	11	11
1	Scheduled Outage	26	10	41	51	30	25	31
2	Loss of Supply	12	7	5	4	3	0	5
3	Tree Contacts	13	17	9	10	22	15	14
4	Lightning	9	4	7	2	0	6	5
5	Defective Equipment	52	50	74	31	46	37	48
6	Adverse Weather	3	6	16	13	24	35	16
7	Adverse Environment	0	3	6	0	4	2	3
8	Human Element	5	2	4	1	2	3	3
9	Foreign Interference	43	40	22	33	34	35	35
	Total	**181**	**149**	**194**	**152**	**172**	**169**	**170**

Table 15. Contribution to SAIFI - Including LoS

Cause	2016	2017	2018	2019	2020	2021	Total
Unknown/Other	1%	0%	0%	1%	8%	15%	4%
Scheduled Outage	6%	1%	1%	2%	3%	1%	2%

Cause	2016	2017	2018	2019	2020	2021	Total
Loss Of Supply	18%	38%	36%	30%	32%	0%	29%
Tree Contacts	9%	3%	0%	3%	1%	3%	2%
Lightning	0%	0%	0%	0%	0%	0%	0%
Defective Equipment	46%	48%	30%	2%	22%	29%	28%
Adverse Weather	0%	8%	24%	11%	3%	34%	13%
Adverse Environment	0%	0%	0%	0%	0%	1%	0%
Human Element	12%	0%	0%	0%	0%	11%	2%
Foreign Interference	8%	2%	9%	51%	31%	5%	19%
Total	100%	100%	100%	100%	100%	100%	100%

Table 16. Contribution to SAIFI – Excluding LoS

Cause	2016	2017	2018	2019	2020	2021	Total
Unknown/Other	1%	1%	1%	2%	11%	15%	5%
Scheduled Outage	7%	2%	1%	3%	5%	1%	3%
Loss Of Supply	11%	4%	0%	4%	1%	3%	3%
Tree Contacts	0%	0%	0%	0%	0%	0%	0%
Lightning	56%	76%	47%	2%	32%	29%	39%
Defective Equipment	0%	13%	37%	16%	5%	34%	19%
Adverse Weather	0%	1%	0%	0%	0%	1%	0%
Adverse Environment	14%	0%	0%	0%	0%	11%	3%
Human Element	10%	3%	14%	73%	45%	5%	27%
Foreign Interference	1%	1%	1%	2%	11%	15%	5%
Total	100%	100%	100%	100%	100%	100%	100%

Table 17. Contribution to SAIDI - Including LoS

Cause	2016	2017	2018	2019	2020	2021	Total
Unknown/Other	1%	0%	0%	2%	3%	3%	1%
Scheduled Outage	2%	3%	1%	13%	1%	5%	2%
Loss Of Supply	9%	43%	18%	12%	5%	0%	15%
Tree Contacts	17%	6%	1%	5%	5%	2%	4%
Lightning	0%	0%	0%	0%	0%	1%	0%
Defective Equipment	60%	37%	10%	10%	42%	31%	28%
Adverse Weather	0%	7%	62%	27%	5%	49%	33%
Adverse Environment	0%	2%	0%	0%	0%	4%	1%
Human Element	2%	0%	0%	0%	0%	1%	0%

Cause	2016	2017	2018	2019	2020	2021	Total
Foreign Interference	8%	3%	8%	32%	40%	6%	15%
Total	100%	100%	100%	100%	100%	100%	100%

Table 18. Contribution to SAIDI - Excluding LoS

Cause	2016	2017	2018	2019	2020	2021	Total
Unknown/Other	1%	1%	0%	2%	3%	3%	2%
Scheduled Outage	2%	5%	1%	14%	1%	5%	3%
Loss Of Supply	19%	10%	1%	5%	5%	2%	5%
Tree Contacts	0%	0%	0%	0%	0%	1%	0%
Lightning	66%	64%	12%	11%	44%	31%	33%
Defective Equipment	0%	11%	76%	31%	5%	49%	39%
Adverse Weather	0%	3%	0%	0%	0%	4%	1%
Adverse Environment	2%	0%	1%	0%	0%	1%	1%
Human Element	9%	6%	9%	36%	42%	6%	18%
Foreign Interference	1%	1%	0%	2%	3%	3%	2%
Grand Total	100%	100%	100%	100%	100%	100%	100%

Figure 6 – Interruptions by Cause Trends

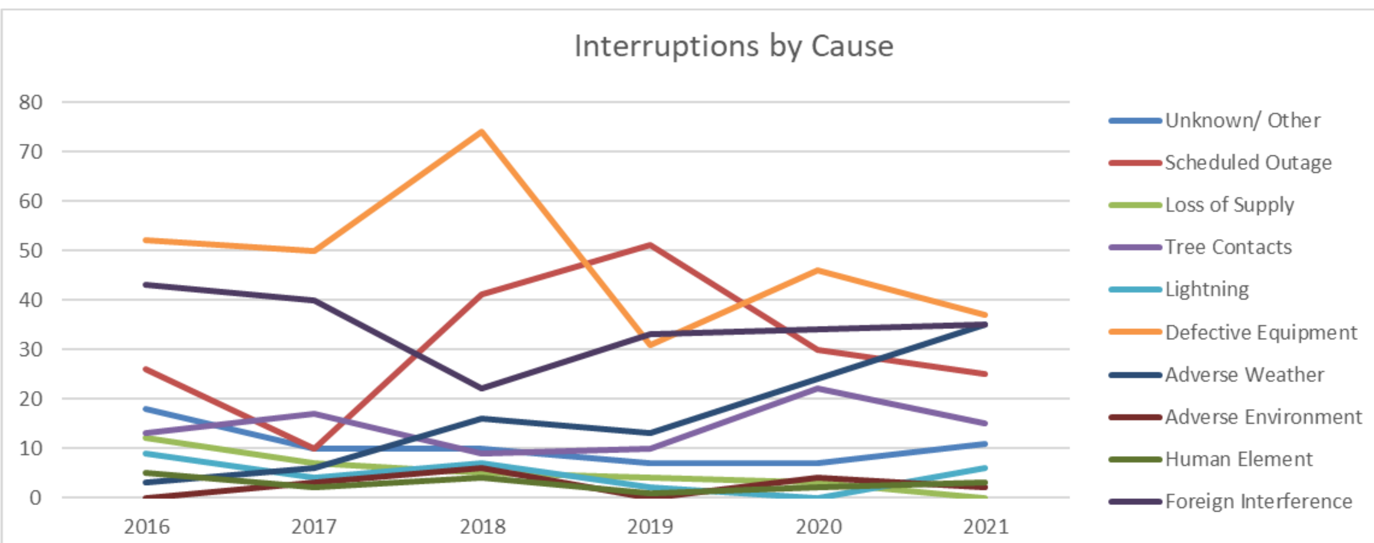
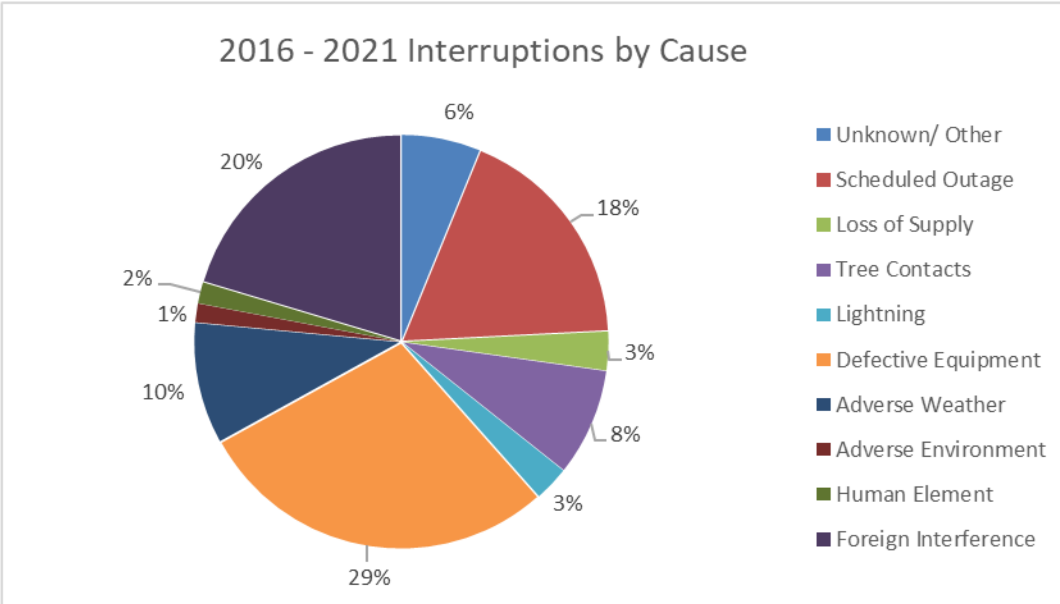


Figure 7 – Interruptions by Cause by Percentage



Most trends have been stable in the historical period. Defective Equipment related outage spiked in 2018, but declined to lower levels by the end of the historical period. Foreign interference, primarily animal contact, continues to account for approximately 20% of annual outages. Adverse Weather outages is showing an increasing trend in the later years.

Adverse weather trends indicate that climate change issues are increasingly impacting the ability of the distribution system to delivery power reliably. Tree Contact and Defective Equipment causes are mitigated through effective maintenance programs and renewal programs for any assets that are at end of useful life.

Customer Oriented Performance - Power Quality

There have been no significant System Level Power Quality issues during the historical period.

Customer voltage power quality has generally met the CSA C235-19 normal operating parameters over the historical period. Any excursions from these parameters, due to MHDI equipment, were dealt with in a timely manner.

No customer transient and harmonic power quality issues, due to MHDI equipment, has been noted in the historical period.

Customer Oriented Performance - O&MA cost per customer/customers per employee

MHDI's OM&A cost per customer was lower than the peer group averages during most of the historical period. The peer group consists of 10 LDCs including MHDI. Since 2005, Milton Hydro's residential rates have increased 10.7%, which is significantly below the rate of inflation. Statistics for the 2016 – 2020 period are shown in Table 19.

Table 19. LDC Peer Group OM&A/Customer Comparators 2016 – 2020

Year	2016	2017	2018	2019	2020
MHDI OM&A/Customer	$262.2	$235.95	$239.73	$249.63	$256.59
LDC Peer Group Average	$247.02	$249.93	$256.53	$261.45	$268.46
MHDI Peer Group Ranking	6th	3rd	3rd	3rd	4th

Table 20. LDC Peer Group Customers/Employee Comparators 2016 – 2020

Year	2016	2017	2018	2019	2020
MHDI Customers/ Employee	624	677	747	777	808
LDC Peer Group Average	607	602	620	624	648
MHDI Peer Group Ranking	5th	4th	2nd	1st	1st

In the Pacific Economics Group ("PEG") Report to the OEB on the 2020 Benchmarking Update, MHDI remained in Group II, maintaining an above average 0.15% stretch factor.

CUSTOMER ORIENTED PERFORMANCE - BILL IMPACTS

MHDI's rebased and harmonized rates through a Cost of Service application in 2016. IRM applications were filed resulting in modest rate adjustments for 2017 through to 2021 that were deemed reasonable by the OEB Board. Milton Hydro deferred its COS application by one year from 2022 to 2023 and is seeking 2022 rates based on 4th Generation IRM principles. Annual rate impacts are shown in Table 21:

Table 21. Annual Customer Rate Impacts

Class	2016	2017	2018	2019	2020	2021
Residential	-1.81%	+1.6%	+0.9%	+1.2%	+1.85%	+2.05%
GS < 50kW	-0.04%	+1.6%	+0.9%	+1.2%	+1.85%	+2.05%

GS > 50kW	-13.28%	+1.6%	+0.9%	+1.2%	+1.85%	+2.05%

CUSTOMER ORIENTED PERFORMANCE - BILLING ACCURACY

MHDI's calculated billing accuracy for 2016 – 2020, as part of its annual RRR filing, has averaged 99.98%.

COST EFFICIENCY AND EFFECTIVENESS

- Planning Quality
- DS Plan Implementation

PLANNING QUALITY

Subsequent to the publishing of the 2016 – 2020 DSP, the 2016 Capital Budget was revised and a number of project and program timing and spending amounts were re-evaluated as resources were reallocated to revised budget spending needs. Additional reallocation of capital resources, required during 2016, resulted in further spending reallocation primarily in the General Plant investment category.

The net result of resource reallocation changes resulted in general Budget to Actual underspend in the System Access, System Renewal and System Service investment categories and Budget to Actual overspend in the General Plant investment category.

Historical 2016 Budgeted and Actual category spending variances is shown in Table 22.

Table 22. 2016 OEB Approved Capital Expenditures vs. 2016 Actual

	2016 OEB Approved	2016 Actual	Var	Var
	$ '000			%
System Access	$7,068	$6,934	($134)	-2%
System Renewal	$2,473	$1,747	($726)	-29%
System Service	$1,520	$620	($900)	-59%
General Plant	$896	$2,252	$1,356	151%
TOTAL EXPENDITURE	$11,957	$11,553	($404)	-3%
Capital Contributions	$3,808	$3,333	($475)	-12%
NET CAPITAL EXPENDITURES	$8,149	$8,220	$71	1%

There was significant capital spending variance in the System Renewal, System Service and General Plant areas. The variance of actual verses planned for each category is described in ***Section 5.4.3*** Justifying Capital Expenditures. Overall, 2016 Actual spending was within 1% of Budget.

DS Plan Implementation

The 2016 – 2020 DSP budget to actual spending is shown in Table 23.

Table 23. DSP Spending Variances 2016 – 2020

Category		DSP Capital Expenditures ($‘000) *				
		2016	2017	2018	2019	2020
System Access	Budget	7,068	8,092	6,212	6,411	6,878
	Actual**	6,934	5,350	6,339	5,972	7,291
System Renewal	Budget	2,473	1,821	1,790	1,800	1,725
	Actual**	1,747	1,810	2,310	1,662	2,179
System Service	Budget	1,520	1,225	1,350	1,350	1,500
	Actual**	620	1,220	1,742	792	431
General Plant	Budget	896	701	711	676	696
	Actual**	2,252	899	1,998	3,413	457
Gross Total	Budget	11,957	11,839	10,063	10,237	10,779
	Actual**	11,553	9,279	12,389	11,839	10,358
% Variance		-3.3%	-21.6%	23.1%	15.6%	-3.9%

** Note: Numbers are rounded to the nearest $’000. Detailed values are captured in Exhibit 2AB.*

Over the historical 2016-2020 DSP 5-year period, a total of $55.4M was spent or an average of $11.1M per year. Total overall actual spending over the 5-year period was 1% over the 5 year DSP budget. Decreased spending in the System Access category was offset by increased spending in the System Renewal, System Service and General Plant areas. Capital Variances are further described in ***Section 5.4.3***.

ASSET/SYSTEM OPERATIONS PERFORMANCE

- Safety
- Reg. 22/04
- System Losses
- Feeder Loading
- System Losses
- Renewed Regulatory Framework for Electricity (“RRFE”) Performance Scorecard

Asset/System Operations Performance – Safety

Over the historical period, MHDI recorded 0 Serious Electrical Incidences involving the general public.

There was one minor lost time injury over the historical period of the DSP. This and all other safety related issues encountered (e.g., slips in adverse weather) are considered controllable through continued education, awareness and application of safe work practices.

ASSET/SYSTEM OPERATIONS PERFORMANCE – REG. 22/04

During the 2016 – 2021 historical period, MHDI has achieved compliance in this portion of the audit. No issues were noted as "Needs Improvement". The audit findings are shown in Table 24.

Table 24. ESA Audit Results

Audit Year	Not in Compliance	Needs Improvement
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0

ASSET/SYSTEM OPERATIONS PERFORMANCE – FEEDER LOADING

The 27.6kV, 13.8kV and 8.32kV feeders loading is shown in ***Section 5.3.2 D***. 27.6kV feeder loadings average 79% of planning capacity (300amps). The 13.8kV and 8.32kV feeder loadings average 14% of planning capacity. In most cases, there is considerable capacity on the 27.6kV feeder system to accommodate incremental load growth (e.g., EVs). All 13.8kV feeders are gradually being replaced by 27.6kV fed infrastructure.

ASSET/SYSTEM OPERATIONS PERFORMANCE – SYSTEM LOSSES

MHDI system losses over the historical period are shown in Table 25.

Table 25. MHDI System Losses

2016	2017	2018	2019	2020	2021
3.59%	3.45%	3.61%	3.74%	3.53%	3.3%

Losses were trending in the 3.3% – 3.7% range over the historical period and within the OEB 5% threshold.

RRFE PERFORMANCE SCORECARD

The RRFE performance scorecard metrics indicate that MHDI is effective in achieving the RRFE performance outcomes. Most measures show historical performance is within target values. MHDI is currently ranked in Group 2 with respect to Efficiency Assessment (stretch factor = 0.15%).

5.2.3D Effect of Performance Information on the Plan

CUSTOMER SURVEY RESULTS

Survey results show that customers continue to be generally satisfied with MHDI's performance. MHDI reviews the survey results to determine if adjustments to corporate programs and strategies are warranted. Any significant change to program/strategies would affect the DSP.

The survey results indicate a positive and consistent customer perception of MHDI in key performance categories.

MHDI believes that the 2023-2037 DSP will provide customer value in terms of reasonable rates and enhanced levels of reliability and information (e.g., billing, general communication, etc.) to allow the customer to make informed choices on their electricity consumption.

CUSTOMER ORIENTED PERFORMANCE - SERVICE RELIABILITY

The reliability indices indicate that equipment failure, foreign interference and adverse weather are three of the key contributors to customer outages. While the number of equipment failure related outages has shown some improvement by the end of the historical period, foreign interference continues to capture approximately 20% of annual outages. Foreign interference due to animal contact generally impact small numbers of customers per occurrence. Foreign interference due to vehicle contact may impact large (pole hit) or small (padmount hit) numbers of customers per occurrence. These events are more difficult to mitigate. There are no specific programs in the forecast period dealing with foreign interference.

There has been an increase in the frequency of adverse weather-related outages. Climate change models indicate that adverse weather conditions are expected to increase, putting additional strain on the design and operation of the distribution system. MHDI plant will continue to be installed according to the latest CSA, IEEE and industry standards. MHDI continues to enhance its preventative maintenance practices in the area of vegetation management to mitigate the impacts of severe wind and storm events.

As a result of customer engagement and review of renewal programs, risk and ROI through a reliability lens, MHDI has enhanced the planned investments in System Service, specifically automated switches and grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR) to minimize and mitigate the impact of outages.

Maintaining historical reliability performance has been factored into the development of the DSP. The asset management and capital expenditure process recognize that for current reliability levels to be maintained, paced system renewal needs are factored into the forecast period

Customer Specific Power Quality

Over the historical period, MHDI did not have customer specific power quality issues; this precludes the need for specific power quality related investment in the DSP.

O&M/Customer and Employees/Customer

While peer group ranking and statistics over the historical period show favourable performance, MHDI has determined that over the DSP forecast period, additional Capital and O&M are required to address system work needs of a growing customer base and a new Control Room.

At first glance, MHDI's customers per employee statistics show a positive trend; however, a deeper understanding of the implications is needed. MHDI's employee to customer ratio has diminished from one employee to approximately 567 customers (2005), to one employee to approximately 719 customers (2021). That's an increase of almost 27% workload per employee. The initial financial perspective looks good, but the reality is employee fatigue, disengagement and dissatisfaction – all of which have a negative financial impact. Any number of reports[3] prove that 'happy' employees are more productive and provide a better customer experience. MHDI is under new leadership since the previous DSP and four strategic objectives have been defined, including: Build a Customer Centric Organization, which means correcting the deficit in employee head count.

Customer oriented performance - Billing Accuracy

Billing accuracy are within OEB guidelines. MH plan is to maintain its performance in this metric. No related investment in the DSP.

Customer oriented performance - Billing Impact

Bill impacts are within OEB guidelines. MH plan is to maintain its performance in this metric. No related investment in the DSP.

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[3] https://go.motivationworks.com/wp-engagement-for-everyone-land?utm_source=google&utm_medium=paid-search&utm_campaign=one-actionable-model&gclid=EAIaIQobChMIpLO9geqY9AIVWG5vBB34gAcnEAAYASAAEgI3v_D_BwE

https://www.ox.ac.uk/news/2019-10-24-happy-workers-are-13-more-productive

https://hbr.org/2019/08/the-key-to-happy-customers-happy-employees

https://www.forbes.com/sites/shephyken/2017/05/27/how-happy-employees-make-happy-customers/?sh=3bcf877e5c35

COST EFFICIENCY AND EFFECTIVENESS – PLANNING QUALITY

As part of the asset management and capital investment planning process, projects and programs have been prepared in consideration that spending must be achievable with the resources that are available [i.e., suppliers (material), design services, municipal approvals, contract labour, vehicles, etc.] in a timely manner. DSP investment planning has been set up to design, issue and construct works that can be achieved within the forecast period.

COST EFFICIENCY AND EFFECTIVENESS – DSP PROGRAM SPENDING

Historical DSP spending has aligned very well with the overall five-year budget spend. The 2023-2027 DSP has been prepared with consideration that program spending must be achievable with the resources that are available (i.e., suppliers, design services, municipal approvals, contract labour, vehicles, etc.) in a timely manner. Programs are to be completed in the year they are budgeted, subject to external factors that particularly influence the timing and amount of System Access spend.

ASSET/SYSTEM OPERATIONS PERFORMANCE – SAFETY

MHDI continues to promote continued education, awareness and application of safe work practices, and as such, safety continues to play a key role in project prioritization. MHDI's safety performance is high and no specific project was identified that needed to be factored into the DSP. In general, ensuring a safe environment for workers and the public has been taken into consideration in the development of the DSP and MHDI's asset management and capital expenditure planning process.

ASSET/SYSTEM OPERATIONS PERFORMANCE – REG. 22/04

MHDI continues to demonstrate prudent compliance with O. Reg. 22/04, and as such, ESA compliance continues to play a key role in project prioritization. MHDI historical performance is in compliance with O. Reg. 22/04 and no specific projects have been identified that need to be factored into the DSP. In general, ensuring Reg. 22/04 compliance is maintained has been taken into consideration in the development of the DSP and MHDI's asset management and capital expenditure planning process.

ASSET/SYSTEM OPERATIONS PERFORMANCE – FEEDER LOADING

Existing performance is within planning capacity thresholds. As new load growth is forecasted in the coming years, MHDI plans to access additional capacity from Halton Hills Hydro MTS and an upsized Palermo TS.

ASSET/SYSTEM OPERATIONS PERFORMANCE – SYSTEM LOSSES

Existing performance is within performance targets and as such there is no specific impact on the DSP.

RRFE PERFORMANCE SCORECARD

The RRFE Performance Scorecard supports the key plan objectives of maintaining current reliability levels and low overall cost to the customer during the forecast period. The current scorecard is shown in Figure 8 below:

Figure 8 – RRFE Scorecard 2020

Scorecard - Milton Hydro Distribution Inc. 10/22/2021

Performance Outcomes	Performance Categories	Measures	2016	2017	2018	2019	2020	Trend	Target: Industry	Target: Distributor
Customer Focus Services are provided in a manner that responds to identified customer preferences.	Service Quality	New Residential/Small Business Services Connected on Time	99.60%	96.76%	99.61%	99.88%	100.00%	up	90.00%	
		Scheduled Appointments Met On Time	100.00%	100.00%	100.00%	100.00%	100.00%	flat	90.00%	
		Telephone Calls Answered On Time	96.70%	96.52%	93.87%	84.44%	73.17%	down	65.00%	
	Customer Satisfaction	First Contact Resolution	89.5	94.2	99.2	100	Compliant			
		Billing Accuracy	99.99%	99.96%	99.99%	100.00%	100.00%	up	98.00%	
		Customer Satisfaction Survey Results	A	A	A	A	A			
Operational Effectiveness Continuous improvement in productivity and cost performance is achieved; and distributors deliver on system reliability and quality objectives.	Safety	Level of Public Awareness	82.00%	84.00%	84.00%	84.00%	82.00%			
		Level of Compliance with Ontario Regulation 22/04 [1]	C	C	C	C	C	flat		C
		Serious Electrical Incident Index: Number of General Public Incidents	0	0	0	0	0	flat		0
		Serious Electrical Incident Index: Rate per 10, 100, 1000 km of line	0.000	0.000	0.000	0.000	0.000	flat		0.000
	System Reliability	Average Number of Hours that Power to a Customer is Interrupted [2]	0.74	0.61	0.74	0.33	1.52	up		0.98
		Average Number of Times that Power to a Customer is Interrupted [2]	0.59	0.49	0.83	0.58	1.15	up		0.82
	Asset Management	Distribution System Plan Implementation Progress	on track	on track	on track	on track	on track			
	Cost Control	Efficiency Assessment	3	3	2	2	2			
		Total Cost per Customer [3]	$723	$667	$683	$700	$682			
		Total Cost per Km of Line [3]	$25,334	$9,673	$10,195	$10,390	$10,157			
Public Policy Responsiveness Distributors deliver on obligations mandated by government (e.g., in legislation and in regulatory requirements imposed further to Ministerial directives to the Board).	Connection of Renewable Generation	Renewable Generation Connection Impact Assessments Completed On Time	100.00%	100.00%			100.00%			
		New Micro-embedded Generation Facilities Connected On Time	100.00%	100.00%	100.00%			flat	90.00%	
Financial Performance Financial viability is maintained; and savings from operational effectiveness are sustainable.	Financial Ratios	Liquidity: Current Ratio (Current Assets/Current Liabilities)	2.01	1.72	1.65	1.56	1.65			
		Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio	1.33	1.25	1.24	1.28	1.37			
		Profitability: Regulatory Return on Equity: Deemed (included in rates)	9.19%	9.19%	9.19%	9.19%	9.19%			
		Profitability: Regulatory Return on Equity: Achieved	9.87%	9.45%	10.45%	6.74%	6.86%			

1. Compliance with Ontario Regulation 22/04 assessed: Compliant (C); Needs Improvement (NI); or Non-Compliant (NC).
2. An upward arrow indicates decreasing reliability while downward indicates improving reliability.
3. A benchmarking analysis determines the total cost figures from the distributor's reported information.

Legend: 5-year trend: up, down, flat. Current year: target met, target not met

5.2.4 Realized Efficiencies Due to Smart Meters

MHDI has deployed smart meters to all its residential customers. MHDI has also deployed MIST meters to all its GS>50kW customers.

Smart meters communicate back to MHDI through Advanced Metering Infrastructure (AMI) provided by Trilliant. This eliminated manual meter reading. All residential smart meters have "last gasp" technology incorporated into them; "last gasp" technology allows the meter to communicate to utility operations when power has been lost. Implementation of "last gasp" functionality is still in progress.

Smart meter consumption data can be aggregated to assist in localized asset utilization studies. This will be especially useful with the continuing deployment of electric vehicles and associated home charging stations. The impact of these systems on the local distribution transformer can be determined and facilitate any decisions as to the necessity of upgrading the transformer to a higher capacity unit.

Load profile data allows MHDI to bill TOU, allowing customers to take advantage of off-peak rates. Reduced on-peak consumption assists in deferring capacity expansion needs.

Smart meter load profile data has proven to be beneficial in resolving a number of customer issues including high bill complaints, flickering lights and low/high voltage complaints. MHDI Customer Service representatives can review consumption history in detail with the customer, which has led to successful resolution of most billing inquiries. Consumption reviews with the customer also educates them with respect to the benefits of energy of energy conservation.

5.3 Asset Management Process

This section of the DSP provides a high-level overview of MHDI's asset management process.

MHDI's asset management process is a systematic approach used to plan and optimize ongoing capital, operating and maintenance expenditures on the distribution system and general plant. Electricity distribution systems are capital intensive in nature and prudent capital investments and maintenance plans are essential to ensure distribution network sustainability.

MHDI's Asset Management Plan outlines the capital and operating expenditures necessary to ensure that Milton Hydro continues to provide high standards for the safe, reliable supply of electricity at the lowest cost.

Milton Hydro's Asset Management Plan was developed with due regard to the different Acts, Regulations, Codes and Guidelines and the continual updating of good utility practice to ensure the needs of the Town of Milton and Milton Hydro customers are met. A copy of the ***Asset Management Plan*** is in ***Appendix D***.

5.3.1 Asset Management Process Overview

5.3.1A Asset Management Objectives

MHDI's asset management objectives align with MHDI's corporate goals which are stated in MHDI's Commitment to Stakeholders:

> *"We will adhere to the highest standards for the safe, reliable revision of services. We will protect our environment, our employees, our customers and the people of the communities in which we do business."*
> *We will strengthen our business by making reliability, safety, health and environmental issues an integral part of all business activities and by continuously striving to align our businesses with an appropriate balancing of stakeholder expectations."*

MHDI's Commitment to Stakeholders is the foundation for MHDI's Asset Management Objectives, which form the high-level philosophy framework for MHDI's investment program. MHDI has identified five asset management objectives that are implicitly embedded in MHDI's capital investment planning process and maintenance program and align with the corporate objectives.

1. Construct, maintain and operate all assets in a safe manner to meet a goal of zero injuries, illnesses and incidents
2. Design, build, operate and maintain all MHDI facilities and transportation equipment so they are reliable, safe, and acceptable to local communities
3. Promotion of open discussion with MHDI stakeholders about their needs and the service MHDI provides to ensure asset management plans align with stakeholder expectations
4. Timely completion of annual planning, inspecting, reporting and implementation activities
5. Minimize waste generation, emissions and impact on the environment through prudent asset management and operation

The key outcome is delivering reliable, safe service through balanced management of stakeholder expectations. Table 26 demonstrates the linkages between RRFE Outcomes, Corporate Objectives and Asset Management Objectives.

Table 26. RRFE Outcomes – Corporate Objectives – Asset Management Linkage

RRFE Outcomes	Corporate Objectives	Asset Management Objectives	AM Objective Measure	AM Objective Target
1. Operational Effectiveness	Safety	Construct, maintain and operate all assets	1. Workplace Injuries,	1. Zero

RRFE Outcomes	Corporate Objectives	Asset Management Objectives	AM Objective Measure	AM Objective Target
		in a safe manner to meet a goal of zero injuries, illnesses and incidents	illness, incidents	
			2. ESA Non-Compliance	2. Zero
	Reliability in electricity delivery	Design, build, operate and maintain all MHDI facilities and transportation equipment so they are reliable, safe, and acceptable to local communities.	1. SAIDI	1. SAIDI within range of past 5 year performance
			2. SAIFI	2. SAIFI within range of past 5 year performance
2. Customer Focus	Stakeholder consultation	Promotion of open discussion with MHDI stakeholders about their needs and the service MHDI provides to ensure asset management plans align with stakeholder expectations	1. Customer Survey	1. Customer survey results (2021): a) Provides consistent, reliable electricity b) Quickly handles outages and restores power c) Accurate billing
			2. DSP consultation	1. > 80% avg agreement with DSP
3. Financial Performance	Financial integrity and accountability	Timely completion of annual planning, inspecting, reporting and implementation activities	1. Investment spending	1. OM&A expenditure +/- 10% to estimate 2. Capital expenditure +/- 10% to estimate

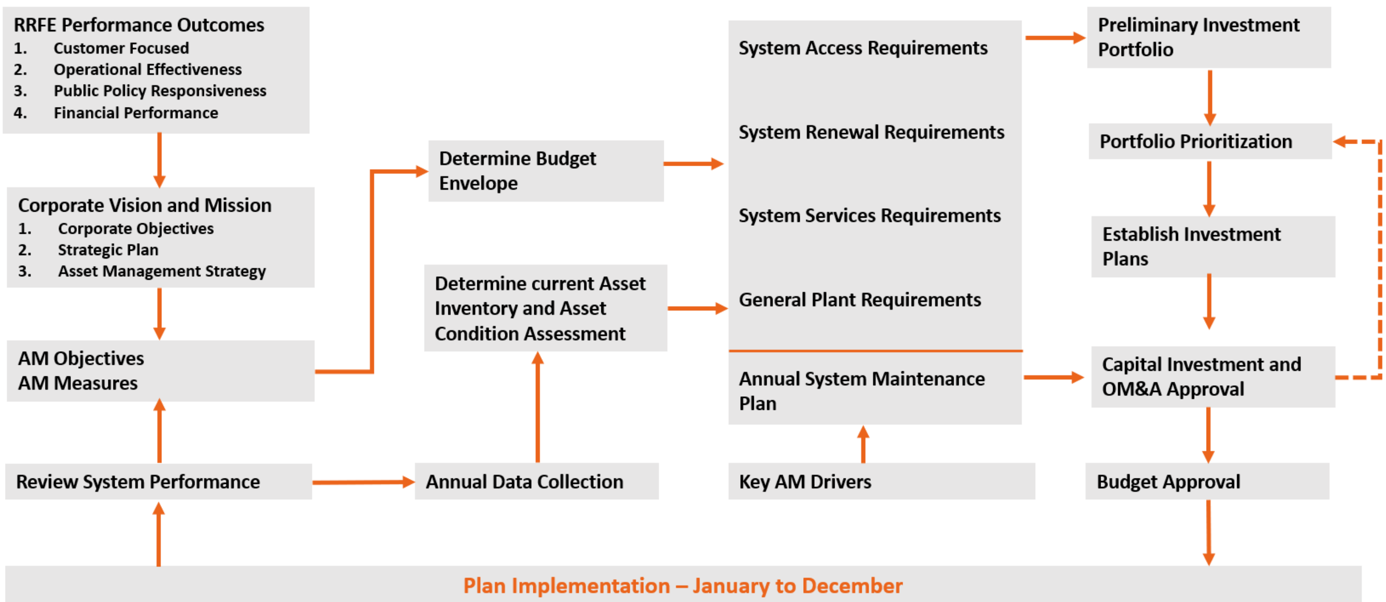
RRFE Outcomes	Corporate Objectives	Asset Management Objectives	AM Objective Measure	AM Objective Target
			2. Investment scheduling	3. >80% annual projects/ programs completed on time
4. Public Policy Responsiveness	Regulatory Compliance	Ensure responsiveness to public policy requirements and objectives; facilitation of new renewable generation; facilitation of the smart grid	1. Reportable spills to the MOE 2. New REG connected on time	1. Zero reportable spills to MOE from Code 5 events 2. 90%+

Inspection and routine maintenance programs are a critical component of how MHDI achieves its asset management objectives – ensuring optimal system performance is sustained during the entire asset service life.

5.3.1B Asset Management Process Components

MHDI's Asset Management planning cycle is detailed in the following flowchart (also identified in the ***Asset Management Plan, Appendix D***).

Figure 9 – MHDI Asset Management Planning Cycle



The Asset Management planning cycle is a process designed to achieve MHDI's Asset Management Objectives by balancing cost, reliability and risk.

The process is a cyclical one that begins with a review of system performance and whether current performance meets MHDI's asset management objectives. Asset data is collected on a continuous basis and used to update MHDI's asset register. The data in the Asset Register is used to develop an Asset Condition Assessment (ACA). MHDI regularly reviews its ACA to quantify the number of assets requiring replacement or refurbishment within some, but not all, asset categories.

The investment planning part of the asset management process begins with updated asset register information, the Asset Condition Assessment, and a proposed budget envelope. The proposed budget envelope consists of capital and operating funds determined by:

1. Financial stability considerations (financing, depreciation stability, debt/equity ratio, etc.)
2. Historical spending considerations
3. Regulatory/government directives/policy
4. Resource capability considerations
5. Investment drivers (asset state; risk; sustainable level of service; critical assets; design and operations)

The proposed budget envelope provides the required information on organizational financial capability for ranking, prioritizing and pacing of investment projects that result in the achievement of the four RRFE performance outcomes.

With the proposed budget envelope as a guide, investment planning then proceeds. Capital Investments are placed in one of the four investment categories:

1. System Access
2. System Renewal
3. System Service
4. General Plant

MHDI's asset management process identifies four key fundamental drivers of investment, from which a preliminary portfolio of capital investments is produced:

1. The current state of the assets
2. Assets critical to performance
3. MHDI's desired level of service and mandated deliverables
4. MHDI's design and operating philosophies

Mandatory capital projects are automatically included as per scheduled need. In general, mandatory projects are defined as:

- New/modified customer service connections (System Access)
- Road authority required plant relocation projects (System Access)
- Mandated service obligations (System Access)
- Renewable energy projects (System Access)
- Emergency replacement of failed equipment (System Renewal)
- Safety related projects (System Service)

The investment schedule might indicate that to address risk and optimize system performance, the capital envelope could require adjustment – defer, accelerate, remove, or add projects. Reasons for adjustment consider factors such as:

- Project interdependencies
- Resource (labour, material, etc.) availability
- Cost and benefit uncertainties/risks
- Capital availability

In this case, a revised capital budget envelope may be considered; the capital investment is re-evaluated to optimize system performance.

Following final investment plan approval, the asset management process proceeds to the plan implementation stage. Investment plans are executed and resulting system performance outcomes are collected and reviewed starting the asset management planning cycle over again.

ASSET REGISTER

Milton Hydro's distribution assets are recorded primarily in electronic asset registers. The data from the various asset registers can be displayed geospatially on its Geographic Information System (GIS). The GIS maintains data (asset attributes) including from the manufacture, make, model, work order number, and non-financial information, such as inspection history and test results gathered throughout each asset's lifecycle. The GIS also provides primary circuit information such as nomenclature and topology. The asset register provides relevant information for ongoing development and optimization of inspection, maintenance, refurbishment and replacement programs.

MHDI converted most of the inspection forms from paper to electronic format including pole inspection data gathered using the ESRI ArcGIS software. Use of the ERSI Survey123 data has enhanced MDHI's pole management efforts through greater accessibility to specific inspection details, which allows Engineering to issue maintenance requests to Operations based non-near, real time inspection results. These inspection results are scanned into Milton Hydro's document management system and stored in the GIS.

Milton Hydro also utilizes its mapping capabilities to geographically define maintenance programs, generating printouts for field inspectors or contractors. These paper maps are provided in addition to the maintenance survey data provided to contractors on tablets. The tablets direct the contractor to the asset and items requiring inspection and guide inputs with specific lists and general comment areas.

The GIS is the primary geospatial asset register for all distribution system assets. The GIS system is used for mapping, representing, and displaying distribution plant information for capital and maintenance activities, information necessary to provide underground utility locates, and for design and construction activities including new capital projects and customer connections. The wide variety of assets displayed within the geospatial context of the GIS include:

- Arrestors
- Distributed Generation Point of Connection
- Faulted Circuit Indicators
- Underground Switchgear and Junction Boxes
- Overhead Switches
- Poles
- Transformers
- Underground Primary and Secondary Cable
- Voltage Regulators

- Revenue Meters
- Overhead Primary and Secondary Conductors
- Primary Metering
- Reclosers
- Substation Equipment
- Remote Terminal Units (RTUs)
- AMI Communication Repeaters and Communication Devices
- Civil Works (Typically Underground Ducts and Foundations)

ASSET REGISTER

Table 27. MHDI Asset Register

Asset Register Component	Owner/Location	Asset Information
GIS	GIS Department	All existing, proposed & removed assets and their related attributes are in the GIS
Northstar Database	Operations (Stores)	Transformer data
Financial System	Finance	IFRS financial asset value Asset useful life studies
	Finance	Purchase history Installation history Removal history
ACA Report	Engineering	Asset condition assessment
Outage History	Engineering	SAIFI, SAIDI stats database
Maintenance Records	Engineering Operations	Transformers, switchgear, poles, stations
Inspection Records	Engineering Operations	All system components
Asset Utilization Records	Engineering	Station, feeder loading, transformer utilization
General Plant	Operations IT IT Finance Finance	Fleet history Computers Software Land Buildings

There is a significant amount of attribute information that can be collected from even the simplest of field assets. The GIS holds pertinent geospatial information on most, if not all, distribution system assets including location, history, condition information, etc. General Plant assets (other than land and buildings) are non-geospatial assets and managed separately.

ASSET CONDITION ASSESSMENT

Milton Hydro's Asset Condition Assessments (ACA) are based on

- field inspections

- testing and maintenance programs
- historical equipment information
- equipment performance
- manufacturer’s maintenance recommendations
- industry best practices
- Milton Hydro’s experience

Inspection programs, delivered by both in-house personnel and contract help, are at the core of MHDI’s ACA. Inspection program results are used to update the Asset Register. In addition to the asset condition information gathered during inspections, Milton Hydro also takes into consideration other areas of asset performance such as equipment vintage, past reliability performance and system impact. Assets that are inspected are rated and scheduled for maintenance, refurbishment, replacement or future inspections.

In 2021, Milton Hydro retained Kinectrics to undertake its distribution asset condition assessment. Using inspection, testing and performance data collected by Milton Hydro, the 2021 Kinectrics’ study assessed the condition of assets in the following categories:

- Substation Transformers
- Substation Reclosers
- Pad Mounted Transformers
- Pole Mounted Transformers
- UG Primary Cables
- Submersible Transformers
- Vault Transformers
- Pad Mounted Switchgear
- MDHI Poles
  - Wood
  - Concrete
- RTUs

The 2021 Kinectrics’ ACA provides a quantitative assessment of the health of MDHI’s assets using a health index methodology. The report includes assets ‘flagged for action’ – estimated asset quantities that can be expected to need attention based on a probabilistic approach. A copy of the ***2021 Kinectrics’ ACA*** is located in ***Appendix E***.

ASSET CAPACITY UTILIZATION / CONSTRAINT ASSESSMENT

Milton Hydro designs its distribution system utilizing best industry practices and adhering to all applicable standards. Milton Hydro uses Canadian Standards Association (CSA) and MHDI approved distribution standards for the distribution system design, ensuring safety and reliability provisions are incorporated.

For planning, Milton Hydro assesses its distribution system asset capacity utilization by using historical loading data and system capacity and configuration data [as discussed in Assessment of existing system capacity (**5.3.2 D**)] to evaluate the distribution system status. Milton Hydro has set a normal feeder loading capacity assessment factor as the "peak demand shall be less than or equal to 50% of the feeder capacity". Milton Hydro uses CYME, system planning software, that enables Milton Hydro to model the electrical distribution system and analyze system parameters, such as feeder loading and voltage levels.

On a daily basis, Milton Hydro monitors its distribution system to ensure system capacities are not exceeded. Utilizing its SCADA system, Milton Hydro monitors distribution feeders at transformer stations on a real time basis. This enables Milton to anticipate possible system overloads and react to system emergencies in real time.

Overall, the system capacity at present is adequate. Feeders that experienced a peak load in excess of the 50% planning criteria have contingency load transfer plans in place and/or were temporarily feeding load from other feeders and are therefore not truly constrained.

HISTORICAL PERIOD DATA ON CUSTOMER INTERRUPTIONS DUE TO EQUIPMENT FAILURE

Milton Hydro keeps records of customer interruptions by cause code. As reviewed in ***Summary of Historical Performance (5.2.3C), Table 14 – Outage Causes 2016 – 2020***, defective equipment, on average, accounted for 30.4% of all reliability events from 2016 – 2020.

Engineering reviews each event to determine and understand the cause or causes. Investigation results are used as input into MDHI's asset management process to support appropriate capital and maintenance response decisions.

WORST PERFORMING FEEDER

Milton Hydro has been gathering feeder performance information since 2016 and periodically presenting the data to the Board of Directors.

<u>27.6 kV feeders</u> – Milton Hydro gathers annual information on the number of auto-reclosures by feeder (including lockouts) and judges good performance as the lowest or least number of autos.

Over the five-year period 2016 to 2020 the five worst performing feeders can be concluded to be:

1. 41M23
2. 41M26
3. A4M-1
4. 280M-12
5. A4M-3

RELIABILITY RISK/CONSEQUENCE OF FAILURE ANALYSES

Reliability risk and consequence of failure for various assets are considered as part of the investment prioritization process. Among the many investment decisions that a utility must make, there are two that require the greatest degree of subjective decision making:

1. System Renewal decisions where “end of life” asset replacement is contemplated
2. System Expansion decisions in anticipation of “new load” (when a utility has higher-than-average growth such as Milton Hydro)

End-of-life – The decision to replace an asset at “end of life” with respect to reliability risk typically looks at the number of customers affected by the failure of the asset. The fewer customers affected by the asset class, the more likely the utility is to run the asset to failure. Typically, distribution transformers and manual switches are “run to failure” type assets. Substation transformers, poles and primary wires are replaced before they age out and fail. Utilizing inspection, maintenance and asset condition assessment programs can provide information to help optimize the replace-before-fail, end-of-life decision.

System Expansion – The decision to expand the system with respect to reliability risk typically looks at:

- The thermal loading capability of an asset
- How quickly that asset is going to approach or exceed its planning threshold
- The length of time required to build relief
- The best guess as to the probability of asset failure due to the expected loading

The utility will use standard Distribution System Planning methodology to come up with an expansion plan. The decision to build new feeders or provide interconnection to relieve loaded feeders considers:

- Subdivision and commercial development plans and expected subsequent load increases
- Peak feeder loading information taken from the SCADA system
- Geospatial feeder location data available from the GIS

Many times, the build decision can be coupled within a mandatory build, such as a road relocation or new commercial service to help minimize costs and optimize the expense.

5.3.2 Overview of Assets Managed

5.3.2A Description of the Distribution Service Area

SERVICE TERRITORY

As of December 31, 2021, MHDI served approximately 38,823 residential customers, 2,918 GS<50kW customers and 342 GS>50kW customers, as well as several unmetered loads and approximately 2,936 street light and 250 sentinel light connections. MHDI is responsible for maintaining distribution and infrastructure assets deployed, including 784 kilometers of overhead lines and 2,030 kilometers of underground lines. A significant portion of these assets have been installed since 2001.

There are no embedded utilities within Milton Hydro's distribution service territory, nor is Milton Hydro a host utility to other distributors.

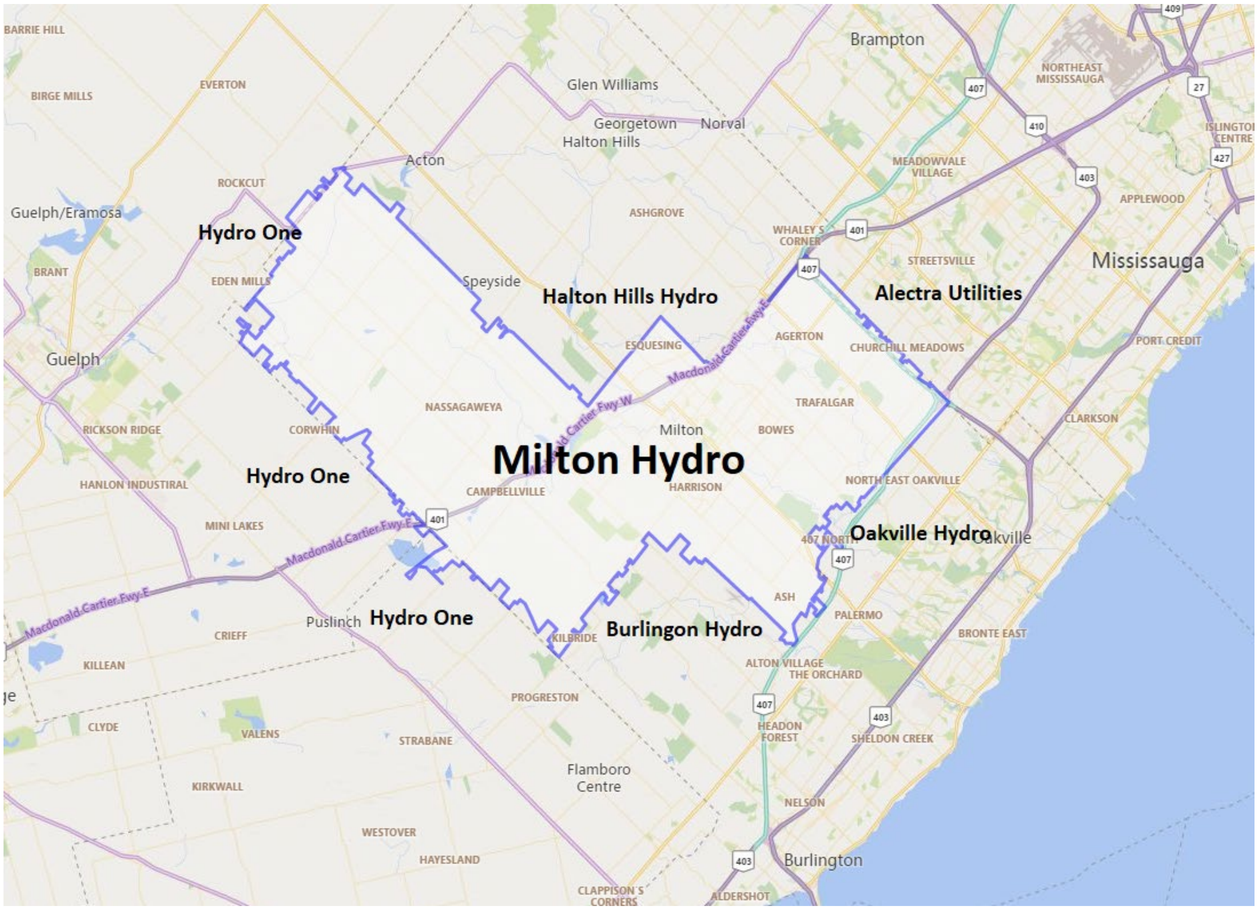
Milton Hydro is bounded by:

- Hydro One Networks Inc. and Halton Hills Hydro to the North
- Oakville Hydro Electricity Distribution Inc. and Burlington Hydro Inc. to the South
- Halton Hills Hydro & Alectra Utilities to the East
- Hydro One Networks Inc. and Burlington Hydro Inc. to the West

MHDI receives bulk power from five wholesale delivery points owned by others and delivered primarily at 27.6kV (one feeder supplies MHDI at 44kV).

Hydro One transmission assets traverse Milton Hydro's service area. A map of the Milton Hydro service area is shown in Figure 10.

Figure 10 – MHDI Service Territory



POPULATION

Milton Hydro is a mixed urban/rural utility with an expanding population and distribution system. The urban area comprises approximately 23% of the service territory, while the rural area comprises the majority of the service territory with 77%.

From 1991 to 2001, Milton Hydro experienced modest customer growth and related infrastructure investment. Since 2001, the Town of Milton has experienced extremely high growth. As a result, Milton Hydro's annual average investment in distribution plant has increased primarily to meet system access requirements and it will continue to be a key driver of future investment needs.

In 2001, Milton's population was 32,800; 15 years later, the population had more than tripled to 113,500. In 2021, the town's population is 132,979. From 2022 to 2027, the Town is expected to grow by greater than 52,000 residential and apartment units, to support a flourishing population of 167,950 and 64,460 jobs.

The ***GSAI Town of Milton Growth Projection Analysis report, Appendix G,*** indicates considerable growth in population, housing and employment will continue. The report maps out the geographic areas that will largely sustain this growth and intensification and the annual growth for apartments, housing and employment.

ENVIRONMENT

The MHDI service area has a humid continental climate (Köppen climate classification Dfb) with four distinct seasons featuring cold, somewhat snowy winters and warm summers. Precipitation is moderate and consistent in all seasons, although summers are a bit wetter than winter due to the moisture from the Gulf of Mexico and the Great Lakes.

Severe weather in the summer manifests itself mostly in the form of thunderstorms that can damage overhead distribution plant. In the winter, severe weather may consist of snow squalls, high winds and freezing rain. May 2018 a severe windstorm blew through Milton taking down multiple poles, affecting more than 33,630 customers, representing 86% of Milton Hydro's total customer base. The incident was recorded as a Major Event Day (MED). In 2019, freezing rain and strong winds resulted in galloping lines at Halton TS. The incident much smaller in magnitude, affecting 3,235 customers, was captured in a video and tweeted in a communication informing customers as the reason for the outage and Milton Hydro's plan to restore power.

5.3.2B System Configuration

Milton Hydro is supplied power from five transformer stations at 44kV and 27.6kV; four are owned and operated by Hydro One Networks Inc. and one is owned and operated by Oakville Hydro. The five wholesale delivery points are as noted in Table 28.

Table 28. Milton Hydro Wholesale Delivery Points

Wholesale Delivery Point	Allocated Capacity MW	Feeders	Voltage KV
Halton TS	139.5	9	27.6
Palermo TS	22.4	2	27.6
Fergus TS	2.0	1	44
Tremaine TS	38.25	4	27.6
Glenorchy TS (Oakville Hydro Owned TS)	40.0	2	27.6

MHDI is transmission connected at Halton TS and Tremaine TS.

There are a number of General Service customers, including, one large user (>5000 kVA service capacity), that take power directly from the 27.6kV feeders through customer owned substations. Most customers are served from 27.6kV distribution transformers, while a few are served from 13.8kV and 8.32kV distribution feeders emanating from Municipal Substations (MS). There is 4km of overhead 44kV, which supplies MS6 and connects two generators, each with 500kW capacity.

There are four municipal substations and one regulator facility in the Milton Hydro service territory as shown in Table 29 below:

Table 29. Milton Hydro MS and Regulator Facilities

Substation Number	Capacity	Transformer Sizes	Primary Voltage kV	Secondary Voltage kV	Feeders
MS #4*	20 MVA	T1 10/13.3/16.6 MVA T2 10/13.3/16.6 MVA	27.6	13.8	3
MS #6	5 MVA	T1 5 MVA	44	8.32	3
MS #7	6 MVA	T1 6 MVA	27.6	8.32	1
MS #9	6 MVA	T1 6/8 MVA	27.6	8.32	3
MRS#7	25 MVA Regulator	N/A	27.6	27.6	1

** MS#4 is being decommissioned as part of Milton Hydro's asset management plans to convert the area voltage to 27.6kV. One feeder has a single customer, another has two customers. One large customer was dependent on 13.8kV until spring 2021. Pre-conversion work has been completed. Final conversion will take place when a location for a new regulator has been identified.*

In addition to directly supplying large industrial and commercial customers, the 27.6kV feeder network provides power to residential and small commercial neighbourhoods where it is transformed down, through local distribution transformation facilities, to user utilization levels of 120/240V, 600/347V and 120/208V.

Municipal substations take power at 44kV and 27.6kV and transforms it to 13.8kV and 8.32kV. A network of 13.8kV and 8.32kV feeders supply power to residential and small commercial neighbourhoods, where it is again transformed down, through local distribution transformation facilities, to user utilization levels of 120/240V, 600/347V and 120/208V.

Total overhead and underground distribution circuitry length is shown in Table 30.

Table 30. Distribution Circuit Lengths

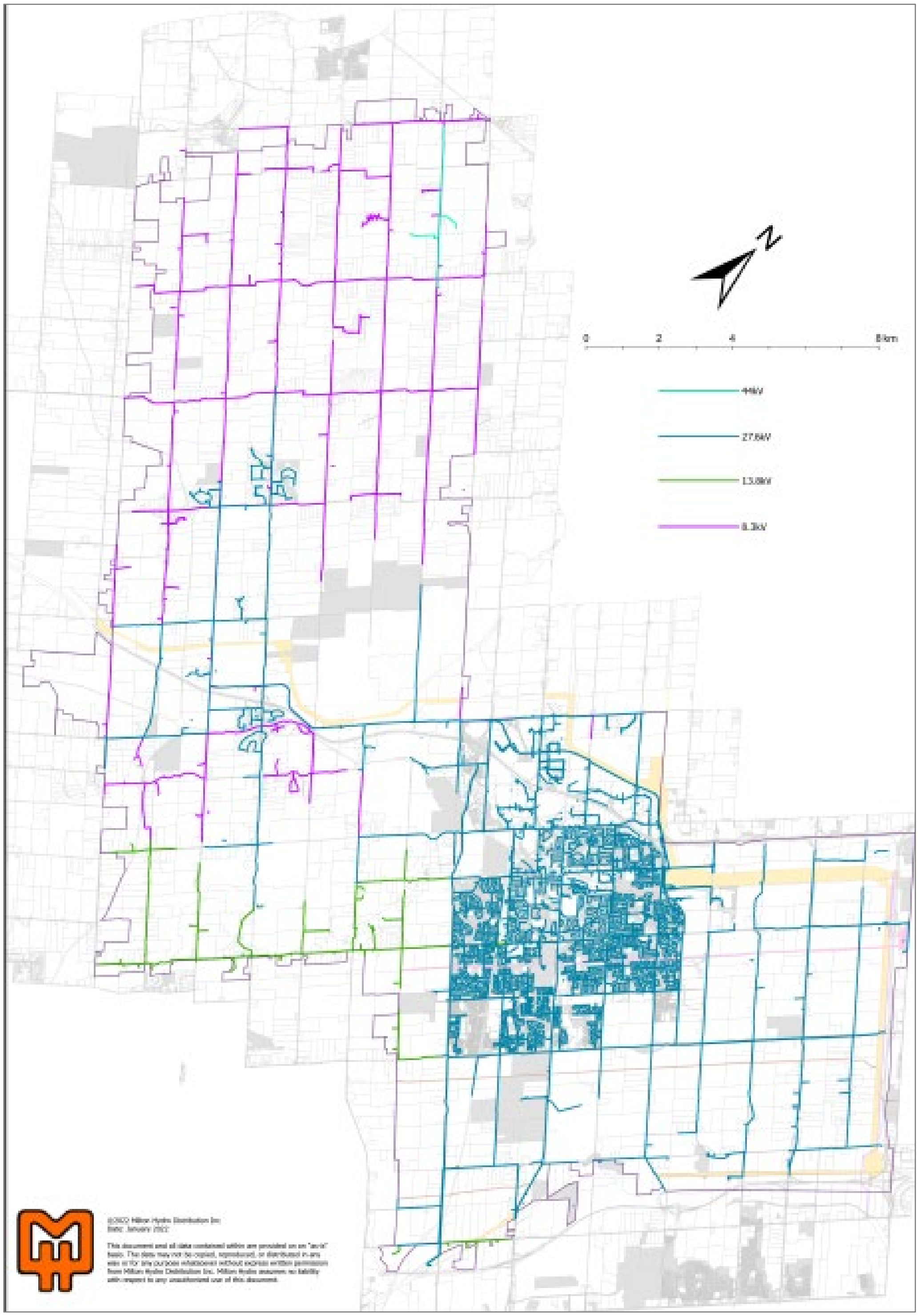
Distribution Circuit Lengths					
	44	**27.6/16**	**13.8/8**	**8.32/4.8**	**Total**
O/H km	4	392	45	167	608
U/G km		490	3	15	508
Total km	4	882	48	182	1116

A significant amount of the underground 27.6kV circuitry is single phase distribution within residential subdivisions. Underground 13.8kV and 8.32kV circuits are limited to residential and rural areas and in declining amounts as the 13.8kV areas are being converted to 27.6kV.

Underground assets consist of pad-mount transformers, submersible transformers, transformer vaults, switchgears and adjacent civil structures.

A schematic diagram illustrates Milton Hydro's 44kV/27.6kV, 13.8kV and 8.32kV distribution systems in Figure 11.

Figure 11 – Primary Distribution System by Voltage Rating



5.3.2C Information by Asset Type

Information regarding MHDI's key assets by asset type, quantity/years in service and condition, based on expected remaining life, is shown in Table 31.

Table 31. MHDI Asset Summary

Asset	Sub-Category	Quantity	TUL* (years)	Asset Life Remaining (TUL base) <10%	11% - 35%	36% - 65%	66% - 89%	>90%	Average Age
Substation Transformers		5	40	4	1	0	0	0	43 years
Regulators **									
Circuit Breakers **									
Pole Mounted Transformers		2332	40	367	489	675	590	211	21 years
Pad Mounted Transformers		3095	40	17	131	1215	1281	451	13 years
Pad Mounted Switchgear		74	20	23	24	19	4	4	15 years
Overhead Switches (Manual) – see below		295	45	4	28	71	119	73	12 years
Overhead Switches (Automated) – see below		132	35	0	1	11	92	28	6 years
Vault Transformers		38	40	10	11	11	4	1	27 years
Submersible Transformers		468	40	0	8	304	139	17	15 years
Underground Cable (metres)		663,784	40	8,319	54,846	301,043	242,782	56,794	14 years
Poles - Wood		9013	45	2,152	1,455	2,314	2,519	573	28 years
Poles - Concrete		759	45	34	13	270	398	44	15 years
MS Reclosers		14	40	0	2	2	9	1	12 years
RTUs		88	15	0	0	0	76	12	3 Years

**The data is as of December 2020. **The Asset Remaining Life was not provided for two assets classes: Regulators and Circuit Breakers.*

Regulators – four of the five remaining voltage regulators have been taken out of service and the remaining unit is a three-phase unit at MS#7. The MS#7 regulator is tested and maintained annually, same as the station power transformers. This last regulator has been determined to be at its end-of-life and is scheduled for replacement in 2023.

Circuit Breakers – the last four remaining circuit breakers within the MDHI system are at MS#4. MS#4 was slated for decommissioning in the 2015 to 2020 DSP. Unfortunately, the station could not be decommissioned as one large customer did not want to convert to 27.6kV, despite the best efforts of MDHI staff; as well Milton Hydro had yet to secure land to install a regulator. In late 2020, the last customer upgraded their service to 27.6kV. MDHI started decommissioned MS#4 in 2021, and the final circuit breaker will be removed from the asset register.

Non-key distribution assets such as low unit cost, run-to-failure items or those that require no maintenance in themselves, such as overhead wire, are not specifically tracked for condition assessment.

Proactive replacement strategies have been adopted for poles, porcelain hardware, defective polymeric switches, legacy padmounted transformers and underground primary switchgear. Reactive replacement strategies have been adopted for the remainder.

Table 32 is taken from the 2021 Kinectrics Asset Condition Assessment report. Kinectrics did not assess overhead switches, manual or automated. There are no known refurbishments that can be performed on the automated switch population, which is a young population and will be run to failure. Manual switches (the type remaining in the MDHI system) are typically run to failure devices. A condition assessment was not performed on either asset class.

Table 32. MDHI Health Index Results Summary

Asset Category	Population	Sample Size	Average Health Index	Health Index Distribution					Average Age	Average DAI	Age Availability
				Very Poor (< 25%)	Poor (25 - <50%)	Fair (50 - <70%)	Good (70 - <85%)	Very Good (>= 85%)			
MS Transformers	5	5	62%	1	1	0	1	2	43	97%	100.0%
MS Reclosers	8	6	100%	0	0	0	0	6	8		75.0%
Wood Poles	9013	9013	84%	61	390	557	517	7488	28	81%	100.0%
Concrete Poles	759	759	87%	0	18	20	11	710	15	86%	100.0%
Pole Mounted Transformers	2332	2329	85%	0	19	279	610	1421	21	70%	99.9%
Pad Mounted Transformers	3095	3095	89%	1	4	4	1393	1693	13	59%	100.0%
Pad Mounted Switchgear	74	74	86%	0	1	14	6	53	14	97%	100.0%
RTUs	88	88	100%	0	0	0	0	88	3		100.0%
UG Primary Cables	671.7	663.7	100%	0.0	0.0	0.2	1.1	662.4	14		98.8%
Submersible Transformers	468	468	94%	0	0	8	11	449	15		100.0%
Vault Transformers	38	38	81%	0	0	9	16	13	27	68%	100.0%

0% 100%

Age Only No information other than age

FLEET

Milton Hydro's Fleet and rolling stock assets consist of 32 vehicles, trailers and specialty-powered equipment; Table 33 provides a summary by vehicle type. Budgetary decisions are made based on the rationale further described in ***Section 5.3.3A Lifecycle policies and practices***.

Table 33. Fleet/Rolling Stock Inventory

Vehicle Type	# in Fleet
Bucket Truck	6
Car	1
Forklift	2
Large Van	2
Mini Van	3
Mobile Generator	1
Pick-up 1500	5
Pick-up 2500	3
Radial Boom Dereck (RBD)	2
CUV	3
Trailers	3
Skidsteer	1

5.3.2D Assessment of Existing System Capacity

MS STATION CAPACITY

MS station capacity, for planning purposes, is based on the sum of the normal rating of the station transformers. In the MHDI service area, MS stations are able to back each other up as shown in Table 34.

Table 34. MS Backup Contingency

MS	Backup
MS4	MS4
MS6	MS9
MS7	MS9
MS9	MS6, MS7 (1 feeder)

Backup capability allows for short term contingency loading above transformer nameplate, to handle short term system disturbances and maintenance needs. Table 35 below lists MS capacities and typical MS loads.

Table 35. MS Loading

MS Name	Capacity (MVA)	2020 Peak Load (MVA)
MS4	20	1.6
MS6	5	2.2
MS7	6	2.7
MS9	6	1.8
Total	37	8.3

MHDI's long term plan is to convert the 13.8kV area to 27.6kV supply. Load growth in MS supplied areas will be accommodated through existing MS capacity or through planned MS area conversion to 27.6kV supply.

44kV Feeder Capacity

MHDI is distribution connected via one 44kV feeder from Fergus transformer station. The 44kV feeder loading for July 9, 2020 (coincident peak loading day) is shown in Table 36. The 44kV feeder loading remains within HONI's normal planning 44kV loading limit.

Table 36. Feeder Loading 44kV

Feeder	Planning Capacity (Amps)	2020 Peak Load (Amps)
Fergus TS		
M4	26	27

27.6kV feeder capacity

MHDI is transmission connected via thirteen 27.6kV feeders from Halton and Tremaine transformer stations and distribution connected via four feeders from Palermo and Glenorchy transformer stations. MHDI has been allocated a combined 240.2MW of capacity by Hydro One and Oakville Hydro. The 27.6kV feeder utilization statistics for July 9, 2020 (coincident peak loading day) are shown in Table 37.

Table 37. Feeder Utilization 27.6kV

Feeder	Planning Capacity (Amps)	2020 Peak Load (Amps)	% Utilization
Halton TS			
M22	300	146	49
M23	300	244	81
M24	300	118	39

Feeder	Planning Capacity (Amps)	2020 Peak Load (Amps)	% Utilization
M25	300	324	108
M26	300	299	100
M27	300	278	93
M28	300	378	126
M31	300	252	84
M32	300	419	140
Palermo TS			
M1	300	407	136
M3	300	249	83
Tremaine TS			
M1	300	88	29
M2	300	186	62
M11	300	150	50
M12	300	279	93
Glenorchy MTS			
M20	300	59	20
M21	300	141	47

Feeder loading is generally within planning guidelines, with a few exceptions related to peak day operational configuration, and as such is not an immediate key driver of material investments according to System Service needs.

The 2020 system peak load was 214MVA, up 28MVA, as compared to the 186MVA system peak in 2019. The 2018 system peak load of 198MVA, however, was higher than that of 2019. The peak temperature on all three peak days were similar at 35 Degrees Celsius. The 2019 system peak occurred on Saturday, while the 2018 and 2020 system peaks occurred on Wednesday and Thursday, respectively. Had the system peak in 2019 occurred on a weekday, the year-to-year load growth would have been more gradual.

13.8kV AND 8.32kV FEEDER CAPACITY

The 13.8kV and 8.32kV feeders emanate from MHDI municipal stations. The feeder loading statistics for July 9, 2020 (coincident peak loading day) are shown below:

Table 38. Feeder Utilization 13.8kV and 8.32kV

Feeder	Capacity (Amps)	2020 Peak Load (Amps)	% Utilization
MS#4			
F1	300	0	0
F2	300	60	20
F4	300	0	0
MS#6			
F1	300	53	18
F2	300	33	11
F3	300	65	22
MS#7			
F1	300	65	22
MS#9			
F1	300	44	15
F2	300	21	7
F3	300	62	21

Feeder loading is generally within planning guidelines and, as such, is not an immediate key driver of material investments according to System Service needs.

5.3.3 Asset Lifecycle Optimization Policies and Practices

5.3.3A Lifecycle Policies and Practices

Milton Hydro's asset lifecycle mandate is to optimize performance of its distribution system assets at a reasonable cost, while meeting customer expectations and providing the Town of Milton with reliable, safe and cost-effective electricity. MHDI's practices towards asset lifecycle optimization are derived from MHDI's Asset Management Plan, Strategy and Objectives. Key asset lifecycle practices are:

Asset Register Development – MHDI's GIS geospatially displays the asset information captured in asset registers. The asset register maintains asset attribute information, as well as non-financial information throughout each asset's lifecycle. The GIS holds asset locational data and primary circuit information (e.g., nomenclature), as well as additional attribute data and historical non-financial information (i.e., inspection history, tests, etc.).

General plant assets information resides with the respective owners of the asset (e.g., fleet assets reside with the Vice President of Engineering & Operations). The asset register provides the relevant information for ongoing development and optimization of assets inspection, maintenance, refurbishment and replacement programs, assist with asset planning, assist in meeting regulatory/legislative compliance and IFRS accounting standards.

The asset register aids in cost control through optimization of the asset's lifecycle. The asset register can help identify like assets that have common attributes and historical performance to develop an appropriate scope of work for the group of assets rather than a single asset, which can be a more efficient use of resources and more cost effective from a materials perspective. This can be especially effective if inspection and/or performance indicate end-of-life for a specific group of assets.

Maintenance Planning – MHDI maintains the efficiency and reliability of its distribution system through an active inspection, maintenance and asset management program that focuses on customer service, employee safety and cost-effective maintenance, and replacement of assets that no longer meet acceptable utility standards. MHDI's inspection process enables the identification and documentation of condition-related deficiencies. The inspection and subsequent analysis results in a framework that supports maintenance and capital expenditures for distribution assets.

Table 39. Inspection and Maintenance Program

Field Asset	Practice	1 Year	3 Year	As Required
Overhead				
1. Overhead plant (poles, conductors, etc.)	Inspection		X	
2. Overhead Insulators	Identify old style porcelain insulators			Identify during overhead plant inspection on 3-year cycle.
3. Overhead Plant (conductors, transformers, switches, etc.)	Infrared inspection	X		
4. Poles	Pole Testing (>25 years in age)			X

Field Asset	Practice	1 Year	3 Year	As Required
5. Poles	Poor poles are replaced within 1 year & identified deficiencies are repaired			X
6. Overhead lines	Tree Trimming		X	
7. Overhead switches	Remotely controlled switches are maintenance free. Visual inspection only.		X	
Underground				
1. Vaults	Inspection and schedule wash			X
2. Switchgear	Inspection & Maintenance		X	
3. Switching Cubicle	Inspection		X	
4. Transformer rooms	Inspection & Maintenance		X	
5. Padmount transformers	Inspection & Maintenance		X	
6. Submersible transformers	Inspection		X	
7. Vaults and structures	Inspection	X		
Stations				
1. MS Stations	Full visual inspection			Monthly
2. Station transformers	Oil tests and dissolved gas analysis	X		
3. Station equipment (breakers, relays, transformers, etc.)	Maintenance		X	

Field Asset	Practice	1 Year	3 Year	As Required
4. Regulators	Oil and tap changer tests		X	
5. Station batteries	Inspection & Maintenance	X		
6. Breakers, Cubicles, Relays, Transformer, Unload Tap Changers and Reclosure Tests			X	
7. Standard 5 Part ASTM Oil and Dissolved Gases in Oil Analysis		X		
Fleet, Buildings and IT				
1. Fleet vehicles (large)	Hydraulic inspection			Every 3 – 6 months
2. Fleet vehicles	Engine fluids and lubrication			Every 2 – 3 months
3. Fleet vehicles	Rustproofing			Annual after year 3
4. Facilities (HVAC, Fire sprinkler)	Inspection			Quarterly
5. Facilities (Emergency Generator)	Inspection and testing			Monthly
6. IT (Hardware, software)	Updates, settings, configuration			As required minimum annually

Maintenance Planning criteria are developed in consideration of the Asset Management Objectives. Maintenance concerns/issues are identified primarily through feedback from distribution system operations, inspections and manufacturer's maintenance recommendations.

Maintenance is performed to ensure equipment continues to provide its essential functionality in a safe manner throughout its lifecycle. Some assets require frequent maintenance efforts (e.g., fleet vehicles), other assets require infrequent maintenance efforts (e.g., pole structures) and some are essentially maintenance free (e.g., conductors). For most assets, regular maintenance programs are set up for the whole class. For large, critical assets (e.g., station transformers), maintenance programs can be asset specific depending on the nature of the asset and discovered issues.

MHDI has a combined inspection and maintenance practice for field assets. General patrol requirements, as outlined in the Distribution System Code, are adhered to. Asset inspection and maintenance is designed to optimize the asset lifecycle until such time that the asset has reached a condition requiring replacement. Inspection and maintenance program details are provided in Table 39.

Routine Inspection and Maintenance – As discussed in ***Asset Management Process Components (5.3.1 B),*** Milton Hydro has implemented detailed inspection and maintenance programs. These programs deliver current asset information that supplements historical data from previous inspection cycles.

Asset Assessment/Replacement – To ensure a prudent decision-making process, MHDI considers a wide range of factors when deciding whether to replace a distribution asset, including public and employee safety, service quality, rate impacts, maintenance costs, fault frequency, asset condition and life expectancy.

If the malfunction of an asset could create a significant safety, reliability or service impact, the asset is replaced within the current year's budget.

Assets that have not reached their end-of-life are left in-service and assessed as required, based on service reliability, condition assessment and regular inspections, per the Distribution System Code.

In order to optimize equipment value and minimize replacement costs, MHDI has developed a procedure for re-use of equipment returned from the field. The procedure is in compliance with O. Reg. 22/04, section 6(1)(b) – *Approval of Electrical Equipment* and ensures that used equipment meets current standards and does not pose an undue hazard for re-use. Examples of equipment subject to potential reuse include: distribution transformers, loadbreak switches and padmount switchgear. All equipment subject to reuse must meet specific minimum condition criteria and must be deemed safe to use by a competent person.

Asset Investment Determination - Asset replacement is considered part of MHDI's annual investment planning process, along with other system expansion capital projects scheduled for completion in the upcoming year. Mandatory asset replacements, due to near-term, significant safety or reliability issues are automatically included in the budget spend envelope. Non-mandatory asset replacements are prioritized and scheduled, providing a degree of planning flexibility to help keep annual capital expenditures stable. The outcome from the investment planning process will align with the proposed budget envelope, or it may indicate that the budget envelope needs revision to adequately address under-investment risks. To address a large volume of specific class assets (e.g., poles) at end-of-life, multi-year asset replacement programs are structured to smooth out budget and resource impacts, if required.

When assets are replaced as a result of system renewal investments, the new assets are incorporated into the inspection and maintenance programs. As the average condition and expected life of an asset group (e.g., poles) improves through system renewal investments, reactive emergency maintenance efforts should be reduced.

Impact of System Renewal on O&M – Milton Hydro does not have a measure that captures the relationship between O&M and System Renewal investments. Milton Hydro operates under the premise that planned maintenance and capital replacement (System Renewal) is more economical than reactive responses to equipment failures and is less disruptive to customers. The majority of MHDI’s distribution assets are not manufactured to be refurbished as a means of extending their functional life. Assets such as pole, wire and hardware are replaced once they reach their end of life. Milton Hydro believes that, in these instances, potential savings are realized by mitigating asset failures and the costs associated with reactive responses. The inspection portion of O&M is not impacted by System Renewal investments.

Fleet – The fleet processes model includes a review of the operating life of all Milton Hydro vehicles. Large vehicles (Classes 6, 7 and 8, such as Bucket Trucks and RBD vehicles) are budgeted on a 12-year replacement schedule. Smaller work vehicles, pickup trucks, CUVs etc. are budgeted on an 8-year schedule. Trailers are on a 20-year budgeted replacement schedule; their life-cycle ends when structural failure is imminent or the trailer no longer passes required MTO inspection protocols.

Specialty equipment, such as a Skid Steer or Mobile Generator, is on a 20-year budgeted replacement schedule due to the equipment’s complex hydraulics, controls and motors. Typically, this type of equipment is run to the point at which the equipment can no longer be operated safely due to key system failures. Replacement approach for other smaller fuel-motorized equipment, such as chainsaws, gas drills, pumps, etc., is run to failure.

Milton Hydro uses external contractors for equipment and vehicle fleet maintenance. This approach to be cost effective and achieves good maintenance practices.

Vehicle maintenance and fuel costs are tracked electronically by individual unit and are summarized annually to determine cost trends. When a vehicle is nearing its time for budgeted replacement, Milton Hydro completes a Vehicle Replacement Assessment that includes the assessment of the vehicle's mileage, engine hours and lifecycle, and repair and maintenance costs. As well, the future intended usage is defined by the Operations Department. The process includes consideration of MTO legislation, safety, 3rd party engineering analysis and departmental needs that might necessitate major modifications for vehicle to remain in service.

If the life of a vehicle can be extended based on these criteria, the vehicle will be inspected to applicable government regulations to ensure it will still meet requirements. The department that uses the vehicle is also consulted to determine whether the vehicle still performs as required, or if a vehicle replacement with newer or different features would increase safety and efficiency. This assessment may result in the vehicle replacement being deferred to the next budget year when the vehicle would be re-assessed. A deferral that extends the vehicle beyond the fully depreciated life cost can nets savings from not purchasing a new vehicle.

Milton Hydro reviews its vehicle replacement schedule and associated maintenance costs annually. This review results in a prioritized list of vehicles and equipment to be replaced in the following year's budget. The Project Sheets for Fleet (see DSP ***Appendix A***) include the planned vehicle replacements from 2023 to 2027.

5.3.3B Lifecycle Risk Management

MHDI collects data through inspection and maintenance to provide a better understanding of each asset's stage in its lifecycle, which leads to more cost-effective decisions with respect to risk management decisions.

Information is obtained through established inspection programs as discussed in Asset Management Process Components (***5.3.1B***) and ***Appendix D Asset Management Plan***. Regular, cyclical inspection programs build on the available historical data to provide an overview of asset conditions. Inspection data, performance history, equipment vintage and life expectancies are all inputs that deliver both asset specific and population-based information.

Asset performance data is collected throughout an investment cycle and utilized in the next investment planning period. Mandatory investments are automatically included in the investment plan regardless of risk. Both system impact and safety are risk considerations for prioritization ranking. A distribution transformer investment will rank lower than critical asset investments such as station transformers and 27.6kV plant due to the potential widespread impact from a failure. Similarly, a project with a potentially smaller system impact may be rated higher if it has a significant safety concern associated with it.

As part of the prioritization process Milton Hydro considers:

1. The asset's current state
2. Assets critical to performance

3. MHDI's desired level of service and mandated deliverables
4. MHDI's design and operating philosophies

Within this context projects are prioritized based on:

- Mandatory
- Non-Mandatory

Mandatory projects, typically System Access projects, are automatically included in response to third party needs.

Non-mandatory, System Renewal, capital projects are prioritized with consideration for:

- Safety
- Reliability
- System Impact
- System Needs
- Pacing of Investments
- Customer Impact

While Safety is always a priority, the annual prioritization of projects attempts to deliver a balanced project list that balances competing drivers, such as cost and reliability.

MDHI takes a proactive and methodical approach to its pole replacement program to maintain a long-term, stable financial investment, a robust distribution system and to operate within OEB rate mitigation guidelines. As part of its Asset Management Program, MHDI performs pole inspection and testing to evaluate the condition and projected life of its poles. One third of MHDI poles are inspected on an annual basis such that each pole is inspected in a three-year cycle. Ground line bore tests are performed on poles initially once they have been in service for 25 years and in subsequent inspection cycles as deemed necessary. Poles are also inspected for signs of decay, surface rot, insect infestation and overall deterioration. Poles identified as at end-of-life may fail unexpectedly or be in an imminent position to fail and are prioritized for near-term replacement to maintain the safety and integrity of the distribution system. This process optimizes infrastructure investment decisions using qualitative data and an informed risk analysis.

5.3.4 System Capability Assessment for Renewable Energy Generation

5.3.4A Applications from Renewable Generators > 10kW

MHDI has connected 22 renewable energy generators to date ranging in size from 91kW to 250kW. A total of 6,988.5kW has been connected.

5.3.4B Renewable Generation Connections Anticipated 2023 -2027

MHDI has offers to connect four renewable energy generators in the 2023 -2027 period for a total of 1050 kW. MHDI will accommodate new requests as required throughout the 2023-2027 period.

It is expected that any other renewable energy generator connections will be at the micro-generation during this period.

5.3.4C Capacity to Connect REGs

The MHDI distribution system (MS stations, feeders) has capacity in excess of the upstream HONI capacity allocations. Each 27.6kV feeder is rated at 600A capacity and has a planned loading level of 300A, which is equivalent to approximately 14MW. At 50% REG penetration level, 7 MW would be available from each MHDI feeder for the connection of renewable generation, subject to upstream limitations.

5.3.4D REG Connection Constraints

MHDI is supplied from the following transformer stations:

1. Palermo TS (HONI)
2. Tremaine TS (HONI)
3. Halton TS (HONI)
4. Fergus TS (HONI)
5. Glenorchy MTS (Oakville)

The HONI website lists station capacity and shows an approximate amount of generation that can be added at each bus or station owned by Hydro One. The list shows approximate values only and the actual capacity can only be determined by completing a Connection Impact Assessment. Information from the list related to HONI TS that supply MHDI are reproduced in the Table 40.

Table 40. HONI TS Station Capacity for DGs *

Station	Short Circuit Capacity (MW)	Thermal Capacity (MW)
Palermo TS	0	71.0
Tremaine TS – B bus	44.0	25.0
Tremaine TS – Y bus	46.5	25.0
Halton TS – J Bus	95.6	45.3
Halton TS – Q Bus	101.4	45.4
Fergus TS	246.9	96.1

** As of October 19, 2021*

Subject to specific Connection Impact Assessments, it appears that capacity to connect renewable generation is available at most of the HONI source stations. The two MHDI feeders fed from Palermo TS are unable to connect renewable generation until HONI short circuit constraints at Palermo TS are rectified.

Oakville Hydro has indicated that there are no station capacity constraints at Glenorchy MTS for the two Milton Hydro feeders connected.

5.3.4E Embedded Distributor Connection Constraint Impacts

There are no embedded distributors in MHDI's service territory.

5.4 CAPITAL EXPENDITURE PLAN

MHDI's DSP details the program of system investment decisions developed from information derived from MHDI's asset management and capital expenditure planning process. Investments, whether identified by category or by specific project, are justified in whole or in part by reference to specific aspects of MHDI's asset management and capital expenditure planning process.

MHDI's DSP includes information on prospective investments over a five-year forecast period (2023 – 2027) as well as planned and actual information on investments over the preceding historical period (2016 – 2022) prior to the initial year of the forecast period.

5.4A Customer Engagement Activities to Ascertain Plan Alignment

Milton Hydro values its customers and is earnest with its engagement efforts. To assist with its customer engagement activities, Milton Hydro retained a third-party expert, Decision Partners, to assist with these efforts. Customer engagement was largely conducted through on-line and virtual (digital) formats, respecting the limitations and restrictions of Covid-19 protocols. Initial research was conducted with telephone interviews. The digital engagement process was comprehensive engaging customers from all customer classes gathering input from more than 2800 customers as to their priorities and expectations. A full report on DSP Customer Engagement, ***Customer Engagement Summary Report*** on Milton Hydro's Investment Planning, is located in ***Appendix J***.

The Customer Engagement was conducted in two Phases:

> Phase I – Foundational Customer Research with a smaller number of customers in an open, in-depth process designed to discover customers' needs, values, interests, and priorities
>
> Phase II – Broader Customer Engagement, designed to broaden the engagement to include all customers. Phase II was further broken down to residential customer and larger commercial and industrial customers.

Phase III is the summary report.

PHASE I FOUNDATIONAL RESEARCH

Decision Partners conducted foundational interviews between May 1 and June 10, 2021, with 25 Milton Hydro customers – a typical number of interviews for a foundational research step. Decision Partners' proven, science-informed, evidence-based Mental Modeling Insight™ (MMI™) was applied for the interview process. The interviews were used to gain a perspective of customers' thinking towards:

- Perceptions of the Electric Industry and Milton Hydro
- Considerations for Business Planning
- Looking Forward and Milton Hydro 2.0
- Key Elements of Capital Spending
- Milton Hydro Customer Engagement and Communications

Residential and Commercial customer interviewees were selected randomly from customer lists grouped by postal code to provide a diverse group from across Milton Hydro's service territory.

Interview Cohorts:

- 12 Residential Customers
- 7 Commercial Customers (GS<50, GS>50)
- 6 Large Use Customers (GS>1000; GS>5000)

The interviews were conducted in a conversational manner that encouraged participants to elaborate on their perspectives and to raise additional topics spontaneously. The foundational interviews used general descriptions of capital and OM&A spending resulting in preliminary qualitative indicators. On average, the interviews had a 33 minute duration.

General observations were garnered from these interviews:

- Nearly all interviewees rated 'Safe', 'Reliable' and 'Affordable' – as 'Very Important' qualities as critical tenents of Milton Hydro's Mission Statement
- Most think they will have an electric vehicle in 10 years.
- Nearly all interviewees thought it was very important for Milton Hydro to prepare for extreme weather events; some suggesting such preparation is a key to reliability.
- System Access: seen to be necessary given the rapid growth in Milton.
- System Renewal: seen to demonstrate that Milton Hydro is being proactive in managing assets.
- System Service: seen as important in order to increase operational efficiency by keeping assets "up to date", and through increased automation.

- General Plant: was seen as important because tools, equipment and utility trucks were seen to be integral parts of the distribution system, “where the rubber hits the road”.
- Nearly all Interviewees acknowledged the importance of having an appropriate number of employees, citing the need to having enough employees for service and proper system maintenance and hiring employees before other retire to assure effective knowledge transfer.

PHASE II DESIGN AND CONDUCT BROAD CUSTOMER ENGAGEMENT

Building on the results of the Foundational Research, Phase II focused on reaching out to all Milton Hydro customers and was further broken down to residential customers, and larger commercial and industrial customers.

The engagement objectives including providing customers with information about:

- the provincial electricity system and Milton Hydro’s role within it
- objectives of Milton 2.0 (future ready, customer centric, enterprise approach, sustainable growth)
- how budget is applied to both capital spends (and its categories) and OM&A
- how capital projects and OM&A affects their monthly electricity bill

Customers were provided information on how the investment plan for the DSP period addresses the cost drivers and the impact these investments would have on customer rates. Customers were also provided information on ‘right-sizing our resources’ to support and operate appropriately as a medium sized utility.

The survey provided customers the opportunity to provide feedback on proposed rate increases.

Residential Customers

Milton Hydro hosted an on-line web survey, between October 8 and November 11, 2021. While this survey was open to all customers, it was primarily designed to engage Residential Customers who were incentivized to participate by offering participation in a draw for 1 of 2 Apple iPads. Email invitations (and reminders) were sent out to more than 30,000 customers. Customers who receive paper billing, received a bill insert announcement. Milton Hydro also promoted the Web Survey with a banner on their website homepage and announcements on Twitter. A total of 4,178 customers opened the survey and answered at least one question, and 2,845 customers answered all survey questions; of these, 98% were Residential Customers.

A complete copy of the residential ***Customer Engagement Web Survey is available in Appendix C*** of Customer Engagement Summary Report on Milton Hydro’s Investment Planning.

Larger Commercial and Industrial Customers (>50kW)

To specifically engage Commercial and Industrial (C&I) customers, Milton Hydro hosted a Larger Customer Webinar inviting 366 commercial/industrial customers in service classifications above GS<50. Invitations were extended via email or a direct phone call. The webinar was conducted on November 3, 2021 engaging 17 participants, representing 15 different companies; 11 participants (representing 8 customers) provided survey responses.

The webinar was designed by Milton Hydro in consultation with Decision Partners, and conducted by Milton Hydro, with Decision Partners facilitating the comment segments. Decision Partners developed a survey to collect participants' responses to questions asked throughout the webinar.

A complete copy of the larger C&I ***Customer Engagement Web Survey is available in Appendix D*** of Customer Engagement Summary Report on Milton Hydro's Investment Planning.

CUSTOMER ENGAGEMENT RESULTS

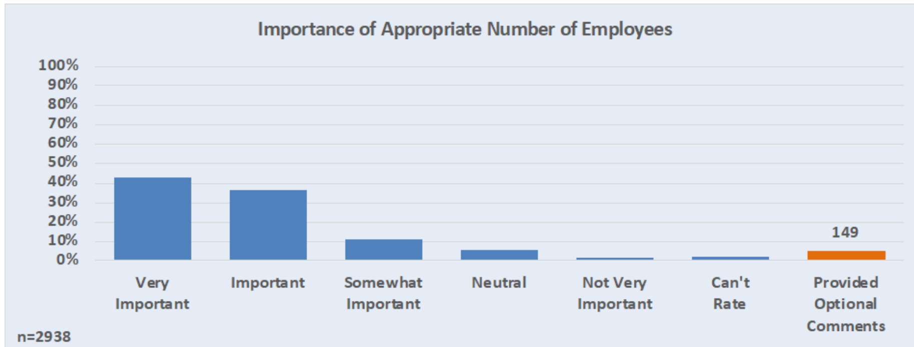
The Residential and Commercial and Industrial workbooks presented much the same information with some differences to ensure the content was directed specifically to the target customer's needs and priorities. For example, the survey asked, "How would you like Milton Hydro to communicate with you as we go forward?" Account Representative was an option available to C&I customers, but was not an option for Residential customers.

What Milton Hydro Customers Said

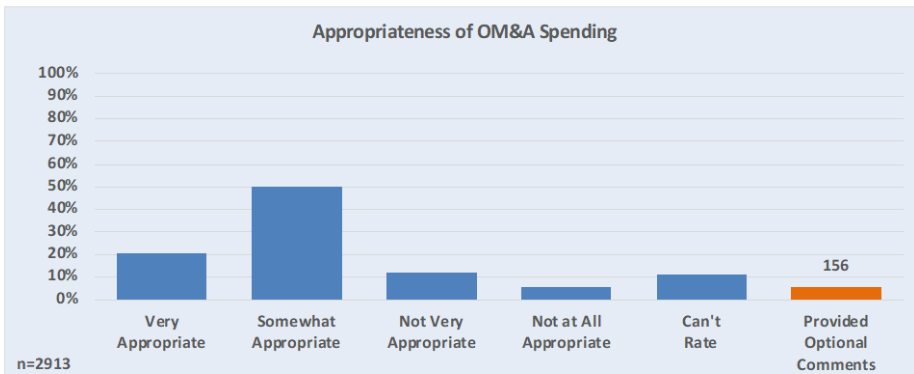
- Customers and Milton Hydro are aligned on the fundamental priorities – safety, reliability, and affordability. A key message from Customers: don't compromise safety and reliability – *but be prudent with spending.*
- Customers are thinking about the future and are aware of the drivers for change to the electricity system – growth in Milton; new types of use/demand such as electric vehicles (EV), solar and storage; more significant weather events due to climate change, etc.
- Most Customers in the Web Survey and the Large Customer Webinar rated the level of spending and the impact on their bills as 'very' or 'somewhat appropriate'.

Summary of Customer Web Survey Ratings of Appropriateness of Capital Spending					
% Rating As:	Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate
System Access (n=3142)	20.5%	55.2%	8.3%	2.9%	13.2%
System Renewal (n=3079)	22.6%	54.1%	8.1%	3.1%	12.1%
System Service (n=3014)	27.0%	53.2%	6.6%	2.1%	11.2%
General Plant (n=2961)	22.2%	53.7%	9.4%	3.7%	11.0%

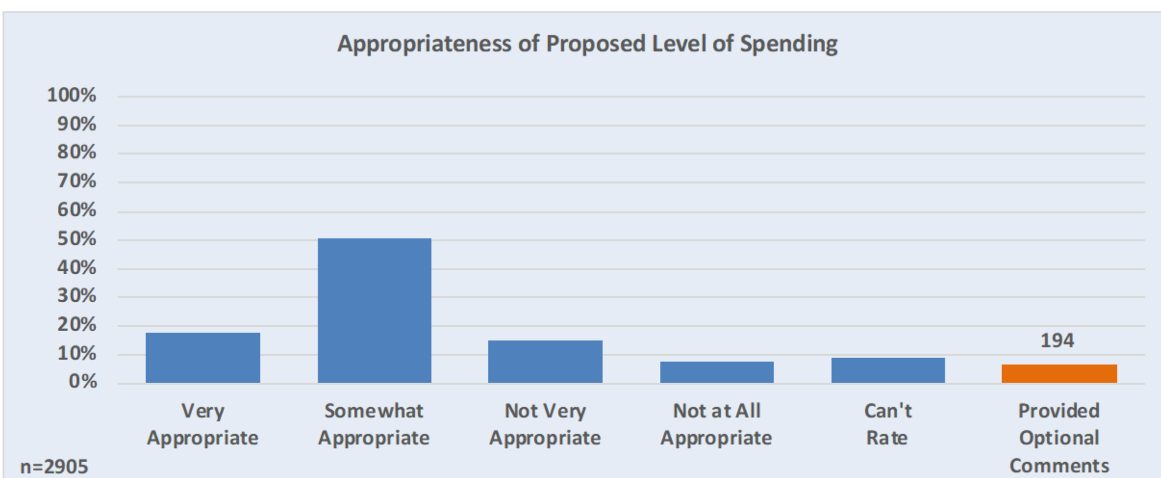
- On OM&A Spending, nearly all Customers in the Web Survey (79.6%) rated ensuring that "Milton Hydro have an appropriate number of employees to effectively and efficiently manage the distribution system as the Milton community continues to grow" as 'Very Important' or 'Important'.



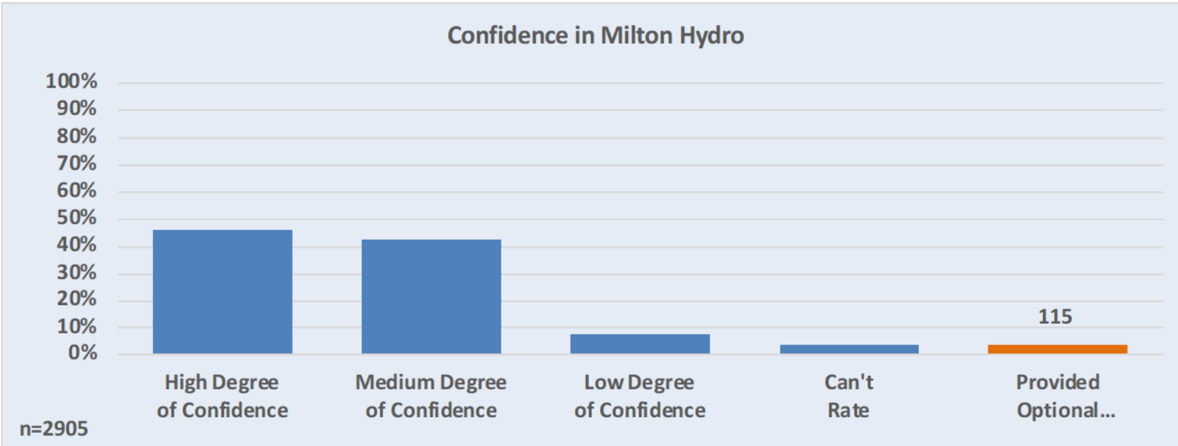
- When asked to what degree the level of OM&A spending is appropriate, Most Survey Respondents (71.4%) rated it as Very or Somewhat Appropriate.



- After being presented with the proposed capital and OM&A spending and the potential overall impact on their bills, most Survey Respondents rated the proposed spending as Very (17.7%) or Somewhat Appropriate (50.7%).



- When asked to consider everything that had been presented in the survey, Respondents were asked how confident they were that Milton Hydro will continue to provide safe, reliable and affordable electricity, nearly all rated it as High (45.9%) or Medium (42.4%).



RESULT IMPACTS OF CUSTOMER ENGAGEMENT ON DSP

Both Residential and C&I customers strongly support outage reductions (time and duration) and increasing reliability, and Milton Hydro being 'future ready' to support their needs. MHDI Engineering team took customers' feedback as an opportunity to return to first principals on the capital budget planning. The team identified budget allocation in System Renewal that had been allocated for switchgear replacement and pole replacement that could be reprioritized to System Service for:

- Additional Overhead and Pad Mounted Switch Automation
- Implementation of a SCADA based Fault Location, Isolation and Services Restoration (FLISR) system

By using remotely monitored and remotely controllable three-phase switches installed on the Pad Mounted Switch Automation and Overhead Switch Automation projects and SCADA, MDHI will quickly be able to quickly identify the location of faults on FLISR enabled feeders. Once identified, MHDI staff can isolate and sectionalize faulted line sections and restore power to unfaulted line sections involved in the initial outage.

The use of FLISR/OMS/SCADA gives MDHI better visibility into the real time or near real time operating status of the distribution system and allows MDHI to respond more quickly to outages. The installation of FLISR is an example of MDHI moving towards grid modernization and increasing its ability to connect Distributed Energy Resources (DERs).

Funds allocated to the pole replacement program remains sufficient to address the ACA Flagged for Action poles in "very poor" and "poor" condition. Budget allocation for Switchgear Replacement was wholly shifted from System Renewal to System Service. A grand total of Capital Budget $3,345,974 was shifted from System Renewal to System Service.

Table 41. Capital Budget Moved from System Renewal to System Service

	2023	2024	2025	2026	2027
From Wood Pole Replacement	$325,189	$525,000	$525,000	$525,000	$525,000
From Switchgear Replacement	$254,768	$254,768	$137,083	$137,083	$137,083
Total Budget Moved to System Service	**$579,957**	**$779,768**	**$662,083**	**$662,083**	**$662,083**

The results of customer engagement did not result in any material impact to the final DSP budgets for System Access and General Plant budgets.

5.4B System Forecast Development 2023-2027

It is expected that the operational and service requirements driving MHDI's capital expenditures will generally remain consistent through the 2023 to 2027 planning window. MHDI expects load and customer growth in line with development plans and intensification forecasts at the municipal and regional level as noted below:

1. Ontario Places to Grow Act (A Place to Grow - August 2020)
2. Halton Region Official Plan (2015)
3. Milton Strategic Plan – Destiny Milton 3 (DM3) (2015-2018)
4. Milton Major Transit Station & mobility Hub Study (2020)
5. Milton Master Transit Plan 2019 - 2023
6. Town of Milton Official Plan (OPA31) (2010)
7. Hydro One GTA West Needs Assessment Study 2019
8. GSAI Projected Growth Analysis Study (2021)

System renewal investments (end-of-life replacement) will ensure that customer service levels with respect to reliability are maintained. Inspection and condition and performance analytics will help direct preventive maintenance to specific at-risk equipment and extend the safe, reliable useful life of all equipment.

It has been determined that a new Hydro One Transformer Station (Halton TS2) in Milton will not be required until post 2027 and has not been factored into the 2023-2027 DSP investment plans. This was an outcome of consultation with Hydro One, Oakville Hydro and Halton Hills Hydro to ensure availability of adequate capacity to supply the Town of Milton's electricity needs.

Milton Hydro increased it System Service investments in response to Customer Engagement and the feedback prioritizing reliability and future grid requirements. These investments promote the deployment and integration of automated switches and Fault Location, Isolation, and Service Restoration (FLISR) into the distribution system. It is expected that this investment will improve outage restoration times thereby mitigating costs incurred by customers as a result of outages (specifically C&I customers).

The accommodation of renewable energy generation projects is not expected to drive any significant system developments over the next five years.

General Plant investments focus on IT software upgrades, including a new ERP system, building improvements to accommodate staff growth and window replacements, and fleet replacements over the forecast period.

5.4.1 Capital Expenditure Planning Process Overview

This section of the DSP provides a high-level overview of MHDI's capital investment planning process as detailed through the Planning Cycle process in ***Section 5.3.1***. Capital investments are determined through the Capital Budget process. The capital investment planning process is embedded within MHDI's Asset Management process.

CAPITAL BUDGET PROCESS

The Capital Budget process at Milton Hydro is an integral planning tool and ensures that appropriate resources are available to maintain and grow its capital infrastructure. It is the responsibility of each department to contribute to the preparation of the Capital and Operating budget, with the assistance of the Finance department. The responsibility of the Finance department is to coordinate the capital budget and forecast process and present a preliminary Capital budget to the President & CEO for approval. Once the preliminary Capital budget and long-range forecast have been approved by the President & CEO, it is presented to the Board of Directors as follows:

1. The President/CEO and the VP Finance present a preliminary Capital budget and long-range forecast at a special meeting of the Board.
2. Subsequent to the special meeting, the Finance department makes any refinements to the Capital budget and long-range forecast, as necessary.
3. The President/CEO, with the assistance of the VP Finance present and recommend the updated Capital budget to Milton Hydro Distribution's Board of Directors for approval.
4. It is then the responsibility of the Board of Directors, on behalf of the stakeholders, to approve the budget.

5. Once approved the complete finance package is presented to the shareholder, the Town of Milton via the CAO and Treasurer.

Once the Board of Directors approves the annual budget, the budget amounts do not change, but rather provide a plan, against which, actual results may be evaluated. In addition to the capital needs of the distribution system, Milton Hydro plans for the required maintenance of its assets considering both performance and safety.

BUDGET DIRECTIVES

Milton Hydro compiles budget information for the three major components of the budgeting process:

1. Revenue Forecasts
2. Operating And Maintenance Expense Forecast
3. Capital Budget Forecast

REVENUE FORECAST

Milton Hydro's revenue forecast is based on the forecasted kWh, kW and customer counts for the 2023 Test Year. Milton Hydro prepared its weather normalized load forecast by customer class and monthly customer class data for the weather sensitive customer classes using the regression analysis, and by average usage and forecasted customer growth for the non-weather sensitive customer classes. The forecast results are then used to calculate the 2023 Test Year revenue requirement at existing rates and proposed rates.

OPERATING MAINTENANCE AND ADMINISTRATION ("OM&A") EXPENSE FORECAST

Milton Hydro allocates available person hours to the capital work that will be done in-house, with the remaining hours allocated to identified O&M projects. Contract work is determined based on the level of expertise required and staffing availability. Milton Hydro reviews and establishes the budget based on historical trends and known factors, as opposed to simply applying an arbitrary inflation factor. Labour costs are in accordance with the Collective Agreement.

CAPITAL BUDGET FORECAST

Milton Hydro's Asset Management Plan identifies the capital projects required and projected to be required over a five-year period based on the best available information for each year. The capital budget forecast is influenced significantly by growth and the conversion of aging infrastructure. All proposed capital projects for the Bridge Year and Test Year will be completed and in service in their respective year. Milton Hydro acknowledges that, where the priority of projects changes, Milton Hydro may be required to re-evaluate the future year's capital project forecast.

As noted in **Section 5.3.1B**, the Asset Management capital planning investment cycle consists of the following steps:

1. Review of System Performance
2. Determination of Asset Inventory condition and needs
3. Set preliminary budget envelope
4. Establish Investment requirements
5. Investment plans and budget approval
6. Investment Plan Implementation

The capital planning investment process is linked to MHDI's Asset Management objectives that guide the capital investment decision making.

5.4.1A Analytical Tools and Methods used for Risk Management

SYSTEM RELIABILITY

MHDI's SCADA system and outage database provide information on outages and are instrumental in the preparation of outage reports that are used to aid in reliability risk management. MHDI manages reliability risk through these reports and the investment planning process.

DISTRIBUTION SYSTEM CONTINGENCIES

Contingency plans are required to deal with any asset related events that affect the proper functioning of the distribution system. Contingency planning deals with potential High Impact Low Probability (HILP) events that can have major repercussions on the distribution system and MHDI customers. This will mostly apply to critical assets such as multiple circuit 27.6kV feeders. All other events, that are generally regular occurrences, low impact, low scope and have established processes to deal with them, are not detailed here. The HILP events considered here are shown in Table 42.

Table 42. Contingency Events and Plans

Asset Class	Contingency Event	Contingency Plan
MS Power Transformers/reclosers	Transformer/recloser failure requiring off-site servicing	1. Permanent load transfer to adjacent MS (8.32kV) 2. Existing transformer/recloser 3. circuit at station (13.8kV)
25MVA Regulators	Regulator failure	1. Spares – Critical parts list 2. Contact plan for manufacturer repair support 3. Feeder emergency loading capability 4. Ties to alternate supplies
27.6kV Feeder cables	Failure of one or more underground cables	1. Spare cable reel 2. Ties to alternate supplies
MS RTU	Failure of RTU leading to loss of station control	1. Standby staff to man station 2. Contact plan for manufacturer repair support
Station Protective Devices	Device failure leading to full/partial loss of station	1. Spare – Critical Parts list 2. Ties to alternate DS supplies
Poles/conductors	Loss of high number of pole structures through high impact event (severe weather, etc.)	1. Stock poles/conductors 2. Supplier stock 3. Neighbouring LDC stock

In all cases, if available contingency measures prove insufficient, load shedding may be required to ensure equipment is not loaded beyond approved tolerances. Distribution Planning is part of the Asset Management process and is a year-round activity. Issues of growth and reliability are evaluated on an ongoing basis to determine optimal solutions that feed into the investment process. Computer modelling tools, such as CYME, are used in conjunction with GIS information to evaluate distribution system configuration performance with respect to the planning criteria.

Solutions incorporate a balance of corporate and stakeholder interests.

CYBER SECURITY

MHDI is committed to ensuring its systems are secure and preserve the privacy of its customers. During the forecast period, a continued investment in hardware, software, services and training will enable MHDI to fully comply with the requirements under the Ontario Energy Board Cyber Security Framework, as well as to further enhance its overall security posture.

CLIMATE CHANGE ADAPTATION

Climate change is expected to increase the risk and frequency of severe weather events that can impact system reliability.

MHDI's distribution system is expected to be primarily impacted by severe changing weather conditions related to:

1. Temperature
2. Heavy Rain/Flooding
3. High Wind velocity/Wind gusts
4. Tornadoes
5. Freezing Rain > 25mm

Climate change projections show primarily increased probabilities of occurrence (return times) in the categories listed above. Magnitude of events experienced may increase slightly.

There are two key concepts related to improving the performance of electrical distribution systems in severe weather situations: hardening and resiliency. Hardening deals with physical changes to make particular pieces of infrastructure less susceptible to severe weather-related damage. Resiliency deals with increasing the ability to recover quickly from damage to distribution infrastructure components or to any of the external systems on which they depend.

At this time, MHDI does not have any investments targeted to specifically address climate change. Some investments have added collateral value with respect to climate change risks, such as installation of smart switches.

5.4.1B Processes, Tools and Methods used To Identify, Select, Prioritize and Pace Projects in each Investment Category

PROJECT IDENTIFICATION

The projects that MHDI selects for its capital budget are the ones that are required to ensure the safety, efficiency, and reliability of its distribution system to allow MHDI to carry out its obligation to distribute electricity within its service area as defined by the Distribution System Code.

System Access projects such as development and municipal plant pole relocation projects are identified throughout the year by external proponents. Most of these projects are mandatory in nature and are budgeted and scheduled to meet the timing needs of the external proponents.

Generally, System renewal projects are non-mandatory in nature. The project needs are identified through the combination of asset inspection, individual asset performance, and asset condition assessments. Equipment failure projects are mandatory.

System Service projects are non-mandatory in nature and ensure that any forecasted load changes that constrain the ability of the system to provide consistent service delivery are dealt with in a timely manner.

General plant projects, such as fleet vehicle acquisition or replacement, software/hardware, etc., are non-mandatory in nature and are identified internally by specific departments (engineering, finance, operations, administration, etc.) and supported through specific business cases for the particular need.

PROJECT SELECTION AND PRIORITIZATION

Mandatory projects are automatically selected and prioritized based on externally driven schedules and needs. Most System Access projects fall into this category and may involve multi-year investments to meet proponent needs.

A system of project prioritization is applied that accounts for growth rates, safety, reliability and performance, condition and age, and other drivers internal or external to Milton Hydro. ***Appendix A*** includes ***Capital Project Summary Sheets*** that Milton Hydro utilizes as a means of capturing project specific information.

Non-mandatory projects are selected and prioritized based on qualitative evaluations of relative need (reliability, safety, operational impacts, efficiencies, etc.) and timing for each project. Most System Renewal, System Service and General Plant projects fall into this category and some projects, such as System Renewal – Poles, may involve multi-year program investments to meet Asset Management needs.

PROJECT PACE

Project pace for System Access projects is generally determined by external schedules and needs. System Service and General Plant projects tend to be lumpy in nature and most are paced to begin and complete within a particular budget year. System Renewal projects tend to be multi-year programs and are paced to balance the Asset Management objective needs of the particular program with regard to available resources and managing the program impacts on the customer's bill. In this sense, program benefit and deferral risk are weighed against the ability of the customer to pay.

MHDI's multi-year System Renewal programs have been prepared and paced, in part, based on 2021 ACA studies performed by Kinectrics. The 2021 Kinectrics studies were used to determine discrete annual investments for the continued renewal of the distribution system. The ACA studies identify the type and quantity of assets (i.e., km of underground cable) that require attention due to assessed asset condition and provides a recommended and prioritized action profile (Flagged for Action plan). This recommended profile was used to guide multi-year capital investment requirements. MHDI's actual replacement plans are a subset of the Flagged for Action plans and are based on MHDI's maintenance and replacement strategy. The multi-year programs cover the five-year period of the DSP. It is recognized that ACA replacement pace is a balance between increasing risk of asset failure and customer outage impacts/costs with the benefits of rate mitigation.

5.4.1C REG Investments

Milton Hydro does not propose to connect distributor-owned renewable generation projects during the forecast period. Milton Hydro prioritizes REG related investments using the same criteria applied to all other investments and in compliance with all applicable regulations including the DSC.

5.4.1D MHDI Policy and Procedure on Incorporating Non-Distribution System Alternatives

MHDI does not have any specific policy or procedure related to utilizing non-distribution system alternatives for system capacity or operational constraint relief.

MHDI actively participates in the Regional Planning process to identify any system capacity or operational constraint relief that can be achieved through cooperative planning and program execution with regional distributors and transmitters.

MHDI notes that non-distribution investments to relieve capacity or operational constraints need to be optimal solutions. The solution must be optimal with respect to the uncertainty of future system loading. The non-distribution system investments need to ensure that distribution system investments can be deferred by a specific time period with certainty. Future uncertainties about local distribution capacity demand need to be factored into the value of the non-distribution system investment.

5.4.1E System Planning – Opportunistic Modernization of the Distribution System

REMOTE CONTROL SCADA SWITCHES/SCADA MONITORED FAULT INDICATORS

MHDI has a program to install remote controlled SCADA switches and SCADA monitored fault indicators. The majority of the remote controlled switches are Viper reclosers, which can be programmed as a switch or a recloser. In long rural circuits, a Viper switches are programmed as reclosers and strategically placed so that they can reclose to recover from temporary faults or open to isolate a permanent faulty section of the distribution system. As an improvement to having fuses, automatic and remote operation of reclosers will reduce outages, outage times and a crew's travel time to re-fuse and restore feeder sections. Installation of switches at feeder tie points provide for rapid backup capability for feeder re-configuration during outage periods.

SCADA monitored fault indication will provide Control Room Operators with immediate details as to general location of system faults; this is much quicker than waiting for crew to respond and identify faulted system components. The SCADA enabled system allows operators to sectionalize the affected area using remote-controlled switches, restoring power to customers outside the affected area while the trouble crew responds. This significantly reduces outage times to customers that are outside the isolated fault area.

OUTAGE MANAGEMENT SYSTEM

MHDI's Outage Management System provides immediate Twitter based outage messaging and an outage map, which customers can access for additional outage information. In 2021, MHDI planned to implement an outage texting system as part of the OMS application. This will send a text message to inform the affected customers that their power is out and will also follow up to inform them when their power has been restored. The program also enables customers to text back to MHDI if their power is still out. This is an improvement to the current Twitter service where the tweet goes out to all subscribers, not just those that are without power.

CELLULAR MODEMS

The use of cellular modems improves the process for MV-90 meter reads and reduce costs to the customer. Modem usage will eliminate the need for MHDI site visits to manually read the MV-90 meter.

AUDIBLE FAULT INDICATORS

Audible fault indicator installations on submersible transformer have been done; padmounts are planned. These installations will reduce outage time, as crews will not have to spend time to open up the installation to check fault indicator status. This is especially useful in winter conditions where ice and snow may make opening a submersible installation problematic.

5.4.1F Distribution Rate Funded CDM Programs

5.4.1.1 Rate-Funded Activities to Defer Distribution Infrastructure

5.4.1.1A CDM Programs to Target Peak Demand (kW) Reduction

There are no rate-funded programs to target peak demand reduction.

5.4.1.1B Demand Response Programs to Defer Distribution Infrastructure

There are no rate-funded demand response programs to defer distribution infrastructure.

5.4.1.1C Programs to Improve the Efficiency of the Distribution System

System losses are within OEB guidelines. Asset utilization within MHDI planning guidelines. Opportunistic improvements to distribution system efficiency, in conjunction with other investment needs, are considered on a case-by-case basis.

5.4.1.1D Energy Storage Programs to Defer Capital Spending

There are no rate-funded energy storage programs to defer capital spending.

5.4.2 Capital Expenditure Summary

Exhibit 2-AB (Table 44) provides information about historical capital expenditures on a project category specific basis.

Table 43 outlines the Capital Project spending per the different project categories. 2016-2021 is actual spending. 2022 is planned spending.

Table 43. Capital Project Category Spending

Project Name	2016	2017	2018	2019	2020	2021	2022
	($000)	($000)	($000)	($000)	($000)	($000)	($000)
System Access							
Customer Initiated and Services	5,299	4,119	4,811	4,145	3,210	5,652	3,458
Road Authority Work	1,423	572	427	893	3,018	2,260	1,771
Meters - Services	211	660	1,102	934	1,062	819	748
Total System Access	**6,934**	**5,350**	**6,339**	**5,972**	**7,291**	**8,730**	**5,977**
System Renewal							
Meters - renewal	53	103	142	-50	339	549	1,446
Overhead	1,609	1,017	1,092	1,114	1,264	761	1,502
Underground	84	690	1,076	599	576	661	513
Total System Renewal	**1,747**	**1,810**	**2,310**	**1,662**	**2,179**	**1,972**	**3,462**
System Service							
Automation	290	1,087	986	793	279	377	587
System Expansion	330	0	756	1,639	367	0	830
Miscellaneous	0	133	0	-1	0	0	0
Total System Service	**620**	**1,220**	**1,741**	**2,431**	**645**	**377**	**1,418**
General Plant							

Project Name	2016	2017	2018	2019	2020	2021	2022
	($000)	**($000)**	**($000)**	**($000)**	**($000)**	**($000)**	**($000)**
Computer Hardware	80	297	0	106	84	92	174
Computer Software	198	183	294	52	67	68	761
Building/Office Equipment	1,366	75	56	364	64	40	593
Rolling Stock	481	118	459	134	0	69	752
Stores and Major Tools	0	0	189	0	0	0	0
Capital Contributions	0	0	1,000	1,000	0	-360	0
Miscellaneous	127	226	0	117	28	0	50
Total General Plant	**2,252**	**899**	**1,998**	**1,774**	**245**	**-91**	**2,329**
Total	**11,553**	**9,279**	**12,389**	**11,839**	**10,358**	**10,988**	**13,186**
Less Renewable Generation Facility Assets and other Non-Rate Regulated Utility Assets							
TOTAL EXPENDITURE	**11,553**	**9,279**	**12,389**	**11,839**	**10,358**	**10,988**	**13,186**
Capital Contributions	**-3,333**	**-2,880**	**-2,920**	**-2,025**	**-2,303**	**-2,947**	**-3,024**
NET CAPITAL EXPENDITURES	**8,220**	**6,400**	**9,469**	**9,814**	**8,055**	**8,041**	**10,162**

The Capital Expenditure Summary, 2AB, provides a ‘snapshot’ of MHDI’s capital expenditures over a 12-year period, including seven historical years and five forecast years.

For ‘summary’ purposes, the entire costs of individual projects or activities are allocated to one of four investment categories on the basis of the primary (i.e., initial or ‘trigger’) driver of the investment.

The investment categories are:

1. System Access
2. System Renewal
3. System Services
4. General Plant

For material projects, costs are allocated to the relevant investment categories.

Brief explanatory notes are provided to explain the factor(s) and/or circumstances underlying marked changes in the share of total investment represented by a given investment category over the forecast period relative to ‘actual’ spending over the historical period.

Explanatory notes for year over year ‘Plan vs. Actual’ variances for individual investment categories are provided where:

- for any given year “Total” ‘Plan’ vs. ‘Actual’ variances over the historical period are markedly positive or negative; or
- a trend for variances in a given investment category is markedly positive or negative over the historical period.

Table 44. Exhibit 2AB

CATEGORY	2016			2017			2018		
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var
	$ '000		%	$ '000		%	$ '000		%
System Access	7,068	6,934	-1.9%	8,092	5,350	-33.9%	6,212	6,339	2.0%
System Renewal	2,473	1,747	-29.4%	1,821	1,810	-0.6%	1,790	2,310	29.1%
System Service	1,520	620	-59.2%	1,225	1,220	-0.4%	1,350	1,742	29.0%
General Plant	896	2,252	151.3%	701	899	28.2%	711	1,998	181.0%
TOTAL EXPENDITURE	11,957	11,553	-3.4%	11,839	9,279	-21.6%	10,063	12,389	23.1%
Capital Contributions	-3,808	-3,333	-12.5%	-3,323	-2,880	-13.3%	-2,118	-2,920	37.9%
Net Capital Expenditures	8,149	8,220	0.9%	8,516	6,399	-24.9%	7,945	9,469	19.2%
System O&M	3,812	3,797	-0.39%	3,576	3,335	-6.74%	3,863	3,773	-2.33%

H

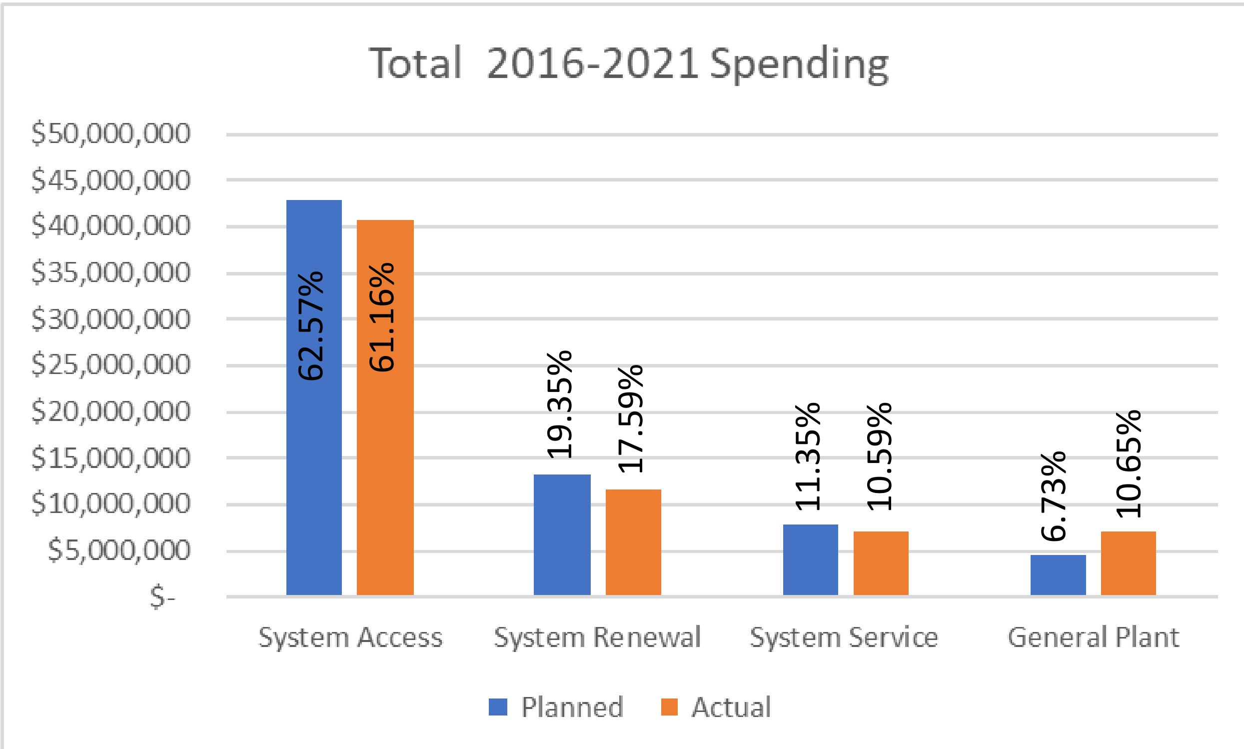
listorical Period (previous plan1 & actual)

CATEGORY	2019			2020			2021		
	Plan	Actual	Var	Plan	Actual	Var	Plan	Actual	Var
	$ '000		%	$ '000		%	$ '000		%
System Access	6,411	5,972	-6.8%	6,878	7,291	6.0%	8,236	8,730	6.0%
System Renewal	1,800	1,662	-7.7%	1,725	2,179	26.3%	3,656	1,972	-46.1%
System Service	1,350	2,431	80.1%	1,500	646	-56.9%	835	378	-54.8%
General Plant	676	1,774	162.4%	696	242	-65.2%	932	-91	-109.8%
TOTAL EXPENDITURE	10,237	11,839	15.6%	10,799	10,358	-4.1%	13,659	10,988	-19.6%
Capital Contributions	-2,181	-2,025	-7.2%	-4,793	-2,303	-52.0%	-4,660	-2,947	-36.8%
Net Capital Expenditures	8,056	9,814	21.8%	6,006	8,055	34.1%	8,999	8,041	-10.6%
System O&M	3,996	3,973	-0.58%	3,923	3,881	-1.07%	3,963	4,748	19.81%

CATEGORY	2022			Forecast Period (planned)				
	Plan	Actual	Var	2023	2024	2025	2026	2027
	$ '000		%	$ '000				
System Access	5,977			5,612	5,308	4,342	6,576	5,511
System Renewal	3,462			2,670	2,520	2,575	2,630	2,687
System Service	1,418			1,711	1,880	1,784	1,807	1,829
General Plant	2,329			2,413	1,735	1,595	1,076	1,757
TOTAL EXPENDITURE	13,186			12,406	11,443	10,295	12,089	11,784
Capital Contributions	-3,024			-2,539	-2,473	-2,137	-2,877	-2,542
Net Capital Expenditures	10,162			9,866	8,971	8,158	9,212	9,242
System O&M	4,292			5,373	5,832	5,988	6,219	6,406

The Total 2016 – 2021 Budget to Actual spending comparison as percentages of investment category is shown in Figure 12.

Figure 12 – Total 2016 – 2021 Budget to Actual Spending Comparison



Historical and forecast spending and trends are shown in Tables 45, 46 and Figure 13 below.

Table 45. Capital Expenditures Trending Analysis - Summary 2016 to 2027

CATEGORY	ACTUAL						PROJECTED					
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
System Access	$ 6,934	$ 5,350	$ 6,339	$ 5,972	$ 7,291	$ 8,730	$ 5,977	$ 5,612	$ 5,308	$ 4,342	$ 6,576	$ 5,511
System Renewal	$ 1,747	$ 1,810	$ 2,310	$ 1,662	$ 2,179	$ 1,972	$ 3,462	$ 2,670	$ 2,520	$ 2,575	$ 2,630	$ 2,687
System Service	$ 620	$ 1,220	$ 1,742	$ 2,431	$ 646	$ 378	$ 1,418	$ 1,711	$ 1,880	$ 1,784	$ 1,807	$ 1,829
General Plant	$ 2,252	$ 899	$ 1,998	$ 1,774	$ 242	-$ 91	$ 2,329	$ 2,413	$ 1,735	$ 1,595	$ 1,076	$ 1,757
GROSS CAPITAL EXPENDITURE	$ 11,553	$ 9,279	$ 12,389	$ 11,839	$ 10,358	$ 10,988	$13,186	$12,406	$11,443	$10,295	$12,089	$11,784
Capital Contributions	-$ 3,333	-$ 2,880	-$ 2,920	-$ 2,025	-$ 2,303	-$ 2,947	-$ 3,024	-$ 2,539	-$ 2,473	-$ 2,137	-$ 2,877	-$ 2,542
Net Capital Expenditures	$ 8,220	$ 6,399	$ 9,469	$ 9,814	$ 8,055	$ 8,041	$10,162	$ 9,866	$ 8,971	$ 8,158	$ 9,212	$ 9,242

Table 46. Forecast Capital Expenditures 2022 to 2027

Project Name	2022	2023	2024	2025	2026	2027
	$0	$0	$0	$0	$0	$0
System Access						
Customer Initiated and Services	3,458	3,783	3,808	3,834	3,860	3,887
Road Authority Work	1,771	1,388	1,100	100	2,300	1,200
Meters - Services	748	441	400	408	416	424
Total System Access	**5,977**	**5,612**	**5,308**	**4,342**	**6,576**	**5,511**
System Renewal						
Meters - renewal	1,446	1,066	1,087	1,110	1,133	1,156
Overhead	1,502	1,124	1,147	1,174	1,200	1228
Underground	513	480	286	291	297	303
Total System Renewal	**3,462**	**2,670**	**2,520**	**2,575**	**2,630**	**2,687**
System Service						
Automation	587	1,361	1,880	1,784	1,806	1,829
System Expansion	830	350	0	0	0	0
Miscellaneous	0	0	0	0	0	0
Total System Service	**1,418**	**1,711**	**1,880**	**1,784**	**1807**	**1829**
General Plant						
Computer Hardware	174	95	95	95	95	95
Computer Software	761	1,273	425	336	336	400
Building/Office Equipment	593	519	460	460	460	461
Rolling Stock	752	451	705	654	135	749
Stores and Major Tools	0	75	50	50	50	52
Capital Contributions	0	0	0	0	0	0
Miscellaneous	50	0	0	0	0	0
Total General Plant	**2,329**	**2,413**	**1,735**	**1,595**	**1,076**	**1,757**
Total	**13,186**	**12,406**	**11,443**	**10,295**	**12,089**	**11,784**
Less Renewable Generation Facility Assets and other Non-Rate Regulated Utility Assets						
TOTAL EXPENDITURE	**13,186**	**12,406**	**11,443**	**10,295**	**12,089**	**11,784**
Capital Contributions	**-3,024**	**-2,539**	**-2,473**	**-2,137**	**-2,877**	**-2,542**
NET CAPITAL EXPENDITURES	**10,162**	**9,866**	**8,971**	**8,158**	**9,212**	**9,242**

Figure 13 – Total 2016 – 2021 Budget to Actual Spending Comparison

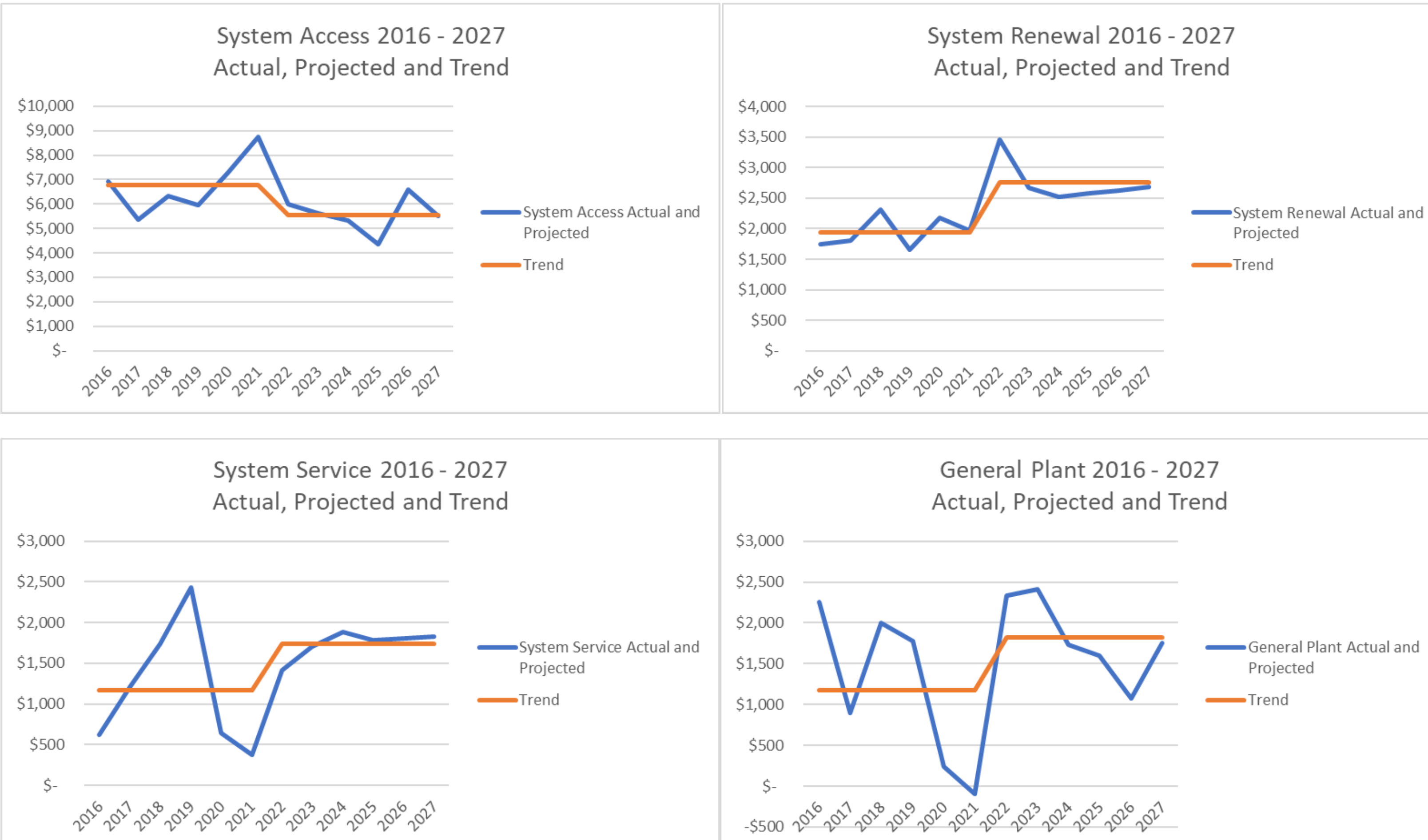


Table 46 shows forecast capital spend (2023-2027) along with Bridge year (2022) spend.

System Access average spending is trending lower in the forcast period compared to the historical period in part due to high spends in 2020 and 2021 compared to the overall 12 year pattern. Customer Initiated and Services work and Meter Services is fairly consistent over the forecast period. The majority of spending variation in the forecast period is due to Road Widening projects where spending has varied from a high of $2.3M to a low of $0.1M. Overall, System Access forecast spending varies between a high of $5.6M to a low of $4.3M over the forecast period

System Renewal average spending is trending higher in the forecast period compared to the historical period which reflects the increased emphasis on replacing assets at end-of-life due to failure or risk of failure, substandard performance, functional obsolescence in accordance with the results of the 2021 Asset Condition Assessment and MHDI's Asset Management Plan. Overhead, Underground and Meter renewal is fairly consistent over the forecast period. Overall, System Renewal forecast spending varies between a high of $2.7M to a low of $2.5M over the forecast period

System Service is trending higher in the forecast period compared to the historical period which reflects increased investments in System Automation. System Automation spend is evenly spaced over the 2024 - 2027 forecast period with a smaller spend in 2023 to accommodate additional spend in the System Expansion program. Overall, System Renewal forecast spending varies between a high of $1.9M to a low of $1.7M over the forecast period.

General Plant is trending higher in the forecast period compared to the historical period which reflects ongoing fleet replacement needs and increased investments to address building needs and software to support business operations efficiencies. The majority of spending variation in the forecast period is due to Computer Software and Fleet spend. Fleet spend tends to be lumpy in character as individual units can reach costs in excess of $500k to procure. Fleet spending varies from a high of $0.8M to a low of $0.1M. The low spend amount reflects an annual spend where no large fleet units are to be procured. Computer software spending is fairly consistent over the 2024 to 2027 forecast period with high spending in 2023 due to ERP software and robotic automation software implementation. ERP spending is significamtly reduced in the following year and robotic automation spending is limited to 2023. Overall, General Plant forecast spending varies between a high of $2.4M to a low of $1.1M over the forecast period.

5.4.3 Justifying Capital Expenditures

5.4.3.1 Overall Plan

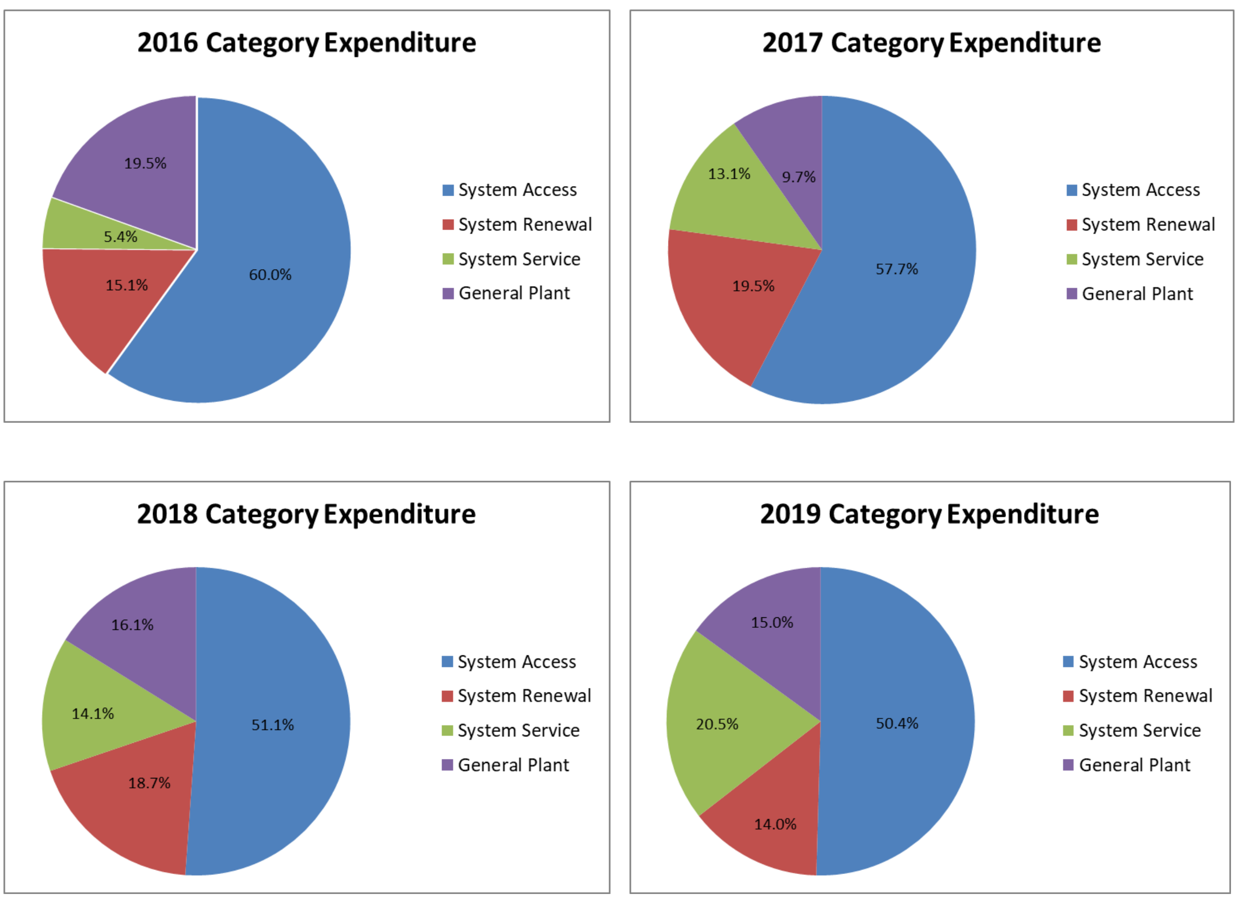
MHDI's DSP delivers value to customers by controlling costs in relation to its proposed investments through appropriate optimization, prioritization and pacing of capital-related expenditures.

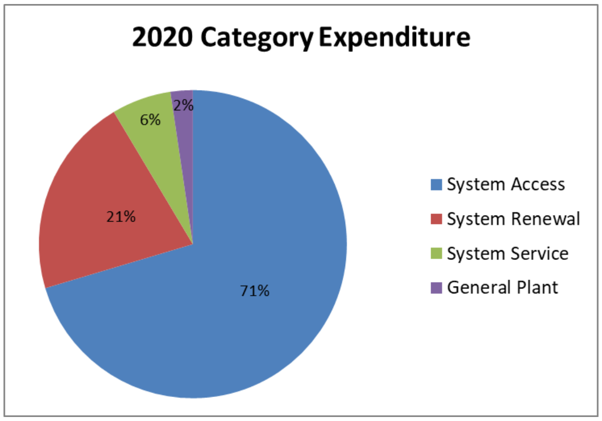
MHDI's DSP is a portfolio of investments allocated across the four investment categories.

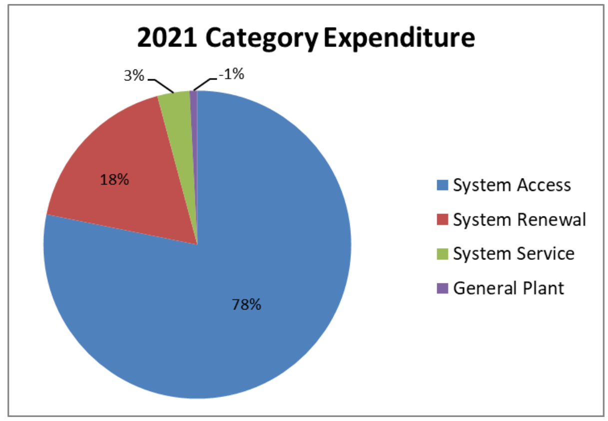
5.4.3.1A Comparative expenditures by category 2016 – 2022

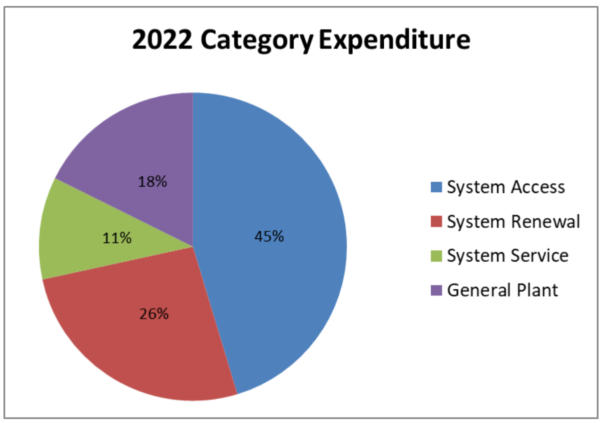
The comparative expenditures by category over the historical period are shown in Table 43 in ***Section 5.4.2*** and in Figure 14.

Figure 14 – Capital Expenditure Charts 2016 – 2022









Historical spending and variance explanation by category is given below:

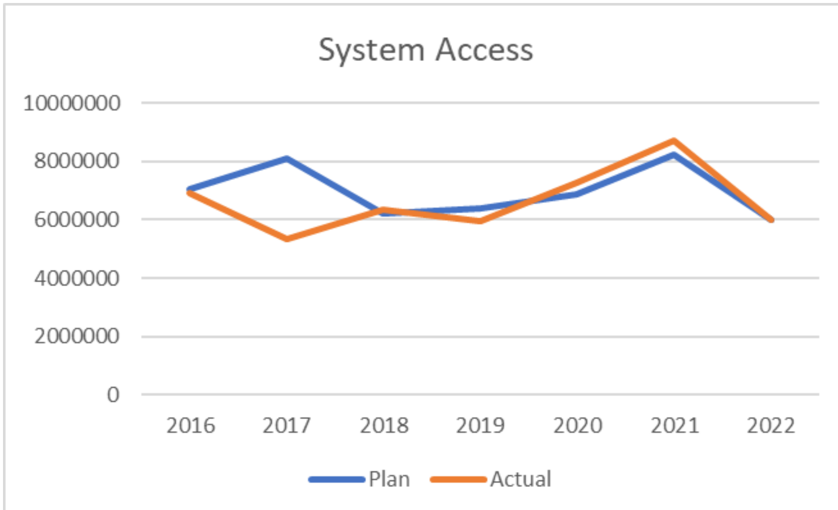
SYSTEM ACCESS

MHDI's System Access investments are driven by others. MHDI is obligated to connect new load and new embedded generation. MHDI uses an economic evaluation methodology prescribed in the DSC to determine the level, if any, of capital contributions for each subdivision project with such levels incorporated into the annual capital budget. The scheduling of investments needs is usually coordinated to meet the needs of third parties.

MHDI is also required to respond to the road authorities by obligations under the *Public Service Works on Highways Act.* The Act prescribes a formula for the apportionment of costs that allows for the road authority to contribute 50% of the "cost of labour and labour saving devices" towards the relocation costs.

The level of System Access expenditures in each of 2016 to 2022 historical years has varied between gross values of $5.4M and $8.7M. There has been an increasing spending trend in the latter part of the historical period. The figures for 2022 are budget estimates as final costs have not been consolidated as of the development of this DSP.

Figure 15 – System Access Capital Expenditure Chart 2016 – 2022



- Between the Town and the Region, there were five significant road work projects that did not get constructed as originally planned, which affected planning and budgets, engineering design and redesign (due to scope changes by others), and actual investments in all presented years. Late-stage property acquisition or inability to acquire property, as well as environmental issues affected project timing. Designs had to be re-engineered as a result of the land acquisitions and environmental issues.
- 2016 planned budget was $7,068,000; the actuals were $6,934,000 and the variance is ($134,000). Decrease from 2016 plan was primarily due to less Road Authority relocation work due to Town and Region schedule changes.
- 2017 planned budget was $8,092,000; the actuals were $5,350,000 and the variance is ($2,742,000). The decrease was primarily due to changes in road authority work and customer connection costs that are outside of Milton Hydro's control.
- 2018 planned budget was $6,212,000; the actuals were $6,339,000 and the variance is $127,000. The increase was primarily driven by an increase in customer connection costs. Road authority work continued to be at a low level similar to 2017.
- 2019 planned budget was $6,411,000; the actuals were $5,972,120 and the variance is ($439,000). The decrease was primarily due to a decrease in customer connections—one of the home builder's labour unions were on strike, which slowed the construction of subdivisions in the Town. There were also less mandated meter replacement costs and a slight increase in road authority work.

- 2020 planned budget was $6,878,000; the actuals were $7,290,648 and the variance is $413,000. The increase was primarily due to an increase in road authority work and mandated meter replacement costs. This was offset by a decrease in customer connection costs.
- 2021 planned budget was $8,236,000; the actuals were $8,730,415 and the variance is $494,000. The increase was primarily due to an increase in road authority work and customer connections.
- 2022 budget spend is estimated to be $5,977,231. The decrease from 2021 is primarily due to a decrease in road authority work forecast spend.

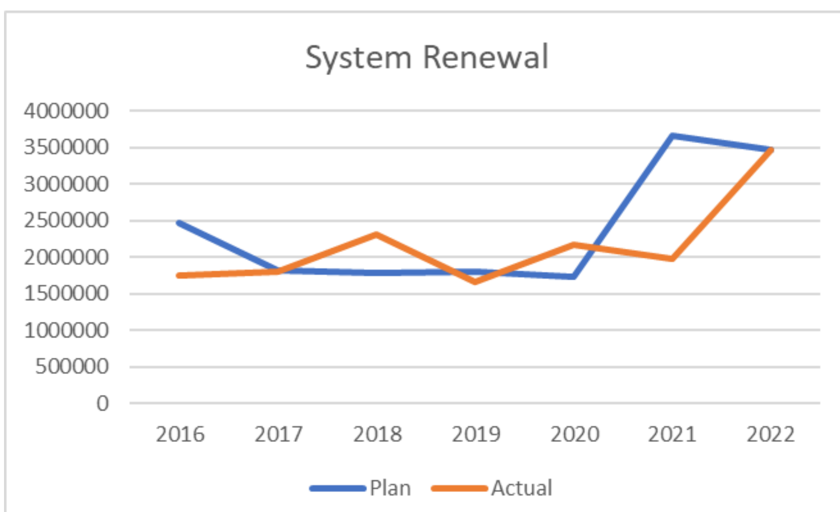
Over the forecast period the System Access proposed spend remains consistent with an average spend of $5.5M.

SYSTEM RENEWAL

System renewal is a mix of non-mandatory (planned end of life replacement) and mandatory (emergency replacement) investments. Non-mandatory investments are identified in the ***Asset Management Plan, Appendix D***, prioritized and scheduled.

The level of system renewal expenditures in each of 2016 to 2022 historical years has varied between $1.7M and $3.5M. Trend has been fairly consistent over the historical period with the exception of the spending in 2022 to address asset end-of-life replacement needs identified in the ACA. The figures for 2022 are budget estimates as final costs have not been consolidated as of the development of this DSP.

Figure 16 – System Renewal Capital Expenditure Chart 2016 – 2022



- Work since March 2020 has been impacted by Covid-19 social distancing restrictions and protocols. It impacted the structure of Milton Hydro teams and number of vehicles being used. Milton Hydro also made more use of contractors to help maintain pace of the workload, which increased costs.
- 2016 planned budget was $2,473,000; the actuals were $1,747,0000 and the variance is ($726,000). The decrease was due to fewer poles being replaced than planned and fewer unexpected overhead and underground equipment failures than anticipated.
- 2017 planned budget was $1,821,000; the actuals were $1,810,000 and the variance is $11,000. The increase was due to an increase in defective meter replacements.
- 2018 planned budget was $1,790,000; the actuals were $2,310,178 and the variance is $520,000. The increase was primarily due to an increase in the number of pole replacements and a windstorm (adverse weather) that resulted in significant damage and overhead replacement work was required on a critical pole line.
- 2019 planned budget was $1,800,000; the actuals were $1,662,000 and the variance is ($138,000). The decrease was primarily due to a fewer reactive overhead rebuild projects.
- 2020 planned budget was $1,725,000; the actuals were $2,179,000 and the variance is $454,000. Covid-19 restrictions dictated how lines crew worked together. Specific projects were identified, and others accelerated that allowed crews to work safely and respect protocols. These projects included accelerating the Porcelain Insulator/Switch Replacements program and initiating the proactive replacement of overhead switches to enhance safety. A transformer foundation was installed – the transformer was previously installed on a vault and the structural integrity was starting to fail.
- 2021 planned budget was $3,656,000; the actuals were $1,972,000 and the variance is ($1,684,000). There was an increase in customer work that required a shift of limited internal resources to complete the design and/or build. Fewer poles were replaced as a result of this shift. Less reactive work was required because there were fewer motor vehicle accidents, fewer equipment failures and less storm damage. There was also less meter renewal work implemented.
- 2022 budget spend is estimated to be $3,461,761. The increase is primarily due to an increase in proactive meter replacement and accelerated work on the pole replacement program as a result of the ACA. Storm damage in 2018 required emergency repairs to part of a pole line that holds two significant circuits. The remaining half of that pole line is at end-of-life and requires rebuilding. Switchgear replacement work is planned based upon the switchgear inspections conducted in December 2021.

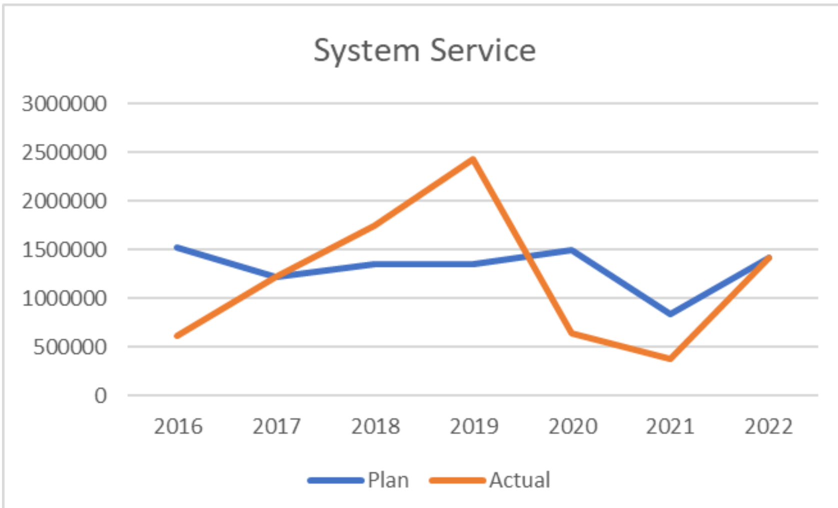
Over the forecast period, excepting 2023, the System Renewal proposed spend remains consistent with an average spend of $2.6M.

SYSTEM SERVICE

System Service investments are non-mandatory investments to provide for consistent service delivery and to meet operational objectives.

The level of system service expenditures in each of 2016 to 2022 historical years has varied between $0.4M and $2.4M. Trend has varied over the historical period with higher annual levels in the middle historical period primarily due to system expansion projects. The figures for 2022 are budget estimates as final costs have not been consolidated as of the development of this DSP.

Figure 17 – System Service Capital Expenditure Chart 2016 – 2022



- 2016 planned budget was $1,520,000; the actuals were $620,000 and the variance is ($900,000). The decrease was due to delayed implementation of the WiMax program.
- 2017 planned budget was $1,225,000; the actuals were $1,220,000 and the variance is $5,000.
- 2018 planned budget was $1,350,000; the actuals were $1,742,000 and the variance is $392,000. The increased level of spend was primarily due to two pole line extension projects.
- 2019 planned budget was $1,350,000; the actuals were $2,431,000 and the variance is $1,081,000. The increase in spending was primarily due to feeder egress work for two new Tremaine TS feeders.
- 2020 planned budget was $1,500, 000; the actuals were $645,914 and the variance is ($854,000). The decrease in spending is primarily due to inability to purchase/take delivery of equipment as a result of Covid-19 related supply chain delivery issues, as well as a slowdown in capital projects due to Covid-19 restriction protocols.

- 2021 planned budget was $835,000; the actuals were $378,000 and the variance is ($457,000). Supply chain delivery issues and Covid-19 restrictions continued to impede the ability to implement the planned investments.
- 2022 budget spend is estimated to be $1,418,000. The increase in spend is due to increases in installation of automated OH and UG switches, intelligent fault indicators, as well as system expansion project work (13.8kV conversion and regulator installation).

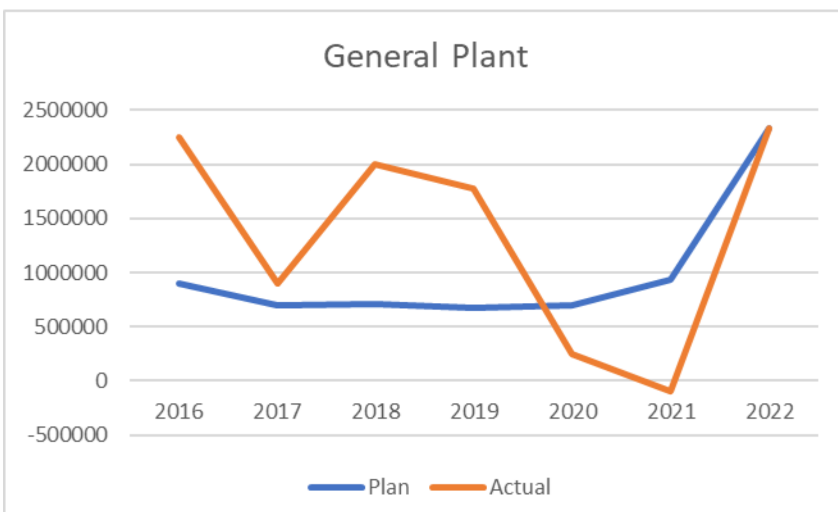
Over the forecast period the average System Service proposed spend is $1.8M. System Service costs are consistent over the forecast period.

GENERAL PLANT

General Plant investments are non-mandatory investments, not part of its distribution system (e.g., fleet, tools, land, etc.). Investments in this category are driven by operational and business needs to achieve a safe workplace, enhance employee work environments and satisfaction, increase efficiencies and productivity, and enhance customer service and value.

The level of general plant expenditures in each of 2016 to 2022 historical years has varied between -$0.1M and $2.3M. Trend has varied over the historical period with peak spending to address capital contributions to Hydro One and an increase in fleet investments. The figures for 2022 are budget estimates as final costs have not been consolidated as of the development of this DSP.

Figure 18 – General Plant Capital Expenditure Chart 2016 – 2022



- 2016 planned budget was $896,000; the actuals were $2,252,000 and the variance is ($1,356,000). The increase was due to high level of General Plant Building/Office Equipment spend to complete construction of Head Office building at 200 Chisholm
- 2017 planned budget was $701,000; the actuals were $899,000 and the variance is $198,000. The increase is a result of investments made in a permanent shelter for fuel tanks and a communication tower.
- 2018 planned budget was $711,000; the actuals were $1,998,000 and the variance is $1,287,000. The increase is primarily due to capital contributions made to Hydro One for the egress of two feeders from Tremaine TS. Spending also included the purchase of a back-up generator.
- 2019 planned budget was $676,000; the actuals were $1,774,000 and the variance is $1,098,000. The increase is primarily due to capital contributions made to Hydro One for the egress of two feeders from Tremaine TS.
- 2020 planned budget was $696,000; the actuals were $242,000 and the variance is ($454,000). The decrease was primarily resulted from no fleet vehicles being purchased.
- 2021 planned budget was $932,000; the actuals were ($91,000) and the variance is ($1,023,000). The decrease is a result of a capital contribution refund from Hydro One related to Tremaine TS feeder egress work. The planned purchase of a single bucket truck, which is a direct replacement for an existing unit, did not happen in 2021 as a result of Covid-19 related supply chain delivery issues. A planned elevator upgrade was not undertaken; the lack of staff in the office as a result of Covid-19 did not warrant the capital investment ($130,000). The planned Cayenta software upgrade was not executed ($250,000) and is further discussed in the ERP business case.
- 2022 budget spend is estimated to be $2,328,875. There are three areas of investments in 2022: new control room, rolling fleet and IT software. The in-house system control centre will enable MHDI to improve the efficiency and accuracy of the utility's response and provides benefits to its customers in terms of quicker resolution of outages and response to emergency calls. The rolling fleet investment is comprised of the planned purchase from 2021, new Backyard RBD machine, and replacement of two full-size pick-up trucks, a mid-size vehicle and Cargo Van. The IT software investment includes an OMNI Channel Platform to enable better and more timely communication with customers, and Human Resource Info System and Enterprise Service Ticketing for better internal management and efficiencies.

Over the forecast period, the average General Plant proposed spend is $1.7M. General Plant costs are higher in 2023 compared to the rest of the period due to the ERP system expenditure. Over the 2024-2027 forecast period, the General Plant proposed spend ranges from $1.1M to $2.4M.

5.4.3.1B Impact of system investment on O&M costs 2023 - 2027

To the extent possible, MHDI's operations and maintenance strategy is to minimize reactive and emergency type work through efficient operations and an effective planned maintenance program, including predictive and preventative actions. MHDI's customer responsiveness and system reliability are monitored continually to ensure that its maintenance strategy is effective. This effort is coordinated with MHDI's capital project work, so that where maintenance programs identify matters that require capital investments, MHDI can adjust its capital spending priorities to address those matters.

System investments will result in:

- the addition of incremental plant (e.g., new poles, switchgear, transformers, etc.)
- the relocation/replacement of existing plant (e.g., road authority work)
- the replacement of end-of-life plant with new plant (e.g., poles, etc.)
- new/replacement system support expenditures (e.g., fleet, software, etc.)

Forecast O&M costs for the 2023 – 2027 period are in Table 45.

Table 47. O&M Projections 2023 – 2027

2023	2024	2025	2026	2027
$5,372,714	$5,832,051	$ 5,988,256	$ 6,219,299	$ 6,405,878

In general, incremental plant additions (e.g., new pole line, etc.) will be integrated into the asset management system and will require incremental resources for ongoing O&M purposes. This is expected to put upward pressure on O&M costs.

Relocation/replacement of existing plant normally results in an asset being replaced with a similar one, so there would be little or no change to resources for ongoing O&M purposes (i.e., inspections still need to be carried out on a periodic basis as required per the Distribution System Code). There may be some slight life advantages when a working older piece of equipment is replaced with a newer one that would impact on O&M repair related charges. Overall, the plan system investments in this category are expected to put neutral pressure on O&M costs.

Replacement of end-of-life plant with new plant will still require the allocation of resources for ongoing O&M purposes. Repair would be the most significant O&M activity impacted by new plant. Certain assets, such as poles, offer few opportunities for repair related activities and generally require replacement when deemed at end of normal life or critically damaged. MHDI primary underground cable is installed in duct. Cable that has faulted or is deemed at end-of-life is replaced normally in sections between two distribution transformers. As such, the response activity for a cable failure is replacement (Capital) as opposed to repair (O&M). If assets approaching end-of-life are replaced at a rate that maintains equipment class average condition, then one would expect little or no change to O&M costs under no growth scenarios, but one would still see upward O&M cost pressure on positive growth scenarios (more cumulative assets to inspect, test and maintain each year). Replacement rates that improve equipment class average condition could result in lowering certain maintenance activities costs (e.g., pole testing, reactive repairs, etc.). Overall, this is expected to put downward pressure on O&M repair related costs.

System support expenditures (e.g., SCADA, ACA studies) are expected to provide a better overall understanding of MHDI's assets that will lead to more efficient and optimized design, maintenance and investment activities going forward. An ACA study was conducted and data gaps were identified. To improve the quality of data used in the ACA studies, increased data collection efforts (i.e., testing program for poles) will be required that will increase pressure on O&M costs. Collected data will be input into the GIS as attribute information for each piece of plant. Improved asset information will allow existing resources to partially compensate for growth related increases in O&M activities. Fleet replacement expenditures will result in reduced O&M for new units; however, this will be offset by increasing O&M of remaining units as they get older.

In summary, the system investments will result in some upward growth related and support related O&M pressures, downward repair related O&M pressures. Overall, the system investments in the System Access, System Renewal and System Service categories are not expected to have a significant impact on total O&M costs in the forecast period.

Forecast General Plant investments are expected to have above average impacts on forecast O&M in the 2023 - 2024 forecast period. Spending on additional staffing will result in a 25% increase in O&M spend in 2023 over 2022 and an 8.5% increase in O&M spend in 2024 over 2023.

Table 48. OM&A Impacts for Significant Assets

Item	Growth impact on O&M	Relocate impact on O&M	Replace impact on O&M	Support impact on O&M
Poles	increase	neutral	neutral	increase
Cables	increase	N/A	neutral	neutral
UG Transformers	increase	N/A	neutral	neutral
UG Switchgear	increase	N/A	neutral	neutral
OH Transformers	increase	neutral	neutral	neutral
MS Transformers	increase	N/A	decrease (repairs only)	decrease
MS Circuit breakers	increase	N/A	decrease (repairs only)	decrease
Meters	increase	N/A	neutral	increase
Fleet	increase	N/A	neutral	neutral
New Control Room	N/A	N/A	N/A	increase

5.4.3.1C Investment Drivers

During the 2023 – 2027 forecast investment period, MHDI has five key drivers of its capital investment:

1. Obligation to connect a customer in accordance with Section 28 of the *Electricity Act, 1998*, Section 7 of Milton Hydro's Electricity Distribution License and the Distribution System Code.
2. The Town of Milton and the Region of Halton are investing in the widening of roads, installation of sewers and water, which in many cases results in Milton Hydro being required to relocate existing distribution lines.
3. Planned system renewal spending to proactively replace plant at end-of-life to meet MHDI's commitment to maintain a safe and reliable supply of electricity to its customers.
4. Milton Hydro's commitment to provide a safe and reliable supply of electricity to its customers.
5. The implementation of the ***PwC Information Technology Roadmap*** (2022 – 2024), the ***Cresa Strategic Facilities Plan***, and replacements of the rolling fleet assets.

The key investments drivers for each category are described below:

SYSTEM ACCESS

- Customer service requests – continued growth in the Town of Milton requiring new customer connections (individual and subdivisions)

- 3rd party infrastructure – planned road widening work by the Town of Milton/Halton Region requiring plant relocation

In summary, due to the forecast employment and population growth in the Town of Milton and lived experience of actual implementation, System Access needs in the 2023 – 2027 period will continue to focus on new subdivision connections, connection upgrades due to site redevelopment, and plant relocation due to urbanization and intensification of the road network.

SYSTEM RENEWAL

- Failure risk – multiyear planned pole replacement programs that address assets in "very poor" and "poor" condition. New Asset Condition Assessment studies have determined that increased spending to address end-of-life poles and other assets is required. Forecast investments will ensure service reliability and customer satisfaction is maintained.
- Functional obsolescence – multiyear proactive meter replacement program that addresses meters that reached functional obsolescence and no longer meet operational requirements
- Reactive needs – emergency reactive replacement of distribution system assets (poles, transformers, switches, switchgear, cable, conductor, insulators, guys, anchors, etc.) due to unanticipated failure, storms, motor vehicle accidents, vandalism, etc.

In summary, system renewal spending will focus more proactively on planned proactive pole replacement programs at higher levels than seen prior to 2023 and on meter replacements for units that have been determined to be functionally obsolete.

SYSTEM SERVICE

- System constraints – line extensions and feeder interconnections to accommodate grid load growth
- System operational objectives – projects to maintain system reliability and efficiency and implementation of MHDI's automation program

In summary, system service spending will continue to focus on maintaining distribution system operational performance.

GENERAL PLANT

- System Maintenance support – replacement of fleet and tools. Historical investments have resulted in specific fleet and tool replacement as required. Replacement of major fleet units tends to create cost spikes in a particular investment year when compared to the replacement costs of small fleet units.

- Business Operations efficiency – Forecast investments on focused spending in 2023 and 2024 supporting the ***PwC IT Roadmap (Appendix F)*** implementation and annual spending supporting associated hardware and software assets.
- Non-system Physical plant – Forecast investments will focus on annual spending supporting asset replacement, and leasehold and office asset needs. Cresa's completed a feasibility plan of MHDI's facilities at 200 Chisholm Drive, Milton. The resulting ***Strategic Facilities Plan (Appendix I)*** identifies a phased approach to better utilize floor space to accommodate staff growth and gathering spaces, a control room, relocation of customer service and window replacements. Milton Hydro's budget for work captured in 2022 and 2023, is less than the Phase I plan identified in the report.

In summary, general plant spending will focus on asset replacement and staff being supported with prudent IT investments. Investments and the pace of spending aligns with historical actual spending (not planned).

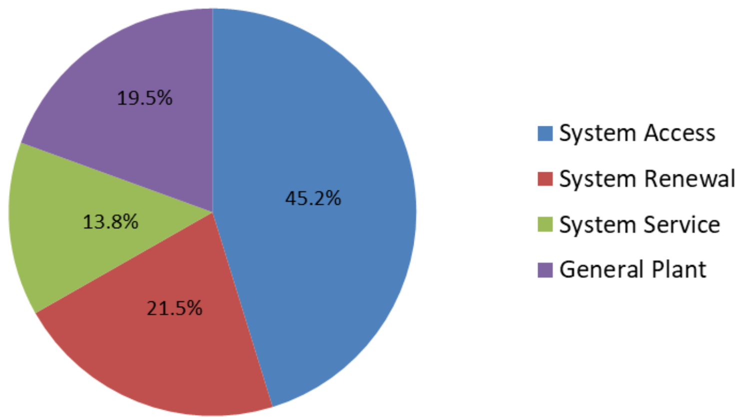
Forecast capital expenditure details by project/program and by overall category spend are shown in Table 49 and Figure 19 below. Detailed information for material project program investments are provided in the Material Capital Summary sheets as cross-referenced in Table 49.

Table 49. DSP Planned Capital Expenditures 2023-2027

Category	Total Expenditure 2023 - 2027	Project Name	2023 $'000	2024 $ '000	2025 $ '000	2026 $'000	2027 $'000	Capital Project Sheet Ref.
System Access	$27.4M	Customer Connections - General Services & Others	$ 947	$ 966	$ 985	$ 1,005	$ 1,025	SA-1
		New Installs - Condos, Commercial & Industrial	$ 306	$ 313	$ 319	$ 325	$ 332	
		New Residential Subdivisions	$ 2,530	$ 2,530	$ 2,530	$ 2,530	$ 2,530	
		Fifth Line - Derry to Britannia	$ 950	$ -	$ -	$ -	$ -	SA-2
		Steeles Avenue - Regional Road 25 to Trafalgar Road	$ 292	$ -	$ -	$ -	$ -	SA-3
		Appleby Line – Derry north	$ 146	$ -	$ -	$ -	$ -	
		Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road	$ -	$ 100	$ -	$ -	$ -	
		Tremaine Road - Widening from 2 to 4 lanes from Lower Base Line to Britannia Road	$ -	$ 1,000	$ -	$ -	$ -	
		Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road	$ -	$ -	$ 100	$ -	$ -	
		Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Road	$ -	$ -	$ -	$ 1,350	$ -	
		Regional Road 25 - Widening from 4 to 6 lanes from Britannia Road to Derry Road	$ -	$ -	$ -	$ 100	$ -	
		Sixth Line (Hwy 401 to Derry Road)	$ -	$ -	$ -	$ 850	$ -	
		James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road	$ -	$ -	$ -	$ -	$ 100	
		Sixth Line - Derry Road to Britannia Rd	$ -	$ -	$ -	$ -	$ 1,100	
		Meter Reverification Program	$ 441	$ 400	$ 408	$ 416	$ 424	SA-4
		Total System Access	$ 5,612	$ 5,309	$ 4,342	$ 6,577	$ 5,511	
System Renewal	$13.1M	Wood Pole Replacement Program	$ 720	$ 734	$ 749	$ 764	$ 780	SR-1
		Reactive OH Replacement of defective/damaged equipment	$ 331	$ 338	$ 344	$ 351	$ 358	SR-2
		Reactive UG Replacement of defective/damaged equipment	$ 280	$ 286	$ 291	$ 297	$ 303	SR-3
		Proactive Meter Replacements	$ 940	$ 959	$ 978	$ 997	$ 1,017	SR-4
		Meter Room Upgrades - Cell Modems	$ 126	$ 129	$ 132	$ 135	$ 139	
		Replace Regulator at MS7	$ 200	$ -	$ -	$ -		SR-5
		Porcelain to Poly replacement program	$ 73	$ 75	$ 80	$ 85	$ 90	N/A
		Total System Renewal	$ 2,670	$ 2,520	$ 2,574	$ 2,629	$ 2,687	
System Service	$9.0M	Overhead switch automation	$ 526	$ 913	$ 967	$ 1,010	$ 1,027	SS-1
		Pad Mounted switch automation	$ 655	$ 806	$ 685	$ 693	$ 696	SS-2
		Adding SCADA/OMS functionality and upkeep	$ 180	$ 160	$ 132	$ 104	$ 106	SS-3
		TS Capacity Relief - new 2 circuit pole line	$ 350	$ -	$ -	$ -	$ -	SS-4
		Total System Service	$ 1,711	$ 1,879	$ 1,784	$ 1,807	$ 1,829	
General Plant	$8.6M	Fleet	$ 451	$ 706	$ 654	$ 135	$ 749	GP-1
		Building Renovations	$ 400	$ 400	$ 400	$ 400	$ 400	GP-2
		Miscellaneous Building Capital	$ 119	$ 60	$ 60	$ 60	$ 61	
		Computer Software Misc	$ 231	$ 86	$ 86	$ 86	$ 86	GP-3
		Computer Software - Data, Analytics, & Other Initiatives	$ -	$ -	$ 250	$ 250	$ 314	
		Computer Software - ERP	$ 722	$ 339	$ -	$ -	$ -	
		Robotic Process Automation Phase 1 - Discovery	$ 120	$ -	$ -	$ -	$ -	
		Robotic Process Automation Phase 2 - Implementation	$ 200	$ -	$ -	$ -	$ -	
		Computer Hardware	$ 95	$ 95	$ 95	$ 95	$ 95	N/A
		Stores Equipment	$ 30	$ 20	$ 20	$ 20	$ 21	N/A
		Major Tools	$ 45	$ 30	$ 30	$ 30	$ 31	N/A
		Total General Plant	$ 2,413	$ 1,735	$ 1,595	$ 1,076	$ 1,757	
Total	**$58.0M**		$ 12,406	$ 11,443	$ 10,295	$ 12,089	$ 11,784	

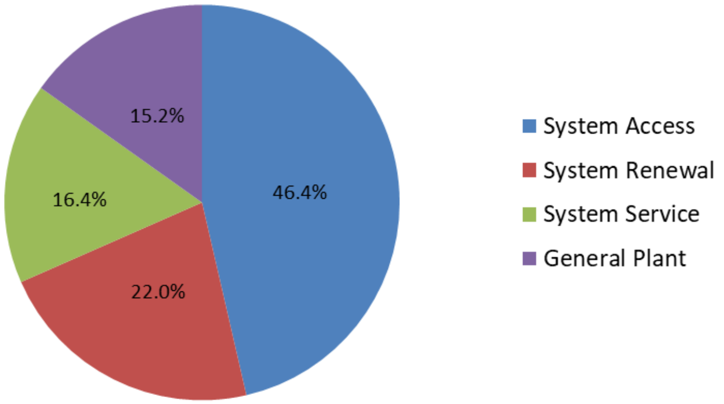
Figure 19 – Capital Expenditure Charts 2023 – 2027

2023 Category Expenditure



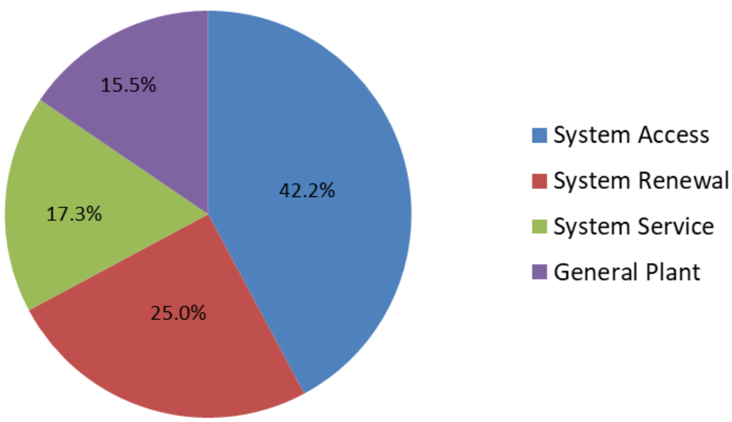
System Access	$5,612,000
System Renewal	$2,670,000
System Service	$1,711,000
General Plant	$2,413,000

2024 Category Expenditure



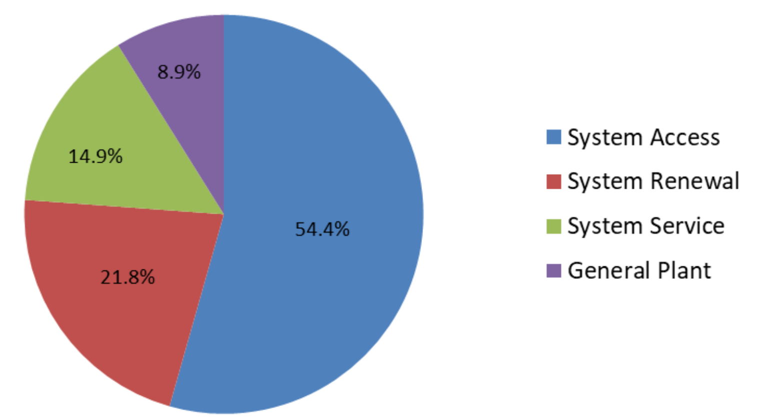
System Access	$5,308,000
System Renewal	$2,520,000
System Service	$1,880,000
General Plant	$1,735,000

2025 Category Expenditure



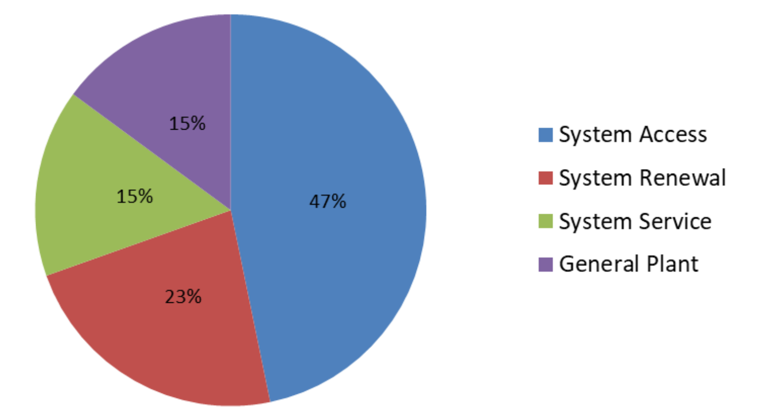
System Access	$4,342,000
System Renewal	$2,575,000
System Service	$1,784,000
General Plant	$1,595,000

2026 Category Expenditure



System Access	$6,576,000
System Renewal	$2,630,000
System Service	$1,807,000
General Plant	$1,076,000

2027 Category Expenditure



System Access	$5,511,000
System Renewal	$2,687,000
System Service	$1,829,000
General Plant	$1,757,000

5.4.3.1D MHDI Capability Assessment

There is sufficient capacity on the MHDI distribution system to connect foreseeable distributed generation needs over the investment period. It is not a significant driver for any of the four category expenditures.

5.4.3.2 Material Investments

This section lists the material projects by year from 2023 to 2027. The materiality threshold is calculated on the basis of 0.5% of Distribution Revenue Requirement.

The 2023 Distribution revenue requirement is $ 24,771,346, and as such the materiality threshold is calculated as being $123,857. MHDI has chosen to report on all investments expected to cost $125,000 or more.

All material projects have the following information provided:

- General Information on the Project/Activity
- Evaluation criteria for each project/activity
- Category-specific information and analysis for each project/activity

GENERAL INFORMATION ON THE PROJECT/ACTIVITY

1. total capital and where applicable, (non-capitalized) O&M costs proposed for recovery in rates
2. any capital contributions made or forecast to be made to a transmitter with respect to a Connection and Cost Recovery Agreement (CCRA)
3. related customer attachments and load, as applicable
4. start date, in-service date and expenditure timing over the planning horizon (2023 – 2027)
5. the risks to the completion of the project or activity as planned, and the manner in which such risks will be mitigated
6. comparative information on expenditures for equivalent projects/activities over the historical period, where available
7. information on total capital and O&M costs associated with REG investment, if any, included in a project/activity; and a description of how the REG investment is expected to improve the system's ability to accommodate the connection of REG facilities

EVALUATION CRITERIA FOR EACH PROJECT/ACTIVITY

Material investments are evaluated based on key regulatory outcomes as indicated below:

1. Efficiency, customer value and reliability
2. Safety
3. Cyber-security, privacy
4. Co-ordination, interoperability
5. Environmental benefits
6. Conservation and Demand Management

CATEGORY-SPECIFIC INFORMATION AND ANALYSIS FOR EACH PROJECT/ACTIVITY

1. System Access
2. System Renewal
3. System Service
4. General Plant

Appendix A Capital Project Summary Sheets and Business Cases

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Annual Customer Additions – Multiyear Expenditure	**Project Number**	SA-1
Investment Category	System Access	**Project Year**	2023 - 2027
Project Description	New customer additions – Annual Program		
Costs	Gross Capital	$19,171,501	
	O&M Costs		
	Total Estimated Cost	$19,171,501	
	Recoverable/Customer Contribution	$10,436,802	
	MHDI Estimated Cost	$ 8,734,699	

Year	Project	Gross cost	Capital Contribution	MDHI Estimated Cost
2023	General Services	$946,671	$710,003	$236,668
	Condos, Commercial and Industrial	$306,490	$0	$306,490
	New Residential Subdivisions	$2,530,000	$1,348,383	$1,181,617
2024	General Services	$965,605	$724,204	$241,401
	Condos, Commercial and Industrial	$312,620	$0	$312,620
	New Residential Subdivisions	$2,530,000	$1,348,383	$1,181,617
2025	General Services	$984,917	$738,688	$246,229
	Condos, Commercial and Industrial	$318,872	$0	$318,872
	New Residential Subdivisions	$2,530,000	$1,348,383	$1,181,617
2026	General Services	$1,004,615	$753,461	$251,154
	Condos, Commercial and Industrial	$325,250	$0	$325,250
	New Residential Subdivisions	$2,530,000	$1,348,383	$1,181,617
2027	General Services	$1,024,707	$768,531	$256,177
	Condos, Commercial and Industrial	$331,755	$0	$331,755
	New Residential Subdivisions	$2,530,000	$1,348,383	$1,181,617

Customer Attachments/Load:	Various		
Start Date	Jan. 1, 2023	**Expected In-Service Date**	Dec. 31, 2027

		Q1	Q2	Q3	Q4
Estimated Expenditure Timing	2023	$945,790	$941,150	$941,150	$941,150
	2024	$952,056	$952,056	$952,056	$952,056
	2025	$958,447	$958,447	$958,447	$958,447
	2026	$964,966	$964,966	$964,966	$964,966
	2027	$971,615	$971,615	$971,615	$971,615

Risks to Completion and Mitigation	Timing is subject to customer needs. Material and resources available.
Comparative Projects	These projects are similar to previous MHDI connection projects.
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not Applicable

	Images, Drawings, Maps, & Other Reference Material

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Access - To provide connection of new customers to the distribution grid
Good Utility Practice	MHDI to ensure grid capacity and infrastructure available for connection with no adverse effect to existing customers
Investment Priority	Regulatory requirement and mandatory project, driven by development. Schedule coordinated with customer requirements
Analysis of Project and Project Alternatives	Ensure compliance with Section 28 of the Electricity Act and customer satisfaction. The costs associated with this project are partially funded by the customer based upon calculated estimates.
Safety	Connection constructed according to Reg 22/04 standards
Cyber security, Privacy	Not applicable

Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd party coordination	Connection coordinated with customer schedule
Future technology enablement /addresses future operational requirements	Not applicable
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Access

Factors affecting the timing/priority	Mandatory; project timing coordinated with customer schedule for energization
Customer/3rd party preferences/inputs	Project completion date subject to customer schedule.
Factors affecting the final cost	Final cost is based upon actual cost of the construction, factors that can affect actual costs include: unexpected changes to scope, number of customer requests (anticipated vs. actual), and customer initiated changes, weather and/or field conditions.
How controllable costs have been minimized	Project coordinated with customer schedule; prudent cost estimates are based on standardized materials, unit rate construction contracts, and appropriate equipment sizing
Meeting planning objectives	Not applicable
Design and/or implementation options	Not applicable
Option considerations and decision making	Not applicable

Result of economic evaluation	Projects subject to economic evaluation per DSC
Project system impacts, modifications and cost recovery	Not applicable

Milton Hydro

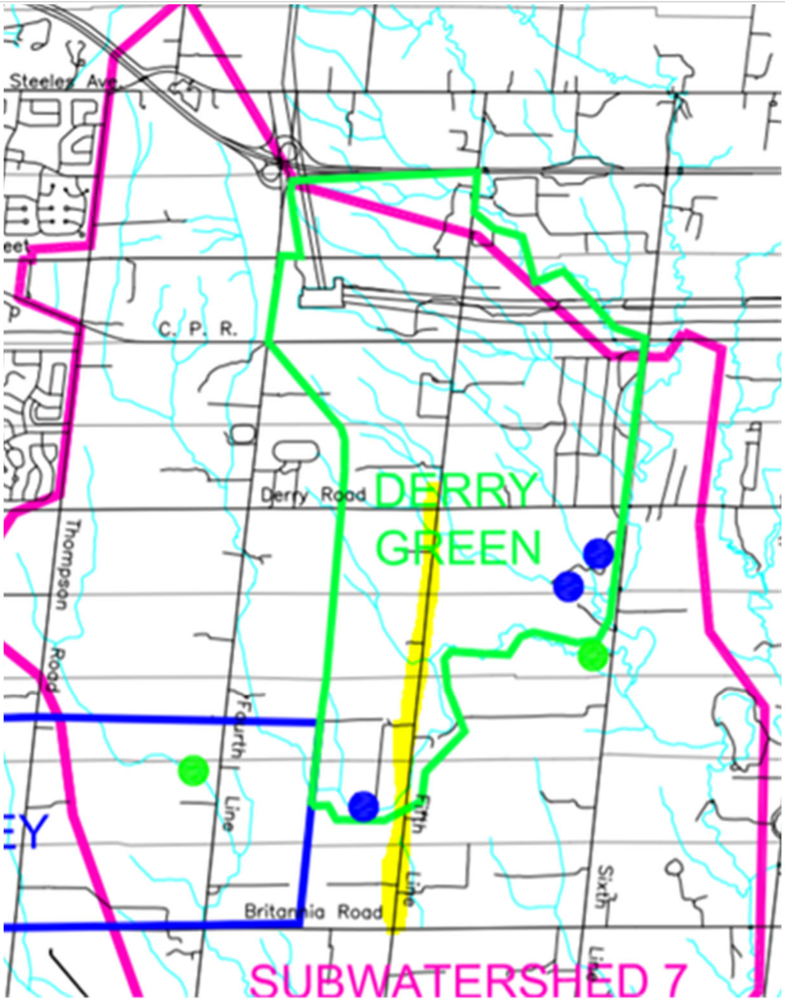
Capital Project Sheets

A. General Project Information

Project Name	Fifth Line – Derry Rd. to Britannia Rd.	**Project Number**	SA-2
Investment Category	System Access	**Project Year**	2023
Project Description	Road widening and provision for servicing Derry Green Business Park. This project consists of removing existing single circuit poleline (55 poles) and building new double circuit poleline to service Derry Green Business Park Secondary Plan Area. Includes 3.2km of double circuit poleline and installation of 79 new poles.		
Costs	Gross Capital	$950,000	
	O&M Costs		
	Total Estimated Cost	$950,000	
	Recoverable/Customer Contribution	($300,000)	
	MHDI Estimated Cost	$650,000	

Customer Attachments/Load:	14 existing secondary services, 7 Txs and 2 primary run offs, to be relocated to new poleline. New double circuit poleline to provide service to Derry Green Business Park Secondary Plan Area			
Start Date	Jan 1. 2023	**Expected In-Service Date**	Dec 31, 2023	
Estimated Expenditure Timing	Q1	Q2	Q3	Q4
	$237,500	$237,500	$237,500	$237,500
Risks to Completion and Mitigation	Overall project timing subject to Town of Milton schedule.			
Comparative Projects	This is an annual mandatory program requiring plant relocation due to road rebuilding. Additional work beyond "like for like" replacement to provide service to Derry Green Business Park Secondary Plan Area			
Capital and OM&A Costs for REG portion of project	Not applicable			
Leave to Construct	Not applicable			

Images, Drawings, Maps, & Other Reference Material



B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	To accommodate Town of Milton road widening. Secondary driver to provide capacity for new load at Derry Green Business Park Secondary Plan Area
Good Utility Practice	New double circuit poleline built to current standards for overhead construction
Investment Priority	Regulatory requirement and mandatory project, driven by third party needs. Plant relocation coordinated with Town of Milton
Analysis of Project and Project Alternatives	Complies with mandated service requirements of DSC. Town of Milton provides capital contribution amounts towards "like for like" relocation costs as per Public Service Works on Highways Act.

	Secondary driver is to provide additional capacity for Derry Green Business Park Secondary Plan Area.
Safety	Relocated plant to be installed in accordance with CSA construction standards and in compliance with ESA Reg. 22/04
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd party coordination	This work will be coordinated with Town of Milton schedule and plan. Additional build beyond “like for like” to service Derry Green Business Park Secondary Plan Area
Future technology enablement /addresses future operational requirements	Not applicable
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Access

Factors affecting the timing/priority	Mandatory; project design parameters and timing coordinated with Town of Milton schedule
Customer/3rd party preferences/inputs	Pole relocation details subject to Town of Milton consultation.
Factors affecting the final cost	Project cost determined by Town of Milton road design issues affecting pole relocation and construction grade required to accommodate safe and reliable installation.
How controllable costs have been minimized	Design to meet current CSA standards and to incorporate sufficient load carrying strength to minimize guying needs and property acquisition. Construction work coordinated with Town of Milton schedule; Town of Milton to provide capital contribution towards “like for like” relocation costs as per Public Service Works on Highways Act.
Meeting planning objectives	There may be some indirect system renewal benefit through replacement of old poles with new plant

Design and/or implementation options	Relocated plant constructed to MHDI planning standards for overhead plant
Option considerations and decision making	Least cost option is to build new double circuit poleline versus strictly “like for like” and adding/replacing overhead plant at a future date.
Result of economic evaluation	Not applicable
Project system impacts, modifications and cost recovery	Not applicable

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Road Widening Projects – 2023 - 2027	**Project Number**	SA-3
Investment Category	System Access	**Project Year**	2023 - 2027
Project Description	Road widening project by Town of Milton and Halton Region. MHDI poles and associated attachments to be relocated due to road widening. Cost sharing as per Public Service Works on Highways Act.		
Costs	Gross Capital	$5,137,569	
	O&M Costs		
	Total Estimated Cost	$5,137,569	
	Recoverable/Customer Contribution	($1,831,000)	
	MHDI Estimated Cost	$3,306,569	

Year	Project	Poles relocated	Gross cost	Capital Contribution	MDHI Estimated Cost
2023	Steeles Avenue - Regional Road 25 to Trafalgar Road	23	$291,746	$116,000	$175,746
	Appleby Line – Derry north	15	$145,823	$65,000	$80,823
2024	Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road	TBD	$100,000	$50,000	$50,000
	Tremaine Road - Widening from 2 to 4 lanes from Lower Base Line to Britannia Road	88	$1,000,000	$350,000	$650,000
2025	Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road	TBD	$100,000	$50,000	$50,000
2026	Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Road	67	$1,350,000	$450,000	$900,000
	Regional Road 25 - Widening from 4 to 6 lanes from Britannia Road to Derry Road	TBD	$100,000	$50,000	$50,000
	Sixth Line - Hwy 401 to Derry Road	43	$850,000	$275,000	$575,000
2027	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road	TBD	$100,000	$50,000	$50,000
	Sixth Line - Derry Road to Britannia Rd	54	$1,100,000	$375,000	$725,000

Customer Attachments/Load:	Various

Start Date	Jan 1. 2023		**Expected In-Service Date**	Dec 31, 2027

Estimated Expenditure Timing		Q1	Q2	Q3	Q4
	2023	$109,392	$109,392	$109,392	$109,392
	2024	$275,000	$275,000	$275,000	$275,000
	2025	$25,000	$25,000	$25,000	$25,000
	2026	$575,000	$575,000	$575,000	$575,000
	2027	$300,000	$300,000	$300,000	$300,000

Risks to Completion and Mitigation	Overall project timing subject to Town of Milton and Halton Region schedules.
Comparative Projects	This is an annual mandatory program requiring plant relocation due to road rebuilding. Similar to previous pole relocation projects.
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not applicable

Images, Drawings, Maps, & Other Reference Material

Not applicable

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	To accommodate Town of Milton and Halton Region road widening.
Good Utility Practice	Polelines relocated and rebuilt to current standards for overhead construction
Investment Priority	Regulatory requirement and mandatory project, driven by third party needs. Plant relocation coordinated with Town of Milton and Halton Region
Analysis of Project and Project Alternatives	Complies with mandated service requirements of DSC. Town of Milton and Halton Region provide capital contribution amounts as per Public Service Works on Highways Act.
Safety	Relocated plant to be installed in accordance with CSA construction standards and in compliance with ESA Reg. 22/04
Cyber security, Privacy	Not applicable

Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd party coordination	This work will be coordinated with Town of Milton and Halton Region schedules and plans.
Future technology enablement /addresses future operational requirements	Not applicable
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Access

Factors affecting the timing/priority	Mandatory; project design parameters and timing coordinated with Town of Milton and Halton Region schedules
Customer/3rd party preferences/inputs	Pole relocation details subject to Town of Milton and Halton Region consultation.
Factors affecting the final cost	Project cost determined by Town of Milton and Halton Region road design issues affecting pole relocation and construction grade required to accommodate safe and reliable installation.
How controllable costs have been minimized	Design to meet current CSA standards and to incorporate sufficient load carrying strength to minimize guying needs and property acquisition. Construction work coordinated with Town of Milton and Halton Region schedules; Town of Milton and Halton Region to provide capital contribution amounts as per Public Service Works on Highways Act.
Meeting planning objectives	There may be some indirect system renewal benefit through replacement of old poles with new plant
Design and/or implementation options	Relocated plant constructed to MHDI planning standards for overhead plant
Option considerations and decision making	Not Applicable

Result of economic evaluation	Not applicable
Project system impacts, modifications and cost recovery	Not applicable

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Proactive Meter Replacements – Multiyear Expenditure	**Project Number**	SA-4
Investment Category	System Access	**Project Year**	2023 - 2027
Project Description	This is an annual program that covers the proactive replacement of metering equipment that is deemed to require replacement in accordance with Measurement Canada standards.		
Costs	Gross Capital	$2,089,698	
	O&M Costs		
	Total Estimated Cost	$2,089,698	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$2,089,698	

Year	Total cost
2023	$441,055
2024	$400,000
2025	$408,000
2026	$416,160
2027	$424,483

Customer Attachments/Load:	Various		
Start Date	Jan. 1, 2023	**Expected In-Service Date**	Dec. 31, 2027

Estimated Expenditure Timing

	Q1	Q2	Q3	Q4
2023	$110,264	$110,264	$110,264	$110,264
2024	$100,000	$100,000	$100,000	$100,000
2025	$102,000	$102,000	$102,000	$102,000
2026	$104,040	$104,040	$104,040	$104,040
2027	$106,121	$106,121	$106,121	$106,121

Risks to Completion and Mitigation	Proactive replacement quantity and schedule subject to results of reverification testing. MHDI material and resources available.
Comparative Projects	Program similar to previous MHDI proactive meter replacement projects.

Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not Applicable

Images, Drawings, Maps, & Other Reference Material

Not applicable.

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Access – Mandatory obligation to replace meters that do not pass the Measurement Canada reverification process.
Good Utility Practice	Ensures MHDI meets regulatory obligations with respect to metering customer electricity consumption.
Investment Priority	Regulatory requirement and mandatory project, driven by meter reverification testing results.
Analysis of Project and Project Alternatives	All meters meet current Measurement Canada and industry standards.
Safety	New assets are installed according to current safety standards in compliance with Ontario Regulation 22/04. Smart meters meet Health Canada Safety Code 6 standards.
Cyber security, Privacy	Meters and wireless communication network designed (through standards, codes, etc.) to protect data and personal information from attack, damage or unauthorized access.
Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd party coordination	Not applicable.
Future technology enablement /addresses future operational requirements	All residential smart meters have "last gasp" technology ("last gasp" technology allows the meter to communicate to utility operations when power has been lost) incorporated into them.
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Access

Factors affecting the timing/priority	Mandatory. Proactive replacement quantity and schedule subject to results of reverification testing to ensure Measurement Canada compliance.
Customer/3rd party preferences/inputs	New meters to be compliant with Measurement Canada standards. .
Factors affecting the final cost	Established processes and procedures used to coordinate MHDI required work in an efficient manner.
How controllable costs have been minimized	Standardized processes have been established to remove and replace meter equipment..
Meeting planning objectives	Not applicable
Design and/or implementation options	Not applicable
Option considerations and decision making	Not applicable
Result of economic evaluation	Not applicable
Project system impacts, modifications and cost recovery	Not applicable

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Pole Replacement Program	**Project Number**	SR-1
Investment Category	System Renewal	**Project Year**	2023 - 2027
Project Description	This is an annual program that covers the planned replacement of individual poles when it has been determined that they have reached end-of-life. End-of-life is determined through various inspection processes and MHDI's asset management program.		
Costs	Gross Capital	$3,746,909	
	O&M Costs		
	Total Estimated Cost	$3,746,909	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$3,746,909	

Year	Poles Replaced	Total cost
2023	120	$720,000
2024	120	$734,400
2025	120	$749,088
2026	120	$764,070
2027	120	$779,351

Customer Attachments/Load:	Various		
Start Date	Jan.1, 2023	**Expected In-Service Date**	Dec. 31, 2027

Estimated Expenditure Timing		Q1	Q2	Q3	Q4
	2023	$180,000	$180,000	$180,000	$180,000
	2024	$183,600	$183,600	$183,600	$183,600
	2025	$187,272	$187,272	$187,272	$187,272
	2026	$191,017	$191,017	$191,017	$191,017
	2027	$194,838	$194,838	$194,838	$194,838

Risks to Completion and Mitigation	Locates required. Process in place for this. MHDI resources available.

Comparative Projects	This is an annual program. Related spending in previous years. Multi-year program to replace up to 600 poles in “very poor”/ “poor” condition. Approximately 120 poles per year are addressed through this program.
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not applicable
Images, Drawings, Maps, & Other Reference Material	
Not applicable	

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Renewal - This project is driven by the need to replace assets that have reached End-of-Life status.
Good Utility Practice	Poles have been identified at end-of-life through MHDI’s asset management program. Replacement of poles will maintain overall reliability of the distribution system.
Investment Priority	Pole replacement quantity and timing determined through the MHDI capital prioritization process
Analysis of Project and Project Alternatives	Plant is replaced like-for-like or upgraded to accommodate future plans for the area
Safety	Assets at end-of-life can be a potential safety hazard to staff and the public. Replacement off end-of-life plant restores the system to safe operating condition
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses future operational requirements	Not applicable

Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Renewal

Asset characteristics and consequences of performance deterioration or failure	Asset may fail due to deteriorated condition or to other factors that exceed design standards (i.e. vehicle impact) Pole failure may involve an entire feeder depending on location and protective device activated (i.e. lateral fuse or circuit breaker, etc.) New poles will reduce risk of unplanned outages due to pole failure. Reduced outages will improve customer satisfaction Customer surveys show that reliability is ranked high in value to them
Timing factors	MHDI has the resources and materials in order to ensure project completion on time. Locates required from others
O&M consequences	Asset failure will incur additional O&M costs to effect emergency repairs
Impact on reliability and safety factors	New poles will be installed per CSA and 22/04 standards
Project benefits/costs/ timing analysis	Pole replacement quantity and timing determined through the MHDI capital prioritization process. Quantity and timing balances investment cost with risk of asset failure while in operation incurring additional costs and outages to customers.
Significant benefits and costs to meet additional planning objectives	Pole class and loading design may be upgraded if it supports future plans for the area.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Reactive replacement of OH damaged/defective equipment	**Project Number**	SR-2
Investment Category	System Renewal	**Project Year**	2023 - 2027
Project Description	This is an annual program that covers the emergency replacement of overhead equipment when they fail. Equipment may fail unexpectantly or be in imminent position to fail and are replaced reactively, as required, in order to maintain the system in its current working state. The failures are caused for numerous reasons including: foreign interference, such as car accidents; trees falling on the lines, major storms, and failure of the equipment due to the condition of the asset.		
Costs	Gross Capital	$1,722,506	
	O&M Costs		
	Total Estimated Cost	$1,722,506	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$1,722,506	

Year	Total cost
2023	$330,994
2024	$337,614
2025	$344,366
2026	$351,253
2027	$358,279

Customer Attachments/Load:	Various		
Start Date	Jan.1, 2023	**Expected In-Service Date**	Dec. 31, 2027

Estimated Expenditure Timing

	Q1	Q2	Q3	Q4
2023	$82,749	$82,749	$82,749	$82,749
2024	$84,403	$84,403	$84,403	$84,403
2025	$86,092	$86,092	$86,092	$86,092
2026	$87,813	$87,813	$87,813	$87,813
2027	$89,570	$89,570	$89,570	$89,570

Risks to Completion and Mitigation	Emergency locates may be required. Process in place for this. MHDI resources available.
Comparative Projects	This is a mandatory annual program. Related spending in previous years
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not applicable
Images, Drawings, Maps, & Other Reference Material	
Not applicable	

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Renewal - This project is driven by the need to replace assets that have failed unexpectantly.
Good Utility Practice	Replacing failed equipment with “like for like” will maintain overall reliability of the distribution system.
Investment Priority	Mandatory replacement of equipment that has failed in service
Analysis of Project and Project Alternatives	Plant is replaced like-for-like or upgraded to accommodate future plans for the area
Safety	Failed equipment represents a safety hazard to staff and the public. Replacement of failed plant restores the system to safe operating condition
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Emergency locates may be required
Future technology enablement /addresses future operational requirements	Not applicable

Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Renewal

Asset characteristics and consequences of performance deterioration or failure	Asset may fail due to deteriorated condition or to other factors that exceed design standards (i.e. vehicle impact) Asset failure may involve an entire feeder depending on location and protective device activated (i.e. lateral fuse or circuit breaker, etc.) New assets will reduce risk of unplanned outages. Reduced outages will improve customer satisfaction Customer surveys show that reliability is ranked high in value to them
Timing factors	MHDI has the resources and materials in order to ensure project completion on time. Emergency locates may be required from others
O&M consequences	Not applicable - failed equipment must be replaced
Impact on reliability and safety factors	Assets will be installed per CSA and 22/04 standards
Project benefits/costs/ timing analysis	Not applicable – immediate response required for reliability and safety reasons
Significant benefits and costs to meet additional planning objectives	Equipment may be upgraded if it supports future plans for the area.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Reactive replacement of UG damaged/defective equipment	**Project Number**	SR-3
Investment Category	System Renewal	**Project Year**	2023 - 2027
Project Description	This is an annual program that covers the emergency replacement of underground equipment when they fail. Equipment may fail unexpectantly or be in imminent position to fail and are replaced reactively, as required, in order to maintain the system in its current working state. The failures are caused for numerous reasons including: foreign interference, such as car accidents and failure of the equipment due to the condition of the asset.		
Costs	Gross Capital	$1,457,131	
	O&M Costs		
	Total Estimated Cost	$1,457,131	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$1,457,131	

Year	Total cost
2023	$280,000
2024	$285,600
2025	$291,312
2026	$297,138
2027	$303,081

Customer Attachments/Load:	Various		
Start Date	Jan.1, 2023	**Expected In-Service Date**	Dec. 31, 2027

Estimated Expenditure Timing

	Q1	Q2	Q3	Q4
2023	$70,000	$70,000	$70,000	$70,000
2024	$71,400	$71,400	$71,400	$71,400
2025	$72,828	$72,828	$72,828	$72,828
2026	$74,285	$74,285	$74,285	$74,285
2027	$75,770	$75,770	$75,770	$75,770

Risks to Completion and Mitigation	MHDI resources available.
Comparative Projects	This is a mandatory annual program. Related spending in previous years
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not applicable
Images, Drawings, Maps, & Other Reference Material	
Not applicable	

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Renewal - This project is driven by the need to replace assets that have failed unexpectantly.
Good Utility Practice	Replacing failed equipment with "like for like" will maintain overall reliability of the distribution system.
Investment Priority	Mandatory replacement of equipment that has failed in service
Analysis of Project and Project Alternatives	Plant is replaced like-for-like or upgraded to accommodate future plans for the area
Safety	Failed equipment represents a safety hazard to staff and the public. Replacement of failed plant restores the system to safe operating condition
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses future operational requirements	Not applicable

Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Renewal

Asset characteristics and consequences of performance deterioration or failure	Asset may fail due to deteriorated condition or to other factors that exceed design standards (i.e. vehicle impact) Asset failure may involve an entire feeder depending on location and protective device activated (i.e. lateral fuse or circuit breaker, etc.) New assets will reduce risk of unplanned outages. Reduced outages will improve customer satisfaction Customer surveys show that reliability is ranked high in value to them
Timing factors	MHDI has the resources and materials in order to ensure project completion on time
O&M consequences	Not applicable - failed equipment must be replaced
Impact on reliability and safety factors	Assets will be installed per CSA and 22/04 standards
Project benefits/costs/ timing analysis	Not applicable – immediate response required for reliability and safety reasons
Significant benefits and costs to meet additional planning objectives	Equipment may be upgraded if it supports future plans for the area.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Meter Replacement Program	**Project Number**	SR-4
Investment Category	System Renewal	**Project Year**	2023 - 2027
Project Description	This is an annual program that covers the replacement of Milton Hydro owned metering assets. Meter replacements include meter room communication upgrades, proactive replacement of metering equipment and the reactive replacement of meter equipment failures.		
Costs	Gross Capital	$5,551,722	
	O&M Costs		
	Total Estimated Cost	$5,551,722	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$5,551,722	

Year	Total cost
2023	$1,065,547
2024	$1,087,487
2025	$1,109,880
2026	$1,132,738
2027	$1,156,069

Customer Attachments/Load:	Various		
Start Date	Jan.1, 2023	**Expected In-Service Date**	Dec. 31, 2027

Estimated Expenditure Timing		Q1	Q2	Q3	Q4
	2023	$266,387	$266,387	$266,387	$266,387
	2024	$271,872	$271,872	$271,872	$271,872
	2025	$277,470	$277,470	$277,470	$277,470
	2026	$283,185	$283,185	$283,185	$283,185
	2027	$289,017	$289,017	$289,017	$289,017

Risks to Completion and Mitigation	MHDI resources available. Meter equipment inventories are reviewed to ensure availability.

Comparative Projects	Portion of the related spending is similar to previous years. Proactive meter and meter equipment replacement program is new going forward due to the age/condition of assets.
Capital and OM&A Costs for REG portion of project	Not applicable
Leave to Construct	Not applicable
Images, Drawings, Maps, & Other Reference Material	
Not applicable	

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	Meter replacements are driven by regulatory obligations to ensure meters in service meet Measurement Canada standards.
Good Utility Practice	Ensuring meters are in good working order mitigates billing errors and associated customer billing complaints. Ensures MHDI meets regulatory obligations with respect to metering customer electricity consumption.
Investment Priority	Program is annual mandatory investment.
Analysis of Project and Project Alternatives	All replaced meters to meet current Measurement Canada and industry standards.
Safety	New assets are installed according to current safety standards in compliance with Ontario Regulation 22/04. Smart meters meet Health Canada Safety Code 6 standards.
Cyber security, Privacy	Meters and wireless communication network designed (through standards, codes, etc.) to protect data and personal information from attack, damage or unauthorized access.
Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses	All residential smart meters have “last gasp” technology (“last gasp” technology allows the meter to communicate to utility operations when power has been lost) incorporated into them.

future operational requirements	
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Renewal

Asset characteristics and consequences of performance deterioration or failure	Program is mandatory and driven by regulatory obligation. Meter performance deterioration would result in increased billing errors, increased customer complaints and failure to maintain Measurement Canada standards for metering installations.
Timing factors	MHDI has the resources and materials in order to ensure project completion on time
O&M consequences	Not applicable – failed or failing equipment must be replaced.
Impact on reliability and safety factors	Assets will be installed per CSA and 22/04 standards.
Project benefits/costs/ timing analysis	Not applicable – mandatory program to replace defective or failed meters
Significant benefits and costs to meet additional planning objectives	Not applicable.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Replacement of regulator MRS-1 at MS7	**Project Number**	SR-5
Investment Category	System Renewal	**Project Year**	2023
Project Description	The regulator MRS-1 at MS7 has reached end-of-life and is to be replaced in 2023. End-of-life has been determined through a detailed Asset Condition Assessment. MRS-1 will be replaced with a new unit.		
Costs	Gross Capital	$200,000	
	O&M Costs		
	Total Estimated Cost	$200,000	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$200,000	

Customer Attachments/Load:	Various				
Start Date	Jan.1, 2023		**Expected In-Service Date**	November 30, 2023	
Estimated Expenditure Timing		Q1	Q2	Q3	Q4
	2023	$0	$100,000	$50,000	$50,000
Risks to Completion and Mitigation	Schedule subject to equipment delivery. MHDI resources available.				
Comparative Projects	Not applicable				
Capital and OM&A Costs for REG portion of project	Not applicable				
Leave to Construct	Not applicable				

Images, Drawings, Maps, & Other Reference Material

Existing MRS-1

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	System Renewal - This project is driven by the need to proactively replace an asset that has reached end of life.
Good Utility Practice	Replacing equipment that has reached end of life will maintain overall reliability of the distribution system.
Investment Priority	Existing asset assessed in Poor condition with 21% life remaining. Priority subject to MHDI Asset Management practices

Analysis of Project and Project Alternatives	Not Applicable
Safety	End of life equipment represents a safety hazard to staff that could be working in the immediate vicinity when failure occurs. Replacement of end-of life plant restores the system to safe operating condition
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable.
Future technology enablement /addresses future operational requirements	Not applicable
Environmental Benefits	This is an oil filled unit. Replacement of at-risk unit mitigates the risk of a major environment oil spill upon equipment failure.
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Renewal

Asset characteristics and consequences of performance deterioration or failure	Asset may fail due to deteriorated condition or to other factors that exceed design standards. Voltage regulators enable utilities to maintain voltage levels within acceptable ranges giving utility customers the assurance that electrical equipment will operate properly. Asset failure may involve entire MS7 station depending on nature of failure and protective device(s) activated (i.e. fuse or circuit breaker, etc.) New asset will reduce risk of unplanned outage and potential collateral damage to other nearby assets and environmental damage.
Timing factors	MHDI has the resources and materials in order to ensure project completion on time.
O&M consequences	Not applicable - failed equipment must be replaced

Impact on reliability and safety factors	Replacement asset to be installed per CSA Standards and 22/04. Supplying unregulated voltage can cause lighting brownouts, overheat and shorten motor life and cause premature failure of electronics.
Project benefits/costs/ timing analysis	Not applicable – project delay runs risk of eventual asset failure with associated impacts on safety, reliability and environment.
Significant benefits and costs to meet additional planning objectives	Not applicable.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Overhead Switch Automation	**Project Number**	SS-1
Investment Category	System Service	**Project Year**	2023 to 2027
Project Description	Replace manual overhead switches with SCADA operated switches		
Costs	Gross Capital	$4,443,290	
	O&M Costs		
	Total Estimated Cost	$4,443,290	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$4,443,290	

Year	Project	MDHI Estimated Cost
2023	Eight (8) SCADA Operated Switches	$525,920
2024	Thirteen (13) SCADA Operated Switches	$913,458
2025	Fourteen (14) SCADA Operated Switches	$967,417
2026	Fifteen (15) SCADA Operated Switches	$1,009,523
2027	Fifteen (15) SCADA Operated Switches	$1,026,972

Customer Attachments/Load:	Various		
Start Date	Jan 1, 2023	**Expected In-Service Date**	Dec 31, 2027

Estimated Expenditure Timing in Each Year	Q1	Q2	Q3	Q4
	2023-$50,000	$158,640	$158,640	$158,640
	2024-$50,000	$287,819	$287,819	$287,819
	2025-$50,000	$305,806	$305,806	$305,806
	2026-$50,000	$319,841	$319,841	$319,841
	2027-$50,000	$325,657	$325,657	$325,657

Risks to Completion and Mitigation	Discretionary work scheduling considers non- discretionary work deadlines as a priority, as well as labour and material constraints for the work contemplated. Operations and Engineering confer to develop a work plan with input from Stores and the Control Room.
Comparative Projects	2021 and 2022 SCADA switch replacement program.
Capital and OM&A Costs for REG portion of project	This investment is not designed to directly enhance or enable REG connection capability. However, the investment will improve the Distribution Electrical System's (DES) ability to manage additional REG connections on various feeder.
Leave to Construct	Not required

Images, Drawings, Maps, & Other Reference Material

Not applicable

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	Main Driver: System Service; Secondary System Renewal This investment addresses the replacement/refurbishment of distribution system assets that are owned and operated by MDHI. This upgraded equipment contributed to the modernization of MDHI's distribution system.
Good Utility Practice	The investment will allow MDHI to replace manual in-line or gang operated three-phase switches with three-phase switches that are remotely monitored and remotely controllable through SCADA. The use of SCADA controlled switches gives MDHI better visibility into the real time or near real time operating status of the distribution system and allows MDHI to respond more quickly to outages. The installation of SCADA switches enables the connection and operation of Distributed Energy Resources (DER) and is adaptable for use in a variety of grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR), Distributed Energy Resources Management (DERMS) or Advanced Distribution Management Systems (ADMS) that MDHI may or may not adopt as it moves towards grid modernization.
Investment Priority	The proposed investment is among the most important contemplated in 2022 and beyond. Improving reliability and resilience is achieved by the installation of remotely monitored and controlled devices. Locations for the installation of these switches are identified as switch locations that are operated often under normal and emergent conditions using data acquired from the Control Room logs. This investment is an example of both a multi-year program investment required to meet Asset Management needs and an opportunistic modernization of the distribution system.

Analysis of Project and Project Alternatives	The majority of the remote-control switches are Viper reclosers which can be programmed as a switch or a recloser. In long rural circuits, Viper switches are programmed as reclosers and strategically placed so that they can reclose to recover from temporary faults or open to isolate a permanently faulted sections of the distribution system. Automatic and remote operation of reclosers will reduce outages, outage times and time spent by crew to travel to substation to re-fuse feeders. Installation of switches at feeder tie points will provide for rapid backup capability for feeder re-configuration during outage periods SCADA monitored fault indication will provide Control Room Operators with immediate details as to general location of system faults much quicker than waiting for crew to respond and identify faulted system components. This in turn will allow Operators to sectionalize the affected area, through the remote-controlled SCADA switches, and restore power to customer outside the affected area, while the trouble crew responds. This can result in significant reductions in outage times to those customers that are outside the isolated fault area.
Safety	Replacement of distribution assets, which are designed and constructed to meet the requirements of Ontario Regulation 22/04 ensures improved worker and public safety by meeting current Standards requirements.
Cyber security, Privacy	Automated switches are part of MHDI's SCADA system and communication network. MHDI follows best practices in accordance with the Ontario Cyber Security Framework when implementing security controls related to automated switches and the communication network. Some of these controls include locked physical cabinets, hardened communication devices, encrypted communications, private cellular networks or privately owned WiMAX, firewalled networks.
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses future operational requirements	The installation of SCADA switches enables the connection and operation of Distributed Energy Resources (DER) and is adaptable for use in a variety of grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR), Distributed Energy Resources Management (DERMS) or Advanced Distribution Management Systems (ADMS) that MDHI may or may not adopt as it moves towards grid modernization.
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Service

Objectives/Cost/Benefit Assessment	Improved visibility into and control of the real time or near real time operation of the distribution system can improve system reliability and resilience and enable the connection of Distributed Energy Resources. Cost of SCADA operated switches is higher than manual switches, however grid modernization requires the installation and use of remotely controllable switches. Improved visibility is defined as the ability to provide real-time voltage, current and other system parameters as well as alarms.
Impact of regional planning infrastructure requirements	Not applicable
Incorporation of advanced technology	SCADA operated switches are an example of advanced technology. The controlling hardware and software use industry standard communication protocols such as DNP 3 and IEC 61850 and are designed to meet the requirements of the Ontario Cyber Security Framework (OCSF).
Reliability, efficiency, safety and coordination benefits	Improved visibility into and control of the real time or near real time operation of the distribution system can improve system reliability and resilience and enable the connection of Distributed Energy Resources.
Factors affecting implementation timing/priority	This is discretionary expenditure which is subject to deferral as non-discretionary spending requirements take precedent
Alternative cost/benefit analysis	The do-nothing option does not further the adoption of grid modernization at MDHI.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Pad Mounted Switch Automation	**Project Number**	SS-2
Investment Category	System Service	**Project Year**	2023 to 2027
Project Description	Replace manual underground (U/G) switches with SCADA operated switches		
Costs	Gross Capital	$3,534,974	
	O&M Costs		
	Total Estimated Cost	$3,534,974	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$3,534,974	

Year	Project	MDHI Estimated Cost
2023	Four (4) SCADA Operated U/G Switches	$654,718
2024	Five (5) SCADA Operated U/G Switches	$806,310
2025	Four (4) SCADA Operated U/G Switches	$684,667
2026	Four (4) SCADA Operated U/G Switches	$692,960
2027	Four (4) SCADA Operated U/G Switches	$696,319

Customer Attachments/Load:	Various		
Start Date	Jan 1, 2023	**Expected In-Service Date**	Dec 31, 2027

Estimated Expenditure Timing in Each Year	Q1	Q2	Q3	Q4
	2023-$50,000	$201,573	$201,573	$201,573
	2024-$50,000	$252,103	$252,103	$252,103
	2025-$50,000	$211,556	$211,556	$211,556
	2026-$50,000	$214,320	$214,320	$214,320
	2027-$50,000	$215,440	$215,440	$215,440

Risks to Completion and Mitigation	Discretionary work scheduling considers non- discretionary work deadlines as a priority, as well as labour and material constraints for the work contemplated. Operations and Engineering confer to develop a work plan with input from Stores and the Control Room.
Comparative Projects	2021 and 2022 SCADA U/G switch replacement program.
Capital and OM&A Costs for REG portion of project	This investment is not designed to directly enhance or enable REG connection capability. However, the investment will improve the Distribution Electrical System's (DES) ability to manage additional REG connections on various feeders.
Leave to Construct	Not required

Images, Drawings, Maps, & Other Reference Material

Not applicable

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	Main Driver: System Service; Secondary System Renewal This investment addresses the replacement/refurbishment of distribution system assets that are owned and operated by MDHI. This upgraded equipment contributed to the modernization of MDHI's distribution system.
Good Utility Practice	The investment will allow MDHI to replace manual end of life PMH switchgear with modern dielectric, pad-mounted three-phase switches that are remotely monitored and remotely controllable through SCADA. The use of SCADA controlled switches gives MDHI better visibility into the real time or near real time operating status of the distribution system and allows MDHI to respond more quickly to outages. The installation of SCADA U/G switches enables the connection and operation of Distributed Energy Resources (DER) and is adaptable for use in a variety of grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR), Distributed Energy Resources Management (DERMS) or Advanced Distribution Management Systems (ADMS) that MDHI may or may not adopt as it moves towards grid modernization.
Investment Priority	The proposed investment is among the most important contemplated in 2022 and beyond. Improving reliability and resilience is achieved by the installation of remotely monitored and controlled devices. Locations for the installation of these switches are identified as switch locations that are operated often under normal and emergent conditions using data acquired from the Control Room logs and end of life asset assessments. This investment is an example of both a multi-year program investment required to meet Asset Management needs and an opportunistic modernization of the distribution system.

Analysis of Project and Project Alternatives	SCADA monitored fault indication will provide Control Room Operators with immediate details as to general location of system faults much quicker than waiting for crew to respond and identify faulted system components. This in turn will allow Operators to sectionalize the affected area, through the remote-controlled SCADA switches, and restore power to customer outside the affected area, while the trouble crew responds. This can result in significant reductions in outage times to those customers that are outside the isolated fault area.
Safety	Replacement of distribution assets, which are designed and constructed to meet the requirements of Ontario Regulation 22/04 ensures improved worker and public safety by meeting current Standards requirements.
Cyber security, Privacy	Automated switches are part of MHDI's SCADA system and communication network. MHDI follows best practices in accordance with the Ontario Cyber Security Framework when implementing security controls related to automated switches and the communication network. Some of these controls include locked physical cabinets, hardened communication devices, encrypted communications, private cellular networks or privately owned WiMAX, firewalled networks.
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses future operational requirements	The installation of SCADA switches enables the connection and operation of Distributed Energy Resources (DER) and is adaptable for use in a variety of grid modernization software packages such as Fault Location, Isolation, and Service Restoration (FLISR), Distributed Energy Resources Management (DERMS) or Advanced Distribution Management Systems (ADMS) that MDHI may or may not adopt as it moves towards grid modernization.
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Service

Objectives/Cost/Benefit Assessment	Improved visibility into and control of the real time or near real time operation of the distribution system can improve system reliability and resilience and enable the connection of Distributed Energy Resources. Cost of SCADA operated U/G switches is higher than manual U/G switches, however grid modernization requires the installation and use of remotely controllable

	switches. Improved visibility is defined as the ability to provide real-time voltage, current and other system parameters as well as alarms.
Impact of regional planning infrastructure requirements	Not applicable
Incorporation of advanced technology	SCADA operated switches are an example of advanced technology. The controlling hardware and software use industry standard communication protocols such as DNP 3 and IEC 61850 and are designed to meet the requirements of the Ontario Cyber Security Framework (OCSF).
Reliability, efficiency, safety and coordination benefits	Improved visibility into and control of the real time or near real time operation of the distribution system can improve system reliability and resilience and enable the connection of Distributed Energy Resources.
Factors affecting implementation timing/priority	This is discretionary expenditure which is subject to deferral as non-discretionary spending requirements take precedent
Alternative cost/benefit analysis	The do-nothing option does not further the adoption of grid modernization at MDHI.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	SCADA	**Project Number**	SS-3
Investment Category	System Service	**Project Year**	2023 to 2027
Project Description	Automate and improve the SCADA based Outage Management System (OMS) and implement a SCADA based Fault Location, Isolation and Services Restoration (FLISR) system.		
Costs	Gross Capital	$682,118	
	O&M Costs		
	Total Estimated Cost	$682,118	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$682,118	

Year	Project	MDHI Estimated Cost
2023	SCADA/OMS/FLISR – Automate OMS processes; Purchase and implement FLISR	$179,957
2024	SCADA/OMS/FLISR – Automate OMS processes; Continue efforts to model system required to expand FLISR implementation, which include recloser co-ordination study and implementation	$160,000
2025	SCADA/OMS/FLISR – Automate OMS processes; Continue efforts to model system required to expand FLISR implementation.	$132,000
2026	SCADA/OMS/FLISR	$104, 040
2027	SCADA/OMS/FLISR	$106, 121

Customer Attachments/Load:	Various		
Start Date	Jan 1, 2023	**Expected In-Service Date**	Some each year

Estimated Expenditure Timing in Each Year	Q1	Q2	Q3	Q4
	2023-$0	$60,000	$60,000	$59,957

	2024-40,000	$40,000	$40,000	$40,000
	2025-$33,000	$33,000	$33,000	$33,000
	2026-$26,010	$26,010	$26,010	$26,010
	2027-$26,530	$26,530	$26,530	$26,530

Risks to Completion and Mitigation	Discretionary work scheduling considers non- discretionary work deadlines as a priority, as well as labour and material constraints for the work contemplated. System Planning and Engineering confer to develop a work plan with input from the Control Room.
Comparative Projects	2021 and 2022 SCADA/OMS program.
Capital and OM&A Costs for REG portion of project	This investment is not designed to directly enhance or enable Renewable Energy Generation (REG) connection capability. However, the investment will improve the Distribution Electrical System's (DES) ability to manage additional REG connections on various feeders.
Leave to Construct	Not required

Images, Drawings, Maps, & Other Reference Material

Not applicable

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	Main Driver: System Service This investment addresses the issue of reliability raised by Customers during the Customer engagement. This upgraded software will contribute to the modernization of MDHI's distribution system.
Good Utility Practice	The investment will allow MDHI to quickly identify the location of faults on FLISR enabled feeders. Using remotely monitored and remotely controllable three-phase switches installed under the proposed "Pad Mounted Switch Automation" and "Overhead Switch Automation" System Service projects (See separate Project Sheets) and SCADA, MDHI will quickly be able to isolate and sectionalize faulted line sections and restore power to unfaulted line sections involved in the initial outage. The use of FLISR/OMS/SCADA gives MDHI better visibility into the real time or near real time operating status of the distribution system and allows MDHI to respond more quickly to outages. The installation of Fault Location, Isolation, and Service Restoration (FLISR) is an example of MDHI moving towards grid modernization and increasing its ability to connect Distributed Energy Resources (DERs).

Investment Priority	The proposed investment is among the most important contemplated in 2023 and beyond. Improving reliability and resilience is achieved by the installation of FLISR and the automation of OMS using the SCADA foundational system. This investment is an example of a multi-year program investment required to modernize the distribution system.
Analysis of Project and Project Alternatives	The alternative to FLISR is to have a System Operator… • Decipher Faulted Circuit Indicator and Recloser data that comes into the SCADA system to determine the likely faulted line section. • Review system operating maps to determine if any Remotely Controllable switches exist within the faulted line section that could be used to isolate the faulted line section and make unfaulted line sections available for transfer to adjacent feeders. • Determine if alternative feeds exist for unfaulted line sections within the outage area. • Calculate the expected load transfer of the unfaulted line sections within the outage area. • Determine if the feeders to which the unfaulted line section(s) can be transferred can accept the load transfer and be within thermal limits. • Operate the Remotely Controllable switches to transfer unfaulted line section(s) to adjacent feeders, if any. …all of which takes significant time while trying to dispatch crews and possibly (depending upon the Control Room setup) answer telephone inquiries from customers. FLISR is designed to automate all the bullet points above. Reducing outage times to many customers and improving customer reliability by using FLISR is MDHI's response to concerns raised during the customer engagements.
Safety	Improved reliability and reduced repair times increase public safety.
Cyber security, Privacy	FLISR is an upgrade to MHDI's existing SCADA software. MHDI follows best practices in accordance with the Ontario Cyber Security Framework when implementing security controls related to SCADA software. Some of these controls include managed user access incorporating the principles of least privilege, controlled physical access, network segregation, user training, protection of data at rest and in transit using encryption, and regular vulnerability assessments.
Co-ordination, Interoperability	Not applicable
Utility, regional planning, and/or 3rd parties coordination	Not applicable

Future technology enablement /addresses future operational requirements	Fault Location, Isolation, and Service Restoration (FLISR) and automation of Outage Management System (OMS) processes are steps in the direction of grid modernization.
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

System Service

Objectives/Cost/Benefit Assessment	FLISR and OMS can improve system reliability and resilience and enable the connection of Distributed Energy Resources. Cost of FLISR and OMS is offset by the reliability and resiliency improvements.
Impact of regional planning infrastructure requirements	Not applicable
Incorporation of advanced technology	FLISR and OMS are examples of advanced technology. The controlling hardware and software use industry standard communication protocols such as DNP 3 and IEC 61850 and are designed to meet the requirements of the Ontario Cyber Security Framework (OCSF).
Reliability, efficiency, safety and coordination benefits	FLISR and OMS can improve system reliability and resilience and enable the connection of Distributed Energy Resources.
Factors affecting implementation timing/priority	This is discretionary expenditure which is subject to deferral as non-discretionary spending requirements take precedent
Alternative cost/benefit analysis	The do-nothing option does not further the adoption of grid modernization at MDHI.

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	TS Capacity Relief	**Project Number**	SS-4
Investment Category	System Service	**Project Year**	2023
Project Description	Boston Church – James Snow Parkway to 5 Side Rd – new double circuit pole line can be used to transfer load from the M22 or M26 (Halton TS #1) to M31 (Glenorchy TS).		
Costs	Gross Capital	$350,698	
	O&M Costs		
	Total Estimated Cost	$350,698	
	Recoverable/Customer Contribution		
	MHDI Estimated Cost	$350,698	

Customer Attachments/Load:	Multiple Residential, Commercial and Industrial customers can be transferred from the M22 or M26 (Halton TS #1) to M31 (Glenorchy TS).			
Start Date		**Expected In-Service Date**		
Estimated Expenditure Timing	Q1	Q2	Q3	Q4
	$	$350,698	$	$
Risks to Completion and Mitigation	Discretionary work scheduling considers non- discretionary work deadlines as a priority, as well as labour and material constraints for the work contemplated. Operations and Engineering confer to develop a work plan with input from Stores and the Control Room.			
Comparative Projects				
Capital and OM&A Costs for REG portion of project	Not Applicable			
Leave to Construct	Not Applicable			

Images, Drawings, Maps, & Other Reference Material

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	Main Driver: System Service This investment addresses rebalancing system loads to meet Transformer Station maximum capacity limits.
Good Utility Practice	The prospective investment allows MDHI to meet its obligations to various Transmitters with respect to maximum Transformer Station Capacity and maintain feeder loading within planning load limits. It is expected that the proposed investment will allow MDHI to maintain or improve SAIDI and SAIFI reliability indices by providing the Control Room greater operational flexibility in the event of an unplanned outage. MDHI is a member of USF and builds all new and refurbished lines to current CSA standards, allowing the Utility to meet or exceed the requirements of Ontario Regulation 22/04.
Investment Priority	The proposed investment is of a high priority. Meeting MDHI's obligations with respect to Transformer Station Capacity is important to the Regional Planning process and the transmitter involved. Maintaining feeders within Planning Load Limits allows the Control Room to more readily and easily transfer loads in emergencies or after an unplanned outage.
Analysis of Project and Project Alternatives	The proposed project provides the least cost connection to transfer loads between the Transformer Stations. Customers will benefit through shorter outages resulting from improved Control Room feeder transfer flexibility.
Safety	Installation of distribution assets, which are designed and constructed to meet the requirements of Ontario Regulation 22/04 ensures improved worker and public safety by meeting current Standards requirements.
Cyber security, Privacy	Not Applicable.
Co-ordination, Interoperability	Not Applicable
Utility, regional planning, and/or 3rd parties coordination	Load transfers to meet Transformer Station capacity requirements allow MDHI to meet it obligations to Transmitters and the Regional Planning process.
Future technology enablement /addresses future operational requirements	The proposed investment allows greater load transfer flexibility to meet future operational requirements.

Environmental Benefits	Not Applicable
Conservation and Demand Management	Not Applicable

C. Category-Specific Requirements

System Service

Objectives/Cost/Benefit Assessment	Milton is a high growth area. Enhancing MDHI's ability to transfer loads as operationally required, helps MDHI meet CSA voltage requirements and Transformer Station Capacity requirements as loads are connected. Maintaining feeder peak loads within Planning Load Limits allows MDHI to react with greater speed and flexibility during emergent and unplanned outage situations.
Impact of regional planning infrastructure requirements	This project is a small part of the flexible system topology that will allow MDHI to defer the construction of the next major transmission station in this high growth area.
Incorporation of advanced technology	Not Applicable
Reliability, efficiency, safety and coordination benefits	Milton is a high growth area. Enhancing MDHI's ability to transfer loads as operationally required, helps MDHI meet CSA voltage requirements and Transformer Station Capacity requirements as loads are connected. Maintaining feeder peak loads within Planning load parameters allows MDHI to react with greater speed and flexibility during emergent and unplanned outage situations.
Factors affecting implementation timing/priority	This is discretionary expenditure which is subject to deferral as non-discretionary spending requirements take precedent
Alternative cost/benefit analysis	Not Applicable

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Purchase of multiple fleet units 2023-2027	**Project Number**	GP-1
Investment Category	General Plant	**Project Year**	2023 - 2027
Project Description	New fleet units are to be procured to replace existing fleet units which have been assessed at economic end-of–life. Repairs and maintenance costs of existing units are expected to remain high with continued operation. New fleet units will have reduced repair and maintenance costs.		

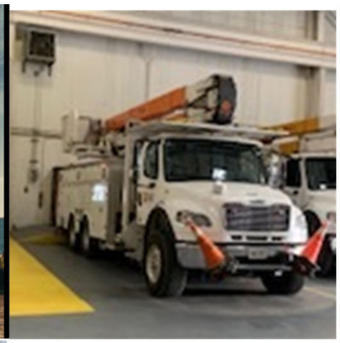
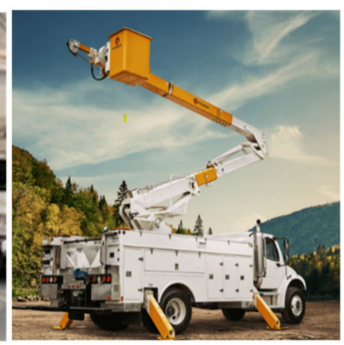
	2023	2024	2025	2026	2027
Unit #52 – ½ Ton Pickup	$ 56,000				
Unit #44 - Single Bucket 46'	$395,000				
Unit #43 - Double Bucket 68'		$550,000			
Unit #53 – Small Van		$ 37,000			
Unit #58 - 3/4 Ton Pick-up		$ 63,000			
Unit #60 – ½ Ton Pickup		$ 56,000			
Unit #48 - Digger Derrick			$500,000		
Unit $59 – Small Van			$ 37,000		
Unit #61 – Small Van			$ 37,000		
Unit #62 – CUV			$ 40,000		
Unit #63 – CUV			$ 40,000		
Unit #65 - ¾ Ton Pick-up				$67,500	
Unit #66 - ¾ Ton Pick-up				$67,500	
Unit #51 - Double Bucket 83' ($620,000					$620,000
Unit #57 – Walkthrough Van					$ 94,000
Unit #70 - Small passenger vehicle					$ 35,000
Total	$451,000	$706,000	$654,000	$135,000	$749,000

Costs	Gross Capital	$2,695,000
	O&M Costs	
	Total Estimated Cost	$2,695,000
	Recoverable/Customer Contribution	
	MHDI Estimated Cost	$2,695,000

Customer Attachments/Load:	N/A			
Start Date		**Expected In-Service Date**	Jan – Dec 2023 - 2027	
Estimated Expenditure Timing	Q1	Q2	Q3	Q4
	$ TBD	$ TBD	$ TBD	$ TBD
Risks to Completion and Mitigation	Delivery subject to manufacturer schedule. Some vehicles have long procurement lead times of up to 30+ months and vary by type of vehicle.			
Comparative Projects	Variability in unit cost subject to unit complexity and currency exchange rates for units procured outside Canada			
Capital and OM&A Costs for REG portion of project	Not applicable			
Leave to Construct	Not Applicable			

Images, Drawings, Maps, & Other Reference Material

Large Vehicle examples


B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	To maintain a reliable fleet in order to provide a robust distribution system while managing OM&A costs at an acceptable level.

Good Utility Practice	Light duty - Milton Hydro regularly inspects vehicle equipment, on a monthly basis. Milton Hydro performs regular scheduled maintenance every six months or 6,000 km and as per manufacturer recommendations. In addition, the utility monitors mileage which may trigger an earlier service requirement. Heavy duty - Milton Hydro regularly inspects aerial equipment on a six month basis. In addition, the utility monitors mileage and engine hours, which may trigger an earlier inspection.
Investment Priority	Fleet replacement determined through MHDI fleet asset assessment. A properly equipped, reliable and well maintained fleet is essential for safely and efficiently completing daily tasks of the Operations & Engineering departments.
Analysis of Project and Project Alternatives	– Maintaining current fleet licensing, di-electric testing and increasing O&M costs on units to be replaced.
	– Reduced distribution reliability based upon an assumed reduced ability to respond as a result of vehicle maintenance/breakdown issues.
	– If the life of a vehicle can be extended, the vehicle will be inspected to applicable government regulations to ensure it will still meet requirements. As well, the department that uses the vehicle is consulted to determine whether the vehicle still performs as required, or if a vehicle replacement with newer or different features would increase safety and efficiency. This assessment may result in the vehicle replacement being deferred to the next budget year when the vehicle would be re-assessed. This deferral extends the vehicle beyond the fully depreciated life cost and nets savings from not purchasing a new vehicle.
Safety	The replaced units will be matched to the work requirements and will reduce the risk of improper work methods. The timing for fleet replacement ensures that units are replaced before they deteriorate to a degree that represents an operational safety hazard. Timely replacement ensures our employees are provided with the appropriate tools and equipment to safely and efficiently perform their duties.
Cyber security, Privacy	Not applicable
Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses	Not applicable

future operational requirements	
Environmental Benefits	Milton Hydro uses a Global Positioning System ("GPS") tracking system called GeoTab. Besides providing vehicle location in real-time, the system also collects data while the vehicle is running. This data includes routes, idling time, kilometers traveled, etc. Tracking this data allows us the opportunity to adjust a user's driving patterns to ensure run time and emissions are minimized where possible. Where applicable and if it makes sense from a business perspective, we will consider acquiring hybrid or electric vehicles when we replace these Fleet vehicles. All heavy duty vehicle engines are "Clean Idle Certified".
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

General Plant

Qualitative/quantitative analyses	In accordance with Milton Hydro's standard practise, general guidelines for fleet vehicle replacement areas follows: Light and Medium duty - replace after 8 years and/or 120,000 kms Heavy duty - replace after 12 years and 5,000 PTO hours. General guidelines are supplemented with quantitative vehicle condition assessments to validate year of replacement.
Business Case	With a total fleet of 32 vehicles servicing an area of more than 367 Sq/km and a current customer base of 42,607, Milton Hydro's average fleet vehicle services more than 1,330 customers. It is critical to maintain a functional and reliable fleet program. See attached business cases

Milton Hydro

Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2024
Unit #	43	
Year	2009	
Description	Double Bucket 68'	
Classification	Heavy	
Original Cost	$342,202	
Repair & Mtce	$35,782	$42,938.34
Mileage	50347	12587
Engine Hours	4196	5409

Variable	Point Allocation	Performance factors	2021 Points	2024 Points
Age	1 point for each year of age	x years	12	15
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	1
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	8	11
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		3	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	1
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	3
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**32**	**36**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **36**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

Note 1 - Adapted from Guide to Vehicle Replacement and Right Sizing - Saskatchewan Ministry of Government Services

Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

Milton Hydro

Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2023
Unit #	44	
Year	2010	
Description	Single Bucket 46'	
Classification	Heavy	
Original Cost	$261,221	
Repair & Mtce	$72,894	$84,108.69
Mileage	161785	191200
Engine Hours	9498	11225

Variable	Point Allocation	Performance factors	2021 Points	2023 Points
Age	1 point for each year of age	x years	11	13
Kilometers	1 point for each 25,000 km of use	xxxxx km	6	8
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	19	22
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	3
Other	1 - 5 points for any other condition criteria not covered above		1	0
		Total Points	**47**	**55**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **55**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

Note 1 - Adapted from Guide to Vehicle Replacement and Right Sizing - Saskatchewan Ministry of Government Services

Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

Milton Hydro

Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2025
Unit #	48	
Year	2013	
Description	Digger Derrick	
Classification	Heavy	
Original Cost	$380,175	
Repair & Mtce	$29,746	$39,661.72
Mileage	38829	58244
Engine Hours	4854	6755

Variable	Point Allocation	Performance factors	2021 Points	2025 Points
Age	1 point for each year of age	x years	8	12
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	2
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	10	14
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		5	5
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	1
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	1
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	3
Other	1 - 5 points for any other condition criteria not covered above		1	0
		Total Points	**30**	**38**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **38**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2027
Unit #	51	
Year	2014	
Description	Double Bucket 83'	
Classification	Heavy	
Original Cost	$461,162	
Repair & Mtce	$5,853	$8,554.02
Mileage	8312	15437
Engine Hours	736	1367

Variable	Point Allocation	Performance factors	2021 Points	2027 Points
Age	1 point for each year of age	x years	7	13
Kilometers	1 point for each 25,000 km of use	xxxxx km	0	1
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	1	5
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	1
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	1
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**17**	**29**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **29**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2023
Unit #	52	
Year	2015	
Description	½ Ton Pickup	
Classification	Light	
Original Cost	$25,861	
Repair & Mtce	$22,065	$28,530.10
Mileage	131623	201623
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2023 Points
Age	1 point for each year of age	x years	6	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	5	8
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	5
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**21**	**32**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **32**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021		Replacement Year 2024
Unit #	53		
Year	2015		
Description	Small van		
Classification	Light		
Original Cost	$28,108		
Repair & Mtce	$11,388		$15,184.19
Mileage	91189		196189
Engine Hours	0		0

Variable	Point Allocation	Performance factors	Points	2024 Points
Age	1 point for each year of age	x years	6	9
Kilometers	1 point for each 25,000 km of use	xxxxx km	4	8
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**20**	**31**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **31**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2027
Unit #	57	
Year	2016	
Description	Walkthrough Van	
Classification	Light	
Original Cost	$93,955	
Repair & Mtce	$2,445	$3,778.70
Mileage	9785	219785
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2027 Points
Age	1 point for each year of age	x years	5	11
Kilometers	1 point for each 25,000 km of use	xxxxx km	0	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	1
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**13**	**32**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **32**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021		Replacement Year 2024
Unit #	58		
Year	2017		
Description	3/4 Ton Pick-up		
Classification	Light		
Original Cost	$30,617		
Repair & Mtce	$8,797		$12,566.84
Mileage	51206		156206
Engine Hours	0		0

Variable	Point Allocation	Performance factors	Points	2024 Points
Age	1 point for each year of age	x years	4	7
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	6
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		5	5
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**16**	**29**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **29**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021		Replacement Year 2025
Unit #	59		
Year	2017		
Description	Small van		
Classification	Light		
Original Cost	$30,882		
Repair & Mtce	$9,467		$14,199.95
Mileage	78291		218291
Engine Hours	0		0

Variable	Point Allocation	Performance factors	Points	2025 Points
Age	1 point for each year of age	x years	4	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	3	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**17**	**31**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **31**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021		Replacement Year 2024
Unit #	60		
Year	2017		
Description	½ Ton Pickup		
Classification	Light		
Original Cost	$30,959		
Repair & Mtce	$12,640		$18,057.03
Mileage	79647		184647
Engine Hours	0		0

Variable	Point Allocation	Performance factors	Points	2024 Points
Age	1 point for each year of age	x years	4	7
Kilometers	1 point for each 25,000 km of use	xxxxx km	3	7
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		5	5
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
	Total Points		**19**	**30**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **30**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2025
Unit #	61	
Year	2017	
Description	Small van	
Classification	Light	
Original Cost	$30,615	
Repair & Mtce	$9,713	$14,570.03
Mileage	84232	224232
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2025 Points
Age	1 point for each year of age	x years	4	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	3	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**17**	**31**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **31**

Notes

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Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2025
Unit #	62	
Year	2017	
Description	CUV	
Classification	Light	
Original Cost	$25,399	
Repair & Mtce	$4,967	$7,449.90
Mileage	38479	178479
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2025 Points
Age	1 point for each year of age	x years	4	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	7
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
	Total Points		**14**	**29**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **29**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2025
Unit #	63	
Year	2017	
Description	CUV	
Classification	Light	
Original Cost	$25,399	
Repair & Mtce	$4,118	$6,177.71
Mileage	30547	170547
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2025 Points
Age	1 point for each year of age	x years	4	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	1	7
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**13**	**29**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **29**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2026
Unit #	65	
Year	2019	
Description	3/4 Ton Pick-up	
Classification	Light	
Original Cost	$48,322	
Repair & Mtce	$11,306	$19,380.94
Mileage	60132	235132
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2026 Points
Age	1 point for each year of age	x years	2	7
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		5	5
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**16**	**32**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **32**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021	Replacement Year 2026
Unit #	66	
Year	2019	
Description	3/4 Ton Pick-up	
Classification	Light	
Original Cost	$48,740	
Repair & Mtce	$9,650	$16,542.99
Mileage	47978	222978
Engine Hours	0	0

Variable	Point Allocation	Performance factors	Points	2026 Points
Age	1 point for each year of age	x years	2	7
Kilometers	1 point for each 25,000 km of use	xxxxx km	2	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		5	5
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		1	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		3	5
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**14**	**32**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **32**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

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Capital Project Sheets

Vehicle Replacement Assessment Guidelines[1]

Assessment Year	2021		Replacement Year 2027
Unit #	70		
Year	2019		
Description	Small passenger vehicle		
Classification	Light		
Original Cost	$37,042		
Repair & Mtce	$10,000		$17,500.00
Mileage	11052		221052
Engine Hours	0		0

Variable	Point Allocation	Performance factors	Points	2027 Points
Age	1 point for each year of age	x years	2	8
Kilometers	1 point for each 25,000 km of use	xxxxx km	0	9
Engine Hours	1 point for each equivalent 25,000km of use (1 engine hour ~ 50km)	x hrs	0	0
Type of Service (duties or driving conditions)	1, 3 or 5 points based on type of service (ie harsh/offroad = 5; paved/daily use = 3; paved/non-daily use = 1)		3	3
Reliability	1, 3 or 5 points depending on frequency that vehicle is in shops for repair (ie. 2-3x/month = 5; 1x/3 months = 1)		1	3
Maintenance and Repair Costs	1, 3 or 5 points based on total life costs. (ie. lifetime costs > original vehicle cost = 5; lifetime costs <20% original vehicle cost = 1)		3	3
Condition	1, 3 or 5 points based on body condition, rust, interior condition, accident history , anticipated repairs,etc. (ie.		1	3
Other	1 - 5 points for any other condition criteria not covered above		0	0
		Total Points	**10**	**29**

Points evaluation	Light	Heavy
Very Good Condition	<20 pts	<18 pts
Good Condition	20 - 24 pts	18 - 22 pts
Fair Condition	24 - 29 pts	23 - 28 pts
Replacement condition	30+ points	29+ points

Condition Assessment **29**

Notes

Assessed by: Scott Tyler, Supply Chain, Facilities and Interim Metering Manager

Date

Note 1 - Adapted from Guide to Vehicle Replacement and Right Sizing - Saskatchewan Ministry of Government Services

Note 2 - Box shade "red" - Replace; Box shade "yellow" - Fair; Box shade "green" - Good or Very Good

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Building Renovations 2023-2027	**Project Number**	GP-2
Investment Category	General Plant	**Project Year**	2023 - 2027
Project Description	This investment primarily covers the cost of building renovations within MHDI's Head office in accordance with a Strategic Facility Plan developed by Cresa. Key renovations include construction of a new Control Room (2022 investment), second floor workstations and offices to accommodate employee growth, relocation of the customer service desk and new windows.		

	2023	2024	2025	2026	2027
Building Renovations	$400,000	$400,000	$400,000	$400,000	$400,000
Miscellaneous Building Capital	$119,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000
Total	$519,000	$460,000	$460,000	$460,000	$460,000

Costs	Gross Capital – Building Renovations	$2,000,000
	Gross Capital – Miscellaneous Building Capital	$ 359,000
	O&M Costs	
	Total Estimated Cost	$2,359,000
	Recoverable/Customer Contribution	
	MHDI Estimated Cost	$2,359,000

Milton Hydro's General Plant capital budget for building renovations underpinning the 2023 COS Application (Original Capital Plan) is $900,000 for the 2022-2023 period. This includes budgeted costs for 2022 of $500,000[1] plus budgeted costs of $400,000 for 2023. The building renovations capital budget was developed and finalized prior to the receipt of the Cresa's Strategic Facilities Plan and the accompanying recommendations.

As discussed in the attached business case, Milton Hydro assessed and adopted Cresa's recommendations, which resulted in an update to the Original Capital Plan. The renewed building renovations capital budget during the 2022-2027 period (Updated Capital Plan) required an advancement of the timing of the capital expenditure although the overall expenditure is slightly less compared to the Original Capital Plan. Milton Hydro's Updated Capital Plan provides for approximately $1,100,000 in 2022 as compared to the Original Capital Plan which underpins the 2023 rate base of $900,000 (i.e. $500,000 building renovations in 2022 and $400,000 building renovations in 2023). Milton Hydro is not proposing to adjust the timing or amounts included in its 2023 rate base as the Original Capital Plan provides a better levelized, smoothed expenditure over the DSP period, with lesser impact to its customers.

Customer Attachments/Load:	N/A

[1] See Appendix 2-AA for 2022 which includes building renovations of $500,000.

Start Date			**Expected In-Service Date**		Jan 2023 – Dec 2027
Estimated Expenditure Timing		Q1	Q2	Q3	Q4
	2023	$130,000	$130,000	$130.000	$129,000
	2024	$115,000	$115,000	$115.000	$115,000
	2025	$115,000	$115,000	$115.000	$115,000
	2026	$115,000	$115,000	$115.000	$115,000
	2027	$115,000	$115,000	$115.000	$115,000
Risks to Completion and Mitigation		Annual completion of renovation work subject to contractor and material availability. Contracts to be put in place to manage deliverables within annual timeframe.			
Comparative Projects		See attached Business Case			
Capital and OM&A Costs for REG portion of project		Not applicable			
Leave to Construct		Not Applicable			

Images, Drawings, Maps, & Other Reference Material
See attached Business Case

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	To improve space utilization across the office portion of the Head Office facility.
Good Utility Practice	Improved space utilization support efforts to continue to provide value to customers for services provided.
Investment Priority	Multi-year program spend
Safety	Office space and layout to accommodate expected increases in FTE complement.
Cyber security, Privacy	Not applicable

Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd parties coordination	Not applicable
Future technology enablement /addresses future operational requirements	Not applicable
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

General Plant

Qualitative/quantitative analyses	See attached Business Case
Business Case	See attached Business Case

Milton Hydro

Capital Project Sheets

A. General Project Information

Project Name	Computer Software 2023-2027	**Project Number**	GP-3
Investment Category	General Plant	**Project Year**	2023 - 2027
Project Description	Computer software investments cover the implementation of a new ERP system, Robotic Process Automation, Data Analytics & Other Initiatives as well as miscellaneous software expenditures. Material expenditure details are provided in attached business cases.		

	2023	2024	2025	2026	2027
Computer Software Misc	$231,000	$ 86,000	$ 86,000	$ 86,000	$ 86,000
Computer Software - Data, Analytics, & Other Initiatives	$ -	$ -	$250,000	$250,000	$314,000
Computer Software - ERP	$722,000	$339,000	$ -	$ -	$ -
Robotic Process Automation Phase 1 - Discovery	$120,000	$ -	$ -	$ -	$ -
Robotic Process Automation Phase 2 - Implementation	$200,000	$ -	$ -	$ -	$ -
Total	$1,273,000	$425,000	$336,000	$336,000	$400,000

Costs	Gross Capital	$2,770,000
	O&M Costs	
	Total Estimated Cost	$2,770,000
	Recoverable/Customer Contribution	
	MHDI Estimated Cost	$2,770,000

Customer Attachments/Load:	N/A		
Start Date		**Expected In-Service Date**	Jan 2023 – Dec 2027

Estimated Expenditure Timing

	Q1	Q2	Q3	Q4
2023	$ 319,000	$ 318,000	$ 318,000	$ 318,000
2024	$ 107,000	$ 106,000	$ 106,000	$ 106,000
2025	$ 84,000	$ 84,000	$ 84,000	$ 84,000

	2026	$ 84,000	$ 84,000	$ 84,000	$ 84,000
	2027	$ 100,000	$ 100,000	$ 100,000	$ 100,000
Risks to Completion and Mitigation		See attached Business Cases for respective risks of specific material software investments			
Comparative Projects		See attached Business Case			
Capital and OM&A Costs for REG portion of project		Not applicable			
Leave to Construct		Not Applicable			

	Images, Drawings, Maps, & Other Reference Material
	See attached Business Cases for ERP, Automation and Data Analytics

B. Evaluation Criteria and Information Requirements

Efficiency, Customer Value, Reliability

Main Driver	To ensure software investments support business operations efficiency. Replacement of obsolete or underperforming IT assets. Focused spending in 2023 and 2024 to support the PwC IT Roadmap
Good Utility Practice	Improvements to business operations efficiency support efforts to continue to provide value to customers for services provided
Investment Priority	Multi-year program spend
Analysis of Project and Project Alternatives	See attached Business Cases
Safety	Not Applicable.
Cyber security, Privacy	Software subject to standard MHDI cyber-security protocols.
Co-ordination, Interoperability	
Utility, regional planning, and/or 3rd parties coordination	Not applicable

Future technology enablement /addresses future operational requirements	See attached Business Cases
Environmental Benefits	Not applicable
Conservation and Demand Management	Not applicable

C. Category-Specific Requirements

General Plant

Qualitative/quantitative analyses	See attached Business Case
Business Case	See attached Business Case

Introduction/Background on existing Processes

Milton Hydro's current Enterprise Resource Planning system (ERP) is Cayenta – a multi-module software. Milton Hydro uses Cayenta to support various departments and functions:

- Cash
- Accounts Payable
- Sales Accounts Receivable
- Payroll
- Timesheet
- Customer Information System (CIS)
- Inventory & Warehousing
- Purchasing
- Job costing
- Work management
- Asset Management

Milton Hydro's current systems lack a Human Resources Information System (HRIS) module, and require modernization to ensure security and privacy protection is maintained. Many existing processes are being completed manually and on a non-integrated basis which creates inefficiencies in the application of business processes, including analytical and reporting capabilities.

Milton Hydro is moving forward with a new vision which is being referred to as Milton Hydro 2.0. This vision includes investments in digital modernization, to become "Customer-Centric" and "Future Ready" with scalability; to transition the Company from operating as a small-sized distributor to a large-sized distributor – meeting the needs of the growing community in the Town of Milton.

To support Milton Hydro's transformation to Milton Hydro 2.0, a thorough review of the business processes has been conducted and an IT Road Map has been established that will:

- improve operational efficiency through simplification/automation of business processes and workflows
- reduce operational cost
- increase opportunity for employees to focus on higher value activities
- and reduce employee fatigue while improving employee satisfaction

Milton Hydro's employees need to be able to respond quickly and provide reliable service in the field and in the office. Investments in an ERP will:

- Increase efficiency through transformation of manual processes to automated process and digitization of inputs
- Centralize databases for single source of "truth" that will reduce the potential for errors
- Increase the communication across the different databases and software for efficiency and allow different departments to share timely information more fluidly
- Improve billing accuracy and timeliness
- Enable more efficient processing of a growing number of business transactions as the customer base grows

Investments in an ERP system will drive operational excellence by optimizing business processes and enhancing project delivery to manage projects effectively. In addition, it will reduce operational overhead by enabling automation through fit-for-purpose tools across various business functions.

Forecast investment required for a new ERP System is provided in the table below:

Investment Year	Amount
2022	$269,815
2023	$721,593
2024	$338,852

Current Processes

Many existing processes across the organization are being completed manually using a patchwork of tools to perform critical analysis and specific reports. This is particularly true in the areas of finance, procurement, supply chain, project management and human resources.

The following identified issues are not an exhaustive list, but illustrative examples of issues managed on a regular basis by Milton Hydro employees.

Finance

Basic financial statements and reports that show the performance of departmental business units versus budget or same period last year require offline analysis (using exported data) and significant manual effort to track, manage and report on progress. Due to the lack of proper system capabilities and tools, employees have created their own 'work arounds' to complete tasks. Disconnected systems and modules force employees to go to two or more systems to gather data for analysis or reporting.

The level of intensity for the variance analysis by different business units is significant and involves various departments and employees at all levels. This analysis is completed monthly, quarterly and annually for internal management, Board meetings, financial institutions, OEB reporting, and the Town of Milton. The simplification of this process would save approximately 20 hours on a monthly basis and ensure accuracy.

Cayenta's data structure is a primary issue; it is inefficient and was set up without the foresight of current reporting requirements or connectivity. The following are a few examples:

- Billing, cash receipts and accounts receivable are completed in Northstar. A single automated summary level journal entry with a batch number from the billing system is posted to Cayenta general ledger (GL). There is no direct link between accounts

receivable and the GL. To reconcile Accounts Receivable (AR), one needs to go back into the billing system to get the details – there are no drill down capabilities.
- The GL structure does not facilitate business unit reporting, nor does it facilitate financial statement reporting. For example, from the GL in the work in process (WIP) account, 3rd party costs cannot be differentiated from in-house capitalized labour costs as the GL string is the same for both.
- To understand AR ageing, one needs to gather data from Northstar – ensuring that the cutoff of the data pulled matches the month end cutoff in Cayenta. The resulting data extracted is a .txt file that does not always import neatly into Excel, requiring time to align the data. The totals are then sorted to match what is applied against AR GL, and then compared to Cayenta GL.

Cayenta also does not facilitate process requirements such as the ability to calculate and post the monthly unbilled revenue accrual. The current manual workaround process requires a data feed exported from Northstar and then imported into Excel. A percentage-based estimate of unbilled revenue is calculated at customer class level. This report is used for both internal and regulatory reporting purposes and more precision and integrity is needed in the calculations. Because of the shortcomings of the existing process, the finance team recently devised another more precise workaround that is currently in 'trial mode', which involves copying the Northstar database, and creating a "month-end" test system which is used solely to run a query to extract unbilled revenue and statistics data and calculate unbilled revenue. Both 'workarounds' are encumbered with manual processes, duplication of databases and have a risk of inaccuracies requiring additional supervision and review of information before using it.

The reporting tools in Cayenta are inadequate for Milton Hydro's needs making it a challenge to access/create accurate, timely, complete reports. Although Cayenta has reporting capabilities and some design flexibility, Milton Hydro staff are not able to readily obtain necessary reports directly from the system.

Reports available in Cayenta:

- Trial balance (not properly balanced)
- Transaction report by GL (this report is used)
- AP
    - AP basic reports outstanding cheques/voided cheques/cheques issued (these reports are used)
    - AP ageing report (vendor transaction/payment history report doesn't exist) – not used because it is only available in Word or PDF, and it is improperly laid out and difficult to read/decipher
- Inventory
    - All inventory reports are in Word or PDF – not excel or CVS formats. None of the available reports are used because the formatting and reports are poorly laid out and difficult to read/decipher.
    - Available reports

        - master (lists all the SKUs)
        - inventory value on hand report
        - Valuation report
        - Transaction report
        - Item history report
        - Low usage report
- Purchasing
    - None of the available reports are used because the formatting and reports are poorly laid out and difficult to read/decipher.
    - Available reports
        - Remaining balance
        - Orders with outstanding receipts
        - Open purchase order

MHDI's Controller created Open Database Connectivity (ODBC) connections to the Cayenta tables to extract data to manually create the following reports using either Excel or Wdesk:

- Finance
    - trial balance
    - income statement
    - balance sheet
    - budget variance
    - cash flow statements
- Inventory
    - analysis of issues and returns by work order
    - slow moving inventory analysis
    - outstanding goods received not invoiced
    - inventory on hand by SKU, dollars and units
- Purchasing
    - Open purchase orders (POs) and those that should be closed
    - Outstanding balance on POs
    - Total value of POs issued to a vendor

Procurement and Inventory Management

Currently, purchase orders require pre-printed forms with appropriate branding, corporate terms, and conditions, etc. The process requires that the purchase orders be physically printed out on the pre-printed forms and then scanned into PDF format to provide vendors with an electronic document. An ERP system with the capability of printing direct to PDF with all the pertinent contract information, then the added (and rising) cost of these pre-printed forms would be eliminated, as well as eliminating the additional employee processing time.

The same issues are true for inventory issues and returns forms. Additionally, pre-printed serial document numbers that are assigned to product issues and returns forms are manually entered in the current system, and the inventory transactions are manually tracked, reviewed, and audited. Automation of concurrent processes would reduce the 'human' errors in data entry and review.

Staff utilize employee designed queries to aid in reporting, tracking and analysis for financial accounting and CIS, and much of the work for inventory management and work order analysis/financial reporting is managed in Excel through the use of a shared network drive.

There are several issues related to these manual processes:

- Training and documentation can only take an individual to a certain level of success.
- Knowledge and skills are lost whenever individuals leave the organization.
- A simple change in a manual process may have unforeseen ripple effects.
- Manual processes are more prone to human errors, are time consuming and reduce efficiency and productivity.

Over the next ten years, Milton's population is projected to grow to approximately 182,000 (37% increase of its current population). By extrapolating this population growth into an increase in business transactions, identifying and implementing efficient processes and better tools is not only a good business practice, but is also necessary to minimize waste.

Needs Assessment/Drivers for Change

Milton Hydro's current ERP (Cayenta) is version 7.8; since 2016 Cayenta has stopped making enhancements and modifications this current version. Cayenta will only provide day-to-day functionality and major bug fixes (unless there is a work around). Support has gradually eroded and Milton Hydro expects that version 7.8 will eventually not be supported at all.

Cayenta v7.8 lacks efficiency, capability and functionality to deliver the necessary operational and reporting needs of the organization such as business unit reporting and analysis. The inefficiencies of the ERP and current workarounds will not sustainably support Milton Hydro as a growing utility.

Milton Hydro's technology initiatives are focused on meeting the needs of its customers and the business. At a high level, the desired benefits and business value that the ERP is intended to deliver include:

- Optimize the existing processes and enabling automation to eliminate manual and repetitive tasks so that employees can refocus on higher-value tasks and meaningful engagements with customers
- Support growth and agility to satisfy population growth and to respond to regulatory changes
- Establish a strong data foundation that allows employees to easily access real time information to respond to customer inquiries faster

More specifically, a new ERP implementation is intended to reduce inefficiencies and improve productivity by reducing the volume of manual work arounds and activities that are inherent in a non-integrated financial system. A new ERP will better support the routine daily tasks and analysis required of Milton Hydro by integrating data from all functional areas of the organization, including a CIS, and become the one source of “truth”.

By streamlining processes and utilizing the integrated functionality of an ERP, Milton Hydro will be positioned to accommodate the increased scale of volume related to future growth and be able to respond to customer inquiries more quickly and more completely by leaning on the efficiencies and centralization of a fully integrated ERP.

Business Outcomes

Implementing a new ERP will improve efficiency and productivity as manual processes and work around processes are eliminated. As part of the new implementation, the current processes will be replaced with best practices and an improved data structure that will improve efficiency and productivity and deliver improved analytics and reporting.

Additional value will be derived from the new ERP through the implementation of a Business Intelligence (BI) system. The BI system will access, analyze and transform ERP data into analytics into meaningful, actionable information that will support reporting. MHDI’s existing MSOffice licensing package includes MicroSoft Power BI.

Expected improvements are as follows:

- Enhanced project planning, management, tracking and delivery capabilities
- Improved operational efficiency through simplification / automation of business processes and workflows
- Reduced operational cost
- Increased opportunity for employees to focus on higher value activities
- Improved collaboration and visibility
- Enhanced decision-making ability
- Increased data visibility and transparency by creating single source of truth

Strategic Alignment

Recognizing the Town of Milton’s projected population growth, Milton Hydro needs to have the proper resources in place to accommodate/service such growth. A new ERP will realize efficiencies that will allow employees to focus on more value-added activities such as timely responses to customers, analytics that can help manage costs. In addition, becoming a data driven organization with one source of the truth and transparency of information will help Milton Hydro become more proactive as opposed to reactive.

Corporate Objectives

- Future Ready the Business

- Sustainability of business processes
- Digitally modernize
- Be customer-centric
- With an integrated system, Milton Hydro can become more proactive and responsive through an Enterprise Approach.

IT Strategic Objectives

- Optimize existing processes and enable automation to eliminate manual and repetitive tasks so that employees may refocus on higher-value tasks and meaningful engagements with customers.
- Build for growth and agility through holistic approach based on people, process and technology in order to satisfy the population growth in the Town of Milton and to respond to regulatory changes and technology disruptions.
- Nurture a cultural change and focus on digital upskilling Milton Hydro's workforce to drive innovation and productivity improvement from best-in-class technology solutions.
- Establish a strong data foundation that allows employees to easily access real-time business information for reporting, customer information to respond to incoming inquiries faster, and enable document management and knowledge sharing capabilities.
- Make technology decisions that are driven by business needs to fulfill customer requirements and enable innovation

Guiding Principles

1. Customer-Centric. Place customers at the heart of decision-making process and enable a 360 degree view of customers to standardize and provide a seamless omni-channel customer experience.
2. Simple & Usable. Allow employees to easily maintain and operate through user friendly interfaces and intuitive processes.
3. Data Driven. Establish a strong data foundation so that data is available across the organization in real time to support fact-based decision making and real-time reporting.
4. Automation. Enable automation through pre-configured workflows and system rules to streamline customer interactions and billing.
5. Integrated. Easy to share data with other third parties and systems across the entire technology ecosystem, including financial and operational indicators and performance data.
6. Scalable. Able to quickly respond to organizational / regulatory changes and scale as future demand grows, including adopting additional capabilities.
7. Cost Effective. Optimize costs that are appropriate for the size of Milton Hydro.
8. Cloud first. Explore cloud platform and cloud services as the default option.

Assumptions

MHDI makes the following assumptions:

1. Milton Hydro has begun and will continue to review internal business processes with Subject Matter Experts to access and implement best practices through process improvement initiative.
2. Within these process reviews, ERP/Cayenta requirements gathering is being captured to support the planned ERP solution.
3. Milton Hydro has hired an IT Director to provide expertise that will enable best practices for user requirements and leverage optimum ERP solution functionality.
4. An independent consultation may be utilized to support internal process reviews.
5. An independent consultant will be utilized for the ERP configuration, design and setup.

Constraints

MHDI identifies the following constraints:

1. Internal resource availability for review and implementation
2. Change management challenges

Technical Analysis/Requirements

The ERP solution will need to integrate/communicate with other software/programs to provide full value to Milton Hydro's employees. These include:

- Customer Information System (CIS)
- Human Resource Information System (HRIS)
- Business Intelligence (BI) /Data Warehousing
- MS Excel or *Power BI* or Open Database Connectivity (ODBC) query
- Document Management

Risks

There are risks that need to be recognized and mitigated for a successful ERP implementation project including poor product selection and poor implementation.

To mitigate these risks, Milton Hydro must be clear on its needs, expected functionality, inputs and outputs, etc. A target state assessment is required to determine changes (e.g., processes, organizational structure, capabilities) that may be dependent and specific to each business unit to ensure a holistic perspective is taken that supports and aligns to the enterprise approach. Requirements (functional & non-functional) should also be reviewed for appropriateness for Milton Hydro's size and its growth.

Milton Hydro must also identify internal subject matter experts (SMEs), and potentially backfill the roles – depending on the duration and intensity of support, to ensure that the project implementation has the proper support throughout the whole implementation process. To support the ERP once the system is live, a system administrator (likely a SME from the implementation process) will be needed.

Training and post implementation strategies need to be in place to address issues such as change management to address people related impacts (i.e., skills, behaviour, culture related).

Alternative Scenarios

Alternative 1: Status Quo

Service Description:	Milton Hydro's current ERP (Cayenta) is version 7.8. Since 2016 Cayenta has stopped making enhancements and modifications to this version. Cayenta will only provide day to day functionality support and major bug fixes (unless there is a work around). Milton Hydro uses Cayenta for: Accounting, Accounts Payable, Payroll, Purchase Orders, Inventory and Job costing. The full capabilities are not leveraged for the purchasing, warehousing/inventory or job costing modules in Cayenta because doing so is not cost effective, nor does it create efficiency. For example, to simply print purchase orders directly from the system, it requires specific programming and development. Other capabilities require increasing the number of steps to complete a process, which equates to increasing the amount of time an employee spends (or increasing headcount) to complete a PO or issue inventory to a job. CIS, billing, cash receipt and HR operations are managed outside Cayenta. Milton Hydro uses Northstar as its CIS system. It was installed prior to the installation of Cayenta, as a result the CIS system in Cayenta was not used. Northstar was also determined to be more robust. Cayenta has since purchased Northstar; the presumption is that eventually Northstar (or its features) will become a part of a future version of Cayenta.
Benefits:	Cayenta is able to accept and facilitate ODBC Excel links. Finance and Operations' investment in the creation of ODBC Excel links to Cayenta tables to support reporting is maintained (although this investment was made as a result of poor reporting capabilities).
Issues:	– Cayenta does not have a BI/data warehousing system. – The data structure's current design is cumbersome and not conducive to analytics. – The GL logic was developed by a former employee that was not documented. It is not understood, nor can it be changed.

	– Lack of proper reports – Current version of Cayenta is becoming obsolete and will not be supported by the software developer (e.g., no patching, no security updates, no customer service).
Overview and Impact on Operations	The current state of Cayenta hinders the analytics that are required to properly manage the Finance and Operations of Milton Hydro. There are many manual processes employees have created to address the shortcomings of the system, resulting in time wasted in manual processes, double checking for accuracy, duplication of databases, and individuals “owning” their processes. Significant time is spent manually manipulating data or trying to figure out where the ‘right’ reports exist. Multiple systems are used and data is disconnected, causing employees to retrieve data from different systems and trying to connect the dots. System lacks proper reports. Cayenta has very simple financial reports, none of which match the defined layout being used to report to stakeholders. From a planning perspective, it is very difficult to load the annual budget into Cayenta. Performance evaluation to the budget (variance reporting) is challenged because Cayenta does not facilitate any drill down analytics. Currently, OEB reporting requirements are being completed manually. A new ERP system would enable Milton Hydro’s team to gather data based on the current reporting structures more efficiently. The same efficiency would be achieved for business unit reporting and financial analysis for internal management and other stakeholders.
Evaluation Criteria	1. Ease of use, the system needs to be more intuitive, easier to train, simplification of tasks with dynamic reporting capabilities. o POOR 2. Data structure, the systems data structure needs to be connected to various other modules that feed into the GL. o POOR 3. System capabilities, dynamic reporting capabilities, multiple GL field definitions, ODBC connectivity, fully functional modules for CIS, Billing (utility specific), Procurement, Inventory, Job costing, Accounts Payable, Accounts Receivable, Payroll, Human Resources. o POOR
Risks	Current version becoming obsolete and unsupported if not upgraded.

	Increase in employees required to process increased business transactions because of projected growth in customer base.
Financial Impact	The financial impact of status quo is hard to quantify. The costs of inefficiency and productivity of employees based on their current processes cannot be properly quantified at this point.
Resource Capacity Assessment	Milton Hydro's resourcing plan is staffed for the current systems, processes and workload. As Milton Hydro grows, an increase in headcount will be required to support the increased business transactions with current inefficiencies. If nothing is changed, the finance department will require an additional three hires within five years. ($400,000/year fully burdened). Potential new staffing hires required to engage with Cayenta in other departments were not calculated.
Conclusion	Status Quo is not a viable solution.

Alternative 2: Upgrade Cayenta

Service Description:	Upgrade to Cayenta Version 9 – The latest version of Cayenta has some new features such as online time entry via mobile devices or desktop. New features and fixes to accounts receivable modules, CIS, purchasing etc. The existing services used and issues experienced with the Cayenta ERP system (see Alternative 1: Status Quo) are not resolved with the Version 9 upgrade.
Benefits:	Access to new features – such as employees time entry, or patches to various modules to fix outstanding problems with current version. New functionality includes cash receipts of deposits to be posted against a specific job/work order, mobile device time entry, approval level capabilities for purchase order approvals, time entry recording, vacation recording etc.
Issues:	Does not resolve MH issues with: – Lack of proper reporting – The current design of data structure is cumbersome and not conducive to analytics. – Cayenta does not have a BI/data warehousing system.

	– Facilitating the process of calculating accruals of monthly unbilled revenue – The logic of the General Ledger (GL) structure is lost. Does not resolve the plethora of manual, disconnected databases used in business processes.
Overview and Impact on Operations	The new features/functionality of Cayenta Version 9 do not net a positive impact on normal business operations as new functionalities are offset by poor internal processes and may even create more inefficiencies; nor does it meet the cross functional/reporting needs. Examples of mismatch of needs and new functionality: – The new payroll functionality does not fulfill all the reporting requirements that a cheaper 3rd party payroll service provider can provide. For Cayenta v9 the costs outweigh the benefits. – The cash deposit function being posted to job/work orders will segregate cash receipts of deposits from regular utility bill receipts, which will complicate the bank reconciliation process even further and affect other GL reconciliation processes. – Cayenta version 9 will actually further complicate existing processes and some processes will have to be reconfigured to derive the desired outcome. For example, Misc. AR billing and cash receipt works in v9; however, cash receipts would have to be separated into two processes: one in CS for power accounts, then another in Misc. AR. Currently this process is managed with one clerk; separation may require two clerks – an increase in headcount.
Evaluation Criteria	1. Ease of use, the system needs to be more intuitive, easier to train, simplification of tasks with dynamic reporting capabilities. o POOR 2. Data structure, the systems data structure needs to be connected to various other modules that feed into the GL. o POOR 3. System capabilities, dynamic reporting capabilities, multiple GL field definitions, ODBC connectivity, fully functional modules for CIS, Billing (utility specific), Procurement, Inventory, Job costing, Accounts Payable, Accounts Receivable, Payroll, Human Resources. o POOR
Risks	– Version 9 has known 'bugs' that have not been resolved. – Outstanding issues remain unresolved.

	– Finance and Operations' ODBC Excel links to Cayenta tables may break and need to be recreated.
Financial Impact	Cost of upgrading the current system is $650k + costs of inhouse resources as subject matter experts will need to be involved in the upgrade, or their roles back filled. The financial impact of inefficiency and productivity of employees based on their current processes cannot be properly quantified at this point.
Resource Capacity Assessment	Internal resources would be required to work on the upgrade; individual departments would need to identify impacts in their areas and resource time to support implementation. As Milton Hydro grows, to support the increased business transactions with the unaddressed inefficiencies, the finance department would require an additional two hires within five years ($250,000/year fully burdened). Potential new staffing hires required to engage with Cayenta in other departments were not calculated.
Conclusion	The Cayenta Version 9 upgrade offers little or no improvement in the way the ERP supports employees and operations in the day-to-day management and reporting functions/requirements.

Alternative 3: Purchase of a new ERP system

Service Description:	Implement a new ERP system – the vendor and product would be selected based upon an evaluation of functionality and cost.
Benefits:	The RFP and evaluation criteria will be based upon a review and redesign of internal transactional processes. As part of the implementation of a new ERP, with the help of Process engineers, subject matter experts (SMEs) and consultants, Business units need to identify the types of analysis and reporting that is required. The review of internal procedures is required to identify areas of "bottlenecks", potential gaps in processes, duplicate and redundant processes and obsolete reports. It will also highlight areas that can be streamlined and create more efficiencies. Milton Hydro has reviewed and developed a conceptual design for its internal data structure to capture data in a format conducive to internal, as well as external reporting and analysis as identified by the business units and management. With the redesign of internal processes and data

	structure completed, these will become a basis for the RFP and evaluation criteria for a new ERP. Once an ERP platform is chosen, with the help of data consultants and implementation consultants, data structure will need to be setup in the ERP with a proper data warehousing system, and historical data needs to undergo an ETL (Extract, Transform, Load). This preliminary work is necessary for a successful implementation with thought and foresight into what each business units requires from the ERP. The real benefit of an ERP is achieved through proper implementation and aligning the data structure with the reporting requirements. The benefits realized is having the capability to drill down into the details of exception reports to its source transactions to answer the “whys”. The logic of the GL structure will be recreated and documented. A well-integrated ERP will help streamline processes and replace manual processes, as a result, increase efficiency and productivity, so that employees can focus on high value tasks, become more customer focused, resolve customer issues on a timely basis. In addition, reporting timelines will be reduced, analysis and reporting will become more accurate and consistent as manual spreadsheets and personal databases are replaced by one source of the “truth”. The new ERP will have BI compatibility.
Issues:	– Various ERP systems offer different solutions at different price points. The issue will be finding a ‘complete’ solution at a reasonable cost or identifying acceptable compromises (e.g., specific issues such as facilitating the process of calculating accruals of monthly unbilled revenue) and/or phased implementation to eventually achieve a ‘complete’ solution – The time required to implement is estimated to be approximately 12 months. – Configuration of existing databases and validation of data – Training efforts for users and super users
Overview and Impact on Operations	One of the pressing issues at Milton Hydro is the ability to leverage the data that is currently available. In addition, the current data structure does not facilitate analysis and reporting. With a well-designed data structure and by leveraging the full functionality of an ERP this will help resolve these current issues. With an integrated ERP, business units will be able to manage and mitigate costs overruns. For example, manage Work order costs and

	fulfill customer expectations, or manage any cost overage in tree trimming costs, proactive maintenance of assets as opposed to reactive repairs during an outage.
Evaluation Criteria	1. Ease of use, the system needs to be more intuitive, easier to train, simplification of tasks with dynamic reporting capabilities. 2. Data structure, the systems data structure needs to be connected to various other modules that feed into the GL. 3. System capabilities, dynamic reporting capabilities, multiple GL field definitions, ODBC connectivity, fully functional modules for CIS, Billing (utility specific), Procurement, Inventory, Job costing, Accounts Payable, Accounts Receivable, Payroll, Human Resources.
Risks	Bad implementation, not doing the due diligence in exploring reporting requirements and simplifying internal processes. The end objective of all internal processes must be identified, then new streamlined business processes are to be created to align with the structure of the ERP process and not the reverse. An ERP must not be customized to fit current processes. Change management – with any change in internal process, there is always resistance to change a process flow or transaction process. Change impact assessment needs to be leveraged to identify and mitigate transition to a new ERP system. Employees need to be educated that the change is to their benefit and will produce efficiency and increase work life balance and reduce stress levels. Eliminating bias – Milton Hydro must be clear on what type of information is required from the ERP. Subject matter experts must be clear on business objectives, business processes and what data drives decision making. Once this is achieved, a best fit ERP can be chosen, that will deliver the capability and functionality that Milton Hydro requires.
Financial Impact	The upfront financial cost is estimated to be ~$ 1.5M. This budget value is based upon the PwC IT Roadmap. Future/on-going operational costs of licensing or costs for additional licenses will be identified in the RFP process.
Resource Capacity Assessment	MH lacks the resources to implement an ERP on its own and would require the use of consultants and project managers. Internal resources who are subject matter experts will be seconded to the implementation and some roles may have to be back filled as the daily tasks performed by these individual still need to be completed.

	Individual departments would need to identify impacts in their areas and resource time to support implementation. Internal resources will be required to support testing/commissioning, and training. As Milton Hydro grows, to support the increased business transactions, the finance department would require an additional hire within five years ($150,000/year fully burdened). Potential new staffing hires required to engage with a new ERP in other departments were not calculated.
Conclusion	Purchase of a new ERP system is a viable solution to meet Milton Hydro's functional, reporting and scalability requirements.

Justification and Recommendation

Alternative 1: Continuing with Status Quo will only exacerbate the current inefficiencies and productivity issues as MHDI's customer base continues to grow.

Status Quo is not a viable solution.

Alternative 2: The Cayenta upgrade does very little to alleviate all the current issues surrounding productivity, efficiency, reporting and analytics. The solution does not offer the scalability that Milton Hydro needs to support its growing customer base.

Alternative 2 is not a viable option.

Alternative 3: As a growing organization, Milton Hydro needs a robust, scalable ERP solution, with a comprehensive and planned data structure that will deliver the required functionality and business reports for all its users in the various departments that interact with the system (finance, purchasing, warehouse, engineering).

Alternative 3 is the preferred option.

Alternative 3 Risk Mitigation

Risk	Mitigation Plan/Action
Implementing old processes	Review all desk procedures and ask "why we do what we do", "who/what are the dependent processes", "where is the source of information" and "is there a better way to achieve the objective identified".

Risk	Mitigation Plan/Action
Changing processes for the sake of change	Review processes with the view in mind of the end objective and how that can be achieve in an ERP functionality.
Refusal to change	Educate and impress on all that the change is for their own well-being, as well as the health of the organization.
Costs over run	Assess integrity of vendors through references, how did they perform against their quotes. Factor in internal costs. Benchmark with other ERP implementations on hidden or unforeseen costs.

Alternative 3 Implementation Workplan

The work plan spells out the terms that will form the basis of any contracts, including the jobs/tasks to be completed, time frames and milestones; include the evaluation criteria for each step or milestone.

- Identify key tasks and locations
- Review each desk procedure and its objectives
- Identify data requirements to achieve these objectives
- Outline milestones and timelines for completion
- Identify risks to goal completion and contingencies
- List project employees and consultants if known, and their responsibilities

Implementation Timeline

The project timeline as shown includes the schedule for prework outside the implementation schedule, specifically:

- 6 months – confirming functional areas in scope, gathering functional and technical requirements, developing use cases, develop/issue RFP
- 6 months – vendor selection, onboarding, planning, co-design of priority business processes

The timeline to implement a functioning ERP system is estimated to be 12 months.

Date	Duration	Activity	Description
2022/23	6 months	Reinvent Business Support Capabilities: Assess & Select the Right Technology	Confirm functional areas in scope, including (but not limited to) Finance, Procurement, Supply Chain and Work Management. Gather non-functional, unique and functional and technical requirements that are tailored for Milton Hydro's size and needs and conduct market scan to better understand the ERP technology landscape. Develop use cases and RFP, then release RFP to select a fit-for-purpose ERP technology vendor.
2023	6 months	Reinvent Business Support Capabilities: Select SI, Plan and Design the Right Technology	Develop and release RFP to select a systems integrator (SI) to act as partner for the ERP implementation. Onboard vendor/SI and develop detailed plan for executing on design and process definition activities. Co-design the future state of the priority business processes based on the chosen technology.
2024	12 months	Reinvent Business Support Capabilities: Implement the Right Technology	Build, configure, test, and demo the Finance, Procurement, Supply Chain, Work Management modules. Design a security framework for the new ERP.
		Go Live	Go live with new ways of working that are enabled by the new ERP solution.

Business Case: Enable Business Process Automation

Overview

The Town of Milton is one of the fastest growing community in Ontario. The population of the Town of Milton grew from 32,800 in 2001 to 87,000 in 2011, and to approximately 133,000 in 2021. The trend of continuous population growth is expected to continue with Halton Region forecasting a population of approximately 182,000 by 2031. Since 2011, the population growth has resulted in an increase in Milton Hydro's customer base by 39% (30,485 in 2011 to 42,270 in 2021).

Despite the continuous population and customer growth, Milton Hydro has operated as a small and lean utility. Milton Hydro did not make sufficient investments in innovation or technology to keep the pace with the growing needs of the business. To ensure continued service and maintain day-to-day operations, Milton Hydro adapted various patchworks for business process workarounds resulting in cumbersome and tedious manual work, requiring higher degree of supervision and quality assurance. Given the forecast of continued population and customer growth, the status quo manual processes are extremely inefficient and are no longer sustainable as Milton Hydro moves towards a future ready, resilient, digitally modernized, and customer-centric utility.[1]

To achieve its strategic objectives, Milton Hydro retained a third-party expert, PwC, to conduct a current state technology review and develop the IT Roadmap that identifies technology investments and implementation activities over the next five years. Milton Hydro's IT Roadmap outlines key technology initiatives that support the needs of the company and its customers. In particular, by investing in technology, PwC identifies the following benefits to Milton Hydro's customers and business value to the company:

- optimizing existing processes and enabling automation to eliminate manual and repetitive tasks so that employees can refocus on higher-value tasks and meaningful engagements with customers;
- support growth and agility in order to satisfy population growth and to respond to regulatory changes;

[1] These are Milton Hydro 2.0 strategic objectives, which are further discussed in Exhibit 1, Subsection 1.2.

- establish a strong data foundation that allows employees to easily access real time information in order to respond to customer inquiries faster;
- focus on end customers and establishing a 360 view of interaction, including omni-channel capability;
- governance that support making technology decision that are driven by business needs to fulfill customer requirements and enable innovation

Milton Hydro can no longer sustain manual, cumbersome and labour heavy processes, nor is it prudent for the company to continue its day-to-day operations relying on status quo processes. As a first step in achieving its strategic objectives in being modernized and customer centric utility, relying on PwC's recommendations, Milton Hydro plans to invest in business process automation. The investment, Robotic Process Automation (RPA), identifies suitable opportunities (e.g., repetitive, administrative and high frequency tasks/processes) for process automations to automate manual and mundane tasks, such as accounts payable, new subdivision set up and RRR reporting. By implementing RPA, Milton Hydro will be able to improve operational efficiency in day-to-day processes and workflows, while reducing employee fatigue by decreasing or eliminating repetitive manual tasks and increasing accuracy. Through efficient and effective processes/workflows, Milton Hydro will also be able to reduce its operational costs by minimizing or eliminating repetitive tasks. This will also enable 'scaling up', which will support MHDI's ability to manage new additional workload resulting from the increased number of customers within the service territory. By focusing on internal processes/workflows improvements, Milton Hydro anticipates further enhancements in its focus and modernization of customer engagement and customer service experience.

Investment Need and Outcomes

Since 2005, the Milton Hydro employee head count has remained relatively flat despite the rapid growth of its customer base. The employee to customer ratio has diminished from one employee to approximately 567 customers (2005), to one employee to approximately 719 customers (2021). This equates to an increase of 27% workload per employee, which has led to employee fatigue and a decrease in job satisfaction. The average large sized utility in Ontario with 30,000 to 99,000 customers in 2020 has a customer to employee ratio of 590 customers per employee.

The sheer magnitude of 'new' work to be completed by staff can be extrapolated with simple math associated with community growth. The goal of the Investment is to optimize existing processes and enable automation to eliminate manual and repetitive tasks, which will allow the team to service the growing needs of the Milton Hydro service territory more efficiently and effectively.

The strategic vision of Milton Hydro 2.0 is founded on specific objectives that include, among other things, ensuring Milton Hydro is "Future Ready". The essence of this objective is to build scalability and resiliency to meet the coming demand over the next decade, as well as prepare for innovation and disruption in the business. Another objective of Milton Hydro 2.0 is to be "Customer Centric", by providing a seamless customer interaction, communicating in a timely manner with accurate information – and prioritizing the customer and a positive experience.

Being customer-centric means having the right digital systems and the right number and appropriately skilled/trained employees who are capable and empowered to operate and maintain the distribution system, respond to outages, and communicate effectively with customers. The main Investment driver is to bring sustainable value through process improvements and wise investments in technology, while enabling longer term cost avoidance and improving employee morale. Milton Hydro anticipates the following benefits and outcomes of the Investment:

- Better enable employees to respond to customer inquiries in a more expeditious and complete manner;
- Reduce operational cost through efficiency and reduce error, increase accuracy;
- Enable Milton Hydro to better support its growing community through the scalability of digitally modernized processes and workflows;
- Reduce employee fatigue and increase employee satisfaction by refocusing on higher value-add tasks.

Investment Description

The Investment involves the identification of opportunities and the development of RPA bots (also known as digital workers), which includes target state process design, solution design, bot development, testing, go-live and knowledge transfer.

The RPA combines the power of artificial intelligence and machine learning to deliver software bots that complete repetitive tasks and additional workload that burden staff and don't provide high value to the business. More particularly, RPA captures data and automates the process of turning unstructured content into structured, actionable data. RPA enables automation through pre-configured workflows and system rules.

Milton Hydro will invest in RPA technology capabilities to identify and prioritize various automation opportunities based upon business value, resource requirements and costs, among other things. It is expected the Investment will unburden Milton Hydro's workforce from mundane work to focus on tasks that empower them, making the utility a faster, more flexible enterprise that drives business results – work smarter, not harder. The Investment is also expected to facilitate better data sharing across disparate systems, which will better enable employees to respond to customer inquiries in a more expeditious and complete manner.

Phase I: Identification of Opportunities

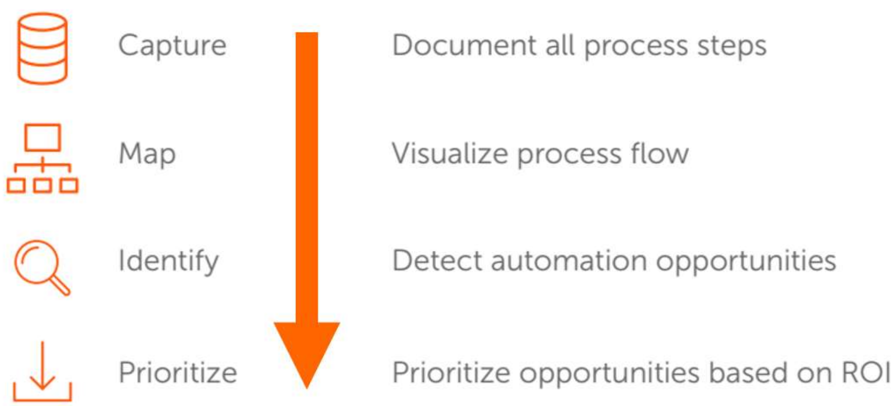
As part of the initial phase of the Investment, Milton Hydro and the successful RPA vendor will conduct a discovery phase across its existing processes and key business areas to identify and select suitable opportunities (e.g. repetitive, administrative and high frequency tasks) for process automation to automate manual and mundane tasks (e.g., billing data entries and regulatory reporting). This phase includes a people-process review, as well as a review of existing software to identify automation opportunities and constraints to ensure full value of the Investment is maximized.

Based on the analysis conducted by PwC as part of the IT Roadmap, Milton Hydro anticipates that there are multiple opportunities exist that can be automated. These opportunities will be selected for implementation and prioritized based on the value each automation opportunity brings to the utility and its customers, resource requirements and costs. Currently, Milton Hydro identified the following software and programming that the RPA would have to navigate and interact with to gather data and enact processes:

- Northstar CIS
- Geographic Information System (GIS)
- Enterprise Resource Planning (ERP)
- Outage Management System (OMS)
- MS SQL DB
- Oracle DB

- Human Resources Information System (HRIS)
- Advanced Metering Infrastructure (AMI)
- MS Office
- Cloud Solutions

A simplified process diagram depicting the discovery phase is presented below.



Phase II: Development & Implementation

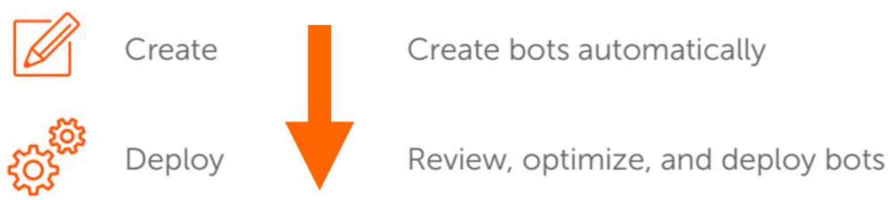
Once Milton Hydro selects automation opportunities, it will deploy RPA bots to achieve the highest return on investment (ROI) potential, while maximizing automation capabilities in a guided, sustainable and scalable way.

The RPA bot creation follows a road map identified in Phase I. Cognitive technologies allow the bot to ‘think’ on its own, as to how to connect/work to be efficient. When it isn’t successful, it tries a different path/access/etc. These technologies follow a standard concept for software development building on the waterfall framework, with the agile principle of Fail Fast, Succeed Sooner.

One of the major benefits of the RPA discovery is it doesn’t have preconceived notions on how something should be done – it looks for the most efficient and accurate process to accomplish the task. Because its ‘thinking’ knows no boundaries, automation opportunities are not limited to ‘human’ thinking, and, as such capable of discovering further automation opportunities that may have not been thought of in Phase I.

RPA bots utilize machine learning to identify and classify content, at the same time, learning from ‘human’ input. The bot then works with the data and any associated files in accordance with rules-based business processes. Through applied analytics and intelligent automation, the bots interact with systems the same way humans do. All process interactions (between RPA bots and humans) are monitored and managed and reviewed for optimization.

A simplified process diagram depicting the development phase is presented below.



Costs

The cost of the Investment is $320,440 in 2023. Milton Hydro developed its Investment’s budget relying on the IT Roadmap. As discussed previously, PwC developed cost estimates associated with, among others, the Investment, identifying potential solution options and then baselining the estimates based on the options, as well as PwC previous experience. The Investment costs include discovery activities to identify suitable automation opportunities and the development of an RPA automation bot that include target state process design, solution design, bot development, testing, go-live, and knowledge transfer. The breakdown of the Investment’s costs is presented in the table below.

Scope	Cost
RPA Phase 1 - Discovery	$120,000
RPA Phase 2 - Implementation	$145,000
Labour	$55,400
Total	**320,440**

Cost Savings/Cost Avoidance/Return on Investment

While Milton Hydro recognizes that not all opportunities and subsequent benefits will result in some form of financial gain, it is important to recognize other non-financial benefits, such employee satisfaction or meaningful customer engagement.

Cost Savings/Cost Avoidance

Substantiating inefficiency is difficult and relies heavily on the assessment of an employee's time to complete a task and assumption that it can be completed more quickly, with the same or better accuracy implementing a different methodology or technology.

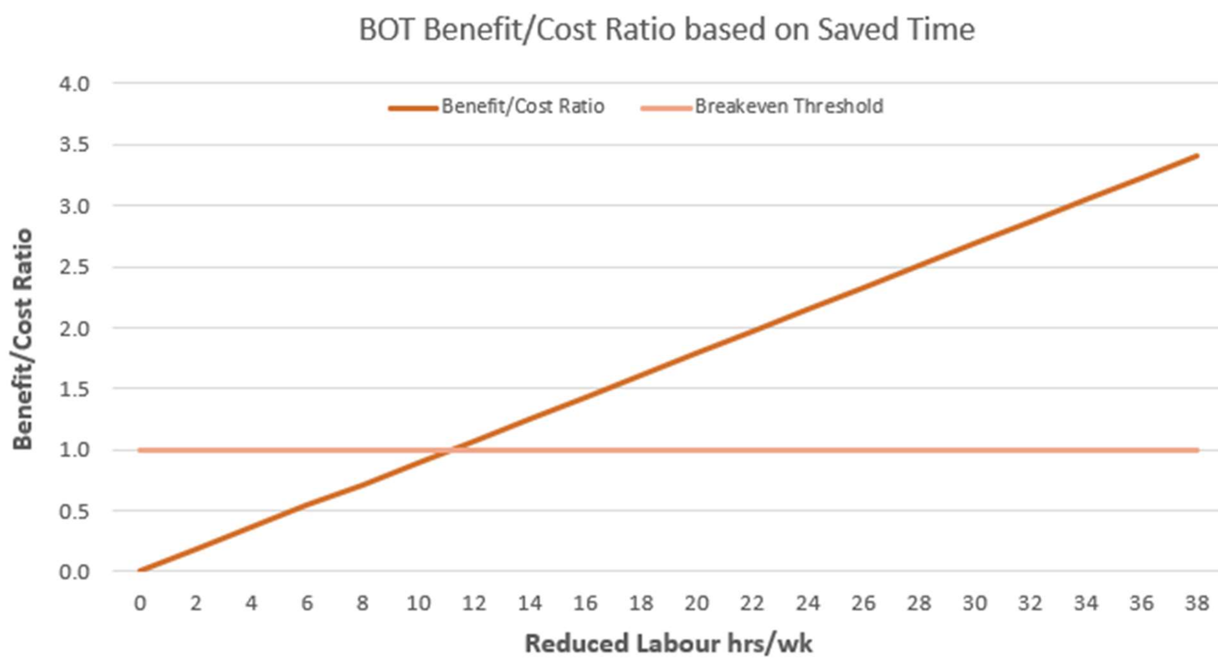
Milton Hydro deems any potential cost savings resulting from inefficient processes being corrected will be rolled into other investments such as training so that staff are able to elevate their contributions to operations and provide better customer service or operational value.

Cost avoidance is also difficult to quantity, predict and measure. Milton Hydro believes that wise investments in scalable software and automation that it will be able to delay new employee hires (for instance, hire an additional employee at customer count of 55,000 rather than at 45,000) and hire more specialized roles.

Return on Investment (ROI)

The ROI on the other hand is possible to quantify. The ROI calculation example illustrated below relates to the implementation of an RPA bot. It does not make any assumptions as to what work/process is being accomplished. For the purpose of this illustration, Milton Hydro assumed the following:

- hourly rate $50.00
- 52 weeks/year
- 5-year timeframe (2023-2027)
- Automation cost is $145,000



Note: every hour saved provides additional labour capacity for higher value work

A bot must save 11 hours/week of employee time in order to meet the cost of the initial investment over a five-year period. The ROI for each additional hour for a five-year period that a bot enables efficient processing saves $13,000[2].

[2] 1 hour/week @ $50/hour for 52 weeks per year for 5 years = $13,000/year

Constraints

Milton Hydro identifies the following constraints:

Constraint	Mitigation Plan/Action
Lack of qualified internal resources with working knowledge of business automation tools	– Identify and train/upskill internal resources to support post-implementation (knowledge transfer) to increase familiarity with automation technology
Lack of internal resource availability for implementation of automation tools	– Assignment/allocation of internal resources assigned throughout project – Early identification of key resources and services/functions impacted by their secondment to the project – Commitment from appropriate Managers for secondment – Identify suitable resources to backfill short term void in IT team
Duplicate effort with other parallel initiatives	– Identify and align key stakeholders on short- and medium-term company initiatives during the initial process discovery – Select automation candidates that are not being addressed by other initiatives (e.g., HRIS or ERP)
System Constraints – lack of Application Programing Interface (API)	– Leverage system APIs within the automation tool solution to provide automation robustness

Risks

Because the Investment will have a broad impact on company operations, there are specific risks that may arise.

Risk	Mitigation Plan/Action
Project cost over-run	– Clearly define scope/statement of work – Ensure contracts have clearly defined parameters for scope creep and/or managing waterfall development – Strong financial terms, e.g., fixed fee, or incentive for completion – Alignment of key stakeholders to schedule and staff commitment for project support involvement (interviews, meetings, testing, etc.) – Dedicated project manager that applies good project management practices – Introduce a contingency to allow for unforeseen cost overages – Capital costs to include back-fill resources
Stakeholder buy-in	Develop and implement a communication plan to increase key stakeholder buy-in, including the identification of a robust change story and complete a stakeholder analysis to identify influencing strategies

Risk	Mitigation Plan/Action
Change Management	Whenever there is a change to an environment, there is a spectrum of responses from welcoming to resistance. – Recognizing the breadth of impact this project will have on the company, a formal change management plan for this project should be identified, that clearly delineates each function and staff member that is affected. – How staff respond to change is both an individual response, as well as a cultural response; both need to be part of the change management plan. – Written procedures need to be developed in support of the new processes, shared and stored where they are easily accessed. Change management strategies across all functional departments will be managed by the project lead.
Technical risks – automation tool knowledge retention	Build training material and not rely on a single internal resource for automation tool implementation, training or administration.
Process workarounds preventing full use of automation potential	Foster a culture of automation with all Milton Hydro employees to encourage full utilization of tools provided.

Implementation Work Plan & Resources

In 2023, Milton Hydro plans to launch RPA project, recognizing the possibility that more than one automation opportunity will be deployed. Process Owners identified during the discovery phase will be involved with individual project implementation and the processes specific to each project.

Process owners will also be required to support automation tool design to ensure users requirements are achieved.

Milton Hydro's Process Improvement Officer will lead this Business Process Automation program. It is anticipated that the project leader will dedicate 50% capacity to manage the overall project and execute change management strategies to sustain benefits.

Below is a high-level work plan for a sample RPA project within the program to illustrate monthly milestones and respective resource requirements.

Activity	2023												Resources				
	J	F	M	A	M	J	J	A	S	O	N	D	Vendor	Process Owners	IT SME	Procurement	Senior Mngt
Project Kick-off													●	○	○	-	-
Discovery													●	○20% FTE per function	○20%	-	-
Opportunity ROI													●	○	○	-	-
Opportunity Selection													-	○	○	-	○
Target State Process Design Document (PDD) development													●	○	○	-	-
Solution Design Document (SDD) development													●	○	○20%	-	-
Build Solution													●	○50% FTE selected sol'n	○20%	-	-
User Acceptance Testing (UAT) including refinements													●	○50% FTE selected sol'n	○	-	-
Go-live with Hypercare													●	○50%	○	-	-

Activity	2023												Resources				
	J	F	M	A	M	J	J	A	S	O	N	D	Vendor	Process Owners	IT SME	Procurement	Senior Mngt
														FTE selected sol'n			
Training and Knowledge Transfer													●	○50% FTE selected sol'n	○50%	-	-

● Milestone Accountability

○ Milestone Responsibility

Building Renovations

With a continuously growing customer base and the resulting need for additional employees, Milton Hydro decided to improve its space utilization across the office portion of the premises. To assist Milton Hydro to develop such plans, in 2021, the utility retained a third-party expert, Cresa, to develop a Strategic Facility Plan (SFP) with recommendations to address the utility's needs and requirements.

Cresa (i) reviewed and assessed the current layout of the building as well as Milton Hydro's forecasted FTE growth projections, (ii) identified future requirements for the premises and (iii) developed a feasibility plan to accommodate a control room operations, the forecasted FTE growth, and other needs of Milton Hydro and its customers, such as relocating a customer service desk[1]. More specifically, the SFP reports provides the following three-phase feasibility plan to address Milton Hydro's near and long-term business objectives in connection with the improved space utilization over the next five years:

Phase I – Control Room and FTE Growth - $1,111,882

The following outlines the scope of Phase I work:

- [redacted]
- Add new workstations and offices [redacted]
- Add additional hoteling on the ground floor for Lines.
- Add informal collaboration spaces in various open areas in the space plan

Phase II – Relocate Customer Service Desk - $369,288

- Milton Hydro determined that the location of the customer service department including the Customer Service Desk needs to be relocated from the 2nd Floor to the 1st Floor.
- The elevator near the service desk does not function properly, is very small and operates exceptionally slowly. There is a large staircase that customers would otherwise need to use to get to the customer service counter.

[1] The SFP can be found in Exhibit 2 Attachment 2-2 of Exhibit 2, Appendix I. Cresa Strategic Facilities Plan.

- To address these challenges and provide a better customer service experience, Milton Hydro determined to relocate its Customer Service Department to the ground floor. This will enable the utility to provide better customer service in keeping with one of its strategic themes of being customer centric, further discussed in Exhibit 1 sub-section 1.2.4. Strategic Themes for Milton Hydro 2.0.
- In response, Cresa prepared a feasibility plan and developed a Class “D” estimates to relocate the Customer Service Desk to the ground floor.

Phase III – Exterior Window Replacement - $747,500

- In the SFP, Cresa indicated that while a detailed building condition assessment was not requested as part of scope of the report, given the age of the building, Milton Hydro should start planning for proactive window repair and replacement.
- The building was constructed in 1991 which makes the building approximately 31 years old. Milton Hydro has advised Cresa that the windows in the building are original. Windows typically have a useful life of 20 to 30 years.
- Reviewing the outside of the building, it appears that some of the seals are failing. To cover the cost of removal and installation of new windows, Cresa recommends a budget of approximately $750,000. The window replacements can be staged over time.

Following the release of the SPF, Milton Hydro analysed the proposed three-phase feasibility plan, and accepted Cresa’s recommendations. As a result, Milton Hydro had to refine its Facilities budget over the 2022-2027 period as follows:

As part of its Phase I Implementation Plan

In 2022, Milton Hydro plans to implement the Phase I of the SFP. More specially, Milton Hydro will invest approximately $1,100,000 to build a control room[2] and add new workstations and offices to accommodate forecasted FTE growth [redacted] Milton Hydro also plans to add additional hoteling on the ground floor for Lines; and informal collaboration spaces in the open areas of the plan. In the SFP, Cresa identified that the current layout of the building provides assigned seating for 63 employees. Based on Milton Hydro's FTE projections, by 2023, the utility will have 83 employees that will require 71 seats and by 2026, the utility anticipates having 93 staff that will require 80 seats.

The utility plans on issuing a Request for Proposal in Q2 2022 and completing the renovation work by the end of 2022 so that the new renovated space is used and useful by the end of that year.

As part of its Phase II Implementation Plan

In 2024, Milton Hydro plans to invest approximately $370,000 to relocate its customer service desk from the second floor to the ground floor to provide a more customer centric experience for visitors.

As part of its Phase III Implementation Plan

Milton Hydro will have the current state of the windows professionally evaluated to determine when replacement work should be completed. The utility expects to incur costs associated with replacing its windows in 2024 and 2025 with the goal of completing all the work by the end of 2025.

[2] For further details on the business case for the control room and the estimated construction capital costs, refer to Exhibit 4 sub-section 4.4.2.4 Network Control Room Operations.

Overview

Milton Hydro Distribution Inc. (MHDI) services the Town of Milton, one of the fastest growing communities in Canada with 42,270 customers. To support its growing community, Milton Hydro's average fixed assets grew by $25,684,730, or 28.2% (2016 to 2023). Milton Hydro is no longer a small utility, and it needs to operate with proper systems and tools to manage its assets, customer expectations and future needs as the large utility it has become.

Since 2014, Milton Hydro has been outsourcing its control room functions to other Ontario utilities. As this arrangement no longer meets the utility's and its customers' needs and objectives, in 2021, Milton Hydro undertook a thorough strategic analysis to:

- determine the most efficient and cost effective way to operate its constantly evolving distribution system in a safe and reliable manner,
- support the capability to restore electricity as efficiently as possible,
- meet growing customer needs and expectations, and
- be future ready, including having the ability to manage the increasing number of Distributed Energy Resources (DERs).

To assist with its analysis, Milton Hydro retained a third-party expert, AESI, to undertake a feasibility study of costs and benefits of implementing an in-house control room as compared to the costs and benefits of various outsourcing and hybrid models, among other things. Based on the comparison of the size, complexity, and age of MHD's electrical system to similar utilities in Ontario, AESI concluded that MHDI is at the stage where a 24x7 control room will provide significant benefits to the utility and its customers.

Relying on its strategic objectives and needs, as further discussed in Exhibit 1, section 1.2, AESI's control room feasibility study findings and customer needs and preferences, Milton Hydro assessed the following three alternatives:

1. 24/7 in house control room;
2. In-house day-shift control room operations and on-call after hours (SCADA in operator's home);
3. Outsource 24/7 coverage.

AESI's report included cost estimates for construction and operation for each of the alternatives. Milton Hydro concluded that the most prudent alternative, yielding best results and benefits to the utility and its customers, meeting utility's objectives and customer expectations, today and in the future, is to have a 24/7 in-house system control room. Milton Hydro rejected a hybrid approach (which is Option 2 above) as it was impractical in nature and presented risks relating to employee fatigue, disengagement and burn out. The analysis of a hybrid approach also demonstrated zero cost benefit to customers. By year five, Option 1 saves approximately $100,000 or 5% in operational costs over Option 3. By Year 10, operation savings and net value to the customer is greater than $600,000.

Milton Hydro also thoroughly assessed the outsourcing option with the 24/7 coverage requirements. Milton Hydro undertook an RFP process to solicit proposals from various proponents to provide 24/7 control room coverage. Following a methodical evaluation approach to assess the received proposals, Milton Hydro concluded that none of the proponents were in a position to meet clearly defined RFP objectives and satisfy continuously growing needs of the utility and its customers.

Milton Hydro plans to construct a control room within its facilities in 2022, along with the hiring and training of two control room operators. Late in 2022, four additional operators will be recruited to start in January 2023.

Staffing a 24/7 system control room requires competent staff that understand the distribution system and its operating systems, and how to manage it all safely and in a timely manner, covering a full 168 hour week. Operators need to be fully present and engaged. Everything from ergonomics to the staffing compliment is considered to maintain a safe operational environment and healthy team. Based upon AESI's report and providing balanced coverage, Milton Hydro will build a team of six shift operators and a supervisor.

Background

In 2014, Milton Hydro contracted out its system control room functions to Guelph Hydro. The expectations were that the service would reduce power restoration times, provide for more timely after-hours outage response, save capital and OM&A costs, and support MHDI's growing, dynamic distribution system, while providing better information during outages. As Milton Hydro's capabilities grew in SCADA/OMS, real time information became available to support an outage map and twitter communications for customers. Guelph Hydro was not able to accommodate this request and Milton Hydro had to look for another service provider.

Since 2017, Milton Hydro entered into agreement with Burlington Hydro to provide control room functions. Burlington Hydro has provided control room services during regular business hours and ad hoc support after hours depending on operator availability.

Both service providers helped Milton Hydro achieve their system control room services objectives for the contracted time periods; however, a strategic review established that the current level of service would not adequately service Milton Hydro or its customers going into the future.

Areas of Strategic Consideration:

- MHDI's growing distribution infrastructure system and customer count;
- Ageing asset population;
- The increase in the number of smart devices in the field;
- Rising customer expectations;
- Enhanced safety and reliability; and
- Anticipated increase in DERs.

In less than a decade, Milton Hydro has experienced evolution from no system control room functionality to today's system and business requirements and customer expectations. The challenges are compounded when electricity's future of DERs and Distribution System Operator (DSO) functionality is considered. The review and evaluation of Burlington Hydro's current service level concluded that MHDI has outgrown its current contract service delivery model with Burlington Hydro and must look for a more robust solution.

As a result of this review, Milton Hydro engaged AESI to conduct an assessment and feasibility study as to:

1. Economic and benefit analysis to operations and customers for various system control room service delivery models;
2. Costs to construct and operate an in-house System Control Room and various operational alternatives;
3. Industry's future and need to manage DERs and operate as a DSO.

Investment Needs and Outcomes

Investment Needs

Since control room functionality was first provided, Milton Hydro's customer base has grown 20% and will continue the same growth trajectory to 2031. Milton Hydro's assets have also increased; from 2016 to 2023, average fixed assets grew by $25,684,730[1], equating to a 28.2% increase. Milton Hydro is no longer a small utility and it needs to operate with proper systems and tools to manage its assets and customer expectations as the large utility it has become.

With the capital investments planned in the 2023-2027 rate period, the complexity, capabilities and functionality of the Milton Hydro distribution system will increase with the addition of new automation equipment. It is prudent to maximize the value extracted from these investments.

As of December 31, 2021, Milton Hydro's customer count is 42,270. Table 1 identifies Milton Hydro's peers, Ontario LDCs with more than 30,000 customers and whether they have in-house system control rooms.

Table 1: Utilities with more than 30,000 Customers and In-house Control Rooms

Distributor	2020 Customer Count	In-house Control Room Y/N
Essex Powerlines Corporation	30,661	No
Sault Ste. Marie PUC Distribution Inc.	33,751	Yes
Bluewater Power Distribution Corporation	36,916	Yes
Brantford Power Inc.	40,662	No
Newmarket-Tay Power Distribution Ltd.	44,187	Yes
Greater Sudbury Hydro Inc.	47,865	Yes

[1] Fixed assets: 2016 = $88,574,495; 2023 = $113,581,019

Synergy North Corporation	56,887	Yes
Niagara Peninsula Energy Inc.	56,973	No
Waterloo North Hydro Inc.	58,438	Yes
Oshawa PUC Networks Inc.	59,486	Yes
Entegrus Powerlines Inc.	60,587	Yes
Energy+ Inc.	67,303	Yes

As can be observed from the table above, most of Milton Hydro's peers do have an in-house control room. Milton Hydro has reached a customer count whereby other utilities have an in-house system control room.

In general, across the broader general marketplace, there is a growing trend of increased customer's expectations today than previously. The electricity sector is not immune. Not only are customer expectations high with respect to having reliable electricity at their fingertips, but customer requirements will change, and the high expectations will remain the same. For example, as electric vehicle (EV) adoption increases, customers will expect that they can charge their vehicles when they want and how they want, not understanding how the increased electricity demand impacts the system's assets. Their expectation of service will remain consistent to their previous experience. A system control room will enable Milton Hydro staff to be better able to respond to issues as they arise, e.g., transformer overloading, and manage increased electricity demands with more control.

The sophistication and evolution of the electricity distribution system to smart grid and inclusion of DERs is no longer a futuristic concept – they are a real part of today's operations and an even bigger part of the future as the market and the IESO DER Roadmap moves forward. From commercial and industrial customers with large storage battery systems to residential solar installations, LDCs, like Milton Hydro, are navigating the management of utility and customer owned DERs. The volume of these installations will only increase as the market moves forward on the Federal government's GHG reduction initiatives, including Net-Zero and Net-Zero Ready building standards.

In order for the provincial grid system to be able to manage the future magnitude of electricity inputs, the system operations function must disseminate down to a regional level. This will require local LDCs to implement similarly sophisticated communications and controls currently utilized by the IESO and transmission utilities, making them regional DSOs. Additionally, distribution system operators will require a different understanding of their local grid and training. The success and stability of the future provincial grid is contingent on reliable and timely communications between the IESO and DSOs, and the DSOs having the flexibility to manage and respond to the varying customer electricity demands.

Over time, Milton Hydro's desired system control room functionality has been evolving with system and customer growth, and ageing assets. Today's consideration must also include the perspective of future needs utilizing increased automation of field assets to meet expanding customer expectations.

In AESI's experience, as the electrical system managed by the utility increases in size, complexity and age, particularly in an area with a growing population and ongoing construction and expansion, a 24/7 control room increasingly improves the efficiency and accuracy of the utility's response and provides benefits to its customers in terms of quicker resolution of outages and response to emergency calls. This is of paramount importance to ensure that Milton Hydro operates its system in a safe and reliable manner and restores power outages as efficient as possible.

An in-house system control room will increase Milton Hydro's operational resiliency, improve the utility's ability to safely operate the distribution grid delivering reliable electricity, support the capability to restore electricity as efficiently as possible, and position Milton Hydro to be 'future ready'.

Investment Outcomes

The investment outcomes from an in-house system control room can be tied back directly to the OEB Renewed Regulatory Framework for Electricity (RRFE):

- Customer Focus
- Operational Effectiveness
- Public Policy Responsiveness

- Financial Performance

Customer Focus: services are provided in a manner that responds to identified customer preferences

In the fall of 2021 Customer Engagement activities, both Residential and C&I customers strongly supported outage reductions (time and duration) and increasing reliability. In-house system control room functionality and service contribute to Milton Hydro's customer service objectives by:

- Ensuring continued capability to receive and respond to trouble calls from customers and/or external stakeholders
- Maintaining the capability to effectively manage, prioritize and resolve multiple concurrent system issues impacting customers
- Providing relevant and timely outage information to customers, such as estimated outage restoration times and other situational information relating to system outages
- Operators actively providing inputs for continuous system improvement on customer engagement processes and operational efficiency

Customer benefits from the improvement of SAIDI/CAIDI are discussed in Alternatives and Evaluation. These improvements directly relate back to having a positive impact for the customer by reducing economic losses as understood by using ICE calculations.

Customers also believe that Milton Hydro needs to invest to be 'future ready' to support their needs. Having system control room functionality will ensure that DERs can be connected and supported properly, as well as having the distribution system operate in a reliable manner, meeting the increased demand with the influx of EVs and the variable demands of net zero and net zero ready homes.

Operational Effectiveness: continuous improvement in productivity and cost performance is achieved; and utilities deliver on system reliability and quality objectives

An in-house system control room will contribute to Milton Hydro's reliability objectives (e.g., SAIDI, SAIFI) by:

- Reducing the likelihood of a complete or partial stand-down of planned and unplanned field work and the likelihood of cascading outages resulting from interruption to visibility over the distribution system
- Ensuring compliance with requirements relating to system restoration planning outlined in Chapter 5, Section 11 of the IESO's Market Rules

An in-house system control room will contribute to Milton Hydro's safety objectives by:

- Providing seamless visibility over the distribution system, thereby reducing the likelihood of worker/public injury resulting from loading issues and inadvertent energizing of equipment
- Ensuring efficient administration and application of the Utility Work Protection Code (UWPC)
- Maintaining compliance with Ontario Regulation 22/04 (Electrical Distribution Safety) through timely reporting of serious electrical incidents involving Milton Hydro plant.

Public Policy Responsiveness: utilities deliver on obligations mandated by government

An in-house system control room will contribute to Milton Hydro's public policy objectives by consistently meeting OEB-mandated service quality targets with respect to Emergency Response (Distribution System Code, s. 7.9).

With stakeholder input, the IESO developed and has published the DER Roadmap that sets out goals, objectives, initiatives and timing for DER integration into electricity markets. The integration activities planned from now until 2026 will address the challenges and opportunities in three key areas: wholesale market integration, transmission-distribution coordination and enabling non-wires alternatives. An in-house system control room will enable Milton Hydro to participate in this 'new' electricity market.

Financial Performance: financial viability is maintained; and savings from operational effectiveness are sustainable

The long-term financial viability of an in-house control room is discussed in the Alternatives and Evaluation.

Investment Description

System Control Room

Within Milton Hydro's office at 200 Chisholm Dr, there is space that can accommodate a system control room. AESI reviewed and assessed the space and concluded that it is suitable for control room operations. AESI prepared a simplified drawing of the proposed control room layout, with areas for two operator consoles and a war room with a supervisor's desk and a long table for holding SCADA/OMS workstations and discussions. The system control room would operate 24/7 with six operators and a supervisor.

In 2022, Milton Hydro will establish a system control room with the construction of new control room office space and a control room war room. Milton Hydro will issue an RFP to select appropriate vendors to complete the work.

The space is approximately 12 meters by 10 meters and would be divided into two rooms: system control room and war room, both would have fire suppression facilities. The system control room would have controlled access, along with HVAC and lighting controls and is large enough for two operator consoles. The war room would house the supervisor's area and a large multi-purpose table and chairs. Located at one end of the table will be three SCADA/OMS view only workstations and monitors. There is also space designated for the placing and pinning paper maps in each room. Additional details are outlined in AESI's report.

Until the new facilities are constructed, Milton Hydro will use a temporary location to house its control room equipment and staffing compliment.

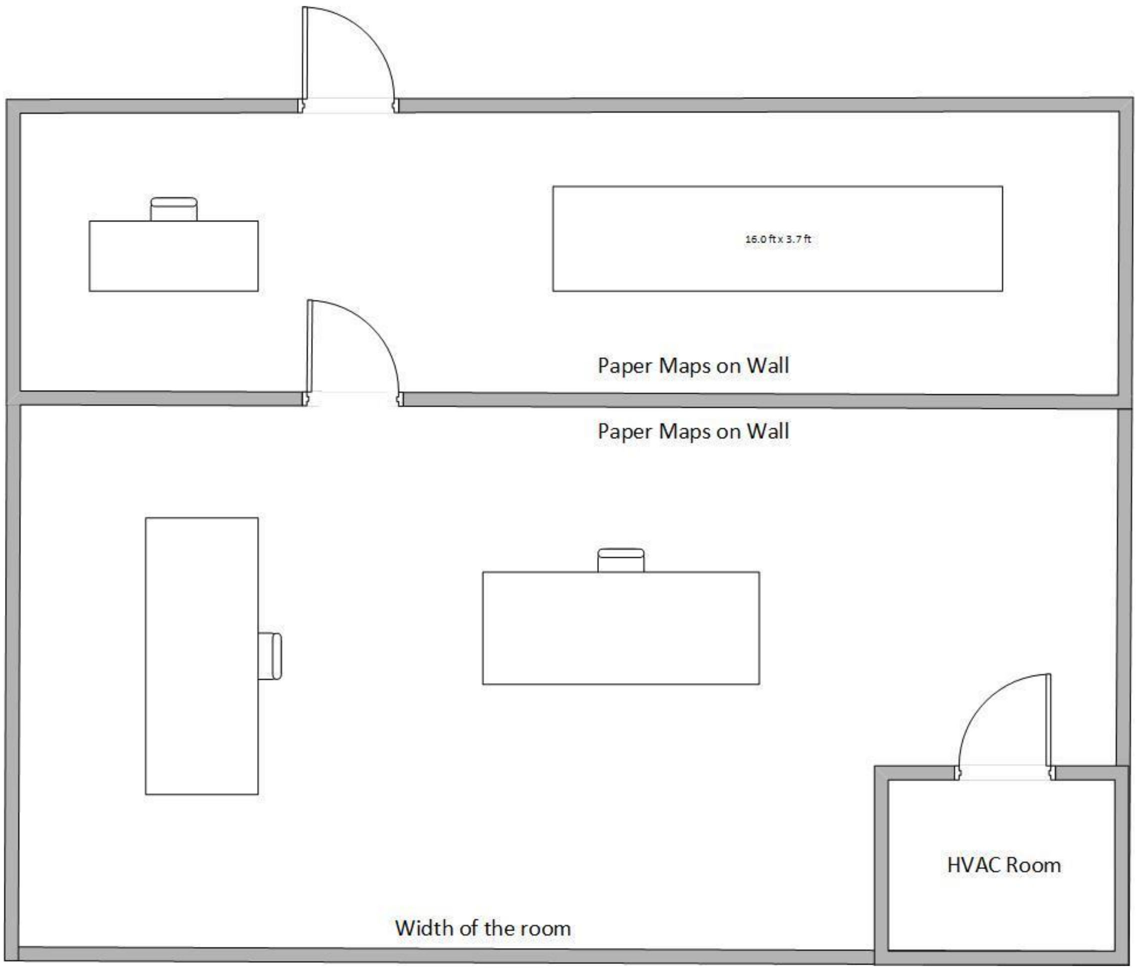


Figure 1: Basic control room layout.

Staffing

A system control room is a complex, fast paced environment that requires constant vigilance to be able to monitor, identify alerts and respond in a timely and safe manner with consistent and fluid communications. To support operators in a demanding and unpredictable environment, great effort goes into creating an ergonomic and operator-centric environment from lighting and operational workflow that will facilitate ease of movement across activities of different screens and operating systems and maps and desks.

The same consideration must be given to the level of staff so that the system control room operators are engaged and alert and the system operations has proper coverage at all times.

There needs to be adequate resources to properly deliver 24/7 coverage without employee fatigue, disengagement or burn out.

AESI presented various staffing scenarios. Milton Hydro's consideration focuses on maintaining a safe operations environment and positive and healthy team. The staffing compliment must take into consideration of a full 168 hour week, training and vacation time, times of additional need (large outage events or switching orders), and supervision/ management.

Utilities that reach the need to have a 24/7 control room typically have enough maintenance, construction, and disconnects/reconnects to warrant two operators during business hours (when the majority of this activity occurs) and one operator outside of business hours (i.e., night shift and weekends) when the system is typically less busy. This schedule is typically covered by six operators and one supervisor.

There are many approaches for scheduling the six operators, however they all center around the following concepts:

1. Ensuring there is always at least one operator on desk.
2. Ensuring there are two operators on desk during busy times – typically during business hours.
3. Having spare operators to cover vacations, training, etc.
4. Ensuring that each operator averages out to around 40 hours per week over the course of the year.

Based upon AESI's report and Milton Hydro's needs and objectives, the utility will build a cohesive team of six shift operators and a supervisor. Milton Hydro will hire two system control room operators in the fall of 2022, and then train them on the distribution grid and infrastructure, the outage management system, operating procedures, etc. Milton Hydro will use Lean Six Sigma methodology to develop new control room operating procedures for best-in-class efficient processes. Milton Hydro plans on commencing recruitment for the remaining four system control room operators in the fourth quarter of 2022, with a January 2023 start date.

Investment Costs

System Control Room

As part of AESI's report, they developed a detailed quote as to the costs to construct and commission a system control room. AESI assessed similarly sized utility system control rooms.

General requirements for building renovations and requirements for software, hardware, communications equipment, and technical specifications were considered.

AESI issued a specification to build a control room, as previously described, to Black and MacDonald, who is familiar with MHDI's building. They also requested a budgetary quote from Tresco for two standard consoles. AESI prepared an estimate for the remaining items that would be included in the overall cost of the control room.

The capital costs* for establishing the system control room ready for use are summarized as follows:

Table 2: System Control Room Investment Costs

Control Room Construction	$352,000
Operator consoles (including delivery and installation)	$70,000
Fire Suppression Installation	$20,000
Furniture, additional workstations, phones, radio, cables	$25,000
Adequate Resiliency and Cyber Security	$45,000
Total	$512, 000

* costs do not include applicable taxes

In 2022, Milton Hydro will invest $512,000 to build and furnish its system control room in the [redacted]

Staff

The staffing costs are based upon an operator's annual salary at $109,000 and fully burden rate of $212,550. The total annual cost for six operators and a supervisor is $1,479,675.

Additional Costs

Additional costs for networking costs for redundancy and resiliency, and operations of the control room equipment total $53,300 per year

Table 3: Total Annual Operating costs

Six operators and a supervisor	$1,532,975
Other costs	$53,300
Total	$1,586,275

Risks

If an in-house control room investment is not made at this time, Milton Hydro runs the risk of:

- Investing money in out-sourced solutions that build no internal capacity
- Having to make the investment in future, at a greater expense
- Not being able to respond as quickly or easily to customers' changing demands
- Not being able to respond to customers' requests for DER support
- Can potentially increase risk of exposing workers and public to unsafe electrical conditions by not having dedicated monitoring and control resources for its dynamically changing system
- Not investing in continual Operator feedback for system flexibility and efficiency

Alternatives and Evaluations

On behalf of Milton Hydro, AESI completed an economic and benefit analysis, considering multiple scenarios for both outsourcing and an in-house system control room, response efficiency, customer loss savings and tangible and intangible benefit analysis for MHD, staff and customers.

AESI presented five options:

1. 24/7 in house
2. Two operators at 36 hours each plus on call
3. Outsource 24-7 coverage
4. In house 5/8 and outsource after hours
5. In house 5/8 + storm call in + on call with field crews on call 86h

The report includes a sixth alternative: the outsource business hours; after hours as required, which is the current SLA for a based line comparison.

AESI's Option 2 and Option 5 were eliminated from Milton Hydro's evaluation. Upon examination and future consideration of longer-term viability, Milton Hydro realized the proposed team structures for these two options were too lean to be sustainable. The likelihood of operator burnout and disengagement was high for critical roles.

Option 1, Option 3 and Option 4 were carried forward for a more detailed analysis.

To properly assess the outsourcing alternative, Milton Hydro issued an RFP for an updated SLA based upon the drivers identified in the Investment Needs and the requirement for 24/7 coverage. Other alternatives were identified in the RFP. The RFP was issued to three utilities: Burlington Hydro, Oakville Hydro and Oshawa Hydro. The SLA outlined Milton Hydro's expectations as to:

- Operator commitment
- Number of SCADA/OMS console desks
- How each SCADA/OMS workstation and operator would be outfitted with the appropriate hardware, communication connects, equipment, operator logs, etc.
- Additional provisions necessary for operators to function effectively
- Specific KPIs for safety, outages, trouble calls, reclosers, working with field crew, monitoring SCADA, maintenance, prepare order to operate/work permit and maintaining operator log

The responses were evaluated using a prescribed methodology with pass/fail thresholds, weighted criteria and scoring (1-10). Information was extracted from this process to build and evaluate the presented alternatives.

Consideration for dedicated operators is valued by Milton Hydro – faster response times will be enabled from immediate proximity to the operating systems and sole focus to the MHDI grid, as well as better knowledge of the distribution system and familiarity with the OMS interface. Knowledge of the distribution system and field devices also enables better communication, direction and safety for the field crews.

Alternatives

Alternative 1 is the complete in-house servicing of the system control room functionality, with 24/7 operator coverage support.

Alternative 2 is a combination of Milton Hydro providing day shift operator coverage in-house, and out-sourcing after hours and weekends.

Alternative 3 is the complete outsourcing of the system control room functionality, with 24/7 operator coverage support.

Alternative Evaluations

AESI used the Interruption Cost Estimate (ICE) Calculator[2] to calculate cost savings based on improved SAIDI/SAIFI/CAIDI numbers; improvements of 10%, 15%, 20% and 25% were calculated. The ICE calculations with the SAIDI/CAIDI improvements were applied to various service coverage alternatives. The 24/7 coverage assumed a 20% average improvement for most lengthy faults.

Table 4: ICE Calculations

Alternatives	**Improvement in SAIDI/CAIDI over Current Service Level**	**Potential Annual Average Savings**
1. 24/7 in house	29.70%	$1,235,000
2. In house 5/8 and outsource after hours	-15.26%	<$0
3. Outsource 24-7 coverage	29.70%	$1,235,000

Using the ICE calculations, the two alternatives that net the highest benefit for customers are Alternatives 1 and 3.

[22] The ICE Calculator is a tool designed for electric reliability planners at utilities, government organizations or other entities that are interested in estimating interruption costs and/or the benefits associated with reliability improvements. It is funded by the Energy Resilience Division of the U.S. Department of Energy's Office of Electricity (OE) under Lawrence Berkeley National Laboratory Contract No. DE-AC02-05CH11231.

Table 5: Comparison of Cumulative Costs* over 5 years

Alternatives	One Time Cost	Annual Staffing Cost	Year 1 total	Year 2 total	Year 3 total	Year 4 total	Year 5 total	Year 10
1. 24/7 in house	$512,000	$1,532,975	$2,044,975	$3,577,950	$5,110,925	$6,643,900	$8,176,875	$15,841,750
2. In-House Day, Outsourced After Hours	$555,500	$774,000	$1,329,500	$2,103,500	$2,877,500	$3,651,500	$4,425,500	$8,295,500
3. Outsourced 24-7 coverage	$117,500	$1,633,100	$1,750,600	$3,383,700	$5,016,800	$6,649,900	$8,283,000	$16,448,500

* The presented costs are drawn from AESI's report and not actual costs received from the RFP process.

Table 6: Comparison of Cumulative Costs and Savings

	Option 1: 24/7 in house	Option 2: In-House Day, Outsourced After Hours	Option 3: Outsourced 24-7 coverage
One Time Costs	$512,000.00	$555,500.00	$117,500.00
Annual Costs	$1,532,975.00	$774,000.00	$1,633,100.00
Potential Annual Customer Benefit	$1,235,064.39	$0	$1,235,064.39
Net Year 1	**($809,910.61)**	**($1,329,500.00)**	**($515,535.61)**
Cumulative Cost 5 Years	$8,176,875.00	$4,425,500.00	$8,283,000.00
Cumulative Savings 5 Years	$6,175,321.95	$0	$6,175,321.95
Net Year 5	**($2,001,553.05)**	**($4,425,500.00)**	**($2,107,678.05)**
Cumulative Cost 10 Years	$15,841,750.00	$8,295,500.00	$16,448,500.00
Cumulative Savings 10 Years	$12,350,643.90	$0	$12,350,643.90
Net Year 10	**($3,491,106.10)**	**($8,295,500.00)**	**($4,097,856.10)**

The sheer loss of any Potential Annual Customer Benefit with Option 2 quickly eliminates Option 2 as a sustainable proposition to achieve and deliver Customer value.

By year 5, the total costs between the Option 1 and 3 is less than 1% and by Year 10, operation savings and net value to the customer is greater than $600,000.

Alternative 1: In-house 24/7 Control Room Services

Milton Hydro will be able to ensure dedicated operators for the full 168 hour week to provide the desired level of service.

Milton Hydro customers and staff achieve maximum benefit from system control room functionality and services.

This solution builds and sustains in-house capacity.

Alternative 2: In-House Day, Outsource After Hours

Milton Hydro will be able to guarantee dedicated operators five days a week, eight hours a day. The desired outcomes from dedicated operators will be achieved, but this accounts for less than 25% of the 168 hour week.

It is highly unlikely to be able to retain system control room services with the desired dedicated resources for after hours and weekend.

There are no Potential Annual Customer Benefit to be derived by Milton Hydro customers with Alternative 2.

This solution builds in-house capacity.

Alternative 3: RFP for outsourcing 24/7 System Control Room Services

Assuming this coverage is provided by dedicated operators, Milton Hydro customers and staff achieve maximum benefit from system control room functionality and services.

If this coverage is not provided by dedicated operators, the derived benefits decrease.

This solution does not build any in-house capacity.

The long-term ROI is not cost effective as Alternative 1.

Appendix B Links

LINKS

- Halton Region Official Plan
- Halton Region Integrated Growth Management Strategy
- Ontario A Place to Grow (August 2020)
- Milton Strategic Plan – Destiny Milton 3 (DM3) (2015-2018)
- Milton Major Transit Station Area & Mobility Hub Study
- Milton Master Transit Plan 2019 – 2023
- Town of Milton Official Plan (OPA31) (2010)
- Town of Milton Council-Staff Work Plan 2020-2023
- Town of Milton Road Projects
- Halton Region Road Projects
- HONI GTA West RIP Report February 2022
- IESO IRRP July 2021
- IESO Northwest KWCG IRRP May 2021
- IESO GTA West Scoping Assessment Outcome Report August 2019
- HONI GTA West Needs Assessment Report, May 2019

Appendix C Milton Hydro's Commitment to Stakeholders

MILTON HYDRO COMMITMENT TO STAKEHOLDERS

We affirm to all our stakeholders that we will conduct our business in a transparent manner with respect and care for the quality of service to our customers, the Health and Safety of our employees and the public and protection of the Environment. We will implement those strategies that build successful businesses and achieve the greatest benefit for all our stakeholders without compromising the ability of future generations to meet their needs.

We will continuously improve our practices in light of advances in technology and new understandings in reliability, safety, health and environmental science. We will make consistent, measurable progress in implementing this commitment throughout our operations.

Highest Standards of Performance, Business Excellence

We will adhere to the highest standards for the safe, reliable provision of services. We will protect our environment, our employees, our customers and the people of the communities in which we do business.

We will strengthen our businesses by making reliability, safety, health and environmental issues an integral part of all business activities and by continuously striving to align our businesses with appropriate balancing of stakeholder expectations.

Goal of Zero Injuries, Illnesses and Incidents

We believe that all injuries and occupational illnesses, as well as safety, environmental and reliability incidents, are preventable, and our goal for all of them is zero. We will promote off-the-job safety for our employees.

We will assess the environmental impact of each facility we propose to construct and will design, build, operate and maintain all our facilities and transportation equipment so they are reliable, safe, and acceptable to local communities and protect the environment.

We will be prepared for emergencies including fire protection and will provide leadership to assist our local communities with their emergency preparedness response capabilities.

Goal of Being an Industry Leader in Minimizing Waste and Emissions

We will strive toward minimal waste generation at the source. Materials will be reused and recycled to minimize the need for treatment or disposal and to conserve resources. Where waste is generated, it will be handled and disposed of safely and responsibly.

We will strive toward minimizing emissions and are dedicated to the elimination of pollutants, giving priority to those that may present the greatest potential risk to health or the environment.

Where past practices have created conditions that require correction, we will responsibly correct them.

Conservation of Energy and Natural Resources, Habitat Enhancement

We will excel in the efficient use of energy, water and other natural resources.

We will manage our land use to minimize impacts on their habitats.

Open and Public Discussion, Influence on Public Policy

We will promote open discussion with our stakeholders about their needs and the service we provide, the materials we use and transport and the impacts of our activities on their safety, health and environment.

We will build alliances with governments, policy makers, businesses and advocacy groups to develop sound policies, laws, regulations and practices that improve reliability, safety, health and the environment.

Management and Employee Commitment, Accountability

The Board of Directors, including the Chief Executive Officer, will receive quarterly reports on pertinent reliability, safety, health and environmental issues and will ensure that policies are in place and actions taken to achieve this commitment.

Compliance with this commitment and applicable laws is the responsibility of every employee and contractor acting on our behalf and a condition of their employment or contract. Management is responsible to educate, train and motivate employees and contractors to understand and comply with this commitment and applicable laws.

George Minakakis, Chair
Milton Hydro Distribution Inc.

Troy Hare, President/CEO
Milton Hydro Distribution Inc.

February 22, 2021

Appendix D Asset Management Plan

Milton Hydro

Asset Management Plan

Issued: November 2021

Prepared By:

Stephanie Meyer, verve

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Manager of Engineering

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1. Introduction

Asset management at Milton Hydro Distribution Inc. (MHDI) is the process of organizing, planning, designing, procuring, maintaining, refurbishing, renewing and disposing of distribution system assets to support the delivery of electricity distribution services. It is a systematic, structured process covering the lifecycle of the distribution system assets.

Prudent asset management aids in the achievement of MHDI corporate goals and delivering on the Ontario Energy Board's (OEB) Renewed Regulatory Framework for Electricity Distributors (RRFE) outcomes, resulting in long-term sustainable value to the consumers.

1.1 Asset Management Considerations and Priorities

To provide service levels that are consistent with its commitment to stakeholders, Milton Hydro manages its assets so that appropriate performance levels are achieved and customer's expectations for safe, reliable electricity delivered at a reasonable price are respected and incorporated into its planning processes. The following considerations help Milton Hydro balance and address the various expectations from an asset management perspective:

- Asset Management should create opportunities for improved efficiencies.
- The activities should demonstrate good stewardship of the distribution system.
- Service delivery should be safe, fair and consistent within all customer groups.
- Any performance improvements should demonstrate a good balance between the achievement of goals and budgetary requirements.
- Maintenance plans should be consistent with good utility practice and incorporate the results from annual assessments and customer needs.
- Capital investment plans should justify proposed expenditures and be able to respond to new priorities and changing capital drivers.
- Annual reviews of asset management processes.

1.2 Corporative Objectives

MHDI's asset management objectives align with MHDI's corporate goals and are implicitly summarized in MHDI's Commitment to Stakeholders:

> "We will adhere to the highest standards for the safe, reliable delivery of services. We will protect our environment, our employees, our customers and the people of the communities in which we do business.
>
> We will strengthen our business by making reliability, safety, health and environmental issues an integral part of all business activities and by continuously striving to align our businesses with an appropriate balancing of stakeholder expectations. The key outcome is maintaining a desired level of customer service at the best appropriate cost."

The key outcome is delivering reliable, safe service through balanced management of stakeholder expectations. Table 1 below shows the linkages between the OEB RRFE Outcomes, Corporate Objectives and MHDI's Asset Management objectives.

Table 1 – RRFE Outcomes—Corporate Objectives—Asset Management linkage

RRFE Outcomes	Corporate Objectives	Asset Management Objectives	AM Objective Measure	AM Objective Target
Operational Effectiveness	Safety	Construct, maintain and operate all assets in a safe manner to meet a goal of zero injuries, illnesses and incidents	1. Workplace Injuries, illness, incidents	1. Zero
			2. ESA Non-Compliance	2. Zero
Operational Effectiveness	Reliability in electricity delivery	Design, build, operate and maintain all MHDI facilities and transportation equipment so they are reliable, safe, and acceptable to local communities.	1. SAIDI	1. SAIDI within range of past 5 year performance
			2. SAIFI	2. SAIFI within range of past 5 year performance
Customer Focus	Stakeholder consultation	Promotion of open discussion with MHDI stakeholders about their needs and the service MHDI provides to ensure asset management plans align with stakeholder expectations	1. Customer Survey	1. Customer survey results (2019): a) Provides consistent, reliable electricity b) Quickly handles outages and restores power c) Accurate billing
			2. DSP consultation	1. > 80% avg agreement with DSP
Financial Performance	Financial integrity and accountability	Timely completion of annual planning, inspecting, reporting and implementation activities	1. investment spending	1. OM&A expenditure +/- 5% to estimate 2. Capital expenditure +/- 5% to estimate
			2. Investment scheduling	3. >80% annual projects/ programs completed on time

RRFE Outcomes	Corporate Objectives	Asset Management Objectives	AM Objective Measure	AM Objective Target
Public Policy Responsiveness	Regulatory Compliance	Ensure responsiveness to public policy requirements and objectives; facilitation of new renewable generation; facilitation of the smart grid	1. Reportable spills to the MOE 2. New REG connected on time	1. Zero reportable spills to MOE from Code 5 events 2. 90%+

MHDI's asset management process identifies four key fundamental drivers of investment:

1. Assets' current state
2. Assets critical to performance
3. MHDI's desired level of service and mandated deliverables
4. MHDI's design and operating philosophies

2. Asset Management Guiding Principles

MHDI utilizes its distribution system assets to deliver services to its customers in the Town of Milton. The distribution system assets are capital-intensive and have a long lifecycle. In order to provide high quality, consistent and sustainable services, MHDI has developed asset management guiding principles to ensure a continual and consistent focus on delivering services in a way that balances risk and long-term costs. The guiding principles establish the core asset management principles that drive MHDI's planning framework.

MHDI guiding principles require that the distribution networks shall be designed, constructed, operated, maintained and renewed in an efficient manner which:

- Supports MHDI's strategic goals and asset management objectives
- Supports the OEB's RRFE outcomes
- Implements MHDI's business plan as documented in the Distribution System Plan
- Complies with regulatory and statutory requirements
    - Health and safety of workers and the public
    - Electricity supply quality and reliability
    - Environmental Protection
    - Good utility practice
    - Financial and IFRS accounting practice
- Effectively controls and balances service levels with asset lifecycle costs and risks

Milton Hydro established a comprehensive system of inspection and measurement as a means of continually assessing its distribution business and achieving consistency with its commitment to stakeholders. System performance reports deliver the information necessary to satisfy the requirements of the OEB Distribution System Code (DSC), as well as Milton Hydro's own internal needs. Milton Hydro has developed reporting mechanisms that are focused on continuous performance improvements that:

- Ensure the availability of long-term capacity to meet the needs of a growing community
- Enable the effective and successful management of all distribution assets
- Fulfill Milton Hydro's regulatory obligations

Milton Hydro regards asset management as a critical driver of the distribution systems' longer-term performance. MHDI management is committed to the asset management guiding principles and ensure that sufficient resources are allocated to support the asset management process. This requires an ongoing investment in resources and personnel to complete the annual planning, inspecting, reporting, and implementation activities associated with the various asset management processes. The quality and consistency of those processes and the resulting data is critical for a successful asset management plan.

3. Asset Management Process Components

MHDI's asset management process begins with a description of how the responsibilities of Asset Management are addressed at MHDI. MHDI has a simplified asset management model that consists of an Asset Owner, Asset Managers and Service Providers.

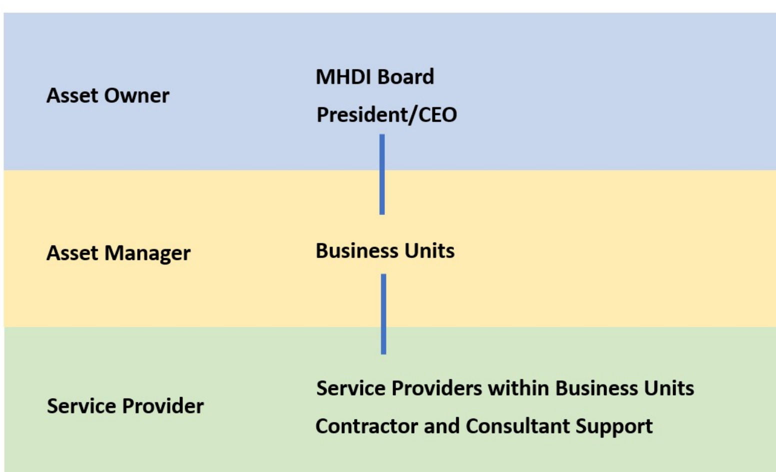


Figure 1 – Asset Management Model

Asset Owner

The Asset Owner can be considered the MHDI Board and the President/CEO. The overall responsibility for MHDI's Asset Management System rests with the President/CEO as delegated by MHDI's Board of Directors. MHDI's Board of Directors is responsible for ensuring high levels of corporate performance through effective management monitoring and strategic guidance. This ensures the Asset Management System is managed effectively.

Asset Managers

The Asset Manager role encompasses responsibility for distribution plant and general plant. MHDI is structured so that its business units (Engineering/Operations, Finance and Information Technology) provide key support for the Asset Management System in these areas.

Business units' heads are responsible for overseeing and ensuring that business unit assets are planned for, specified, procured, installed, operated, maintained, refurbished, renewed and disposed of as appropriate for long term sustainability.

Specifically, the Asset Manager's responsibilities primarily involve risk management and ensuring that:

- The inspection process is organized with assets identified in reasonable zones and segments.
- Inspections and follow-up maintenance are effectively organized and performed.
- Records are accurate and current including those in the GIS.
- Condition analysis is completed correctly.
- Potential Maintenance and Capital Budget recommendations are incorporated into the planning process.
- The condition of the distribution system is reviewed to ensure system reliability efforts are implemented in the most cost effective manner for the short, medium and long term.

Service Providers

The Service Providers are responsible for delivering asset investment programs, to inspect, maintain and operate the assets based on the guidelines set by the Asset Managers. Service Providers (i.e., Lines section, etc.) are groups under control of the Business Unit Asset Manager to which they report to. The Service Provider groups can include external contractors and consultants that support them as required.

4. Asset Management Strategy

The Asset Management Strategy is an essential part of MHDI's effective business planning. At a high level, it links together MHDI's Asset Management objectives with:

1. The levels of service needed to deliver them
2. The work required on the assets to sustain those levels of service
3. The finances needed to support that work

The Strategy is founded on Guiding Principles.

Guiding Principles

- Maintaining current high levels of worker and public safety and environmental responsibility

- Utilizing “good utility practices”, as practiced by a significant portion of the electric utility industry in North America, for distribution system infrastructure design, installation and operation
- Ensuring that all legislative, regulatory and other mandatory requirements together with political, social and economic environments are taken into account
- Optimizing investment plans and asset lifecycle through risk and value assessment methodologies to minimize costs and maximize efficient investment
- Incorporating continuous improvement in asset management system development including new technology adoption where warranted, asset management team and process competencies and capabilities
- RRFE alignment and delivering outputs valued by our stakeholders (customers, shareholder, regulator, etc.)

Table 2 – Linkages of Strategy Practices to Strategic Actions

Strategy Practices		Strategic Actions
1	Responsibility for developing MHDI’s Asset Management System will rest with the office of the President/CEO.	Responsibility for specific asset management responsibilities will be identified and incorporated into staff job descriptions as required.
		Asset Management Objectives shall be linked to MHDI corporate strategy and objectives (stakeholder commitment) and RRFE outcomes.
2	Distribution system infrastructure will be designed, installed and operated based on “good utility practices” as practiced by a significant portion of the electric utility industry in North America.	Annual ESA audits will be conducted to ensure a consistent, systematic and safe application of distribution system design and installation practices.
		MHDI shall utilize deterministic planning techniques for asset utilization and operation of the distribution system.
		MHDI shall utilize acquired engineered construction standards (other LDC or USF) standards, as well as standards developed in-house or specifically for MHDI.
		MHDI will actively participate in Regional Planning studies to develop cost effective integrated planning solutions.
3	Asset procurement will follow North American utility industry specifications and standards.	Field assets shall be specified using relevant CSA, IEEE and ANSI standards.
4	An Asset Register shall be designated to hold asset attribute information and historical records of non-financial information through each asset's lifecycle	The GIS will be the designated asset register for Field Assets attribute information and non-financial information. Linkages will be made with designated databases for custom records applications and enterprise databases for financial information.
		Processes will be put in place to ensure consistent and accurate information flow to/from the asset register.

Strategy Practices		Strategic Actions
5	Asset lifecycle management will balance rate increases with customer value, long term spending stability and corporate returns.	Customers will be surveyed biennially to determine customer values and needs. Service levels will be determined in consultation with the community.
		A sustainable, long term financial plan will be prepared by the VP Finance that covers the Distribution System Plan (DSP) asset management plan expenditure projections.
		Maintenance, inspections and refurbishment programs will be documented and implemented to maximize asset lifecycle value.
6	Assets shall be subject to comprehensive inspection, maintenance and renewal programs.	Asset information will be updated on a continual basis to provide for comprehensive investment decision support.
		Asset inspections will be performed, at a minimum, per OEB schedules as outlined in the DSC.
		Asset maintenance will be performed on scheduled cycle specific to the particular asset group. Where information is available, condition-based maintenance shall be performed on specific assets. Maintenance practices shall follow a combination of manufacturer's recommendations and internally developed practices.
		Asset refurbishment/renewal needs will be based on long term 10 year asset condition assessment studies that incorporate asset lifecycle risk and value.
7	Knowledge-based assessments will be used to determine asset investment prioritization.	Investments will be categorized as mandatory or non-mandatory. Non-mandatory investments will be assessed and prioritized for implementation.
8	Asset plans will cover the forecast period per the DSP and represent customer preferences and expectations for MHDI distribution system development	Asset management plans will be prepared for all major distribution assets. Major distribution system assets will undergo asset condition assessment studies as required.
		Resources (funding, material, labour) shall be sourced to achieve the outcomes required of the investment programs. An annual forward looking projection, covering the period of the DSP, of internal and external resources required will be produced.
		MHDI shall undertake customer engagement activities to ascertain asset plan alignment with customer needs, preferences and values.
9	The asset management system performance will be subject to regular review.	Asset management performance with respect to asset management objectives will be reviewed on an annual basis. Benchmarking with peer organizations shall be pursued.

Strategy Practices		Strategic Actions
		Specific performance measures shall be established to gauge customer oriented, cost efficiency/effectiveness and asset/system operation performance.
10	The asset management process will be subject to continuous improvement.	Asset Management maturity across the organization will be reviewed annually. Action plans of suitable scope and timing will be developed for noted gaps.
		Workflow processes will be reviewed annually to ensure the skills to maintain the assets are fully and clearly understood by the organization.

5. Asset Management Objectives

The objective of MHDI's Asset Management program is to optimize the lifecycle of the distribution system assets configuration of distribution plant, minimizing related risks and costs, while balancing the the optimum level of investment.

Good governance and effective deployment of business systems, processes and human resources are key aspects of this endeavour.

The Asset Management strategy, Commitment to Stakeholders and guiding principles form the foundation for MHDI's Asset Management Objectives, which are:

- Construct, maintain and operate all assets in a safe manner to meet a goal of zero injuries, illnesses and incidents
- Design, build, operate and maintain all MHDI facilities and transportation equipment so they are reliable, safe, and acceptable to local communities
- Promotion of open discussion with MHDI stakeholders about their needs and the service MHDI provides to ensure asset management plans align with stakeholder expectations
- Timely completion of annual planning, inspecting, reporting and implementation activities
- Minimize waste generation, emissions and impact on the environment through prudent asset management and operation.

This forms the high-level philosophy for MHDI's investment program and is implicitly embedded in the MHDI's capital investment planning process and maintenance program. The Asset Management objectives are used to provide guidance to investment planning, including maintenance budget and capital investment proposals.

Identifying, mitigating and managing risk is embedded in the Asset Management Objectives, which supports informed investment decision making. Risks are assessed across all phases of an asset's lifecycle, and drive processes, and resource and training requirements to ensure risks are manageable.

6. PLANNING CYCLE

The process is a cyclical one that begins with a review of system performance and whether current performance meets MHDI's asset management objectives. Asset performance information and annual asset data collection is used to update MHDI's asset register for the investment planning part of the cycle. Performance data normally reflects the previous year's data. Data collection is ongoing as new/replaced assets are added to the system. The Asset Management planning cycle consists of seven steps:

1. Review of System Performance
2. Determination of Asset Inventory condition and augmentation needs
3. Set preliminary budget envelope
4. Establish Investment requirements
5. Develop and prioritize investment portfolio
6. Investment plans and budget approval
7. Investment Plan Implementation

MHDI's Asset Management planning cycle is detailed in the following flowchart.

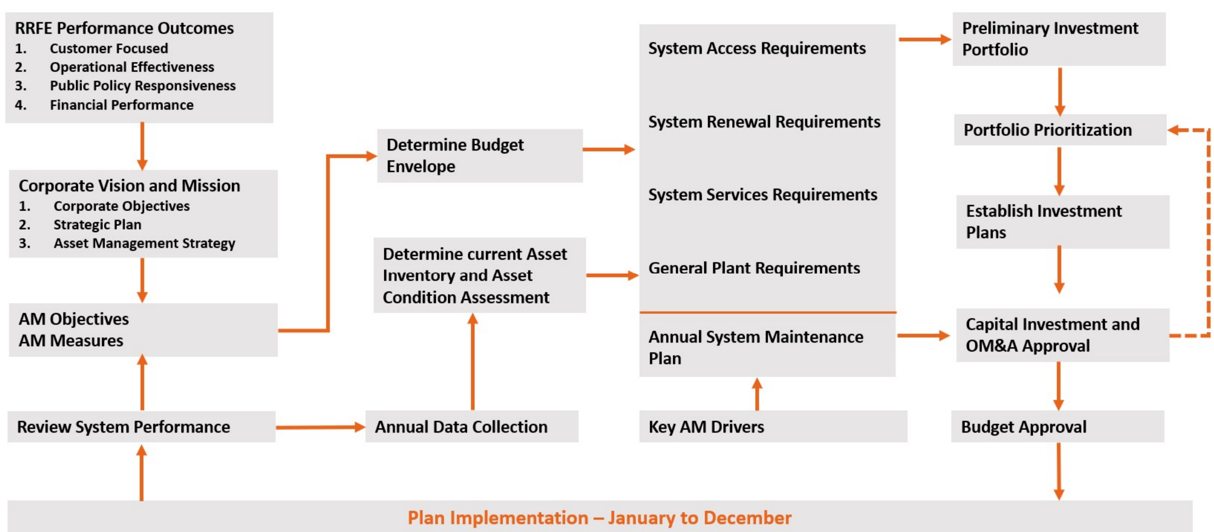


Figure 2 – MHDI Asset Management Planning Cycle/Capital Investment Requirements

7. LIFECYCLE MANAGEMENT

MHDI's Asset Lifecycle Management considers activities that balance asset management performance, costs and risk while avoiding adverse long-term impacts to the organization from short-term decisions. It ensures that asset lifecycle costs match asset lifecycle expenditures to maintain service levels.

The following considerations help Milton Hydro to balance and address the various expectations from an asset lifecycle management perspective:

- Asset Management should create opportunities for improved efficiencies.
- The activities should demonstrate good stewardship of the distribution system.
- Service delivery should be safe, fair and consistent within all customer groups.
- Any performance improvements should demonstrate a good balance between the achievement of goals and budgetary requirements.
- Maintenance plans should be consistent with good utility practice and incorporate the results from annual assessments and customer needs.
- Capital investment plans should justify proposed expenditures and be able to respond to new priorities and changing capital drivers.
- Staff should conduct annual reviews of asset management processes.

Asset lifecycle management is an optimized and sustainable process that maximizes the overall long term value of the asset for the corporation and stakeholders. Asset management plans and activities ensure that assets are:

- planned for
- specified
- procured
- installed
- inspected
- operated
- maintained
- replaced
- refurbished/renewed
- disposed of

8. Risk Management

Milton Hydro takes a systematic approach to identify and mitigate risk to its assets and distribution system, assessing the following attributes of each asset:

- Condition
- Risk exposure
- Age and life expectancy
- Location
- Operational data
- Maintenance

Risk assessments support consistent key decision-making across the organization at all levels, Asset Owner, Asset Managers and Service Providers.

9. System Performance

Milton Hydro operates a distribution system comprised of high voltage networks at 27.6kV, 13.8kV, and 8.32kV. It assesses the performance of its distribution system through monthly tracking of OEB's Service Quality Indicators

(SQIs), which provides a statistical measure of system performance. Milton Hydro's Engineering and Operations staff review the statistical data to gauge ongoing system performance levels, including:

1. changes in reliability levels (SAIDI, SAIFI),
2. failure trends (increasing, decreasing)
3. associated causes, (controllable, uncontrollable)

Corrective action is taken as required. The SQI's are reported to Milton Hydro's Board as part of the regular Board Reports.

Outage data is monitored, and information is accumulated on feeders' performance at the three voltage levels. This data is reviewed and analyzed with attention focused on identifying those causes that negatively impact system reliability and the continuity of supply. Any pattern of system failures that is attributable to the same root cause is identified, analyzed and used to prioritize capital projects and maintenance programs.

10. Asset Register

Milton Hydro's distribution assets are recorded primarily in electronic asset registers. The data from the various asset registers can be displayed geospatially on its Geographic Information System (GIS). The register maintains data (asset attributes) including from the manufacture, make, model, work order number installation costs, and non-financial information, such as inspection history and test results gathered throughout each asset's lifecycle. The GIS also provides primary circuit information such as nomenclature and topology. The asset register provides relevant information for ongoing development and optimization of inspection, maintenance, refurbishment and replacement programs.

The asset register can help identify like assets that have common attributes and historical performance to develop an appropriate scope of work for the group of assets rather than a single asset, which can be a more efficient use of resources and more cost effective from a materials perspective. This can be especially effective if inspection and/or performance indicate end-of-life for a specific group of assets.

Asset data for both new and existing assets is collected on a continuous basis and used to update MHDI's asset register. The data in the Asset Register is used to formulate an asset condition assessment on specific assets and asset classes. MHDI uses this assessment to quantify the number of assets requiring replacement or refurbishment within some, but not all, asset categories.

Table 3 – MHDI Asset Register

Asset Register Component	Owner/Location	Asset Information
GIS	- GIS Department	- All existing, proposed & removed assets and their related attributes are in the GIS
Northstar Database	- Operations (Stores)	- Transformer data

Asset Register Component	Owner/Location	Asset Information
Financial System	- Finance	- IFRS financial asset value - Asset useful life studies
	- Finance	- Purchase history - Installation history - Removal history
ACA Report	- Engineering	- Asset condition assessment
Outage History	- Engineering	- SAIFI, SAIDI stats database
Maintenance Records	- Engineering - Operations	- Transformers, pad-mount switchgear, poles, stations
Inspection Records	- Engineering - Operations	- All system components
Asset Utilization Records	- Engineering	- Station, feeder loading, transformer utilization
General Plant	- Operations - IT - IT - Finance - Finance	- Fleet history - Computers - Software - Land - Buildings

11. Inspection and Maintenance Plans

Milton Hydro's inspection and maintenance plans have been developed as part of Milton Hydro's Commitment to Stakeholders to deliver reliable service while maintaining the highest safety standards possible.

Operations and maintenance budgets are developed as budgetary forecasts of routine and non-routine operations and maintenance activities for the upcoming year. Operations and maintenance costs are captured by the appropriate OEB accounts and include overhead underground and substation inspections, reactive and preventative maintenance, and general system maintenance.

Routine activities occurring annually, such as vegetation management, are forecasted annually with the help of historical experience and figures. As part of the ongoing review process, these values are adjusted to reflect the most current scope of work and price information. The expenditures are based on either an estimate of internal labour hours required to complete the activity or, alternatively, estimated based on proposals or quotations from external sources.

For routine activities occurring on a cyclical basis, associated expenditures are only included within the operations and maintenance budget for the year in which the activity is scheduled to be performed. While the majority of operations and maintenance activities are recurring, non-routine or single occurrence expenditures may be warranted to reflect changes to performance priorities or new operations and maintenance programs. These non-routine maintenance activities typically undergo an internal review process that explores the drivers and costs associated with the deviation from past operational and maintenance activities.

Lastly, administrative expenditures, such as staff training, are identified and included prior to completion of the budget.

11.1 Inspections and Assessments

Formal Asset Condition Assessment studies are performed on asset classes, as required, to determine asset health. This aids in asset lifecycle optimization for those class of assets with significant end-of-life issues. Installation, enhancement, maintenance and renewal activities account for a significant portion of MHDI's expenditures.

The Distribution System Code (DSC) encourages good utility practices and mandates a defined approach to distribution system inspections. Milton Hydro incorporated the DSC requirements into its internal processes as a means of continually monitoring its facilities and ensuring the performance level of the distribution system remains at acceptable levels.

The Minimum Inspection Requirements (Appendix B of the DSC) details the inspection standards and inspection cycles required of all distributors. Table C-1 identifies the maximum intervals for inspection cycles, which for most urban facilities is three years, for rural facilities is six years, and for stations is six months, one year or three years.

A definition of Patrol Inspection is also included in Appendix B of the DSC. Milton Hydro's inspection of its major distribution facilities is comprehensive and at a level of detail that satisfies the requirements established by the OEB's Patrol Inspection definition.

In addition to fulfilling the OEB's cyclical inspection requirements, Milton Hydro's inspection process enables the identification and documentation of condition-related deficiencies, which, taken together with the subsequent analysis process, results in a framework that supports maintenance and capital expenditures for the various distribution assets.

A thorough understanding of the condition of existing assets is critical in order to maximize asset life, improve efficiencies, improve reliability by reducing failures, plan for proper capital replacement, and enact maintenance programs that help to ensure the safety of both employees and the general public.

Milton Hydro Operations staff use the Report a Deficiency feature, **Appendix A,** in the electronic Mobile Distribution System Map to report on equipment that is found to be in need of repair or replacement.

11.1.1 Asset Condition Assessment

Milton Hydro's Asset Condition Assessments (ACA) are based on field inspections, testing and maintenance programs, historical equipment information, equipment performance, manufacturer's maintenance recommendations, industry best practices, and Milton Hydro's experience.

Inspection programs, delivered by both in-house personnel and contract help are at the core of MHDI's ACA. From time to time, MHDI engages external consultants for the completion of a formal ACA report. Kinectrics is one such consultant that provided a quantitative assessment of the health of MDHI's assets using a health index methodology.

The result of these inspection programs is asset condition information that is used to update the Asset Register. Milton Hydro also takes into consideration other areas of asset performance such as equipment vintage, past reliability performance and system impact. Inspected assets are rated and scheduled for maintenance, refurbishment, replacement, or future inspections.

MHDI regularly reviews its ACA.

11.1.2 Overhead Systems Inspection

Milton Hydro systematically inspects its overhead distribution system, completing approximately one third of its distribution system each year, as per Appendix B 'Minimum Inspection Requirements' of the DSC. The visual patrol serves as an inspection to assess the condition of overhead assets, including wood/concrete poles and their supports and attachments, pole-mount distribution transformers, switches and surrounding vegetation.

Inspections results are documented through the Overhead Distribution System Inspection forms included in **Appendix B** of this document.

11.1.3 Pole Inspection

Milton Hydro maintains a system of wood poles and concrete poles within its distribution system that are inspected every three years, meeting the DSC's minimum inspection requirements.

Dependent on age and condition, poles are either tested or visually inspected.

Poles are tested once they reach 25 years of age and every third cycle thereafter. The pole testing cycle is scheduled based on the geographic areas shown in **Appendix C**. Milton Hydro contracts out the pole test inspections to a qualified independent third party who inspects and tests all poles to determine the overall condition of individual poles. Pole inspection and testing data is collected using online survey forms via the arcGIS platform. A screen shot of the database has been included in **Appendix B**. Poles requiring immediate replacement are changed in the current year on a priority basis. Those poles requiring replacement within the next year are scheduled to be replaced as part of the following year's budget. A Sample Pole Testing Results is located in **Appendix D**.

In addition to inspecting, testing and assessing poles, the contractor also visually inspects pole mounted transformers, switches, cross arms and other hardware for any signs of abnormal conditions.

Deficiencies identified during the pole inspections are reviewed and organized for action by Engineering. Work instructions for repair of deficiencies are issued by Engineering for action by Operations.

11.1.4 Underground Systems Inspection

Similar to the general overhead process of inspection and condition assessment, the underground distribution system is also inspected on a three-year cyclical basis to assess the condition of underground assets including pad-mount transformers, submersible transformers, transformer vaults and associated civil structures. Specific attention is given to the following elements of the underground system.

11.1.4.1 Underground Vault Inspection

Underground vaults are equipped with submersible transformers and inspected on a three-year cycle. They are cleaned and pressure washed as required. An inspection checklist is completed and returned to Engineering for record keeping and follow up purposes as required. The Transformer Maintenance Inspection Form and Checklist attached in **Appendix E** are used for recording vault inspections and initiating any required maintenance.

11.1.4.2 Pad-Mounted Switchgear Inspection

Milton Hydro has Pad-Mounted Switchgear; they undergo infrared inspection annually and a documented asset inspection is conducted every three years. A Pad-Mounted Switchgear Inspection form is included in **Appendix F.**

11.1.4.3 Transformer Room Inspection

Milton Hydro has distribution transformers installed in locked rooms within various buildings throughout the Town of Milton; access to these rooms is only available to qualified Milton Hydro employees. These transformer rooms are checked regularly to ensure they remain locked and have not been tampered with. Milton Hydro line staff inspect and maintain the transformer rooms every three years. While existing transformer rooms are maintained, they are no longer an acceptable installation for new additions to the distribution system.

11.1.4.4 Pad-mounted Transformer Inspection

Milton Hydro utilizes pad-mounted transformers of varying capacity, within its distribution system. Pad-mount transformers are inspected on a three-year cycle. Milton Hydro staff perform the inspections and complete a Transformer Maintenance Inspection Checklist, included in **Appendix E**, which is reviewed by the Engineering Department and issued to Operations for follow up as required.

11.1.5 Substation Inspection

As with the overhead and underground distribution system, Milton Hydro staff or contractors inspect and assess all of its substations on an ongoing basis (every three years). Inspection findings are captured by the General Specifications for Inspection, Testing and Preventative Maintenance on Medium Voltage Distribution Substations, included in **Appendix G**, and returned to the Engineering Department for follow up and records purposes. Periodic third party testing and condition assessment of Regulating Transformers is conducted. The substation inspection process supports short- and long-term maintenance and capital planning activities.

Milton Hydro Operations staff inspect substations monthly using a checklist, included in **Appendix H.**

11.2 Maintenance Programs

Preventative maintenance, when properly carried out, helps to minimize possible distribution plant failures and improve system reliability and performance.

Depending on the level of specialization required, planned maintenance activities may be carried out by Milton Hydro line staff or contracted out to an external supplier. Any deficiencies reported are reviewed and prioritized by Engineering and Operations staff to determine whether reactive maintenance is required or if the work can be scheduled as a component of a future capital project or planned maintenance. The following maintenance programs are an integral part of Milton Hydro's asset management activities.

11.2.1 Infrared Thermography

Infrared Thermography is an annual maintenance program. An independent contractor scans all of Milton Hydro's overhead plant, as a means of detecting 'hot spots', which are system weak spots that lead to equipment failure.

Milton Hydro receives a written report that details the location, the extent of the temperature rise and the severity of the hot spot. Milton Hydro Engineering staff issue work instructions based on a prioritization of the inspection results. This is a program used to proactively detect and prevent unnecessary failures and equipment damage.

A sample Infrared Thermography report is included in **Appendix I**.

11.2.2 Pad-Mount Switchgear Cleaning

Pad-mount switchgear cleaning and inspection is cyclical three-year program, with a third of Milton Hydro's pad-mount switchgear being inspected and cleaned annually. Cleaning is completed on air insulated pad-mount switchgear prior to thermography to eliminate contaminants as a factor with the inspection.

For air insulated pad-mount swtichgear, the process may include dry ice cleaning, which involves a high pressure blast of CO_2/dry ice vapor to clean the pad-mount switchgear. The process removes contamination from the insulating components of the switches, as well as, providing an overall cleaning of the pad-mount switchgear. Milton Hydro contracts this work out and receives a full report on the work performed and any concerns or deficiencies that require Milton Hydro's attention. The Pad-mount Switchgear Maintenance Checklist is shown in **Appendix J**.

11.2.3 Tree Trimming – Vegetation Management

Milton Hydro's service area is divided into three geographic zones as shown in **Appendix K**. Each zone is trimmed on a three-year cycle (minimum). We also monitor, report and remediate tree trimming needs of individual locations through the annual pole inspection program. Tree trimming specifications include type of tree and growth cycle. Lessons learned from significant weather events, such as the December 2013 ice storm, are incorporated to tree trimming specifications to maintain a robust program.

Milton Hydro tenders the work annually to a qualified utility arborist. Maps are provided to the contractor and Milton Hydro personnel inspect the contractor's work. This proactive approach reduces the number of tree related power outages during stormy conditions and minimizes the possibility of inadvertent tree contacts, with energized distribution lines, during moderate weather conditions.

Milton Hydro also responds to requests from the public to remove or trim trees that are growing into the power lines.

11.2.4 Recloser Maintenance

An annual inspection and routine maintenance is conducted annually on the in-field (oil-filled) reclosers to assess their condition and number of operations. Active monitoring ensures that after a set number of operations, the unit will be replaced and serviced. This restores the unit to very good or as new condition and reduces the probability of end-of-life device failure. A Recloser checklist is provided in **Appendix L**.

11.2.5 Substation Maintenance

All Milton Hydro's substations are regularly inspected and assessed for short- and long-term maintenance requirements and to monitor the condition of the transformer. Routine maintenance is a contracted service and is completed at the time of inspection. Any deficiencies identified during inspections are documented with recommendations. Some deficiencies are repaired in conjunction with routine maintenance; others are completed reactive basis or part of planned capital works. Oil samplings are completed annually from each transformer and the voltage regulators. Oil samples are tested to ensure insulating properties remain within acceptable levels. The substation maintenance program ensures that the substations will function reliably and safely at all times.

11.2.6 RTU Maintenance

Remote Terminal Units (RTUs) are overhead or underground switches in either substations or as field devices. Major RTU components include the relay, battery, communication devices such as a cellular router or WiMAX and a cabinet that houses the components.

The majority of Milton Hydro's RTUs are comprised of a micro-processor relay that serves as a controller, as well as a protection device.

Batteries are tested daily by the relay software to ensure they contain enough power capacity to perform control operation of the switches. When a battery deteriorates to a point where it does not have enough power to operate the switch, the relay sends an alarm to the SCADA, which alerts the technician to perform a battery replacement. The general life of an RTU battery is approximately 5 years. Once a battery reaches five years old, they are placed into a battery replacement program and closely monitored.

RTUs are visually inspected regularly to:

- Ensure the cabinet is securely mounted and its overall cabinet condition (6 months)
- Assess the condition of the internal components (annually)
- Ensure the integrity of the battery leads and that there are no leaks (annually)
- Ensure the integrity of the cables and antenna (annually)

At the time of inspection, the communication signal strength is recorded to track historical signal issues.

An RTU maintenance checklist is provided in **Appendix M**.

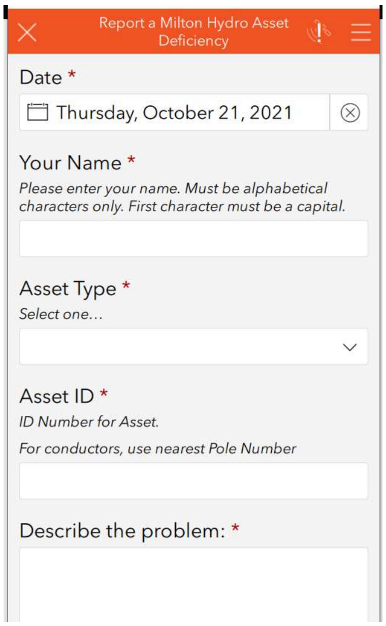
11.3 Inspection and Maintenance Schedules

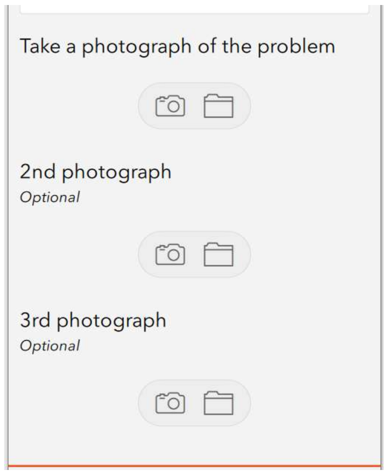
Table 4 – Maintenance Schedule

Field Asset	Practice	1 Year	3 Year	As Required
Overhead				
1. Overhead plant (poles, conductors, etc.)	Inspection		X	
2. Overhead Insulators	Identify old style porcelain insulators			Identify during overhead plant inspection on 3-year cycle.
3. Overhead Plant (conductors, transformers, switches, etc.)	Infrared inspection	X		
4. Poles	Pole Testing (>25 years in age)			X
5. Poles	Poor poles are replaced within 1 year & identified deficiencies are repaired			X
6. Overhead lines	Tree Trimming		X	
7. Overhead switches	Remotely controlled switches are maintenance free. Visual inspection only.		X	

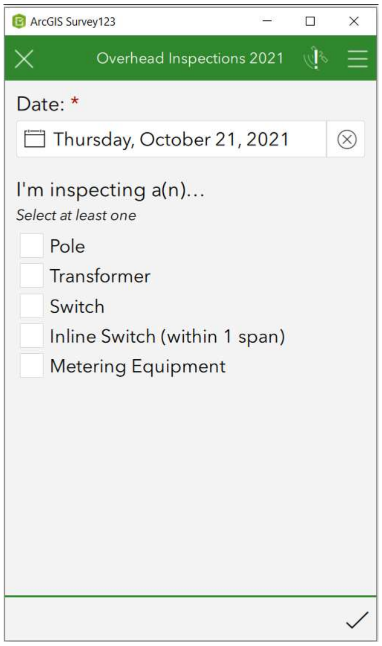
Field Asset	Practice	1 Year	3 Year	As Required
Underground				
1. Vaults	Inspection and schedule wash			X
2. Pad-Mounted Switchgear	Inspection & Maintenance		X	
3. Transformer rooms	Inspection & Maintenance		X	
4. Pad-mounted transformers	Inspection & Maintenance		X	
5. Submersible transformers	Inspection		X	
Stations				
1. MS Stations	Full visual inspection			Monthly
2. Station transformers	Oil tests and dissolved gas analysis	X		
3. Station equipment (breakers, relays, transformers, etc.)	Maintenance		X	
4. Regulators	Oil and tap changer tests		X	
5. Station batteries	Inspection & Maintenance	X		
6. Breakers, Cubicles, Relays, Transformer, Unload Tap Changers and Reclosure Tests			X	
7. Standard 5 Part ASTM Oil and Dissolved Gases in Oil Analysis		X		

APPENDIX A – Report a Deficiency (feature in Mobile Distribution Map)





APPENDIX B – Overhead Distribution System Inspection Form


ArcGIS Survey123

Overhead Inspections 2021

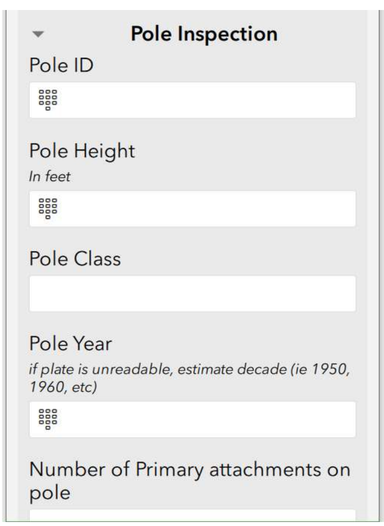
Date: *

Thursday, October 21, 2021

I'm inspecting a(n)...

Select at least one

- Pole
- Transformer
- Switch
- Inline Switch (within 1 span)
- Metering Equipment


Pole Inspection

Pole ID

Pole Height

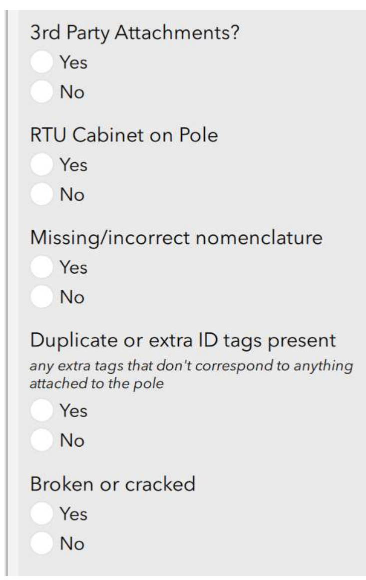
In feet

Pole Class

Pole Year

if plate is unreadable, estimate decade (ie 1950, 1960, etc)

Number of Primary attachments on pole


3rd Party Attachments?

Yes

No

RTU Cabinet on Pole

Yes

No

Missing/incorrect nomenclature

Yes

No

Duplicate or extra ID tags present

any extra tags that don't correspond to anything attached to the pole

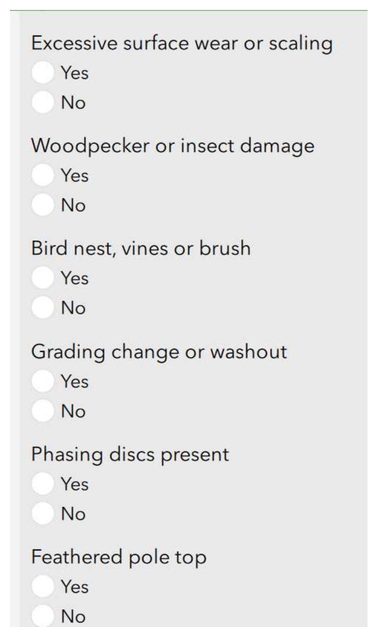
Yes

No

Broken or cracked

Yes

No


Excessive surface wear or scaling

Yes

No

Woodpecker or insect damage

Yes

No

Bird nest, vines or brush

Yes

No

Grading change or washout

Yes

No

Phasing discs present

Yes

No

Feathered pole top

Yes

No

Pole abandoned

All 3rd party transfers complete. Pole ready to be removed

- Yes
- No

Is there an arrester present?

Of any type

- Yes
- No

Overall Pole Condition:

Select one

Pole photo

Optional - Take a photo showing overall pole condition

Conductor Information

Primary

Select all that apply

- Low conductor clearance
- Broken/frayed wires
- Tree trimming required (within 1m)
- Blown lightning arrester

Neutral Size

Select all that apply

- #2
- 1/0
- 3/0
- 336
- No Neutral

Secondary

Select all that apply

- Low conductor clearance
- Broken/frayed wires
- Tree trimming required (within 0.3m)
- Overhead connections

Isolated conductor present

- Yes
- No

Comments

Optional

Conductor Repair Priority

Select one

- Emergency
- Urgent
- Follow up
- No follow-up required

Tree Trimming Information

Expected Density of Trees Near Primary Wires Within the Next 3 Years

None

- Heavy Density
- Medium Density
- Light Density
- None

Trees Present

Trees growing up into primary wires

- Yes
- No

Trees overhanging primary wires

- Yes
- No

Tree/branch dead/dying & at risk of falling into primary line

- Yes
- No

Tree trimming photo

Optional - Take a photo showing tree branches near wires

Hardware

Cutout at pole for Transformer on private property

- Yes
- No

Loose, cracked or broken crossarms or brackets

- Yes
- No

Loose or missing hardware

- Yes
- No

Insulators/conductors floating or flashed over

- Yes
- No

Porcelain Hardware

- Line insulator
- Bell insulator
- Switch
- Arrester

Guying

Guying present
- Yes
- No

Guying Details

Loose or broken guy wires or guy strain insulators
- Yes
- No

Guy guard replaced
- Yes
- No

Guy pole?
- Yes
- No

Anchor present?
- Yes
- No

Span Guy(s) present?
- Yes
- No

Grounding

Is down ground present?
- Yes
- No

Ground wire missing or broken
- Yes
- No

Ground mould missing or broken
- Yes
- No

Ground mould replaced
- Yes
- No

Dip/Riser pole?
- Yes
- No

Was this pole drilled today?
- Yes
- No

Comments

Overall pole repair priority

Select one

Transformer Inspection

Transformer ID

Located on private property
- Yes
- No

Missing/incorrect nomenclature
At supply pole if transformer on private property
- Yes
- No

Contamination or discolouration of bushings
- Yes
- No

Tank corrosion
- Yes
- No

Oil leak
- Yes
- No

Bird nest, vines or brush
- Yes
- No

Damaged disconnect switch or lightning arrester
- Yes
- No

Unattached ground wires (incl. arrester)
- Yes
- No

Installed below secondary bus
- Yes
- No

Blown Arrester Present
- Yes
- No

Transformer photo
Optional - take a photo showing overall transformer condition

Transformer Comments
Optional

Transformer repair priority
Select one

Switch/Fuse Inspection

Switch ID

Switch Type
Select one

Missing/incorrect nomenclature
- Yes
- No

Missing/faded phasing discs
- Yes
- No

Damaged/cracked insulators
- Yes
- No

Damaged/misaligned operating handle
- Yes
- No

Missing operating handle grounding
- Yes
- No

Padlock missing
- Yes
- No

Cabinet in poor condition
- Yes
- No

Switch Comments
Optional

Switch repair priority
Select one

Switch photo
Optional - take a photo showing overall switch condition

Inline Switch

Inline Switch ID

If transformer fuse, use transformer ID + 'C'. Example: 1234C

Inline Type

- Firon
- Tyco
- Other

Jumper missing from inline

- Yes
- No

Metering Equipment Inspection

Metering Equipment On Pole

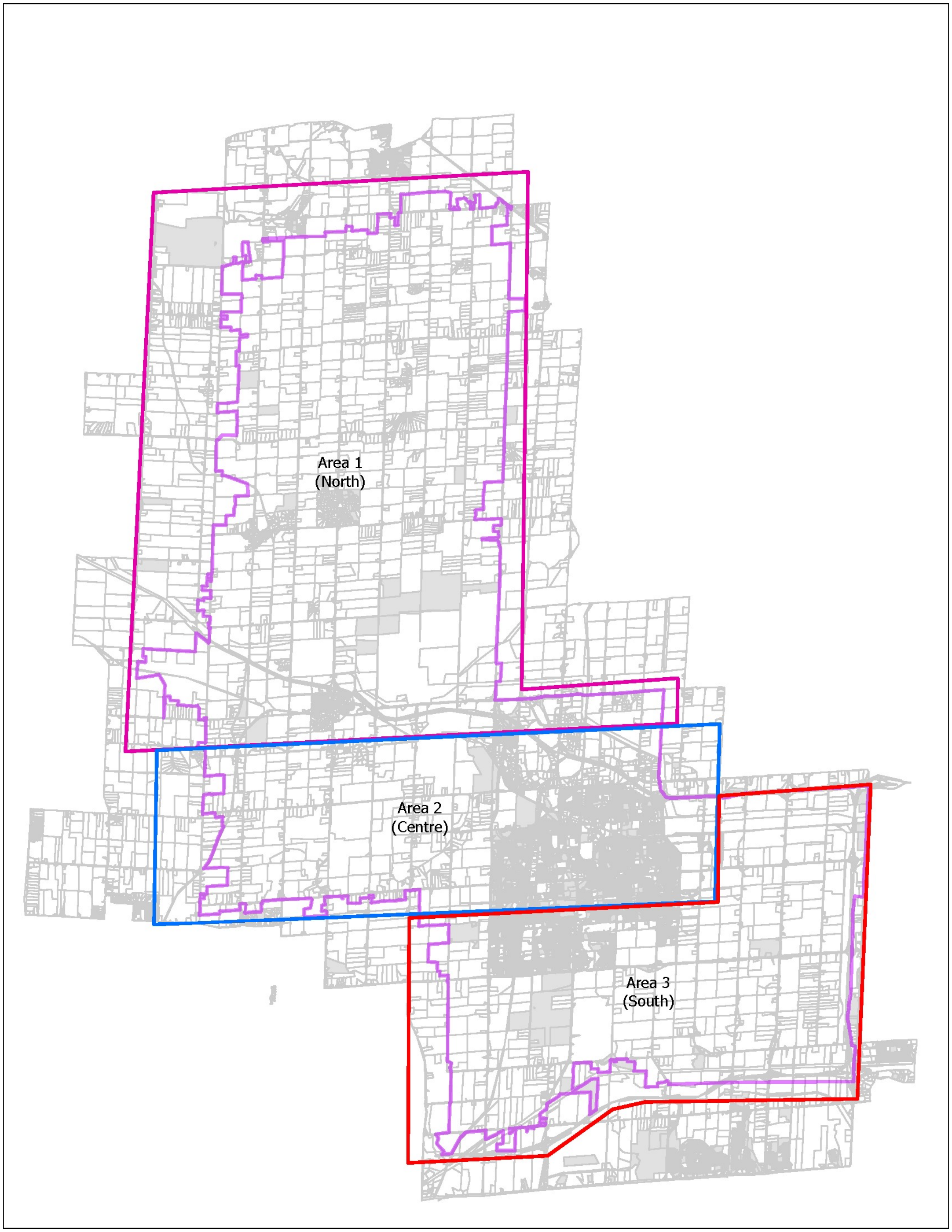
Select at least one

- Mesh Gate
- Repeater
- Collector

Comments:

Describe any problems or issues you see

APPENDIX C – Pole Inspection (Areas – Zone Map)



APPENDIX D – Sample Pole Testing Results

Date:	I'm inspecting a(n)...	Pole ID	Pole Height	Pole Class	Pole Year
2021-09-10 16:00:00	1	3589	35	4	1970
2021-09-15 16:00:00	1,3	1810	35	4	1992
2021-09-24 16:00:00	1	2115	30	6	1960
2021-09-24 16:00:00	1	1940	30	5	1950
2021-09-24 16:00:00	1	1937	35	5	1950
2021-09-24 16:00:00	1	1935	35	5	1950

Was this pole drilled today?	Comments	Overall pole repair priority
Yes	Hollow and rotting off. Replace in 2021. Station light pole	Urgent
Yes	Drilled pole......Pole is Rotten and needs replaced A.S.A.P	Urgent
Yes	Tested good inside but rotting exterior at ground. Pole has 10 years approximately	No follow-up required
Yes	Spur marks outside but tested good	No follow-up required
Yes	Soft, wet, two holes near base. Replace 1-2 years	Follow up
Yes	Wet, soft and rotting below grade. Replace 1-2 years	Follow up

APPENDIX E – Transformer Maintenance Inspection Form and Checklist

Date:
Monday, October 4, 2021

Transformer ID

Transformer Type
- (●) PAD
- ( ) SUB
- ( ) VAULT

Padmount Transformer

Transformer ID Tag Missing or Damaged
ID tag should be clear and easy to read
- ( ) Yes
- ( ) No

Tank/Paint Condition *
Check for rust.
Very Good = no work needed
Good = paint touch-up required
Fair = TX must be opened to re-paint
Poor = replace transformer

Oil Leaking? *
Oil is fresh; stain appears wet
- ( ) Yes
- ( ) No

Transformer Shifted off Pad *
- ( ) Yes
- ( ) No

Lock / Penta Bolt is Missing *
- ( ) Yes
- ( ) No

Lock / Penta Bolt is Missing *
- ( ) Yes
- ( ) No

Access Problem *
Vegetation or other obstruction blocking access
- ( ) Yes
- ( ) No

Grading Changed *
Hint: Transformer sinking or visibly not level; sinkholes, etc.
- ( ) Yes
- ( ) No

Exposed Rebar / Crumbling Foundation *
- ( ) Yes
- ( ) No

Overall Follow-Up Urgency
Select One
- ( ) No follow-up required
- ( ) Follow-up
- ( ) Urgent
- ( ) Emergency

Other problems?
Or additional comments
- (●) Yes
- ( ) No

Problem description

Other Photo as Needed

Transformer Type
- ( ) PAD
- (●) SUB
- ( ) VAULT

Submersibles and Vault Rooms

Vault Door or lid is closed and secure
- ( ) Yes
- ( ) No

Visible Damage to door or vault
That would affect safety or security of public
- ( ) Yes
- ( ) No

Photo of Vault Door or Lid

APPENDIX F – Pad-Mounted Switchgear Inspection form

Switching Cubicle Maintenance Checklist

Description content for the survey

Switching Cubicle #: *

Address/Location: *
e.g., address, streetname, or nearest cross streets

Existing Nomenclature in place *
- Yes
- No
- N/A

New Nomenclature has now been added *
- Yes
- No
- N/A

Take photos of all of the sides of the Switch Cubicle with labeling *

Switching Cubicle Maintenance Checklist

Take a Photo of the Nameplate Information *

Take photos of any problems that you discover. *

Phasing Targets Installed *
- Yes
- No
- N/A

Cables properly labelled *
- Yes
- No
- N/A

Contacts visually checked *
- Yes
- No

Switching Cubicle Maintenance Checklist

- N/A

Switch Alignment checked *
- Yes
- No
- N/A

Insulators in good condition (cleaning required)? *
- Yes
- No
- N/A

Line/Load connections in good condition *
- Yes
- No
- N/A

Grounding & Neutral cable/connections in good Condition *
- Yes
- No
- N/A

Switching Cubicle Maintenance Checklist

Operating handle/joints/rods/brackets in good repair *
- Yes
- No
- N/A

Line and load conductors at open point have been phase checked *
- Yes
- No
- N/A

Exterior of Switching Cubicle in good condition (paint comment below if required) *
- Yes
- No
- N/A

Hinges in good condition (oil if necessary) *
- Yes
- No
- N/A

Switching Cubicle Maintenance Checklist

Unit aligned with base *
- Yes
- No
- N/A

Replace flush mount bolts/nuts on access doors if required *
- Yes
- No
- N/A

Concrete Base in good condition *
- Yes
- No
- N/A

Hex bolt padlock secure on unit *
- Yes
- No
- N/A

Open hatch and check for water in base *
- Yes
- No

Switching Cubicle Maintenance Checklist

New Hazard Identified (comment below) *
- Yes
- No
- N/A
- Other

Comments:

Completed by: *

Completed Date: *
Date

Follow-up by:

Follow-up Date:
Date

APPENDIX G – General Specifications for Inspection, Testing and Preventative Maintenance on Medium Voltage Distribution Substations

MILTON HYDRO DISTRIBUTION INC.

GENERAL SPECIFICATIONS
FOR
INSPECTION, TESTING
AND PREVENTATIVE MAINTENANCE
ON
MEDIUM VOLTAGE
DISTRIBUTION SUBSTATIONS

Contents

1 - GUIDELINES

1.1 - GENERAL SCOPE OF WORK

The contractor shall perform inspection, testing and preventative maintenance on electrical power apparatus and systems of specifically designated load centre substations located in the Milton Hydro Distribution Inc. distribution area.

The work under this specification shall be performed following the highest safety standards and practices.

These specifications apply to the following substations:

MS4 Derry Road
MS6 Sixth Line
MS7 Five Side Road
MS9 Second Line

1.2 - DE-ENERGIZATION AND GROUNDING PROCEDURE:

Prior to start any work on any piece of equipment or system, the contractor shall perform by itself with the approval of Milton Hydro Distribution Inc., or verify it was done by others, the basic de-energization and grounding procedure, as follows:

- Isolation of all incoming and outgoing feeders.
- Discharge of any stored energy in operating mechanism of protective devices.
- Testing for voltages.
- Testing for stored energy in protective devices.
- Grounding of incoming and outgoing feeders in substation

1.3 - PRE-ENERGIZATION PROCEDURE:

- Verification of condition of equipment or systems to be re-energized.
- Removal of safety grounds.

1.4 - RE-ENERGIZATION PROCEDURE:

- Re-energization of electrical sources.
- Re-connection of outgoing feeders.
- Verification of normal conditions in supply and feeders.

1.5 - REPORT PREPARATION:

After completing the site work, the contractor shall prepare a comprehensive report listing equipment nameplate data, findings and results of inspection and tests for each piece of equipment or system under the scope of work on each substation.

1.6 - GENERAL SPECIFICATION

1.6.1 - POWER TRANSFORMERS

The power transformers existing in substations under the scope of these specifications are step down units, as follows:

Three phase

- Type: Mineral oil filled, sealed or conservative tank.
- Cooling: Self cooled or forced air cooled.
- Voltage ratio: 44000/8320/4800 V or 27600/8320/4800 V.
- Bushings: On top of tank or inside compartments.
- Ratings: 1000 KVA to 10000 KVA.
- Type: Sealed or conservative tank.

The Dissipation Factor readings and Insulation Resistance readings obtained during tests having the transformer oil at any other temperature shall be corrected to 20° C.

The valves connecting conservative tanks to main tanks are to be left open.

The contractor shall reclaim at site or replace with new stock any silica gel, or other types of transformer breathers having more than 50% of its volume showing pink colour.

1.6.2 - PROTECTIVE RELAYS

Milton Hydro Distribution Inc. will provide to the contractor the required settings for protective relays.

The contractor shall test the relays to Milton Hydro Distribution Inc. provided settings.

Testing of phase overcurrent relays shall be conducted with the units in their cases.

One of the fourt substations are equipped with air circuit breakers with phase over current relays and reclosing relays. No ground fault relays exist in those substations.

2 - SUBSTATION YARDS:

A - INSPECTION:

- General area: Check for drainage and grading problems.
- Perimeter fence: Check integrity of fence and gates, check for gaps between fence and grade, ice lifting in posts, lack of bonding conductors between gates and fence and tube splices.
- Locks: Check for existence, number, proper operation and location.
- Danger signs: Check for number and location.
- Layer of gravel: Minimum depth required is 6”. Check for depth and level of contamination.
- Vegetal Growth: Check for weeds and trees growth.
- Ground grid cables: Check for integrity, level of corrosion and tightness of connectors.

B - TESTS:

- Ground grid resistance test using a four terminal instrument and fall of potential method.

C - PREVENTATIVE MAINTENANCE:

- Removal of weeds, trees, leaves and foreign matters from substation area.
- Re-tightening and re-adjustment of fence hardware, as necessary.

3 - STEEL STRUCTURES:

A - INSPECTION:

- Bus insulators: Check for integrity, cracks, chips, tracking, signs of flashover and corona.
- Buses: Check for excessive sag or stress, corrosion and loose hardware.
- Power cable terminations: Check for integrity, discoloration, signs of tracking, flashover and corona.
- Structure: Check for excessive sagging, stress, corrosion and loose hardware.
- Grounding/bonding cables: Check for integrity, level of corrosion and tightness of connectors.
- Concrete bases: Check for integrity.

B - TESTS:

- Bus insulation resistance test, as required.
- Surge arresters tests, required.
- Instrument transformers tests, as required.

C - PREVENTATIVE MAINTENANCE:

- Bus insulators clean-up.
- Power cable terminations clean-up.
- Clean-up of instrument transformers and lightning arresters.
- Re-torqueing of hardware and electrical connectors.

4 - POLE STRUCTURES:

A - INSPECTION:

- Bus insulators: Check for integrity, cracks, chips, tracking, signs of flashover and corona.
- Buses: Check for excessive sag or stress, corrosion and loose hardware.
- Power cable terminations: Check for integrity, discoloration, signs of tracking, flashover and corona.
- Steel structure: Check for excessive sagging, stress, corrosion and loose hardware.
- Poles: Check for cracks and mechanical damage and rotten wood.
- Grounding/bonding cables: Check for integrity, level of corrosion and tightness of connectors.
- Concrete bases: Check for integrity.

B - TESTS:

- Bus insulation resistance test, as required.
- Surge arresters tests, required.
- Instrument transformers tests, as required.

C - PREVENTATIVE MAINTENANCE:

- Bus insulators clean-up.
- Power cable terminations clean-up.
- Clean-up of instrument transformers and lightning arresters.
- Re-torqueing of hardware and electrical connectors.

5 - LOAD BREAK SWITCHES:

A - INSPECTION:

- Recording of nameplate data.
- Insulators: Check for integrity, cracks, chips, tracking, signs of flashover and corona.
- Buses or cables: Check for excessive sag or stress, corrosion and loose hardware.
- Keyed interlocks: Check proper operation of locking and interlocking scheme.
- Power cable terminations: Check for integrity, discoloration, signs of tracking, flashover and corona.
- Three pole switches: Check for proper operation and alignment of contacts on opening and closing.
- Hardware: Check for corrosion and tightness.

B - TESTS:

- Insulation Resistance at 5 KV dc on main bus.
- Contact resistance.

C - PREVENTIVE MAINTENANCE:

- Insulators clean-up.
- Power cable terminations clean-up.
- Removal of old grease residues.
- Lubrication of switch operating mechanism and contacts with approved grease.

6 - POWER FUSES:

A - INSPECTION:

- Recording of nameplate data for fuse holders and fuse links.
- Insulators: Check for integrity, cracks, chips, tracking, signs of flashover and corona.
- Buses or cables: Check for excessive sag or stress, corrosion and loose hardware.
- Power cable terminations: Check for integrity, discoloration, signs of tracking, flashover and corona.
- Fuse holders: Check for proper operation and latching on each pole.
- Hardware: Check for corrosion and tightness.

B - TESTS:

- Insulation Resistance at 5 KV dc on main bus.
- Fuse link resistance.

C - PREVENTIVE MAINTENANCE:

- Insulators clean-up.
- Power cable terminations clean-up.
- Removal of old grease residues.
- Lubrication of jaws and fuse holder contacts with approved low temperature contact grease.

7 – SURGE ARRESTERS:

A - INSPECTION:

- Recording of nameplate data for surge arresters.
- Case: Check for integrity, cracks, chips, tracking, sign of flashover and corona.
- Buses or cables: Check for excessive sag or stress, corrosion and loose hardware.
- Hardware: Check for corrosion and tightness.

B – TESTS:

- Insulation Resistance to ground.
- Arrestors applied on 27.6 KV system shall be tested at 5 KV dc.
- Arrestors applied on 8.32 KV system shall be tested at 3 KV dc.

C - PREVENTATIVE MAINTENANCE:

- Case clean-up.
- Re-torqueing of line and ground conductors.

8 - INSTRUMENT TRANSFORMERS:

A - INSPECTION:

- Recording of nameplate data.
- Paint condition.
- Bushing clamps and gaskets.
- Draining and sampling valves.
- Primary and secondary Bushings.
- Primary, secondary and ground connections.

B - INSTRUMENT READINGS RECORDING:

- Oil level.

C - TESTS:

- Windings Insulation Resistance at 1000 V dc.
- Turns Ratio.

D - PREVENTATIVE MAINTENANCE:

- Clean-up of primary and secondary bushings.
- Tapchanger Exercising.
- Re-torqueing of primary and secondary connections.

9 - OIL FILLED POWER TRANSFORMERS:

A - INSPECTION:

- Recording of nameplate data.
- Radiators: Check for oil leakage and paint condition.
- Main tank: Check for oil leakage and paint condition.
- Conservative tank: Check for oil leakage, oil level and paint condition.
- Cooling fans: Check for proper operation.
- Cooling fans control panel: Check for corrosion and proper operation.
- Control wiring: Check condition and connections tightness.
- Paint: Check for condition.
- Bushing clamps and gaskets: Check condition of gaskets and hardware.
- Tapchanger operating handle: Check operating condition and tap position.
- Draining and sampling valves: Check for leakage and status.
- Primary and secondary Bushings: Check condition, oil level and tightness of connections.
- Tank cover and handhold cover gasket seals: Check for oil leakage.
- Primary, secondary and ground connections: Check for tightness.
- Conservative tank valves: Check for oil leakage and status.
- Silica gel breathers: Check silica gel for excessive moisture content.

B - INSTRUMENT READINGS RECORDING:

- Liquid Temperature Gauge: Current and maximum oil temperature.
- Windings temperature.
- Pressure/Vacuum Gauge.
- Tapchanger Position Indicator.
- Pressure Relief Device Indicator.
- Oil level.

C - TESTS:

- Windings Capacitance and Dissipation Factor.
- Windings Insulation Resistance at 1000 V dc.
- Turns Ratio on three phases at all the tap positions.

D - PREVENTATIVE MAINTENANCE:

- Clean-up of primary and secondary bushings.
- Tapchanger Exercising.
- Primary and Secondary connections re-torqueing.

10 - METAL ENCLOSED SWITCHGEAR FRAMES:

A - INSPECTION:

- Recording of nameplate data.
- Cells.
- Keyed interlocks.
- Insulators, buses and interphase barriers.
- Instrument transformers.
- Surge arrestors.
- Cell heaters.
- Power cable terminations.
- Switch operations and alignment.
- Power fuses alignment and latching.

B - TESTING:

- Insulation resistance at 5 KV dc on main bus.
- Insulation resistance at 500 V dc on wiring.
- Contact resistance on load break switches.
- Fuse link resistance on power fuses.
- Operating mechanism on load break switches.

C - PREVENTIVE MAINTENANCE:

- Cells floor clean-up.
- Power cable terminations clean-up.
- Clean-up of insulators, buses and interphase barriers.
- Clean-up of instrument transformers and surge arresters.
- Clean-up of switch and power fuses insulators.
- Exercising and lubrication of operating mechanisms on load break switches.
- Exercising and lubrication of hinges and contacts on power fuses.

11 - METAL CLAD SWITCHGEAR FRAMES:

A - INSPECTION:

- Recording of nameplate data.
- Cells.
- Capacitor trip devices.
- Control, protection and metering wiring.
- Control power transformers.
- Voltage transformers.
- Current transformers.
- Voltage transformer and control fuses and fuse holders.
- Insulating sleeves, boots, bus supports and barriers.
- Instrument transformers and surge arresters.
- Cell heaters.
- Racking mechanisms and cell shutters.
- Power cable terminations.
- Cell latches.
- Keyed interlocks.
- Ground connections.

B - TESTING:

- Insulation Resistance at 5 KV dc on main bus.
- Insulation resistance at 500 V dc on wiring.
- Fuse link resistance fuses.
- See Inspection, Testing and Maintenance instructions for medium voltage circuit breakers.

C - PREVENTATIVE MAINTENANCE:

- Cells floor clean-up.
- Power cable terminations clean-up.
- Exercising and lubrication of racking and shutter mechanisms.
- Clean-up of insulating sleeves, boots, bus supports and barriers.
- Clean-up of instrument transformers, cable connections and surge arresters.
- Clean-up of insulators including breakers stab insulators.
- Lubrication of breaker operating mechanism.

12 - AIR CIRCUIT BREAKERS:

A - INSPECTION:

- Recording of nameplate data.
- Main and arcing contacts.
- Arc chutes.
- Interphase barriers.
- Paint condition.
- Charging motor brushes.
- Auxiliary contacts pallet.
- Control and protection wiring.
- Racking, Closing and Tripping mechanisms.

B - INSTRUMENT READINGS RECORDING:

- Operation counter.

C - TESTS:

- Insulation Resistance at 1000 V dc on all three phases:
  - Phase to Ground with breaker closed.
  - Phase to phase with breaker closed.
  - Line side to Load side with breaker open.
- Insulation resistance on all three arc chutes.
- Insulation Resistance at 500 V dc on control and protection wiring.
- Contact resistance.
- Tripping by protection.
- Manual closing and tripping.
- Electrical closing and tripping.
- Closing and tripping coils integrity.

D - PREVENTATIVE MAINTENANCE:

- Clean-up of line and load insulators.
- Dusting of frame, interphase barriers.
- Verification of connections in wiring.
- Main contacts clean-up and lubrication.
- Control contacts and finger cluster contacts clean-up and lubrication.
- Racking, closing and tripping mechanisms lubrication.

13 - RECLOSERS:

A - INSPECTION:

- Recording of nameplate data.
- Internal inspection.
- Paint condition.
- Bushings.

B - INSTRUMENT READINGS RECORDING:

- - Operation counter.

C - TESTS:

- Insulation Resistance at 5000 V dc:
  - Phase to Ground with contacts closed.
  - Line side to Load side with contacts open.
- Contact resistance.
- Manual closing and tripping.

D - PREVENTATIVE MAINTENANCE:

- Clean up of line and load bushings.
- Repeated close and open operations.

14 - PROTECTIVE RELAYS:

A - INSPECTION:

- Recording of nameplate data and available setting ranges.
- Induction disc condition.
- Coils condition.
- Helicoidal spring condition.
- Target flags.
- Wiring condition.

B - SETTINGS RECORDING:

- Timed pick up setting.
- Time dial setting.
- Instantaneous pick up setting.

C - TESTS:

- Wiring insulation resistance at 500 V dc.
- Time Overcurrent Unit pick up test.
- Trip time at 3 times pick up current.

- Trip time at 6 times pick up current.
- Instantaneous Overcurrent Unit pick up test.
- Seal in unit test.
- Flags test.

D - PREVENTIVE MAINTENANCE:

- Clean up.
- Verification of tightness in wiring connections.

15 - RECLOSING RELAYS:

A - INSPECTION:

- Recording of nameplate data and available setting ranges.
- Timing motors condition.
- Wiring condition.

B - SETTINGS RECORDING:

- Number of shots.
- Timed delay on shots.

C - TESTS:

- Wiring insulation resistance at 500 V dc.
- Operation tests.

D - PREVENTIVE MAINTENANCE:

- Clean up.
- Verification of tightness in wiring connections.

APPENDIX H – Substation Maintenance checklist

Milton Hydro
Monthly Substation Maintenance Checklist

Station

Transformer Information

Gauges	Current	Peak
Winding Temp		
Oil Temp		
Oil Level		
Pressure		vac / press

Tap Pos

Bushing Oil Level		
Red	White	Blue

Feeder Information
Amp Demand

* reset ammeters

Bay	Red		White		Blue		Battery
	Current	Peak	Current	Peak	Current	Peak	Voltage
F1							
F2							
F3							

Inspection Checklist

Yes	No	
		Fencing Secure
		Inspect all locks and lubricate if required
		Alignment of gates allow them to open and close properly
		"High Voltage" signs approx every 6 mtrs on all sides of fenced area and are mounted properly
		Grounding to fence / gates is in place & gates bonded
		Fences clear of bracnhes and shrubs, if not correct
		Compound/perimeter are clear of weeds, if not clear weeds
		Compound/perimeter are clear of garbage and debris, if not clear area
		Insulators appear fine using visual and audio checks
		Equipment is free of oil leaks
		Operating switch platforms clear of debris & or snow, if not clear area
		Switch handles clear of wasps, if not clear handles
		Flip Fire Extinguisher and check to insure it is charged
		New hazzard identified - if yes comment below

Comments: ______________________________

____

____

Inspected By: ____________________ **Follow Up By:** ____________________

APPENDIX I – Infrared Thermography Inspection

AINSWORTH Power System Group

THERMOGRAPHIC INSPECTION REPORT No. 57.- 657530

Customer	Time
Milton Hydro	11:55

Device	Component
SC 63	SC 63

Load Amps	Ambient Temp.	Reference Temp.	Maximum Temp.	Temperature Rise
N/A	6 °C	7.8 °C	11.1 °C	3.3 °C

Reference

THERMOGRAM	PHOTO
	

COMMENTS:
No anomalies were found during this inspection.
The accompanying report contains a sample thermogram for reference purposes only.
No corrective action is required.

Thermographer : David Bourdeau Date: November 25th, 2019

Repaired By:______________________

Signature:________________________Date:__________

Rescan Comment

By:_____________________________Date:__________

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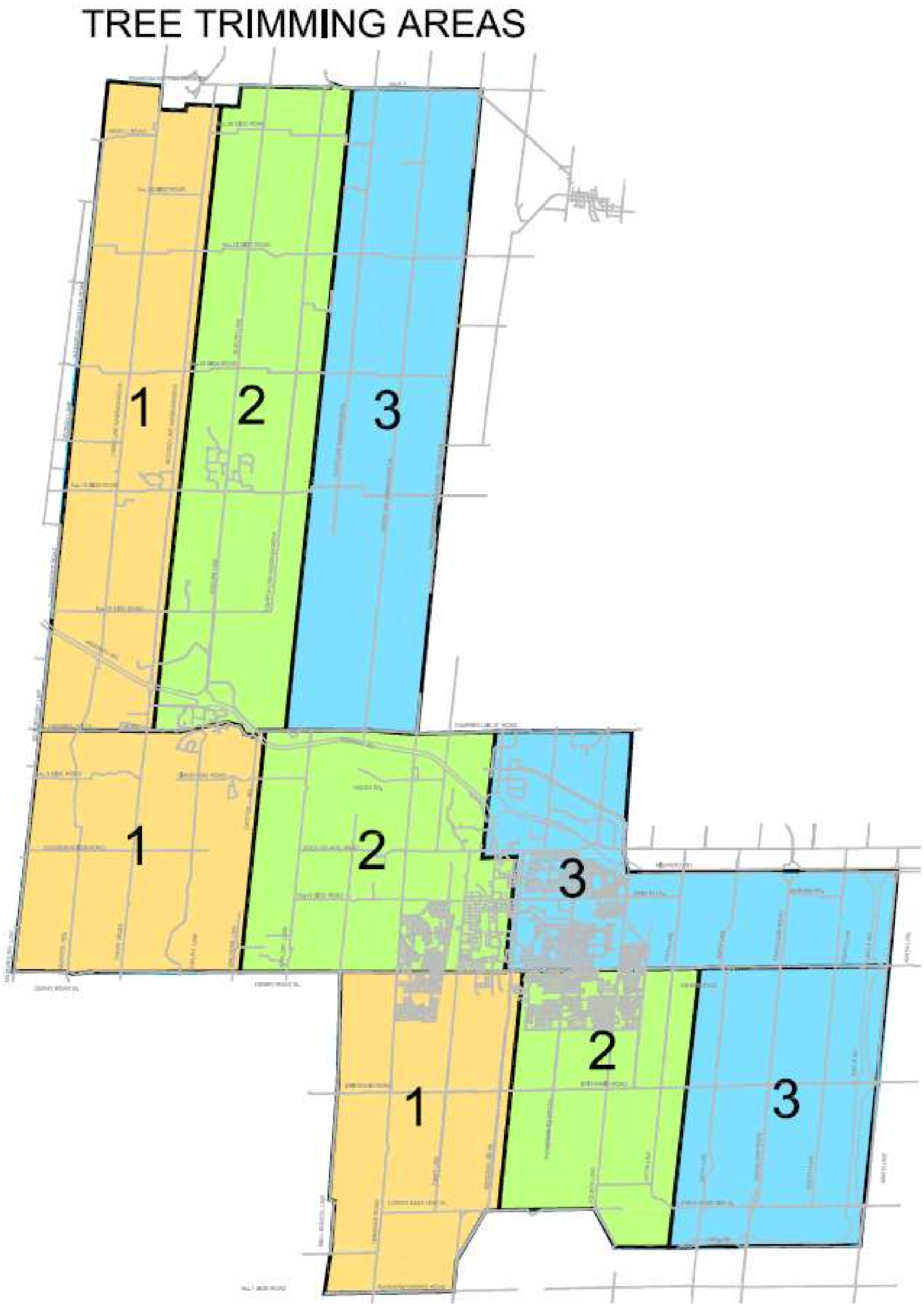
131 Bermondsey Rd. Toronto, Ontario M4A 1X4 Tel. (416) 751-4420 www.ainsworth.com

APPENDIX K – Tree Trimming (Areas – Zone Map)



APPENDIX L – Recloser Checklist

Date:		Location:	
1. Identify and obtain a hold-off on the feeder feeding the recloser location.			
2. Inspect the bypass switch(es), live line clamps and wire feeding to and from the bypass switch.			
3. Close and open the bypass switch several times to ensure it is operating correctly.			
4. Once satisfied the switch is operating properly, close the bypass switch(es) and open the recloser.			
5. Record the serial number:		6. Record the number on the counter:	
7. Remove the wire leads and live line clamps. Replace as required.			
8. Operate the hold-off lever and open/close lever.			
9. Inspect bushings and condition of recloser tank (rust, paint).			
10. Inspect grounding.			
Comments:			
Inspected by		Follow up	

APPENDIX M – RTU Maintenance

RTU Inspection Form: To be recorded annually

Date of Inspection (YYYY/MM/DD) ______________________

Condition			Good	Poor
Cabinet				
	Rust			
	Mount			
Communication				
	Antenna and lead wire condition			
	Signal strength in DB			
Battery				
	Leads condition			
	Leaks	Yes		
		No		
Comments:				
Completed by:				

Appendix E Kinectrics Asset Condition Assessment

MILTON Hydro
2021 ASSET CONDITION ASSESSMENT

Kinectrics Report: K-814266-RA-0001-R05

February 10, 2022

Kinectrics Inc.
800 Kipling Avenue
Toronto, ON
M8Z 6C4 Canada
www.kinectrics.com

DISCLAIMER

MILTON HYDRO
2021 ASSET CONDITION ASSESSMENT

Kinectrics Report: K-814266-RA-0001-R05

February 10, 2022

Prepared by:

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Date: 2022.02.10 13:26:26 -05'00'

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Senior Engineer/Scientist

Reviewed and Approved by:

Digitally signed by Yury Tsimberg
Date: 2022.02.10 16:50:48 -05'00'

Yury Tsimberg M. Eng. P. Eng.
Director – Asset Management

Dated: 2022-02-10

To: Milton Hydro Distribution Inc
200 Chisholm Drive
Milton, Ontario
L9T 3G9

Revision History

Revision Number	Date	Comments	Approved
R00	2021-06-01	Draft	
R01	2021-06-10	Draft	
R02	2021-08-27	Draft	
R03	2021-12-02	Draft	
R04	2022-01-12	Draft	
R05	2022-02-10	Final	

EXECUTIVE SUMMARY

In 2021 Milton Hydro (MH) determined a need to perform a condition assessment of its key distribution assets. MH selected and engaged Kinectrics Inc. (Kinectrics) to assist with this work. This report presents the results of 2021 Asset Condition Assessment (ACA) study, based on the available condition data as of the end of April 2021.

Asset Categories Considered

The 11 asset categories include in the 2021 ACA are as follows:

- MS Transformers
- MS Reclosers
- Wood Poles
- Concrete Poles
- Pole Top Transformers
- Pad Mounted Transformers
- Pad Mounted Switchgear
- RTUs
- UG Primary Cables
- Submersible Transformers
- Vault Transformers

For each asset category, available data are assessed, Health Index distribution is determined, and condition-based Flagged-for-action plan is developed.

For two of these asset categories, specifically MS transformers and MS reclosers, assets are typically replaced *proactively*, i.e., before they fail, while for the rest of the asset categories assets are typically run to failure and replaced *reactively*. For the two asset categoires with assets replaced *proactively* a risk based prioritized list is developed identifying specific units and required action timing for each. For assets replaced *reactively*, a number of units expected to be replaced each year is estimated without identifying specific units.

Overall Health Index Distribution

In general, more than half of the 11 categories have over 70% of their units classified as “good” or “very good” and with an average Health Index score of greater than 80%.

With respect to the asset categories of concern, MS Transformers and Wood Poles have 10% or more of units classified as “poor” or “very poor” condition.

Flagged-for-action plans

Flagged-for-action plan refers to a 10-year plan identifying how many units within each asset category require some action. In most cases the required action is replacement, however, for the asset categories replaced proactively other options are available, e.g., refurbishment, enhanced maintenance, operating solution, real time monitoring, or even “do nothing”. For that reason, the numbers presented in the Flagged-for-action plan are not necessarily equal to the number of assets to be replaced as units to be replaced represent a subset of the Flagged for Action units.

None of asset category have a backlog in terms of flagged for action units and all flagged-for-action plans show smooth projections throughout the next 10 years.

For all the asset categories their first year flagged-for-actions units are 5 or less or accounted for 5% or less of the entire population.

It is worth noting that within the next 10 years, over one third of Vault Transformers are expected to require some action to be taken to address their condition.

Data Availability

All the asset categories have sufficient information to develop credible health index scores.

MS Transformers have relatively complete data sets, with both test and detailed inspection data available in addition to age information.

MS Reclosers, RTUs, UG primary Cables and Submersible Transformers have age information only.

The remaining asset categories have age information and inspection data available.

Recommendations

As a long-term goal, it is recommended that MH enhance data collection in the following areas:

- Start collecting inspection and test data for MS Reclosers, UG Primary Cables, and Submersible Transformers. This is important even for the newer units to establish long-term degradation trends.
- Start collecting loading data for the distribution transformers. Although these transformers are usually sized with some margin to meet forecasted load, the expected proliferation of EVs will results in reduced margins and different loading patterns.
- Create a single file (instead of separate files) for storing inspection and test data for all the individual units collected for MS Transformers and MS Reclosers.

- Start recording removal and failure records for MS Reclosers, Concrete Poles, RTUs and Vault Transformers to enable development of MH specific asset degradation curves.

- Start tracking of UG Primary Cables failures by location in the outage database. Once sufficient data are available, they could be incorporated in ACA.

Findings and recommendations of this study are based on asset condition only as determined from available data and information. Note that there are numerous other considerations that may influence MH's planning process, such as obsolescence, system growth, corporate priorities, technological advancements, etc.

It is also important to note that the Flagged-for-action plans are based solely on asset condition using a probabilistic, non-deterministic, approach and, as such, can only show expected failures or probable number of units that are expected to be candidates for replacement or other action. While this condition-based Flagged-for-action plan can be used as a guide for Renewal Investment category within Distribution System Plan, it is not expected that it be followed directly or as the final deciding factor in making investment decisions. There are numerous other factors and considerations that will influence MH's Asset Management decisions, such as obsolescence, system expansion, regulatory requirements, municipal projects, customer preferences, etc.

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DEFINITIONS

Terminology	Acronym	Definition
Age Limiter	AL	The final HI assigned to an individual asset may also be limited by the asset's age. The AL is generally equal to the cumulative survival probability at a given age of an asset category. If the calculated HI is less than or equal to the AL, the final HI assigned is the calculated HI. Otherwise, the final HI assigned is equal to the AL.
Asset Condition Assessment	ACA	Process of using asset information to determine the condition of assets. Condition data can include nameplate information, test results, asset inspection records, corrective maintenance records, operational experience, etc.
Condition Parameter Score	CPS	Score of an asset for a particular condition parameter. In this study, the scoring system used ranges from 0 through 4 (0 = worst; 4 = best).
Condition Parameters	CP	Asset characteristics or properties that are used to derive the HI.
Criticality		Metric used to quantify consequence of failure in this methodology.
Criticality Index	CI	Index used to determine asset Criticality. CI ranges from 0% to 100%, with 100% representing the unit with the highest possible consequence of failure.
Cumulative Distribution Function	CDF	Cumulative distribution function. Assumed in this methodology as the Weibull function representing the cumulative likelihood of removals.

Terminology	Acronym	Definition
Data Availability Indicator	DAI	A measure of the amount of condition parameter data that an asset has, as measured against the full data sets that are practically available and included in the HI formula. It is determined by the weighted ratio of the condition parameters availability of an individual unit, over the maximum condition parameters availability of an asset category.
Data Gap		A data gap is the case where none of the units in an asset category has data for a particular item as requested by "ideal" data sets. A data gap means the data is either unavailable or not in a useable format.
De-rating Multiplier	DR	Multipliers used to adjust a condition or sub-condition parameter score or calculated Health Index so as to reflect certain conditions.
Flagged-for-action plan	FFA Plan	Number of units that are expected to require attention annually.
Flagged for Action Year	FFA Year	The year that a particular unit is flagged for action.
Health Index	HI	Health Indexing quantifies equipment condition based on numerous condition parameters that are related to the factors that cumulatively lead to an asset's end of life. HI is given in terms of a percentage range of 0%-100%, with 100% representing as new condition.
Probability Density Function	PDF	Probability density function. Assumed in this methodology as the Weibull function representing the likelihood that an asset will be removed from service when its age is within a particular range.
Removal Rate		Weibull hazard function. Assumed in this methodology as the rate of removal (removals per year for given age, including failures, proactively replaced, removal for non-condition reasons).
Risk		Product of likelihood of removal and consequence of failure.
Sample Size		Subset of an asset population with enough data (i.e. age or condition data) to calculate the HI.

Terminology	Acronym	Definition
Sub-Condition Parameter Score	SCPS	Score of an asset for a particular sub condition parameter. In this study, the scoring system used ranges from 0 through 4 (0 = worst; 4 = best).
Sub-Condition Parameters	CP	Asset characteristics or properties that are used to derive the HI. Each condition parameter can be comprised of multiple sub-condition parameters.
Weibull Distribution		Continuous function used, in this methodology to model, the removal rates of assets.
Weight of Condition Parameter	WCP	In the HI formula, condition parameters are assigned a weight that is based on t he degree of contribution or relevance to asset degradation.
Weight of Sub-Condition Parameter	WSCP	In the HI formula, condition parameters are assigned a weight that is based on t he degree of contribution or relevance to asset degradation.

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I INTRODUCTION

Milton Hydro (MH) engaged Kinectrics Inc (Kinectrics) in 2021 to perform an Asset Condition Assessment (ACA) on selected distribution assets. ACA produces a quantifiable evaluation of asset condition and aids in prioritizing and allocating sustainment investments. This undertaking, if done continuously over time, would allow MH to monitor trends in the condition of its assets and to continuously improve its ACA process and asset management practices. This ACA covers MH's asset population as of April 2021. This report presents results based on the available data. Year 0 shown in all figures is for 2021, year 1 for 2022, year 2 for 2023 etc.

I.1 Objective and Scope of Work

The categories and sub-categories of assets considered in this study are as follows:

- MS Transformers
- MS Reclosers
- Wood Poles
- Concrete Poles
- Pole Top Transformers
- Pad Mounted Transformers
- Pad Mounted Switchgear
- RTUs
- UG Primary Cables
- Submersible Transformers
- Vault Transformers

I.2 Deliverables

The deliverable in this study is a Report that includes the following information:

- Description of the Asset Condition Assessment methodology
- For each asset category the following are included:
  - Health Index formulation
  - Age distribution
  - Health Index distribution
  - Condition-based Flagged-for-action plan
  - Assessment of data availability and a Data Gap analysis

- Additionally, prioritized risk-based lists are provided for the two asset categories with assets typically replaced before they fail, specifically MS transformers and MS Reclosers.

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II ASSET CONDITION ASSESSMENT METHODOLOGY

Asset Condition Assessment (ACA) Methodology involves the process of determining asset Health Index, as well as developing a condition-based Flagged-for-action plan for each asset category. The methods used are described in the subsequent sections.

II.1 Health Index

Health Indexing quantifies equipment condition based on numerous condition parameters that are related to the degradation factors leading to an asset's end of service life. The Health Index is an indicator of the asset's overall health and is typically given in terms of percentage, with 100% representing an asset in brand new condition and 0 asset at the end of its life. Health Indexing provides a measure of long-term degradation and, thus, differs from defect management, whose objective is finding defects and deficiencies that need correction or remediation to keep an asset operating prior to reaching its end of life.

Condition parameters are the asset characteristics or properties that are used to derive the Health Index. A condition parameter may be comprised of several sub-condition parameters. For example, a parameter called "Oil Quality" may be a composite of parameters such as "Moisture", "Acid", "Interfacial Tension", "Dielectric Strength" and "Color".

In formulating a Health Index, condition parameters are ranked, through the assignment of *weights*, based on their contribution to asset degradation. The *condition parameter score* for a particular parameter is a numeric evaluation of an asset with respect to that parameter.

Health Index (HI), which is a function of scores and weightings, is therefore given by:

$$HI = \frac{\sum_{m=1}^{\forall m} \alpha_m (CPS_m \times WCP_m)}{\sum_{m=1}^{\forall m} \alpha_m (CPS_{m.\max} \times WCP_m)} \times DR$$

Equation 1

where

$$CPS = \frac{\sum_{n=1}^{\forall n} \beta_n (CPF_n \times WSCP_n)}{\sum_{n=1}^{\forall n} \beta_n (WSCP_n)}$$

Equation 2

CPS	Condition Parameter Score
WCP	Weight of Condition Parameter
α_m	Data availability coefficient (1 if available; 0 if not available)
CPF	Sub-Condition Parameter Score
WSCP	Weight of Sub-Condition Parameter
β_n	Data availability coefficient for sub-condition parameter (1 if available; 0 if not available)
DR	De-Rating Multiplier

The scale that is used to determine an asset's score for a particular parameter is called the *condition criteria*. For this project, a condition criterion scoring system of 0 through 4 is used. A score of 0 represents the worst score while 4 represents the best score, i.e., $CPF_{max} = 4$.

De-Rating multipliers are applied to the calculated HI. These may be used to represent the impact of non-condition issues such as design or operating environment.

II.1.1 Health Index Results

As stated previously, an asset's Health Index is given as a percentage, with 100% representing "as new" condition. The Health Index is calculated only if there is sufficient condition data. The subset of the population with sufficient data is called the *sample size*. Results are generally presented in terms of number of units and as a percentage of the sample size. If the sample size is sufficiently large and the units within the sample size are sufficiently random, the results may be extrapolated for the entire population.

The Health Index distribution given for each asset category illustrates the overall condition of the asset category. Further, the results are aggregated into five categories and the categorized distribution for each asset category is given. The Health Index categories are as follows:

Very Poor	Health Index < 25%
Poor	25 ≤ Health Index < 50%
Fair	50 ≤ Health Index <70%
Good	70 ≤ Health Index <85%
Very Good	Health Index ≥ 85%

Note that for critical asset categories, such as Power Transformers, the Health Index of each individual unit is given.

II.2 **Condition Based Flagged-for-action plan**

The condition based Flagged-for-action plan outlines the number of units that are expected to require attention in the next 10 years. The numbers of units are estimated using either a *proactive* or *reactive* approach. In the proactive approach, units are considered for action prior to failure, whereas the reactive approach is based on expected failures per year.

Both approaches consider asset removal rate and probability of failure. The removal rate is estimated using the method described in the subsequent section.

II.2.1 Removal Rate and Probability of Removal

Based on Kinectrics' experience in removal rate studies of multiple power system asset categories, Weibull equation is used to model the removal curves. The Weibull function has no specific characteristic shape and, as such, can model the exponentially increasing removal rate using empirically derived parameters.

The Weibull removal density function is defined as:

$$f(t) = \frac{\beta t^{\beta-1}}{\alpha^{\beta}} e^{-(\frac{t}{\alpha})^{\beta}}$$

Equation 3

f	= removal rate per unit time
t	= time
α, β	= constant that control the scale and shape of the curve

The corresponding cumulative removal distribution also sometimes referred to as Probability of Failure is:

$$Q(t) = 1 - R(t) = 1 - e^{-(\frac{t}{\alpha})^{\beta}}$$

Equation 4

Q(t)	= cumulative failure distribution
R(t)	= survival function

Finally, the removal rate function also known as hazard function) is:

$$\lambda(t) = \frac{f(t)}{1 - Q(t)} = \frac{\beta t^{\beta-1}}{\alpha^{\beta}}$$

Equation 5

$\lambda(t)$	= hazard function (removals per year)

Different asset categories have different removal rates corresponding to different removal distributions. The parameters α and β are determine the shapes of these curves. For each asset category, the values of these constant parameters are selected to reflect typical useful lives for assets in this asset category.

Consider, for example, an asset class where at the ages of 40 and 75 the asset has cumulative probabilities of removal of 20% and 95% respectively. It follows that when using Equation 5, α and β are calculated as 57.503 and 4.132 respectively. The removal rate and probability of removal graphs for these parameters are as follows:

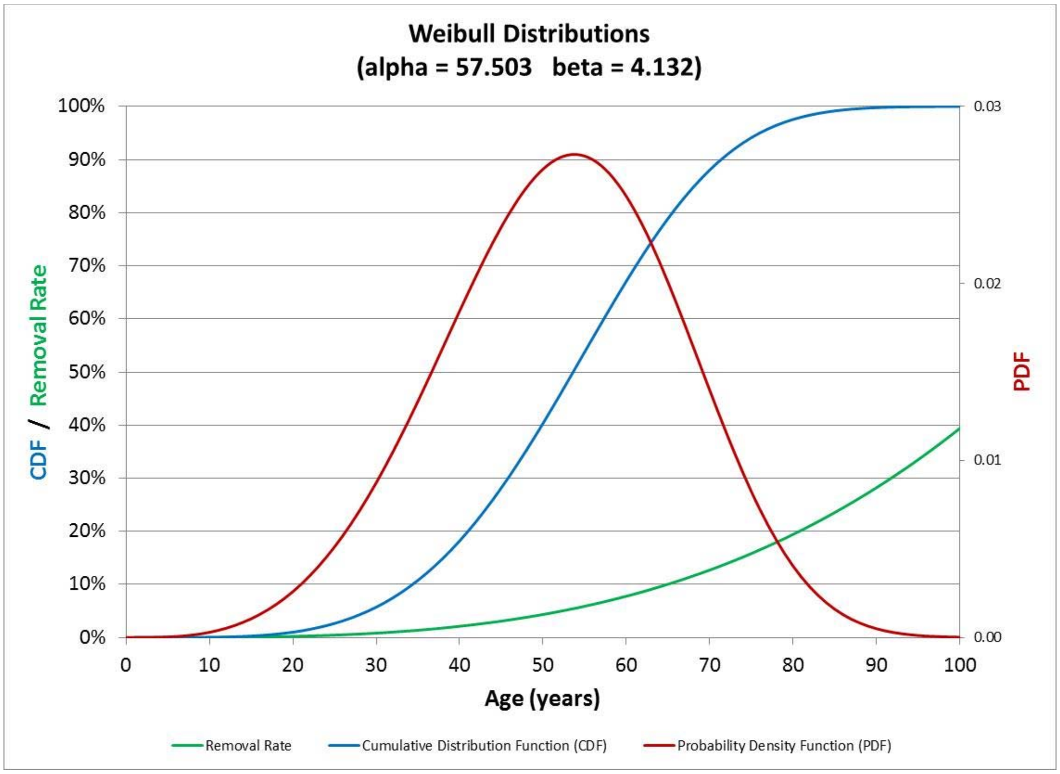

Figure 1 Removal rate vs. Age

II.2.2 Projected Flagged-for-action plan Using a Probabilistic Approach

For assets that have low consequences of failure that are run to failure and are replaced *reactively*, a probabilistic approach is taken to estimate the number of units that are expected to fail and flagged for action in each year.

For these asset categories, the number of units expected to be replaced in a given year is determined based on the asset's failure rates. The number of failures per year is given by Equation 5.

An example of such a Flagged-for-action plan is as follows: Consider an asset distribution of 100 - 5-year-old units, 20 – 10-year-old units, and 50 - 20-year-old units. Assume that the removal rates for 5-, 10-, and 20-year-old units for this asset class are $\lambda_5 = 0.02$, $\lambda_{10} = 0.05$, $\lambda_{20} = 0.1$ failures / year respectively. In the current year, the total number of replacements is 100(.02) + 20(0.05) + 50(0.1) = 2 + 1 + 5 = 8.

In the following year, the expected asset distribution is, as a result, as follows: 8 – 1 year old units, 98 – 6-year-old units, 19 – 11-year-old units, and 45 - 21-year-old units. The number of replacements in year 2 is therefore $8(\lambda_1) + 19(\lambda_6) + 45(\lambda_{11}) + 45(\lambda_{21})$.

Note that in this study the "age" used is in fact "effective age", or condition-based age if available, as opposed to the chronological age of the asset.

For the asset categories below, the probabilistic approach is used to estimate the FFA Plan. It is also important to note that the FFA gives the estimated number of assets per year that need to be addressed; the year that a specific unit needs to be addressed is not calculated.

- Poles (wood, concrete)
- Distribution transformers (pole mounted, pad mounted, submersible, vault)
- Pad mounted switchgear
- RTUs
- UG primary cables

II.2.3 Projected Flagged-for-action plan Using a Prioritized Risk Approach

For some asset categories costs of replacement and/or consequences of failure are more substantial, and they are typically replaced *proactively*, i.e., before they fail. For such assets planning for replacement requires a risk-based approach when developing the FFA Plan. This risk-based methodology considers both the asset likelihood of removal (as related to HI) and its consequence of failure (criticality). The product of likelihood or removal and consequence of failure determines asset risk.

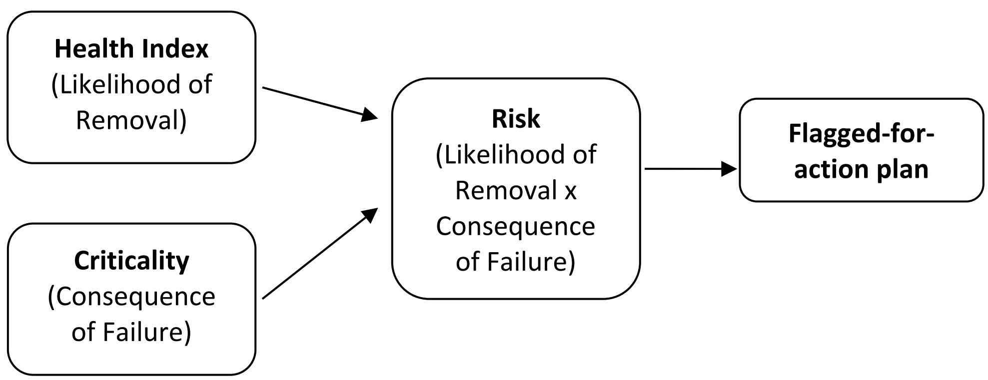

Figure 2 Risk Assessment Procedure

Relating Health Index and Probability of Removal

Typically, a stress asset is exposed is not constant and has normal frequency distribution. This is illustrated by the probability density curve of the stress below. The vertical lines in the figure represent condition or strength (Health Index) of an asset and bell-shaped curved stress distribution.

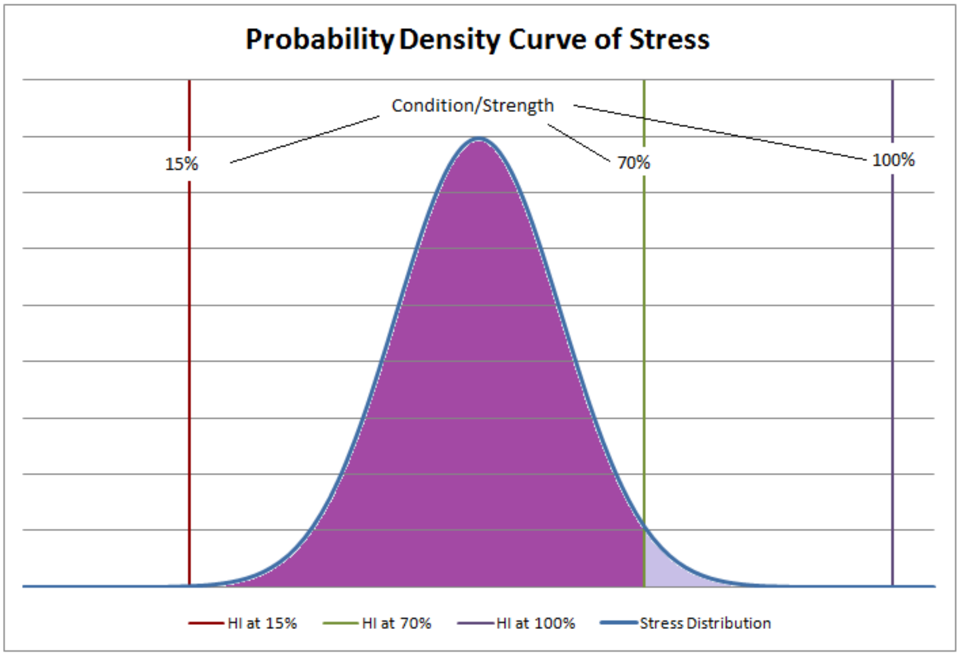

Figure 3 Stress Curve

An asset is in as-new condition (100% strength) should be able to withstand all levels of stress. As the condition of the asset deteriorates, it may be less able to withstand higher levels of stress. Consider, for example, the green vertical line that represents 70% condition/strength. The asset should be able to withstand magnitudes of stress to left of the green line. If, however, the stress is of a magnitude to the right of the green line, the asset will fail.

To create a relationship between the Health Index and likelihood of removal, assume two “points” on the stress curve that correspond to two different Health Index values. In this example, assume that an asset that has a condition/strength (Health Index) of 100% can withstand all magnitudes of stress to the left of the purple line. It then follows that probability that an asset in 100% condition will fail is the probability that the magnitude of stress is at levels to the right of the purple line. This corresponds to the area under the stress density curve to the right of the purple line. Similarly, if it assumed that an asset with a condition of 15% will fail if subjected to stress at magnitudes to the right of the red line, the probability of failure at 15% condition is the area under the stress density curve to the right of the red line.

The likelihood of removal at a particular Health Index is found from plotting the Health Index on X-axis and the area under the probability density curve to the right of the Health Index line on Y-axis, as shown on the graph of the figure below.

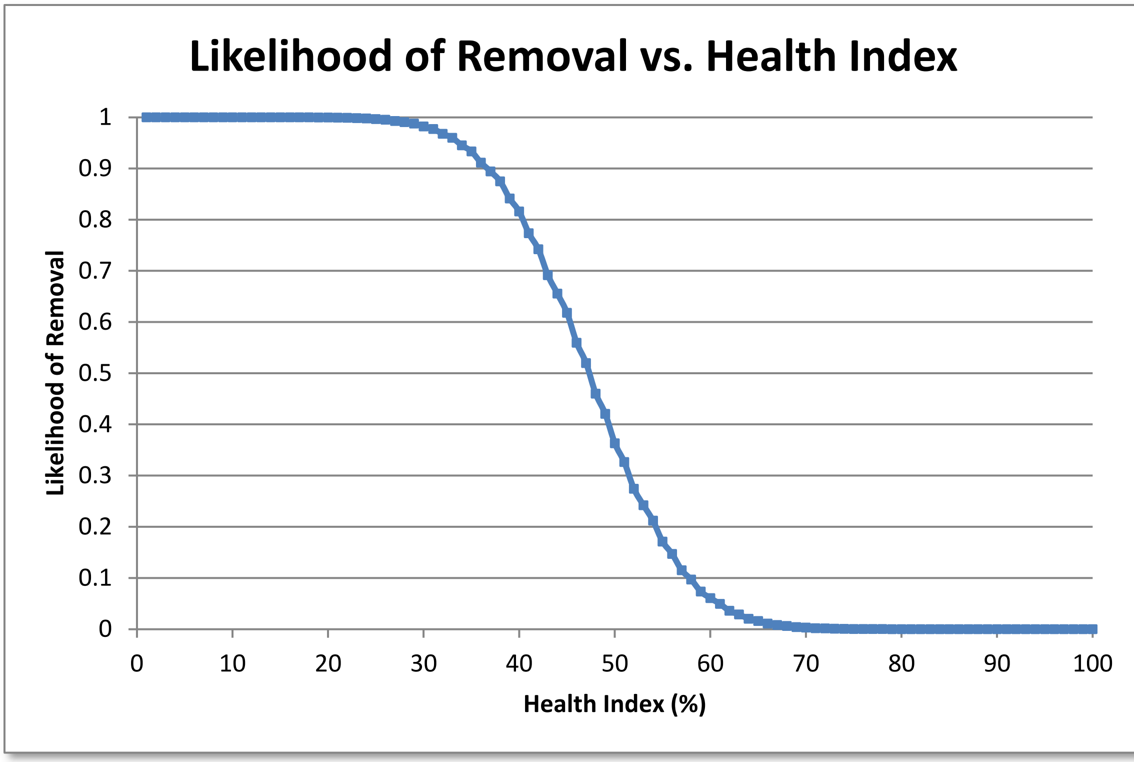

Figure 4 Likelihood of Removal vs. Health Index

Condition-Based Flagged-for-action plan

The metric used to measure consequence of failure is referred to as *Criticality*. Criticality may be determined in numerous ways, with monetary consequence or degree of risk to corporate business values being examples. The higher the criticality value assigned to a unit, the higher it's consequence of failure.

Risk-based prioritization using both estimated probability of failure related to the calculated condition and impact of failure using criticality are used for MS Transformers and MS Reclosers only. As per feedback from MH, all units within these asset categories are of equal criticality, so the prioritized list is based on their condition.

To develop a Flagged-for-action plan, the risk of removal of each unit must be quantified. Risk is the product of a unit's likelihood of removal and its consequence of failure. An asset is flagged for action when the calculated risk value exceeds a pre-set threshold.

For the asset categories listed below, the risk-based approach is used to estimate the FFA Plan.

- MS transformers
- MS reclosers

With this approach, the FFA Year (i.e., the years that a particular unit is flagged for action) is determined for each asset.

II.3 Data Assessment

The condition data used in this study include the following:

- Test Results (e.g., Oil Quality, DGA)
- Inspection Records
- Loading
- Make, Model, and Type
- Age

There are two components that assess the availability and quality of data used in this study: data availability indicator (DAI) and data gap.

II.3.1 Data Availability Indicator (DAI)

The Data Availability Indicator (DAI) is a measure of the amount of condition parameter data that an asset has, as measured against the full data sets that are available for at least one unit. It is determined by the weighted ratio of the condition parameters availability of an individual unit, over the maximum condition parameters availability for this asset category. The formula is given by:

$$DAI = \frac{\sum_{m=1}^{\forall m} (DAI_{CPS\,m} \times WCP_m)}{\sum_{m=1}^{\forall m} (WCP_m)}$$

Equation 6

where

$$DAI_{CPSm} = \frac{\sum_{n=1}^{\forall n} \beta_n \times WCFn}{\sum_{n=1}^{\forall n} (WCPFn)}$$

Equation 7

DAI_{CPSm}	Data Availability Indicator for Condition Parameter m with n Condition Parameter Factors (CPF)
β_n	Data availability coefficient for sub-condition parameter (=1 when data available, =0 when data unavailable)
$WSCP_n$	Weight of Condition Parameter Factor n
DAI	Overall Data Availability Indicator for the m Condition Parameters
WCP_m	Weight of Condition Parameter m

For example, consider an asset with the following condition parameters and sub-condition parameters:

Condition Parameter		Condition Parameter Weight (WCP)	Sub-Condition Parameter		Sub-Condition Parameter Weight (WCF)	Data Available? (β = 1 if available; 0 if not)
m	Name		n	Name		
1	A	1	1	A_1	1	1
2	B	2	1	B_1	2	1
			2	B_2	4	1
			3	B_3	5	0
3	C	3	1	C_1	1	0

The Data Availability Indicator is calculated as follows:

$$DAI_{CP1} = (1*1) / (1) = 1$$
$$DAI_{CP2} = (1*2 + 1*4 + 0*5) / (2 + 4 + 5) = 0.545$$
$$DAI_{CP3} = (0*1) / (1) = 0$$

$$DAI = (DAI_{CP1}*WCP_1 + DAI_{CP2}*WCP_2 + DAI_{CP3}*WCP_3) / (WCP_1 + WCP_2 + WCP_3)$$
$$= (1*1 + 0.545*2 + 0*3) / (1 + 2 + 3)$$
$$= 35\%$$

An asset with all available condition parameter data represented will, by definition, have a DAI value of 100%. In this case, an asset will have a DAI of 100% regardless of its Health Index score. Bear in mind that a DAI of 100% does not mean there is no data gaps (to be discussed in the following section). What it really indicates is that, at the time of study, an asset has information on all the condition parameters available for ACA calculations. For other units with fewer input data points available the DAI will be less and calculated as shown above.

Provided that the condition parameters used in the Health Index formula are of good quality and there are little data gaps, there will be a high degree of confidence that the Health Index score accurately reflects the asset's condition.

II.3.2 Data Gap

The Health Index formulae developed and used in this study are based only on MH's available data. There are additional parameters or tests that MH may not collect at the present time but that are important indicators in determining the extent of assets degradation. While these will not be included in the HI formula, they are referred to as data gaps. A data gap is the case where none of the units in an asset category has data for a particular item as requested by "ideal" data sets.

As part of this study, the data gaps of each asset category are identified. In addition, the data items are ranked in terms of importance. There are three priority levels, the highest being most indicative of asset degradation.

Priority	Description	Symbol
High	Impactive data; most useful as an indicator of asset degradation	☆☆☆
Medium	Important data; can indicate the need for corrective maintenance or increased monitoring	☆☆
Low	Helpful data; least indicative of asset deterioration	☆

When closing data gaps, it is generally recommended that data collection be initiated for the items marked with higher priority because when more impactive and important data are included in the Health Index formula the higher is confidence in the calculated Health Index score.

If an asset category has significant data gaps and lacks good quality condition, there is less confidence that the Health Index score of a particular unit accurately reflects its condition, regardless of the value of its DAI.

To facilitate the incorporation of data gap items into improved Health Index formulas for future assessments, the data gaps are shown at sub-condition parameters level. For each of them, the parent condition parameter is identified. Also given are the object or component addressed by the parameter, a description of what to assess for each component or object, and the possible source of data.

The following is an example for "Tank Corrosion" on a Pad-Mounted Transformer:

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Tank Corrosion	Physical Condition	☆☆	Oil Tank	Tank surface rust or deterioration due to environmental factors	Visual Inspection

III RESULTS

This section summarizes the findings of this study.

III.1 Health Index Results

A summary of the Health Index results is shown in Table 1. For each asset category the population, sample size (number of assets with sufficient data for Health Indexing), average age, age availability and average DAI are given. The average Health Index and distribution are also shown. A summary of the Health Index distribution for all asset categories are also graphically shown in Figure 5. Note that the Health Index distribution percentages are based on the asset category's sample size.

It can be observed that out of the 11 categories, 10 of them have over 70% of their units classified as "good" or "very good". Besides, all of them have an average Health Index score of greater than 80%.

The only asset categories that have all the units in "very good" condition are MS Reclosers and RTUs.

The results show that compared to other asset categories, MS Transformers have higher percentage of assets classified as "poor" or "very poor", being 40% of the entire population. Given the fact that the entire fleet has 5 assets in total, this represented only 2 assets.

Other asset categories have no more than 5% of assets classified as "poor" or "very poor".

Table 1 Health Index Results Summary

Asset Category	Population	Sample Size	Average Health Index	Health Index Distribution					Average Age	Average DAI	Age Availability
				Very Poor (< 25%)	Poor (25 - <50%)	Fair (50 - <70%)	Good (70 - <85%)	Very Good (>= 85%)			
MS Transformers	5	5	62%	1	1	0	1	2	43	97%	100.0%
MS Reclosers	8	6	100%	0	0	0	0	6	8		75.0%
Wood Poles	9013	9013	84%	61	390	557	517	7488	28	81%	100.0%
Concrete Poles	759	759	87%	0	18	20	11	710	15	86%	100.0%
Pole Mounted Transformers	2332	2329	85%	0	19	279	610	1421	21	70%	99.9%
Pad Mounted Transformers	3095	3095	89%	1	4	4	1393	1693	13	59%	100.0%
Pad Mounted Switchgear	74	74	86%	0	1	14	6	53	14	97%	100.0%
RTUs	88	88	100%	0	0	0	0	88	3		100.0%
UG Primary Cables	671.7	663.7	100%	0.0	0.0	0.2	1.1	662.4	14		98.8%
Submersible Transformers	468	468	94%	0	0	8	11	449	15		100.0%
Vault Transformers	38	38	81%	0	0	9	16	13	27	68%	100.0%

0% 100%

Age Only — No information other than age

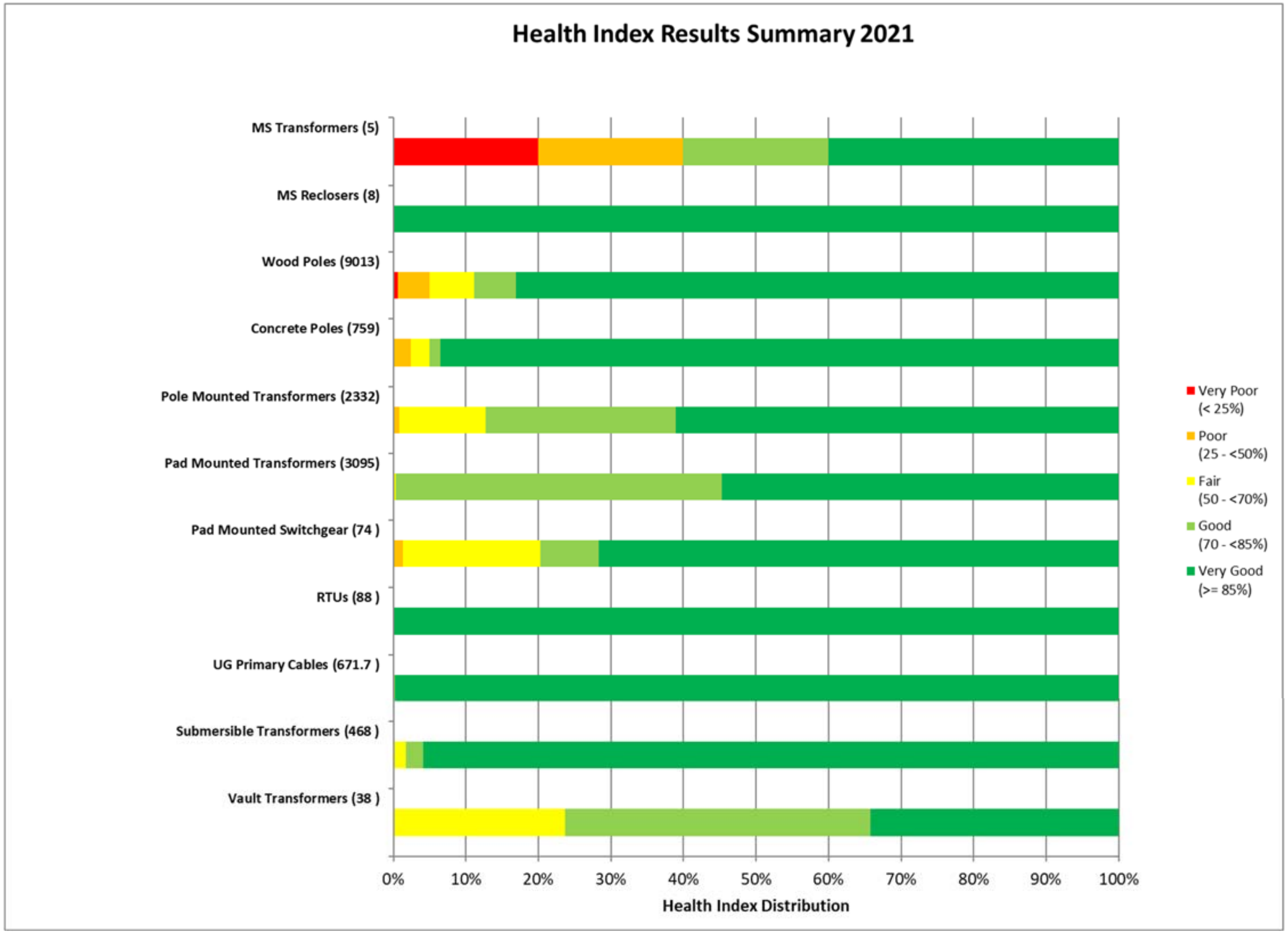

Figure 5 Health Index Results Summary

III.2 Condition-Based Flagged-for-action plan

The Flagged-for-action plan estimates the number of units expected to require attention in a given year, the attention being replacement or other actions as described earlier in this document.

It is important to note that the Flagged-for-action plan is based solely on asset condition. It uses a probabilistic, non-deterministic, approach and, as such, can only show expected failures or probable number of units that are expected to be candidates for replacement or other action. While this condition-based Flagged-for-action plan can be used as a guide for Renewal Investment category within Distribution System Plan, it is not expected that it be followed directly or as the final deciding factor in making investment decisions. There are numerous other factors and considerations that will influence MH's Asset Management decisions, such as obsolescence, system expansion, regulatory requirements, municipal demand, customer preferences, etc.

Table 2 shows the Year 0 (year 2021) and 10 Year cumulative Flagged-for-action plan. Table 3 shows annual 10 Year Flagged-for-action plan.

Table 2 Summary of Flagged for Action

Asset Category	1st Year Action		10 Year Action in Total	
	Quantity	Percentage	Quantity	Percentage
MS Transformers	1	20.0%	1	20.0%
MS Reclosers	0	0.0%	0	0.0%
Wood Poles	183	2.0%	1334	14.8%
Concrete Poles	19	2.5%	163	21.5%
Pole Mounted Transformers	38	1.6%	334	14.3%
Pad Mounted Transformers	43	1.4%	387	12.5%
Pad Mounted Switchgear	3	4.1%	23	31.1%
RTUs	1	1.1%	19	21.6%
UG Primary Cables	0.2	0.0%	6.7	1.0%
Submersible Transformers	10	2.1%	144	30.8%
Vault Transformers	2	5.3%	14	36.8%

High Low

Table 3 Ten Year Flagged-for-action plan

Asset Category	Flagged for Action Plan by Year									
	0	1	2	3	4	5	6	7	8	9
MS Transformers	1	0	0	0	0	0	0	0	0	0
MS Reclosers	0	0	0	0	0	0	0	0	0	0
Wood Poles	183	141	141	141	141	141	141	141	80	84
Concrete Poles	19	16	16	16	16	16	16	16	16	16
Pole Mounted Transformers	38	32	33	33	33	33	33	33	33	33
Pad Mounted Transformers	43	36	38	38	38	38	39	39	39	39
Pad Mounted Switchgear	3	3	3	2	2	2	2	2	2	2
RTUs	1	1	1	1	2	2	2	3	3	3
UG Primary Cables	0.2	0.2	0.3	0.3	0.5	0.7	0.8	1.0	1.2	1.5
Submersible Transformers	10	10	11	13	14	15	16	18	18	19
Vault Transformers	2	2	2	2	1	1	1	1	1	1

* Year 0 = 2021, year 1 = 2022, year 2 = 2023 … etc km for UG Primary Cables

III.3 **Data Assessment Results**

Data assessment determines the data availability of each asset category and identifies data gaps for each asset category. Data availability is a measure of the amount of data that an individual unit has in comparison with the set of data currently available for its asset category. Data gaps are data that are not collected or available for any asset in an asset category. The higher the DAI and the fewer the data gaps, the higher the quality of Health Index results.

Data for MS Transformers (main tank) include age, loading, oil and Furan test results, and inspection records. Data gaps are test and inspection records for windings/bushings and cooling systems.

Data for MS Reclosers include age only. Data gaps include incorporation of wear tracking information and external visual inspection records.

Data for Wood Poles include age and inspection results. MH has up to 2010 test data for wood pole strength measurement as well as regular ground line bore test for poles over 25 years old. A recent updating of these test data is needed.

Data for Concrete Poles include age and inspection results. Given the age profile and population size of this asset category, there is no pressing data gaps.

Data for Pole mounted Transformers and Pad Mounted Transformers include age and inspection results. Considering expected proliferation of EV which will impact their loading pattern, it would be desirable to start analyzing loading data.

Data for Pad Mounted Switchgear include age and inspection results. There are no pressing data gap.

Data for RTUs include age only. Given the age profile and population size of this asset category, there is no pressing data gaps.

Data for UG Primary Cables include age only. Data gaps include historic removal records, inspection results at component level and fault statistics at segment level.

Data for Submersible Transformers include age only. Due to inspection accessibility, no inspection could be conducted. Given the operation practice for this asset category, the only data gap is transformer loading.

Data for Vault Transformers include age and inspection results with the only data gap being transformer loading.

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IV CONCLUSIONS

An Asset Condition Assessment is conducted for eleven of MH's distribution asset categories (twenty sub-categories). For each asset category, the Health Index distribution is determined, and a condition-based Flagged-for-action plan is developed.

Risk based prioritized lists are developed for MS Transformers and MS Reclosers only. These lists indicate the projected flagged for action year for each individual unit.

Flagged-for-action plan presented in this study is based solely on available asset condition data and there are other considerations that may influence MH's Asset Management Plan, such as obsolescence, system growth, regulatory requirements, municipal initiatives, etc.

The following conclusions are drawn based on the ACA findings of this study.

1) In general MH's assets are in good condition, with 10 out of 11 categories having an average Health Index score of greater than 70%.

2) Among all the asset categories, MS Reclosers and RTUs are in the best condition, having all the units classified as "very good".

3) Only MS Transformers have over 5% of its assets in "poor" or "very poor" condition. Given the fact that there are in total 5 MS Transformers, this represents only 2 assets.

4) In terms of flagged-for-action plans, no asset category has major backlog.

5) For 10-year long term flagged-for-action plans, Vault Transformers have the highest percentage of the population to be addressed.

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V RECOMMENDATIONS

The following recommendations are made based on the study results:

a) Continue collecting asset removal records for all the asset categories, to improve the accuracy of asset degradation curves.

b) Start collecting Inspection records at component level for UG Primary Cables to improve the input granularity for better assessment of component condition status.

c) Start collecting loading data for all types of distribution transformers in anticipation of EV proliferation that will affect their loading

d) Start collecting operation wear data and external visual inspection results for MS Reclosers.

e) Continue collecting pole strength measurements for Wood Poles older than 25 years.

f) Start tracking UG Cables failures preferably by cable segments for statistical processing before being incorporated in ACA study.

g) For MS transformers and station MS reclosures merge Inspection and test data for the individual units in one data file for each asset category.

h) Standardize inspection forms to ensure consistency of inspections records collected in the field.

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VI APPENDIX A: RESULTS FOR EACH ASSET CATEGORY

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1 MS TRANSFORMERS

1.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

1.1.1 Condition and Sub-Condition Parameters

For substation transformers without tap changers, the overall calculated health index is simply HI_{TX}. For transformers with tap changers, a composite health index, HI_{COM}, is calculated. HI_{COM} is a weighted composite of the transformer main tank and tap changer. The formula is as follows, where HI_{TX} refers to the Health Index of the main tank:

Table 1-1 MS Transformers Composite Health Index Formula

If (***Transformer has LTC***)	If (***HI_{TX} < 50%***) then **$HI_{COM} = HI_{TX}$**
	Else If (***HI_{LTC} < 50%***) then **$HI_{COM} = HI_{LTC}$**
	Else **$HI_{COM} = 60\%HI_{TX} + 40\%HI_{LTC}$**
Else	**$HI_{COM} = HI_{TX}$**

Main Tank (LTC and Non-LTC)

Table 1-2 Main Tank Condition Parameter and Weights – MS Transformers

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Insulation	6	Table 1-3
2	Sealing & Connection	1	Table 1-4
3	Service Record	3	Table 1-5
	Age Limiting	Overall Multiplier	Figure 1-1

Table 1-3 Insulation Sub-Condition Parameters and Weights (m=1) – MS Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Oil Quality	3	Table 1-9
2	Oil DGA	5	Table 1-7
3	Furan	1	Table 1-10

Table 1-4 Sealing and Connection Sub-Condition Parameters and Weights (m=2) – MS Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Leak	1	Table 1-11
2	Main Tank Oil Level	1	Table 1-11
3	Desiccant	1	Table 1-11

Table 1-5 Service Record Sub-Condition Parameters and Weights (m=5) – MS Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Loading	1	Table 1-12

Tap Changers

Table 1-6 Condition Parameters and Weights – LTC

n	Condition Parameter	WCP_m	Condition Criteria Table
1	Oil Quality	3	Table 1-9
2	Oil DGA	4	Table 1-8
	Age Limiting	Overall Multiplier	Figure 1-1

1.1.2 Condition Criteria

Oil DGA – Transformer Oil

--- Main Tank

Table 1-7 DGA Criteria – Main Tank

	Dissolved Gas	Scores					
		4	3.2	2.4	1.6	0.8	0
2.5 MVA to 10 MVA	H2 (Hydrogen)	X ≤ 70	70 < X ≤ 100	100 < X ≤ 200	200 < X ≤ 400	400 < X ≤ 1000	X >1000
	CH4 (Methane)	X ≤ 70	70 < X ≤ 120	120 < X ≤ 200	200 < X ≤ 400	400 < X ≤ 600	X > 600
	C2H6 (Ethane)	X ≤ 75	75 < X ≤ 100	100 < X ≤ 150	150 < X ≤ 250	250 < X ≤ 500	X > 500
	C2H4 (Ethylene)	X ≤ 60	60 < X ≤ 100	100 < X ≤ 150	150 < X ≤ 250	250 < X ≤ 500	X > 500
	C2H2 (Acetylene)	X ≤ 3	3 < X ≤ 7	7 < X ≤ 35	35 < X ≤ 50	50 < X ≤ 100	X > 100
	CO (Carbon Monoxide)	X ≤ 750	750 < X ≤ 1000	1000 < X ≤ 1300	1300 < X ≤ 1500	1500 < X ≤ 1700	X > 1700
	CO2 (Carbon Dioxide)	X ≤ 7500	7500 < X ≤ 8500	8500 < X ≤ 9000	9000 < X ≤ 12000	12000 < X ≤ 15000	X > 15000
> 10 MVA	H2 (Hydrogen)	X ≤40	40 < X ≤ 100	100 < X ≤ 300	300 < X ≤ 500	500 < X ≤ 1000	X >1000
	CH4 (Methane)	X ≤ 80	80 < X ≤ 150	150 < X ≤ 200	200 < X ≤ 500	500 < X ≤ 700	X > 700
	C2H6 (Ethane)	X ≤ 70	70 < X ≤ 100	100 < X ≤ 150	150 < X ≤ 250	250 < X ≤ 500	X > 500
	C2H4 (Ethylene)	X ≤ 60	60 < X ≤ 100	100 < X ≤ 150	150 < X ≤ 250	250 < X ≤ 500	X > 500
	C2H2 (Acetylene)	X ≤ 3	3 < X ≤ 7	7 < X ≤ 35	35 < X ≤ 50	50 < X ≤ 80	X > 80
	CO (Carbon Monoxide)	X ≤ 350	350 < X ≤ 500	500 < X ≤ 600	600 < X ≤ 1000	1000 < X ≤ 1500	X > 1500
	CO2 (Carbon Dioxide)	X ≤ 3000	3000 < X ≤ 4500	4500 < X ≤ 5700	5700 < X ≤ 7500	7500 < X ≤ 10000	X > 10000

--- LTC

Table 1-8 DGA Criteria – LTC

Dissolved Gas (X)	**Scores**					**Weight**
	1	2	3	4	5	
X = C2H4/C2H2	X < 0.33	0.33 ≤ X < 0.67	0.67 ≤ X < 1	1 ≤ X < 1.33	X ≥ 1.33	3
X = C2H6/CH4	X < 0.20	0.2 ≤ X < 0.4	0.4 ≤ X < 0.6	0.6 ≤ X < 0.8	X ≥ 0.80	2
H2	X < 70	70 ≤ X < 500	500 ≤ X < 1000	1000 ≤ X < 1500	X ≥ 1500	1

Note: Overall Factor =1.2 when ALL the following conditions meet

- H2 (hydrogen)< 1500 ppm
- C2H4 (Ethylene) < 1000 ppm
- C2H2 (Acetylene) < 1000 ppm

A test must have been conducted within the past 5 years to be considered.

General Oil Quality

Table 1-9 Oil Quality Test Criteria

Oil Quality Test		Voltage Class [kV]	Score				
			4	**3**	**2**	**1**	**0**
Water Content (D1533) [ppm]	Main Tank	V ≤ 69	< 30	30-33.3	33.3-36.6	36.6-40	> 40
		69 < V < 230	< 20	20-25	25-30	30-35	> 35
		V ≥ 230	< 15	15-18.3	18.3-21.6	20-25	> 25
	Tap	V ≤ 69	< 30	30-33.3	33.3-36.6	36.6-40	> 40
		V > 69	< 20	20-25	25-30	30-35	> 35
Dielectric Strength (D1816 – 1mm gap) [kV]	Main Tank	V ≤ 69	> 20	20-17.5	12.5-17.5	10-12.5	< 10
		69 < V < 230	> 25	21-25	17-21	13-17	< 13
		V ≥ 230	> 27	23-27	20-23	17-20	< 17
	Tap	V ≤ 69	> 25	21.6-25	18.3-21.6	15-18.3	< 15
		V > 69	> 30	26-30	22-26	18-22	< 18
Dielectric Strength (D877) [kV]	Main Tank	All	> 40	33.3-40	22.6-33.3	20-22.6	< 20
	Tap	All	> 25	21.6-25	18.3-21.6	15-18.3	< 15
IFT (D971) [dynes/cm]	Main Tank	V ≤ 69	> 25	21.6-25	18.3-21.6	15-18.3	< 15
		69 < V < 230	> 30	26-30	22-26	18-22	< 18
		V ≥ 230	> 32	28-32	24-28	20-24	< 20
	Tap	All	> 25	21.6-25	18.3-21.6	15-18.3	< 15
Color	Main Tank	All	< 1.5	1.5-1.8	1.8-2.1	2.1-2.5	> 2.5
	Tap	All	< 2.0	2.0-2.3	2.3-2.6	2.6-3.0	> 3.0
Acid Number (D974) [mg KOH/g]	Main Tank	V ≤ 69	< 0.05	0.05-0.1	0.1-0.15	0.15-0.2	> 0.2
		69 < V < 230	< 0.04	0.04-0.077	0.077-0.113	0.113-0.15	> 0.15
		V ≥ 230	< 0.03	0.03-0.053	0.053-0.076	0.076-0.1	> 0.1
	Tap	All	< 0.05	0.05-0.1	0.1-0.15	0.15-0.2	> 0.2
Dissipation Factor (D924 - 25C)	Main Tank and Tap	All	< 0.5%	0.5%-1%	1-1.5%	1.5-2%	> 2%
Dissipation Factor (D924 - 100C)		All	< 5%	5%-10%	10%-15%	15%-20%	> 20%

Furan

Table 1-10 Furan Criteria

Score	Description
4	2FAL < 100
3	100 < 2FAL < 200
2	200 < 2FAL < 600
1	600 < 2FAL < 1000
0	2FAL > 1000

Individual Inspection

The score based on accumulated defect findings in inspection in the past years.

Table 1-11 Individual Inspection Criteria - MS Transformers

Score	Accumulated defect count Q
4	0-1.5
3	1.5 – 2.5
2	2.5 - 3
1	3 - 4
0	> 4

Where Q is calculated as follows:

$$Q = W_i Mark_i$$

Equation 1-1

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)	$Mark_i$
2021	1	$Mark_i = \begin{pmatrix} 1 & defect\ found \\ 0 & no\ defect\ found \end{pmatrix}$
2020	0.9	
2019	0.8	
2018	0.7	
2017	0.6	
2016	0.5	
2015	0.4	
2014	0.3	
2013	0.2	In each year when there are multiple inspections, the worst case is adopted to represent the score of the year
2012	0.1	
2011	0	

Loading History

Table 1-12 Loading History - MS Transformers

Data: S1, S2, S3, …, SN recorded data (average daily loading)
SB= rated MVA NA=Number of Si/SB which is lower than 0.6 NB= Number of Si/SB which is between 0.6 and 0.8 NC= Number of Si/SB which is between 0.8 and 1.0 ND= Number of Si/SB which is between 1 and 1.2 NE= Number of Si/SB which is greater than 1.2 Score = $\frac{NA \times 4 + NB \times 3 + NC \times 2 + ND \times 1}{N}$

Age Limiting Factor

Age is used as a limiting factor to reflect the degradation of asset over time.

The calculated overall HI result (after considering all the possible de-rating multipliers) is then compared with an age limiting factor.

$$Final\ overall\ HI = \begin{cases} HI_{calculated} & if\ HI_{calculated} <= Age\_Limiter \\ Age\_limiter & if\ HI_{calculated} > Age\_Limiter \end{cases}$$

The age derating is the Weibull survival function (1 – cumulative distribution function).

$$Age\_Derating = S_f = e^{-(\frac{x}{\alpha})^{\beta}}$$

Equation 1-2

S_f = survivor function
x = age in years
α = *constant that controls scale of function*
β = *constant that controls shape of function*

The parameters of MS Transformers age limiting curve are shown in the following table and are based on industry information.

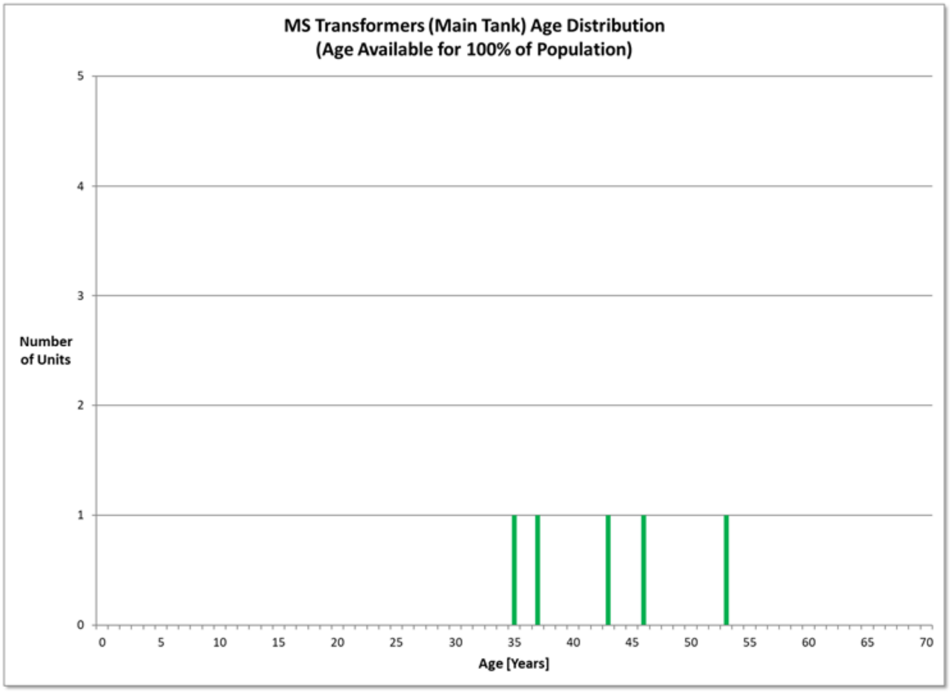
Table 1-13 Age Limiting Curve Parameters - MS Transformers

Asset Type	α	β
MS Transformers (MainTank/LTC)	**65.59**	**5.53**

Figure 1-1 Age Limiting Factor Criteria - - MS Transformers

1.2 Age Distribution

The average age is 43 for MS Transformers. The age distribution is as follows.



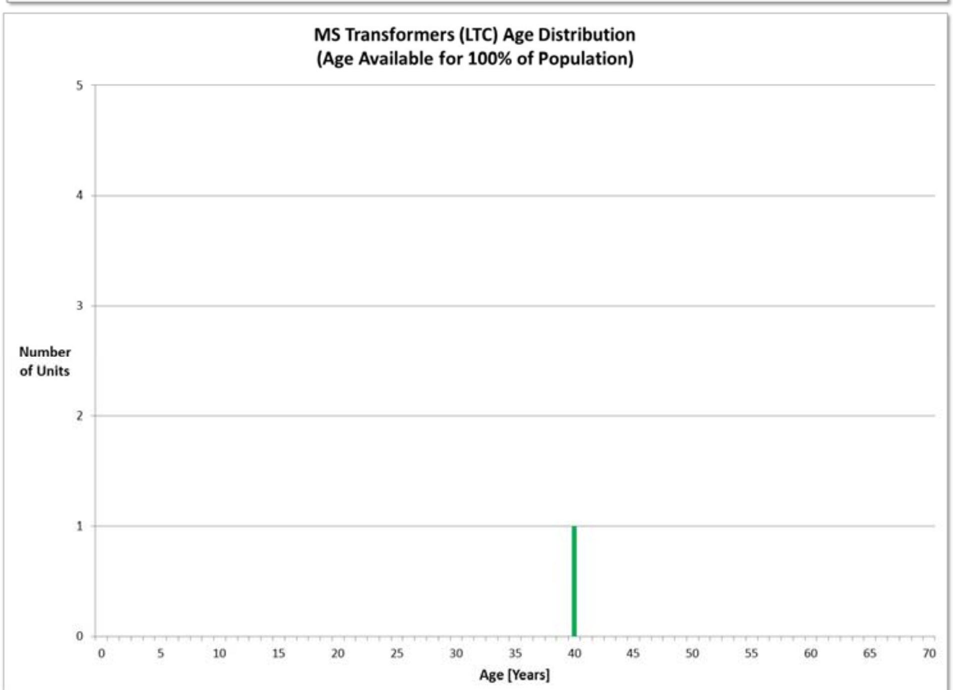


Figure 1-2 Age Distribution –MS Transformers

1.3 Health Index Results

There are 5 units of MS Transformers, with 1 unit having LTC.

The average Health Index are 77% and 19%, for main tanks and LTC respectively.

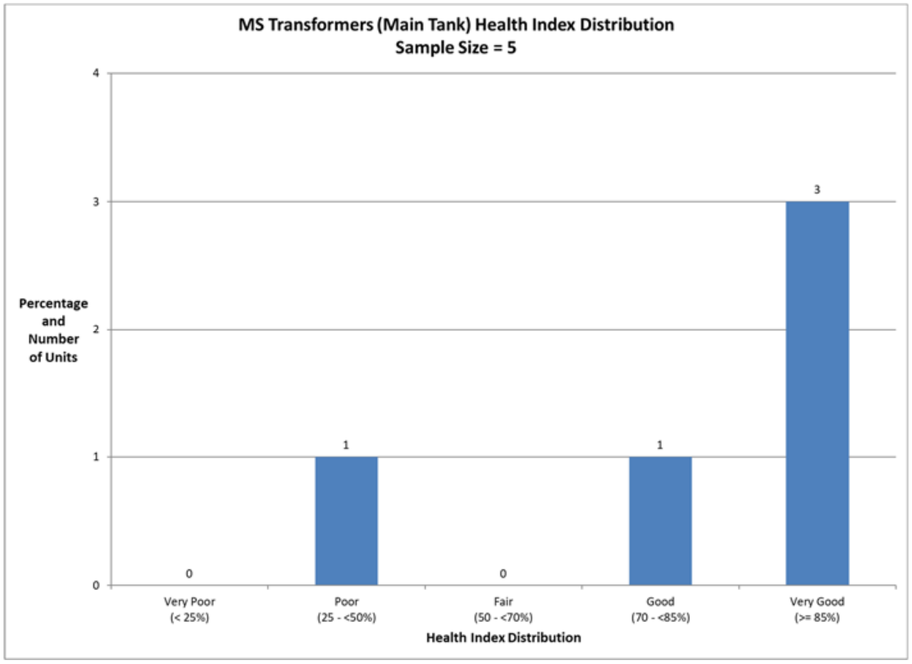


Figure 1-3 Health Index Distribution –MS Transformers (Main Tank)

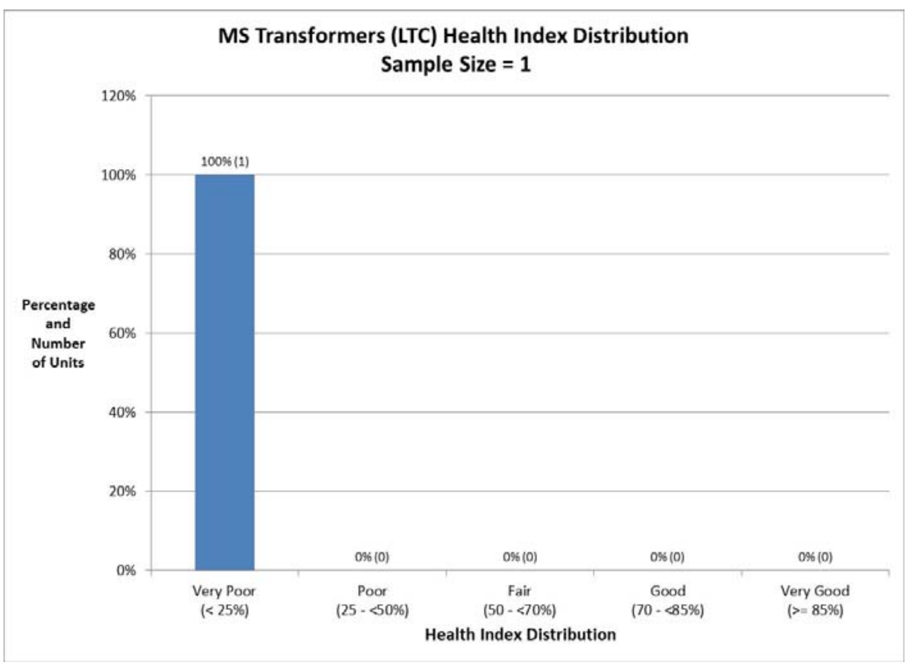


Figure 1-4 Health Index Distribution –MS Transformers (LTC)

The average composite Health Index is 62%.

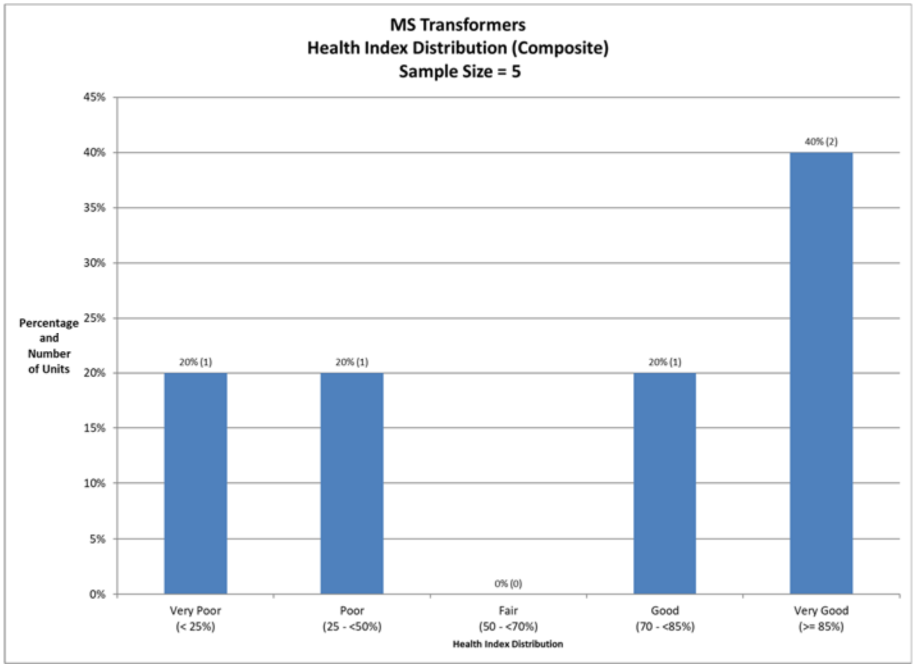


Figure 1-5 Health Index Distribution –MS Transformers

1.4 Flagged-for-Action Plan

MS Transformers are proactively replaced and the risk assessment and methodology described in Section II.2.3 is used to develop flagged-for-action plan.

Minimum criticality value is assigned for each of MS Transformers asset so that a unit becomes a candidate for action when its cumulative probability of failure is greater than or equal to 80%.

The flagged-for-action plan is as follows:

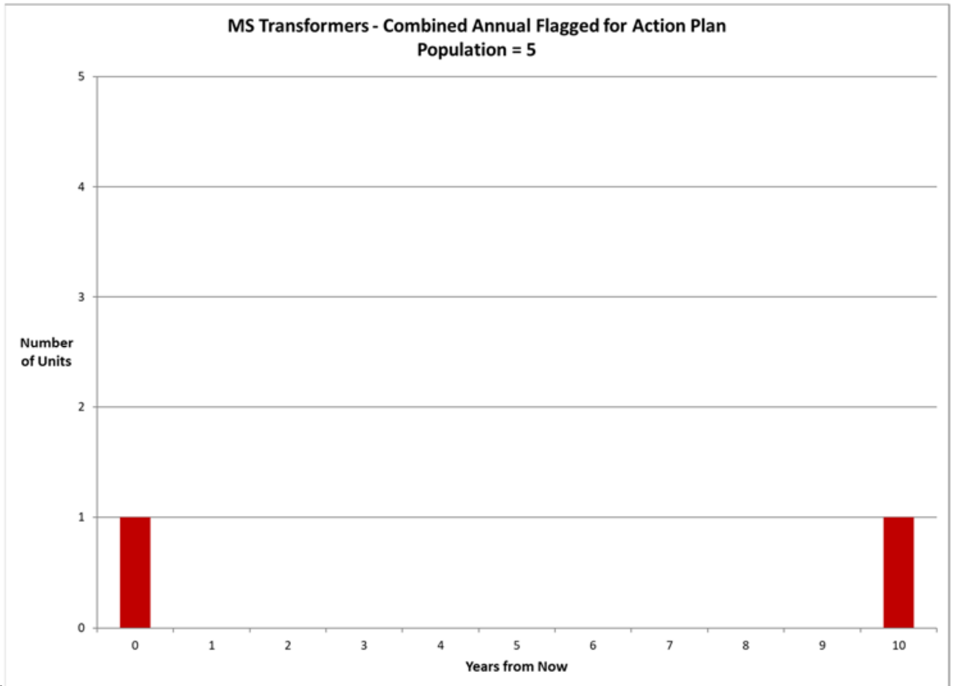


Figure 1-6 Flagged-for-action plan - MS Transformers

1.5 Risk Based Prioritized List

The following table shows the risk-based prioritization list if units.

Table 1-14 Risk Based Prioritization List - MS Transformers

Rank	ID	Location	Capacity (MVA)	Main Tank			LTC	Composite Health Index		Risk Index 100% = Most Risk 0% = Least Risk	FFA Year
				Age	DAI	Main Tank HI	LTC HI	HI (TX+LTC)	HI Category		
1	MS6	12725 SIXTH LINE NASSAGAWEYA	5	43	93%	90%	19%	**19%**	Very Poor	84.2%	0
2	MS4T2	6791 DERRY ROAD	10	37	100%	43%		**43%**	Poor	62.5%	10
3	MS7	4178 CAMPBELLVILLE ROAD	5	53	93%	73%		**73%**	Good	0.1%	>20
4	MS4T1	6791 DERRY ROAD	10	46	100%	87%		**87%**	Very Good	0.0%	>20
5	MS9	11190 SECOND LINE NASSAGAWEYA	6	35	100%	89%		**89%**	Very Good	0.0%	>20

1.6 Data Gaps

Available data for MS Transformers include age, loading, oil and various transformer test results. The following table shows the data gaps.

Table 1-15 Data Gap for MS Transformers

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
TTR, Excitation Current, Winding Resistance	Winding	☆☆	Winding degradation	Testing
Bushing PF, Dielectric Loss, Capacitance	Bushings	☆☆	Insulation degradation or defects for bushings	Testing
Radiators, Coolers Fans	Cooling System	☆	Defect due to installation	Maintenance and/or Inspection records

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2 MS RECLOSERS

2.1 Health Index Formula

With no other data available, the HI assessment for this asset category is based simply on age and the cumulative likelihood of survival at a given age.

2.1.1 Condition and Sub-Condition Parameters

The HI is determined by age limiting factor.

Table 2-1 Condition Parameter and Weights – MS Reclosers

<table>
<tr><th rowspan="2">m</th><th rowspan="2">Condition Parameter</th><th>WCP_m</th><th rowspan="2">Sub-Condition Parameters</th></tr>
<tr><th></th></tr>
<tr><td></td><td colspan="2">Age Limiting</td><td>Figure 2-1</td></tr>
</table>

2.1.2 Condition Criteria

<u>Age Limiting Factor</u>

Age is used as a limiting factor to reflect the degradation of asset as time passed by. Refer to section 1.1.2 for the background.

The parameters of MS Reclosers age limiting curve are shown in the following table and are based on industry experience.

Table 2-2 Age Limiting Curve Parameters - MS Reclosers

Asset Type	α	β
MS Reclosers	**46.78**	**6.78**

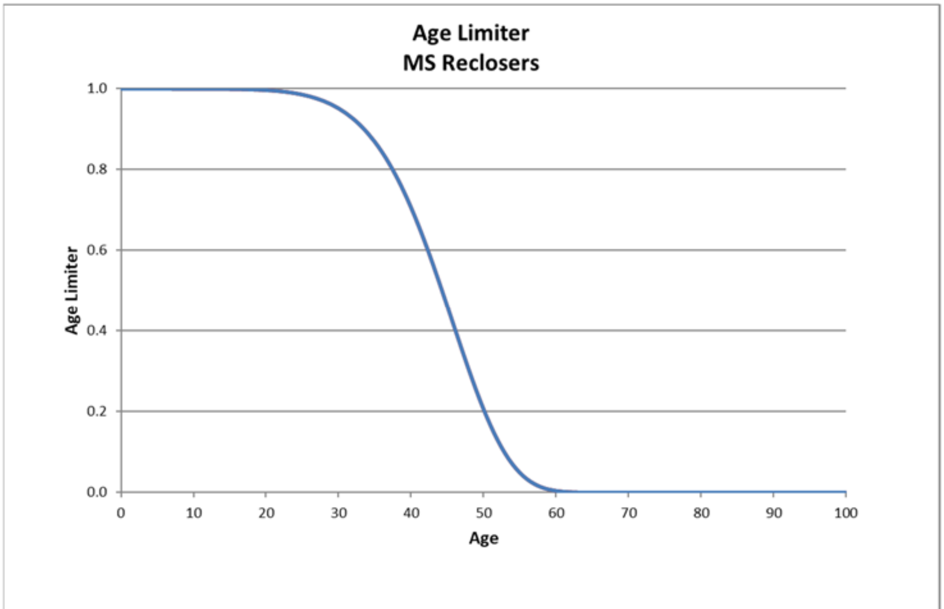

Figure 2-1 Age Limiting Factor Criteria - - MS Reclosers

2.2 Age Distribution

The average age is 8. The age distribution is as follows.

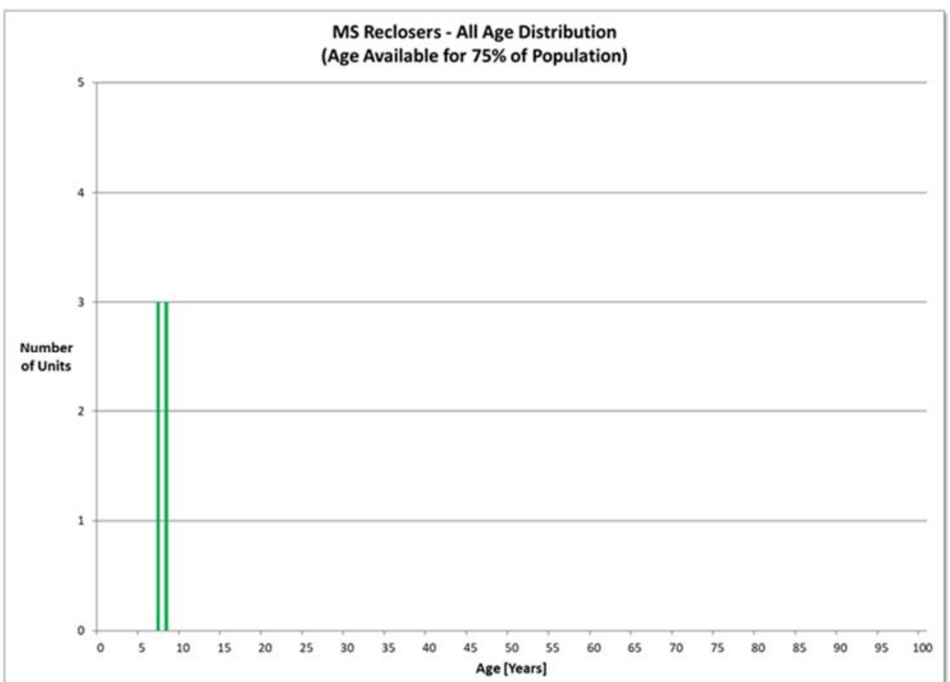

Figure 2-2 Age Distribution –MS Reclosers

2.3 Health Index Results

There are 8 units of MS Reclosers. Among them, 6 have sufficient data for a Health Indexing.

The average Health Index is 100%.

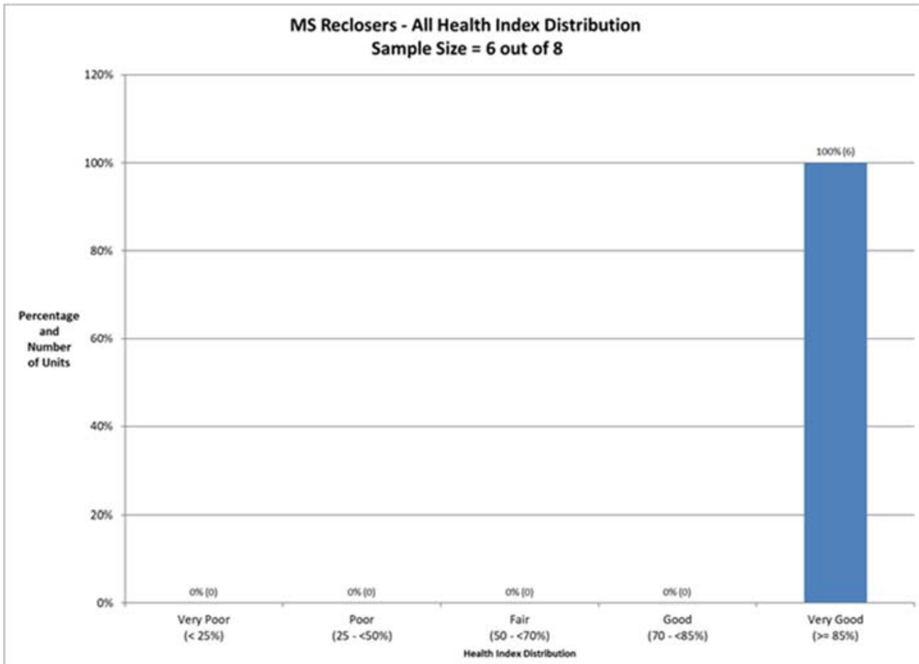

Figure 2-3 Health Index Distribution –MS Reclosers

2.4 Flagged-for-Action Plan

MS Reclosersare proactively replaced and the risk assessment and methodology described in Section II.2.3 is used to develop flagged-for-action plan.

Minimum criticality value is assigned for each of MS Reclosers so that a unit becomes a candidate for action when its cumulative probability of failure is greater than or equal to 80%.

No MS Reclosers are flagged for action in the next 10 years.

2.5 Risk Based Prioritized List

The following table shows the risk-based prioritized list of units.

Table 2-3 Risk Based Prioritization List - MS Reclosers

Rank	ID	Substation	Circuit	Age	DAI	HI	Risk Index 100% = Most Risk 0% = Least Risk	FFA Year
1	MS9-F3	MS9	F3	8	N/A	100%	0.0%	>20
2	MS9-F2	MS9	F2	8	N/A	100%	0.0%	>20
3	MS9-F1	MS9	F1	8	N/A	100%	0.0%	>20
4	MS6-F1	MS6	F1	7	N/A	100%	0.0%	>20
5	MS6-F2	MS6	F2	7	N/A	100%	0.0%	>20
6	MS6-F3	MS6	F3	7	N/A	100%	0.0%	>20
7	MS7-F1	MS7	F1		N/A			
8	MS7-F3	MS7	F3		N/A			

2.6 Data Gaps

Data for MS Reclosers include age only. The following table shows the data gaps.

Table 2-4 Data Gap for MS Reclosers

Data Gap (Sub-Condition Parameter)	Parent Condition Parameter	Priority	Description	Source of Data
Cabinet	Operating mechanism	☆	Control cabinet issue	Inspection/ Maintenance Records
Contact	Contact performance	☆ ☆	Contact wear	Monitoring record
Operating Count	Service Record	☆ ☆	Number of operation cycles	Operation records

Given the age profile and population size of this group, historic removal record is not considered to be a data gap at this stage, but plans should be made to start collecting the removal statistics when the removals start.

3 WOOD POLES

3.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the “worst” and “best” scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is “4”.

3.1.1 Condition and Sub-Condition Parameters

Table 3-1 Condition Parameter and Weights - Wood Poles

m	Condition parameter	WCP_m	Sub-Condition Parameters
1	Pole Condition	5	Table 3-2
2	Pole Accessories	3	Table 3-3
3	Service Record	6	Table 3-4
	Age Limiting		Figure 3-1

Table 3-2 Pole Condition Sub-Condition Parameters and Weights (m=1) - Wood Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Crack	2	Table 3-5
2	Rot	2	Table 3-5
3	Decay	3	Table 3-5
4	Woodpeckers	2	Table 3-5
5	Damage	1	Table 3-5

Table 3-3 Pole Accessories Sub-Condition Parameters and Weights (m=2) - Wood Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Guy	1	Table 3-5

Table 3-4 Service Record Sub-Condition Parameters and Weights (m=3) - Wood Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Overall	1	Table 3-5

3.1.2 Condition Criteria

Individual Inspection

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 3-1

Where *i* represents the year of inspection

Table 3-5 Individual Inspection Criteria - Wood Poles

Score	Inspection Defect
4	No follow-up required
3	MH grading 1, good
2	MH grading 2, fair, follow-up
1	MH grading 3, poor
0	Yes

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

Age Limiting Factor

Age is used as a limiting factor to reflect the degradation of asset over time. Methodology for applying the degradation survival curve is described in Equation 1-2 of Section 1.1.2.

The parameters of Wood Poles age limiting curve are shown in the following table and based on MH removal prediction derived from pole strength test data in 2010.

Table 3-6 Age Limiting Curve Parameters - Wood Poles

Asset Type	α	β
Wood Poles	**68.53**	**6.91**

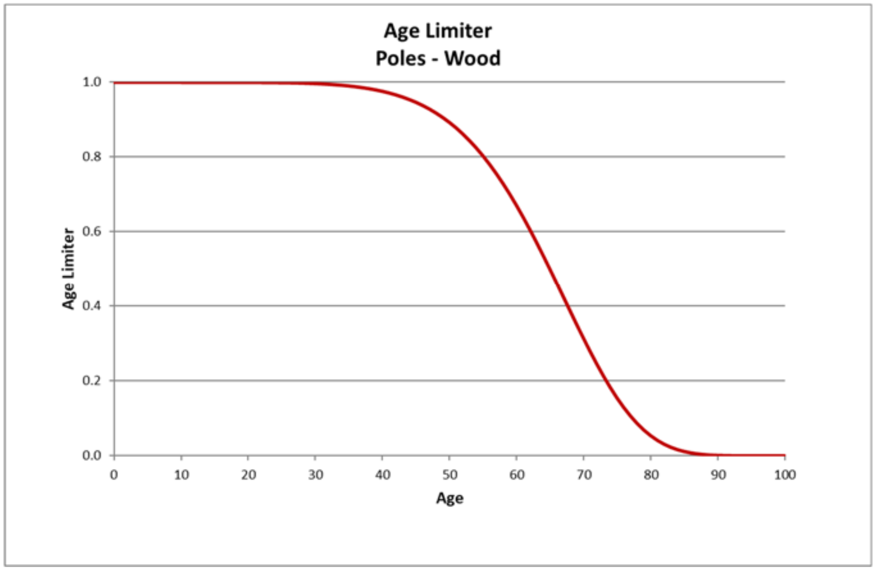

Figure 3-1 Age Limiting Factor Criteria - Wood Poles

3.2 Age Distribution

The average age of all units is 28 years for Wood Poles.

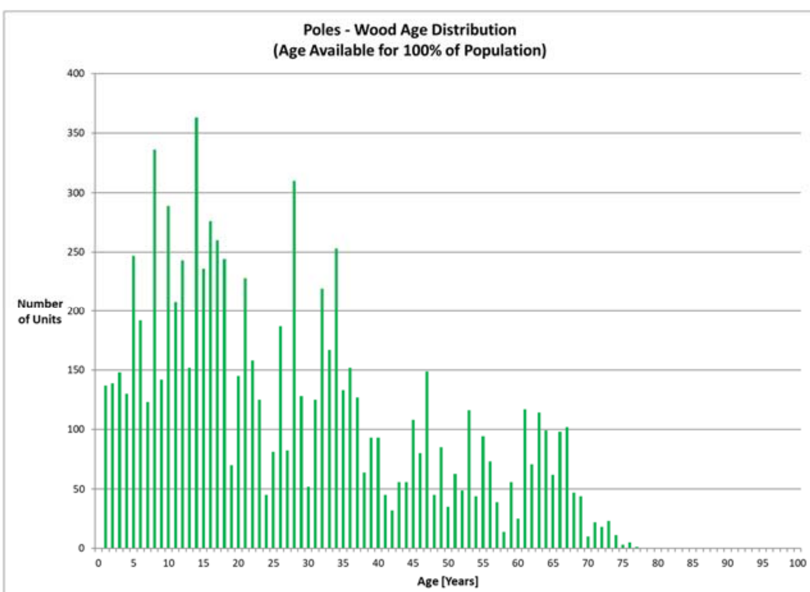

Figure 3-2 Age Distribution – Wood Poles

3.3 Health Index Results

There are 9013 units of Wood Wood Poles. All of them have sufficient data for obtaining Health Indexing results.

The average Health Index score is 84%.

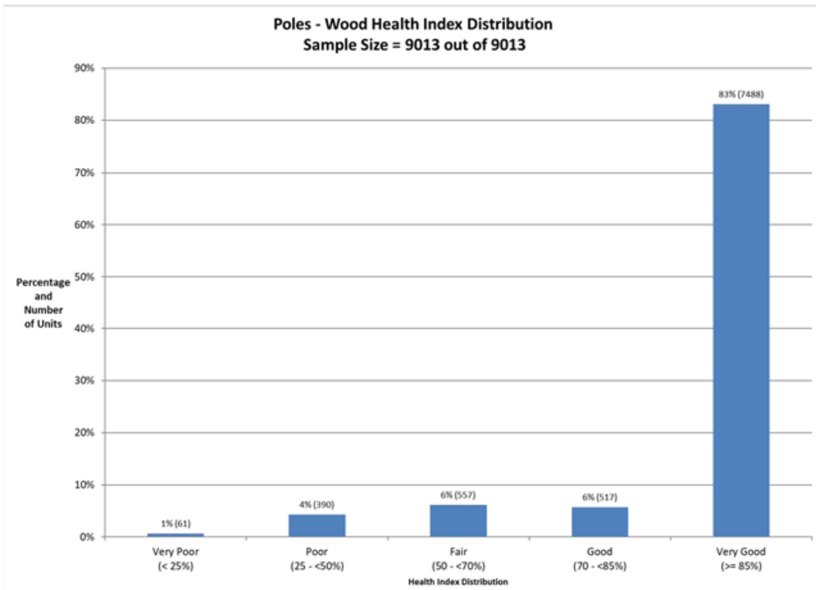

Figure 3-3 Health Index Distribution - Wood Poles

3.4 Flagged-for-Action Plan

The flagged-for-action plan of Wood Poles is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

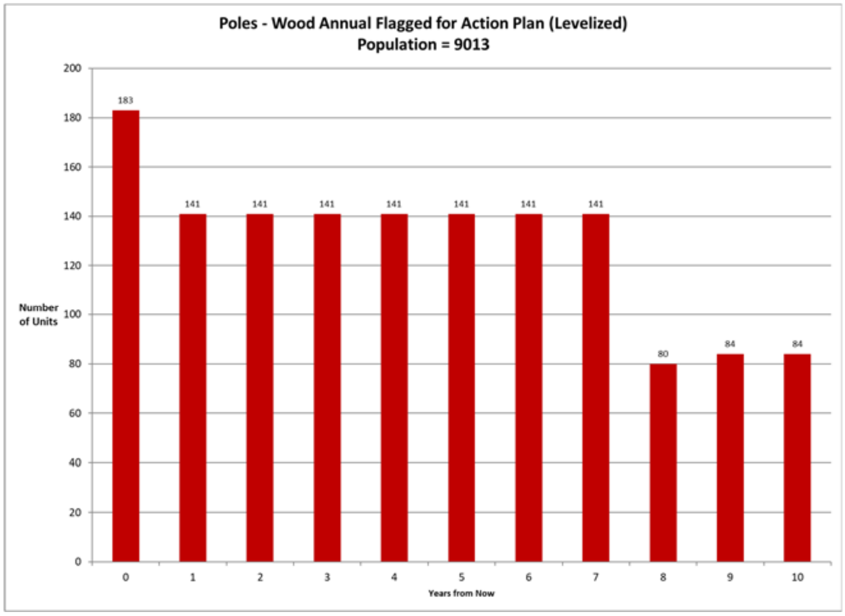

Figure 3-4 Flagged-for-action plan - Wood Poles

3.5 Data Gaps

The data used for Wood Poles assessment include age and pole inspection status condition.

The data gaps for this asset category are as follows:

Table 3-7 Data Gap for Wood Poles

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
Pole Strength*	Pole Physical	☆ ☆	Remaining strength	On-site test

* Data available at MH, but needs to be constantly updated

MH performs ground line bore test for its wood poles that are older than 25 years on a regular basis. Additionally, pole strength test is conducted up to year 2010. This information needs to be constantly updated.

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4 CONCRETE POLES

4.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

4.1.1 Condition and Sub-Condition Parameters

Table 4-1 Condition Parameter and Weights - Concrete Poles

m	Condition parameter	WCP_m	Sub-Condition Parameters
1	Pole Condition	5	Table 3-2
2	Pole Accessories	3	Table 3-3
3	Service Record	6	Table 3-4
	Age Limiting		Figure 3-1

Table 4-2 Pole Condition Sub-Condition Parameters and Weights (m=1) - Concrete Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Crack	2	Table 3-5
2	Rot	2	Table 3-5
3	Decay	3	Table 3-5
4	Damage	1	Table 3-5

Table 4-3 Pole Accessories Sub-Condition Parameters and Weights (m=2) - Concrete Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Guy	1	Table 3-5

Table 4-4 Service Record Sub-Condition Parameters and Weights (m=3) - Concrete Poles

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Overall	1	Table 3-5

4.1.2 Condition Criteria

Individual Inspection

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 4-1

Where *i* represents the year of inspection

Table 4-5 Individual Inspection Criteria - Concrete Poles

Score	Inspection Defect
4	No follow-up required
3	MH grading 1, good
2	MH grading 2, fair, follow-up
1	MH grading 3, poor
0	Yes

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

Age Limiting Factor

Age is used as a limiting factor to reflect the degradation of asset over time. Methodology for applying the degradation survival curve is described in Equation 1-2 of Section 1.1.2.

The parameters of Concrete Poles age limiting curve are shown in the following table and are based on industry data.

Table 4-6 Age Limiting Curve Parameters - Concrete Poles

Asset Type	α	β
Concrete Poles	**57.15**	**2.27**

Figure 4-1 Age Limiting Factor Criteria - Concrete Poles

4.2 Age Distribution

The average age of all units is 15 years for Concrete Poles.

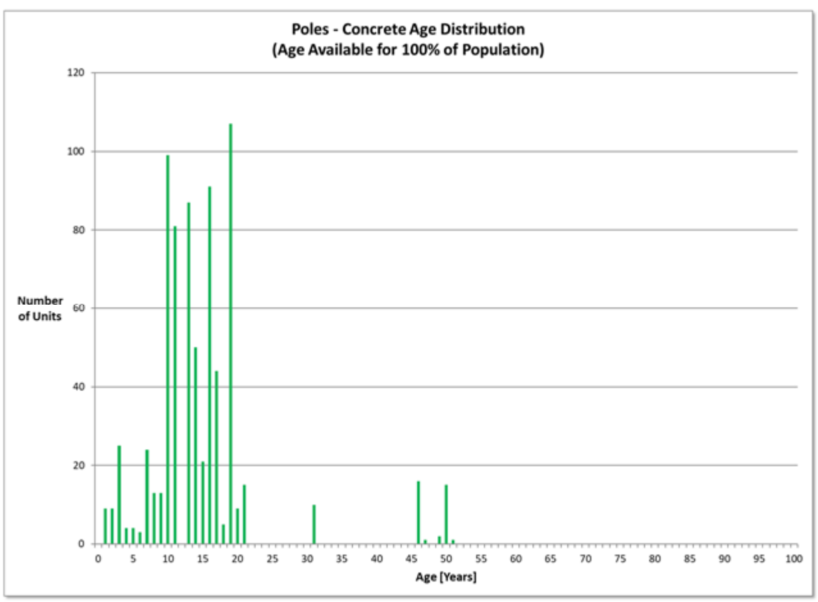

Figure 4-2 Age Distribution – Concrete Poles

4.3 Health Index Results

There are 759 Concrete Poles. All of them have sufficient data for a Health Indexing.

The average Health Index is 87%.

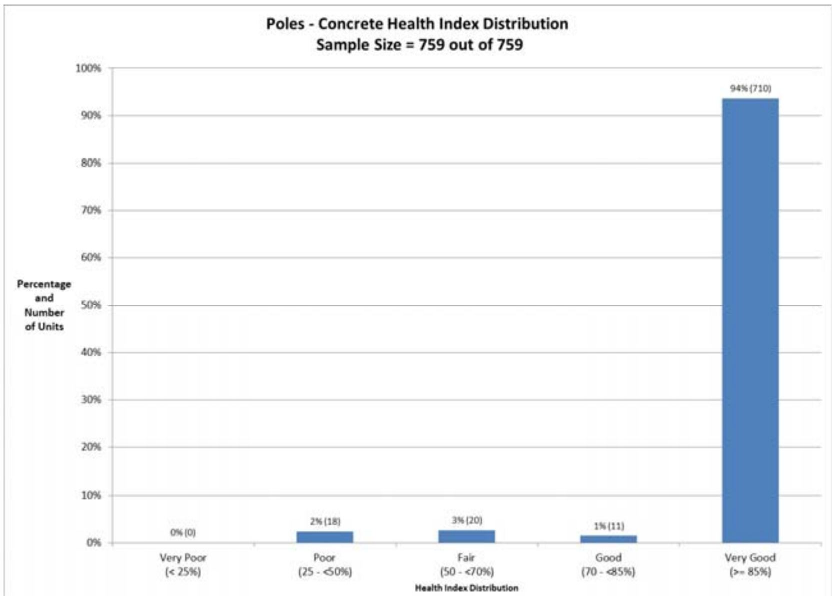

Figure 4-3 Health Index Distribution - Concrete Poles

4.4 Flagged-for-action plan

The flagged-for-action plan of Concrete Poles is based on the asset removal rate and age distribution.

The following diagrams show the flagged-for-action plan:

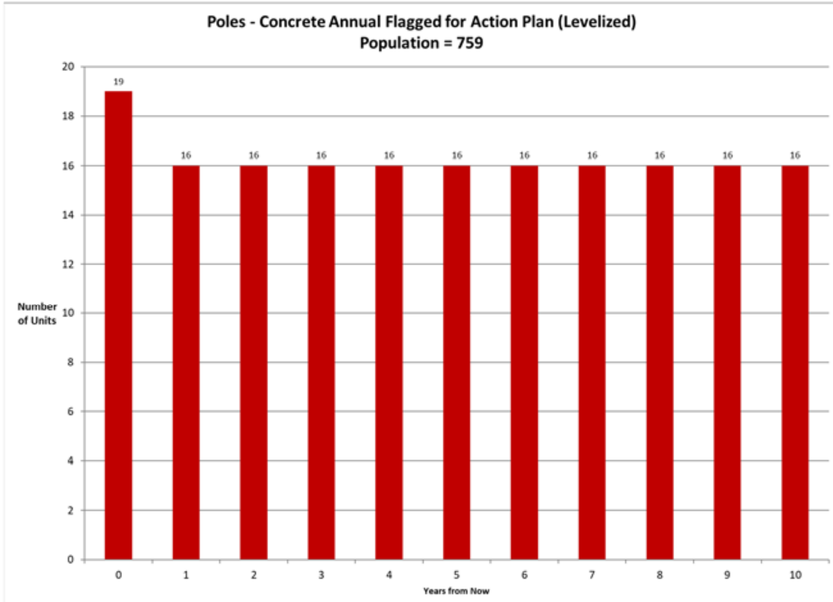

Figure 4-4 Flagged-for-action plan - Concrete Poles

4.5 Data Gaps

The data used for Concrete Poles assessment include age and pole inspection status condition.

There are no major data gaps.

MH needs to start collecting removal record (age at removal) going forward.

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5 Pole Mounted Transformers

5.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

5.1.1 Condition and Sub-Condition Parameters

Table 5-1 Condition Parameter and Weights – Pole Mounted Transformers

m	Condition Parameter	WCP_m	Sub-Condition Parameters
1	Physical Condition	3	Table 5-2
2	Connection and Insulation	5	Table 5-3
3	Service Record	5	Table 5-4
	Age Limiting		Figure 5-1

Table 5-2 Physical Condition Sub-Condition Parameters and Weights (m=1) – Pole Mounted Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Paint	1	Table 5-5

Table 5-3 Connection and Insulation Sub-Condition Parameters and Weights (m=2) – Pole Mounted Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Oil Leak	1	Table 5-5
2	Bushing	2	Table 5-5

Table 5-4 Service Record Sub-Condition Parameters and Weights (m=3) – Pole Mounted Transformers

n	Sub-Condition Parameter	$WCPF_n$	Condition Criteria Table
1	Overall	1	Table 5-5

5.1.2 Condition Criteria

<u>Individual Inspection</u>

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 5-1

Where *i* represents the year of inspection

Table 5-5 Individual Inspection Criteria - Pole Mounted Transformers

Score	Inspection Defect
4	No
0	Yes

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

<u>Age Limiting Factor</u>

Age is used as a limiting factor to reflect the degradation of asset over time, refer to section 1.1.2 for description.

The parameters for Pole Mounted Transformers age limiting curve are shown in the following table and are based on MH historic removal data.

Table 5-6 Age Limiting Curve Parameters - Pole Mounted Transformers

Asset Type	α	β
Pole Mounted Transformers	**65.79**	**1.93**

Figure 5-1 Age Limiting Factor Criteria - - Pole Mounted Transformers

5.2 Age Distribution

The average ages of all in service units is 21. The age distribution is as follows.

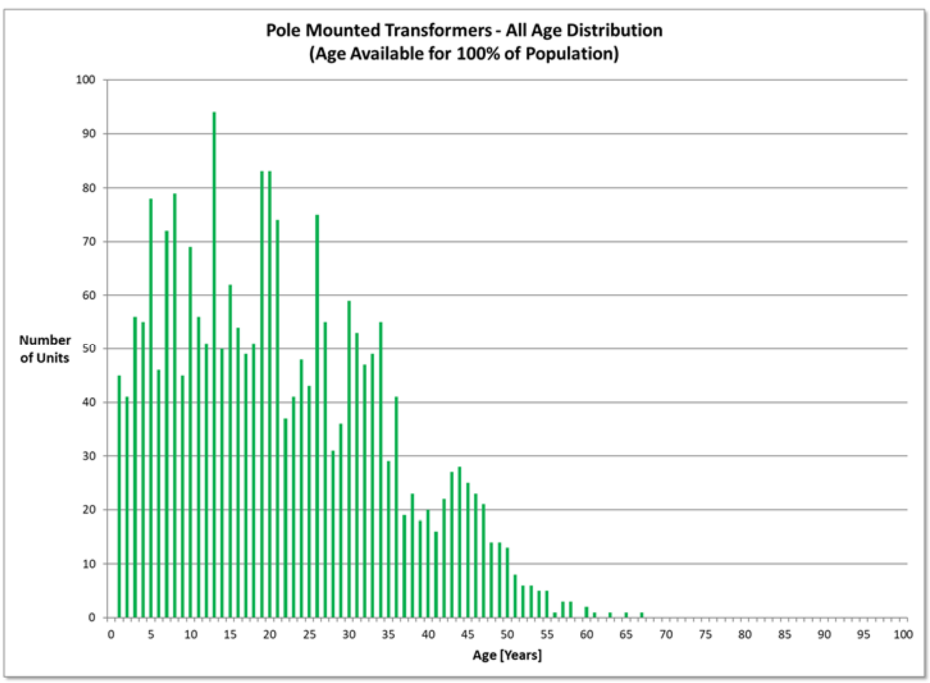

Figure 5-2 Age Distribution - Pole Mounted Transformers

5.3 Health Index Results

There are 2332 Pole Mounted Transformers. Among them, 2329 units have sufficient data for calculating a Health Indexing score.

The average Health Index is 85%.

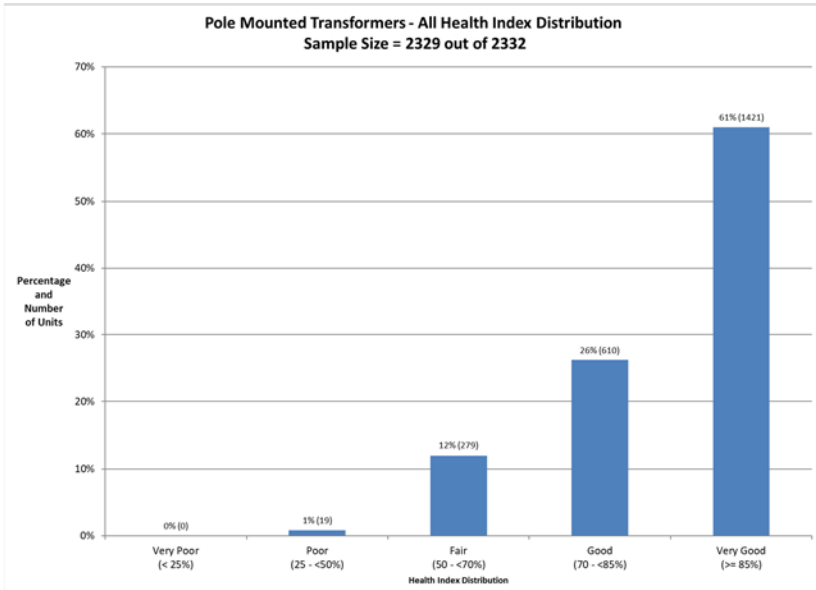

Figure 5-3 Health Index Distribution - Pole Mounted Transformers

5.4 Flagged-for-action plan

The flagged-for-action plan for Pole Mounted Transformers is based on the asset removal rate and age distribution.

The flagged-for-action plan for Pole Mounted Transformers is as follows:

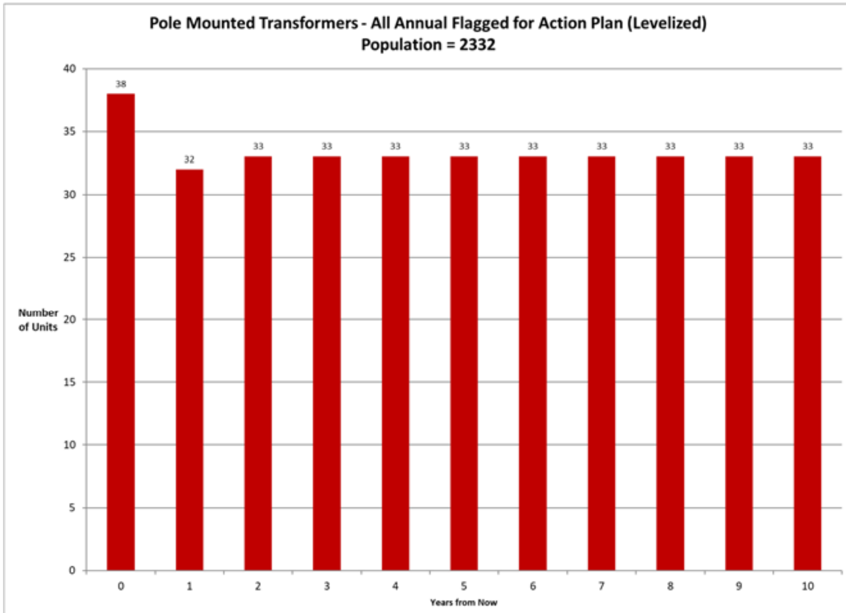

Figure 5-4 Flagged-for-action plan – Pole Mounted Transformers

5.5 Data Gaps

The data for in service Pole Mounted Transformers include age and component inspection.

The data gaps for this asset category are as follows:

Table 5-7 Data Gap for Pole Mounted Transformers

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
Loading	Service Record	☆☆	Monthly 15 min peak load throughout years	Operation Record

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6 PAD MOUNTED TRANSFORMERS

6.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the "worst" and "best" scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is "4".

6.1.1 Condition and Sub-Condition Parameters

Table 6-1 Condition Parameter and Weights - Pad Mounted Transformers

m	Condition parameter	WCP_m	Sub-Condition Parameters
1	Physical Condition	3	Table 6-2
2	Connection and Insulation	5	Table 6-3
3	Service Record	5	Table 6-4
	De-rating Factor		Table 6-6
	Age Limiting		Figure 6-1

Table 6-2 Physical Condition Sub-Condition Parameters and Weights (m=1) - Pad Mounted Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Tank Corrosion	3	Table 6-5
2	Access	1	Table 6-5
3	Base	2	Table 6-5

Table 6-3 Connection Sub-Condition Parameters and Weights (m=2) - Pad Mounted Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Oil Leak	2	Table 6-5

Table 6-4 Service Record Sub-Condition Parameters and Weights (m=3) - Pad Mounted Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Overall	2	Table 6-5

6.1.2 Condition Criteria

<u>Individual Inspection</u>

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 6-1

Where *i* represents the year of inspection

Table 6-5 Individual Inspection Criteria - Pad Mounted Transformers

Score	Inspection Defect
4	No follow-up required, MH grading 1
3	MH grading 2
2	MH grading 3
1	MH grading 4
0	Yes

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

De-rating Factor

In this project, the following de-rating factor is applied as a multiplier to the overall Health Index:

Table 6-6 De-rating Factors - Pad Mounted Transformers

De-rating Factor	Description – Issue Detected
0.3	(Unit age < 15) AND (score of Tank Corrosion < 3)

<u>Age Limiting Factor</u>

Age is used as a limiting factor to reflect the degradation of assets over time. Methodology for applying the degradation survival curve is described in Equation 1-2 of Section 1.1.2.

The parameters of Pad Mounted Transformers age limiting curve are shown in the following table and are based on MH historic removal data.

Table 6-7 Age Limiting Curve Parameters - Pad Mounted Transformers

Asset Type	α	β
Pad Mounted Transformers	**71.56**	**2.55**

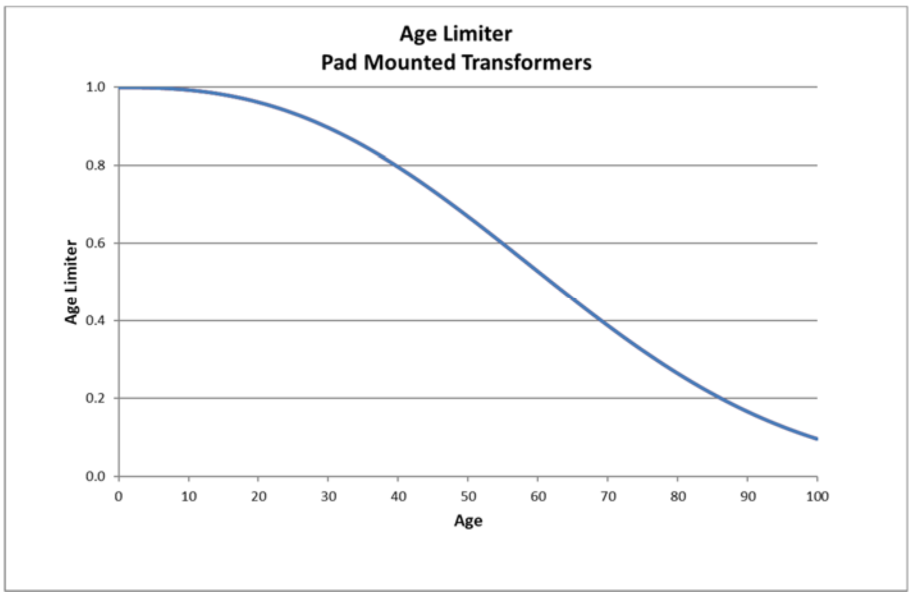

Figure 6-1 Age Limiting Factor Criteria - - Pad Mounted Transformers

6.2 Age Distribution

The average age of the units is 13 years for Pad Mounted Transformers.

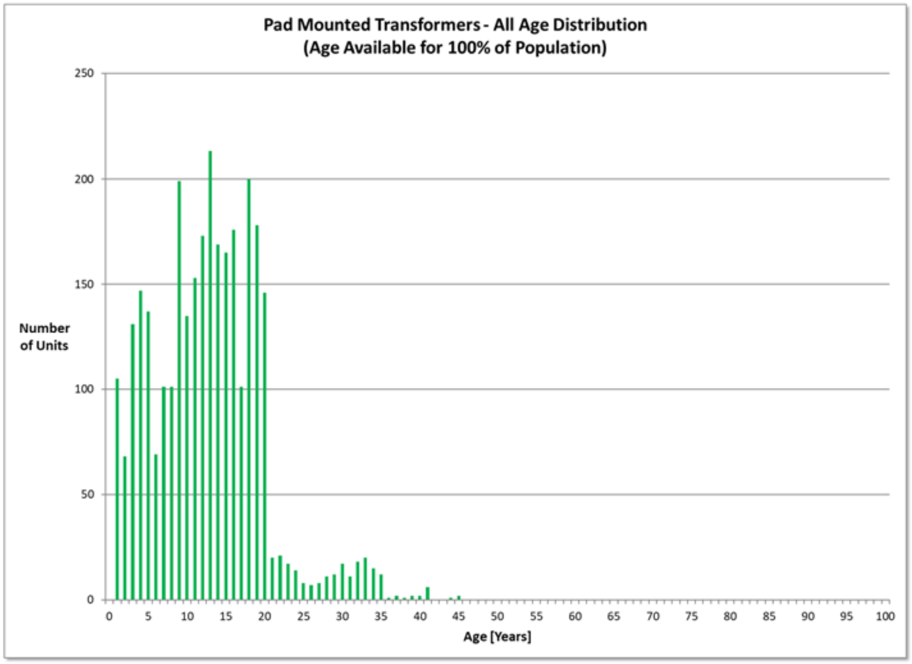

Figure 6-2 Age Distribution - Pad Mounted Transformers

6.3 Health Index Results

There are 3095 Pad Mounted Transformers. All of them have sufficient data for a Health Indexing.

The average Health Index score for this asset category is 89%.

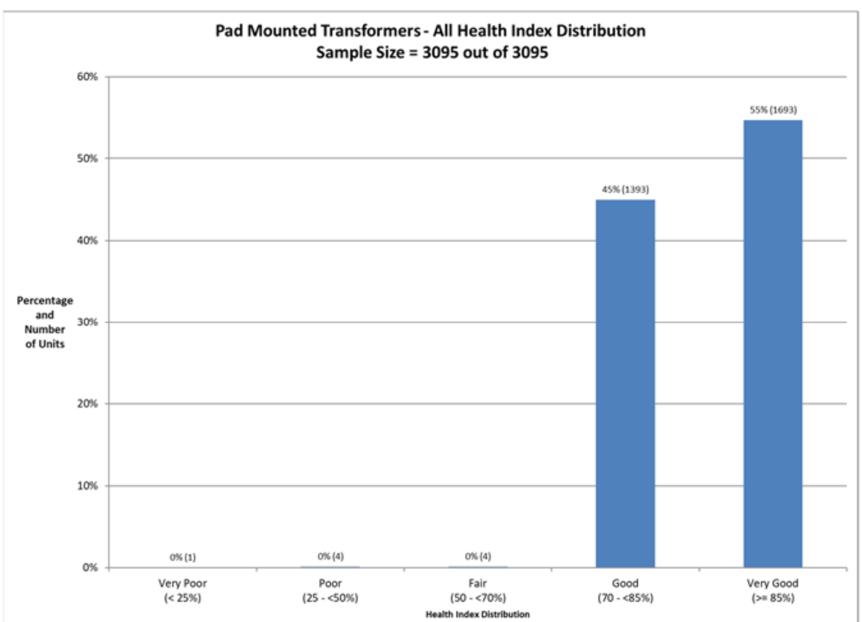

Figure 6-3 Health Index Distribution - Pad Mounted Transformers

6.4 Flagged-for-action plan

The flagged-for-action plan of Pad Mounted Transformers is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

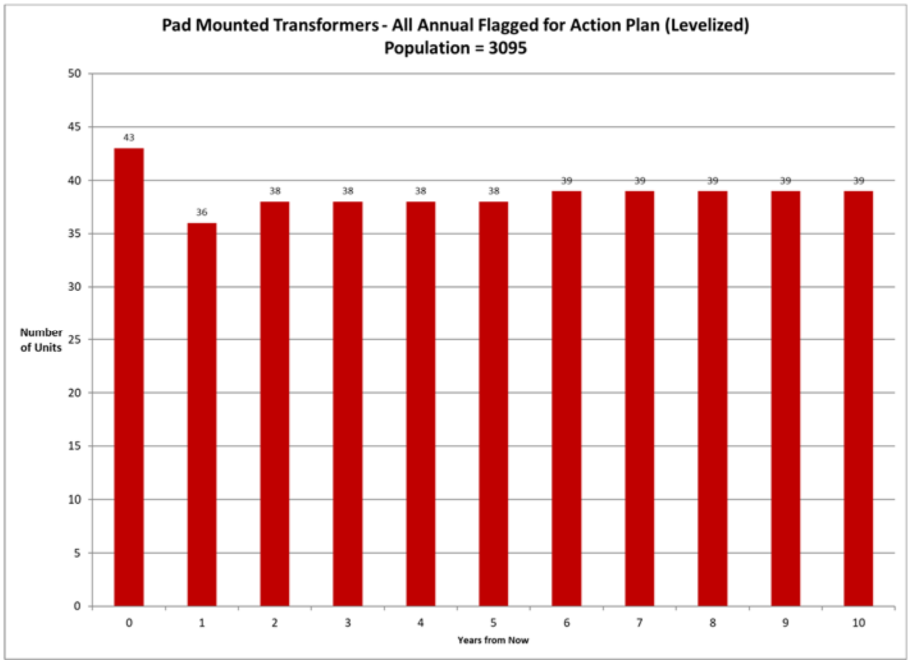

Figure 6-4 Flagged-for-action plan - Pad Mounted Transformers

6.5 Data Gaps

The data used for single phase Pad Mounted Transformers assessment include age and inspection results for some individual components.

The data gaps are as follows.

Table 6-8 Data Gap for Pad Mounted Transformers

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
Elbow	Connection	☆ ☆	Elbow connector issue	Inspection/ Maintenance Records
Grounding		☆	Grounding wire issue	Inspection/ Maintenance Records
Insulation		☆	Connection insulation issue	Inspection/ Maintenance Records
Loading	Service Record	☆ ☆	Monthly 15 min peak load throughout years	Operation Record

7 PAD MOUNTED SWITCHGEAR

7.1.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the “worst” and “best” scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is “4”.

7.1.2 Condition and Sub-Condition Parameters

Table 7-1 Condition Parameter and Weights - Pad Mounted Switchgear

m	Condition parameter	WCP_m	Sub-Condition Parameters
1	Physical Condition	6	Table 7-2
2	Connection and Switch	3	Table 7-3
3	Insulation	5	Table 7-4
4	Service Record	8	Table 7-5
	Age Limiting		Table 7-7

Table 7-2 Physical Condition Sub-Condition Parameters and Weights (m=1) - Pad Mounted Switchgear

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Cubicle	4	Table 7-6
2	Base	1	Table 7-6
3	Hinge	1	Table 7-6

Table 7-3 Connection and Switch Sub-Condition Parameters and Weights (m=2) - Pad Mounted Switchgear

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Cable	2	Table 7-6
2	Elbow	1	Table 7-6
3	Grounding	1	Table 7-6
4	Switch	3	Table 7-6

Table 7-4 Insulation Sub-Condition Parameters and Weights (m=3) - Pad Mounted Switchgear

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Insulator	1	Table 7-6

Table 7-5 Service Record Sub-Condition Parameters and Weights (m=4) - Pad Mounted Switchgear

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Overall	1	Table 7-6

7.1.3 Condition Criteria

Individual Inspection

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 7-1

Where *i* represents the year of inspection

Table 7-6 Individual Inspection Criteria - Pad Mounted Switchgear

Score	Inspection Defect
4	MH grading Good
2	MH grading Fair
0	MH grading Poor

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

Age Limiting Factor

In this project, age is used as a limiting factor to reflect the degradation of asset over time. Methodology for applying the degradation survival curve is described in Equation 1-2 of Section 1.1.2.

The parameters of Pad Mounted Switchgear age limiting curve are shown in the following table and are based on MH historic removal data.

Table 7-7 Age Limiting Curve Parameters - Pad Mounted Switchgear

Asset Type	α	β
Pad Mounted Switchgear	**38.54**	**2.47**

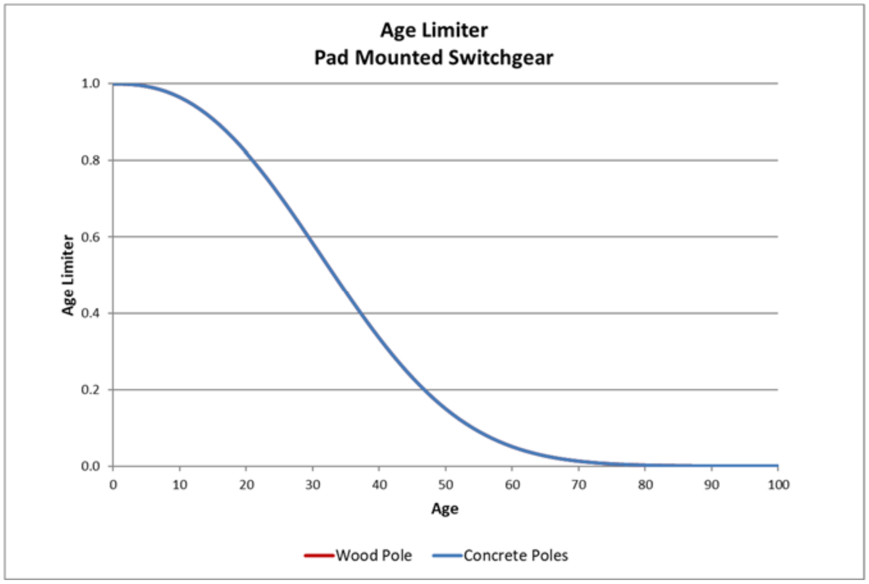

Figure 7-1 Age Limiting Factor Criteria - - Pad Mounted Switchgear

7.2 Age Distribution

The average age of the units is 14 years for Pad Mounted Switchgear.

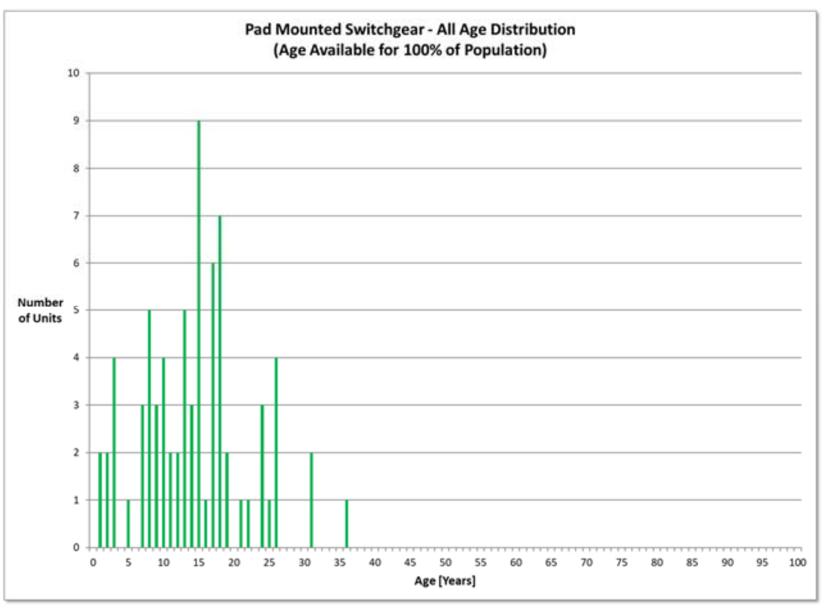

Figure 7-2 Age Distribution - Pad Mounted Switchgear

7.3 Health Index Results

There are a total of 74 units of Pad Mounted Switchgear. All the units have sufficient data for deriving Health Indexing results.

The average Health Index score for this asset category is 86%.

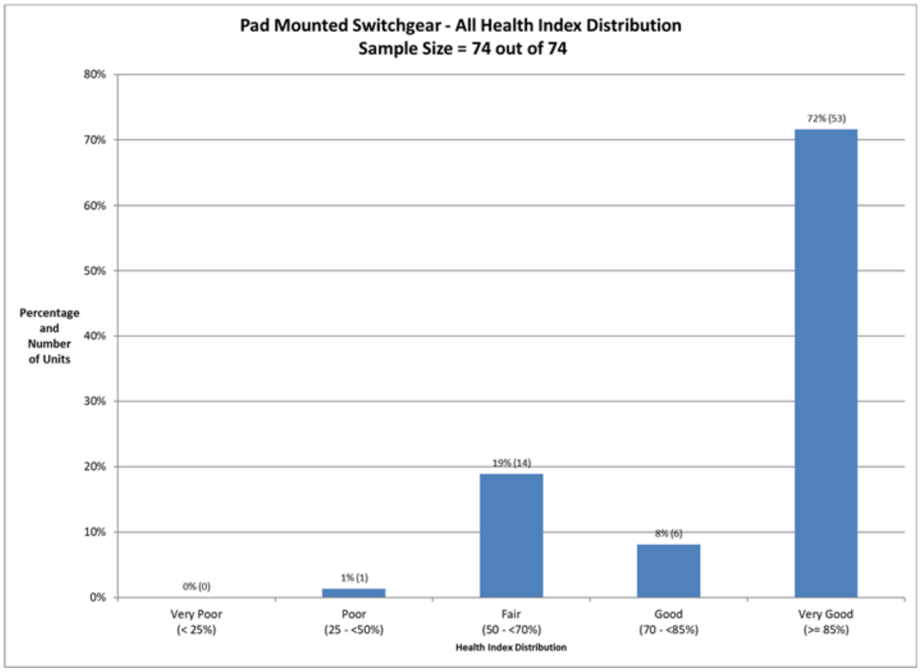

Figure 7-3 Health Index Distribution - Pad Mounted Switchgear

7.4 Flagged-for-action plan

The flagged-for-action plan of Pad Mounted Switchgear is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

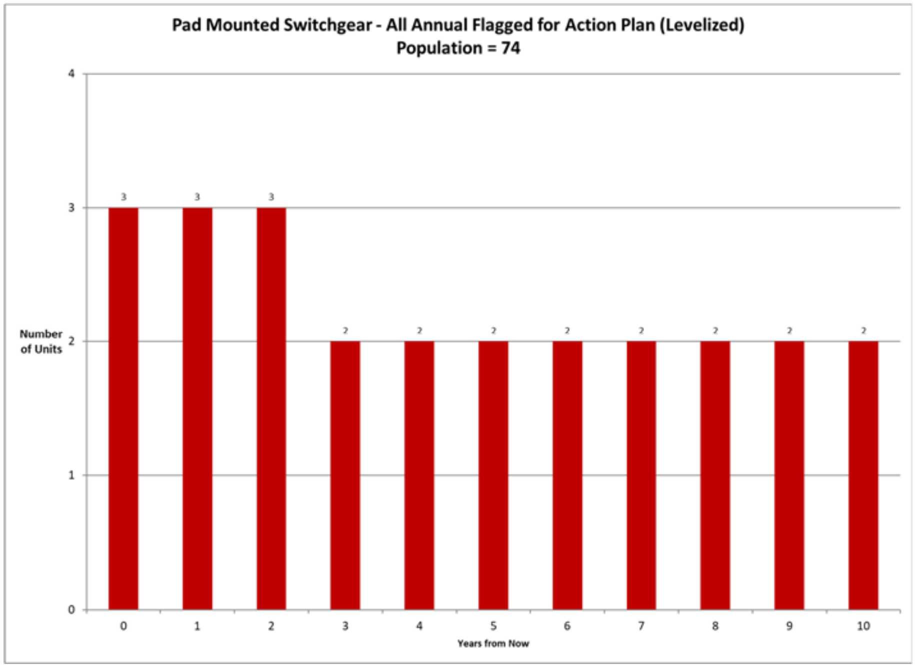

Figure 7-4 Flagged-for-action plan - Pad Mounted Switchgear

7.5 Data Gaps

The data used for Pad Mounted Switchgear assessment include age and inspection results. There are no data gaps.

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8 RTUs

8.1 Health Index Formula

As there is insufficient condition data available and HI assessment for this asset category is based simply on age and the cumulative likelihood of survival at a given age.

Age is used as a limiting factor to reflect the degradation of asset over time, refer to section 1.1.2 for the description.

8.1.1 Condition and Sub-Condition Parameters

Table 8-1 Condition Parameter and Weights – RTUs

m	Condition Parameter	WCP_m	Sub-Condition Parameters
	Age Limiting		Figure 8-1

8.1.2 Condition Criteria

<u>Age Limiting Factor</u>

The parameters of RTUs age limiting curve are shown in the following table and are based on industry information.

Table 8-2 Age Limiting Curve Parameters - RTUs

Asset Type	α	β
RTUs	**22.37**	**3.09**

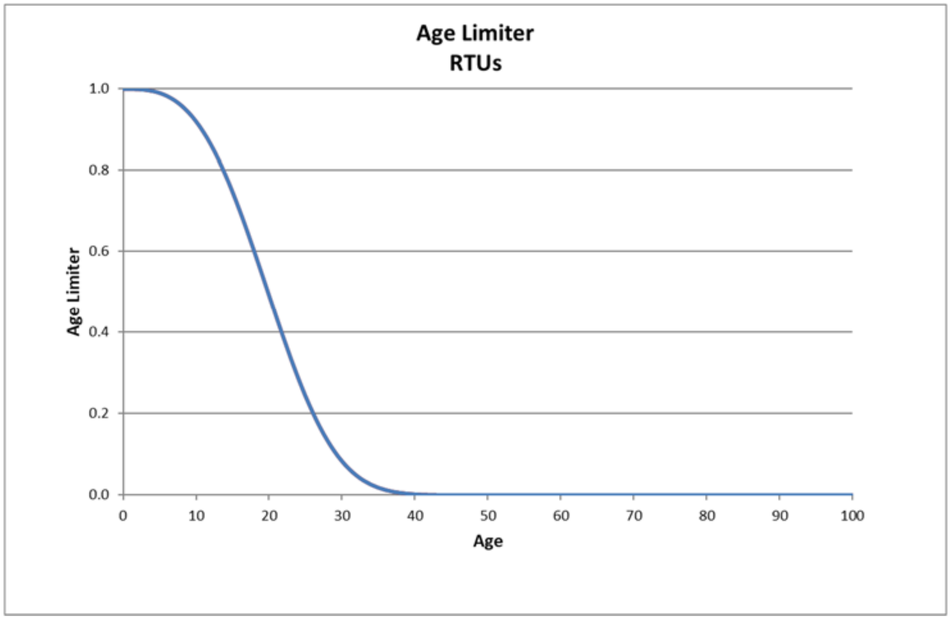

Figure 8-1 Age Limiting Factor Criteria - - RTUs

8.2 Age Distribution

The average age of all units is 3 years for RTUs.

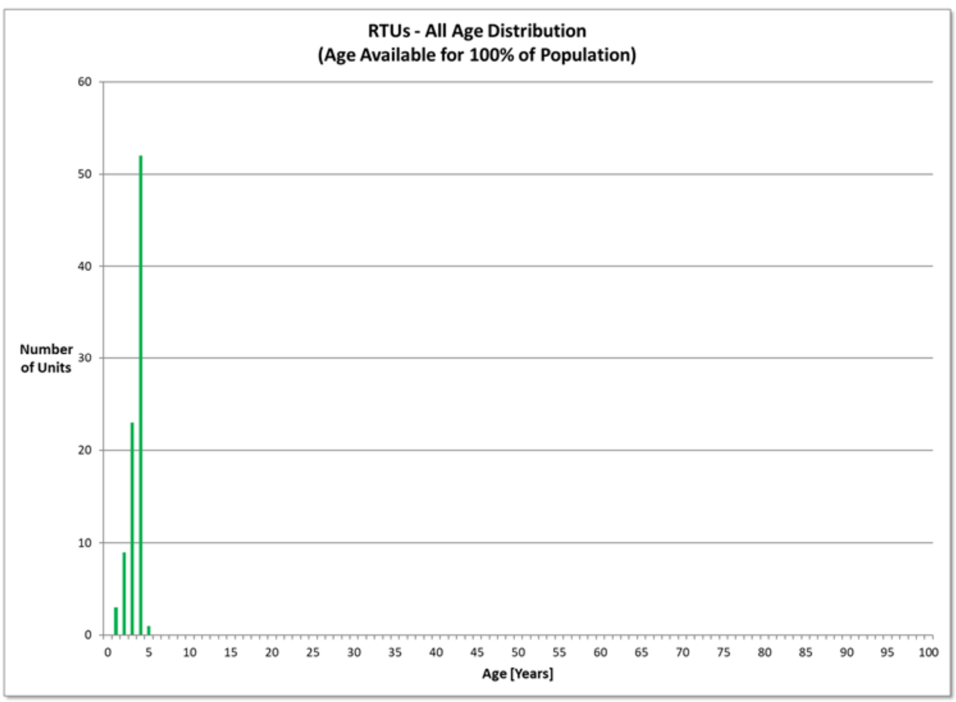

Figure 8-2 Age Distribution – RTUs

8.3 Health Index Results

There are 88 RTUs. All of them have sufficient data for a Health Indexing.

The average Health Index is 100% for RTUs.

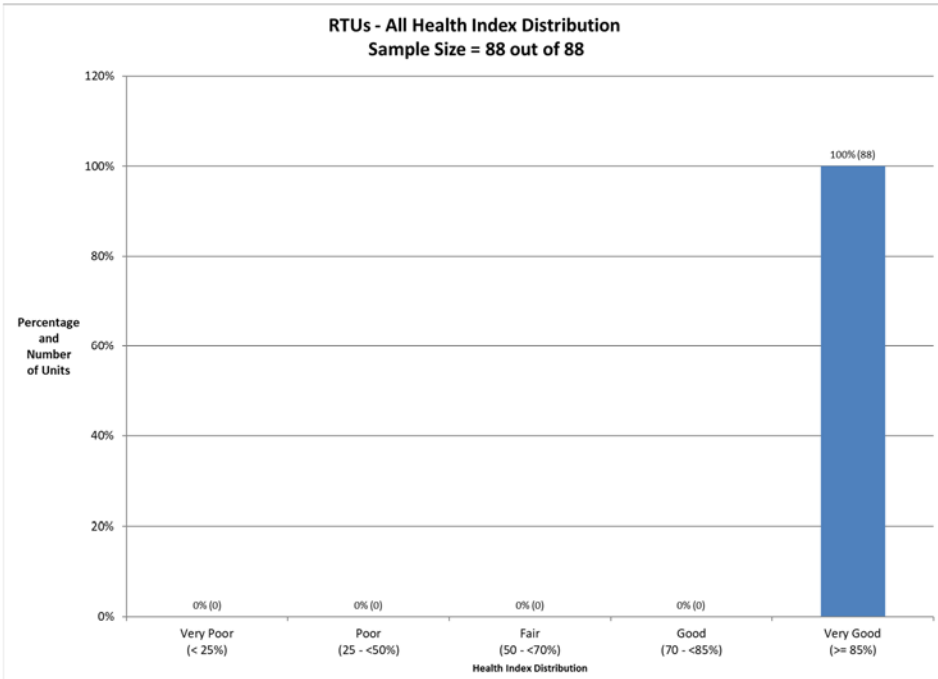

Figure 8-3 Health Index Distribution - RTUs

8.4 Flagged-for-action plan

The flagged-for-action plan of RTUs is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

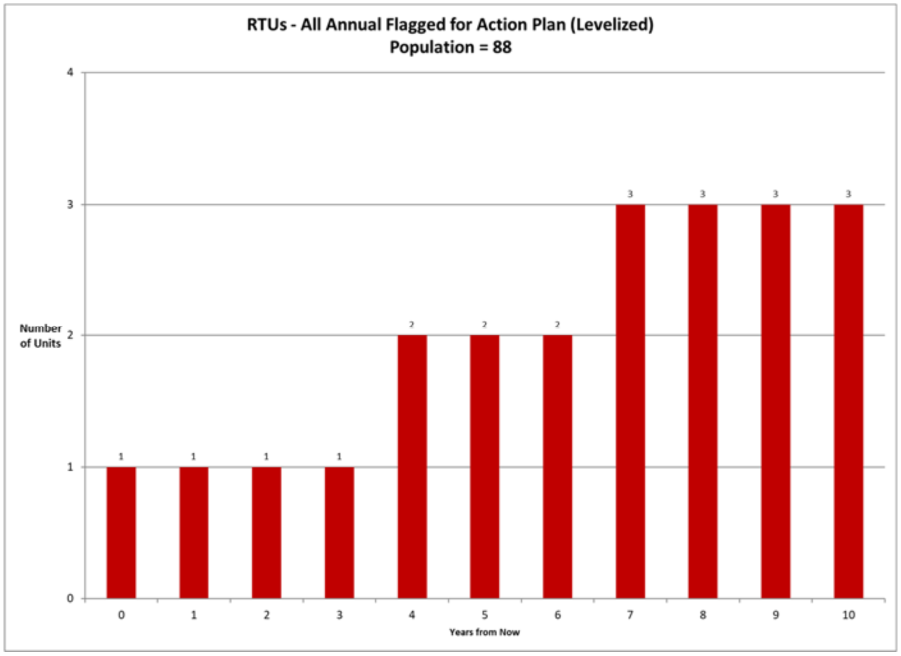

Figure 8-4 Flagged-for-action plan - RTUs

8.5 Data Gaps

The data used for RTUs assessment include age only.

There are no data gaps. It is recommended to start collecting removal statistics (age at removal) in the future.

9 UG PRIMARY CABLES

9.1 Health Index Formula

The HI assessment for this asset category is based on age and the cumulative likelihood of survival at a given age.

Age is used as a limiting factor to reflect the degradation over time as described in section 1.1.2.

The parameters of UG Primary Cables age limiting curve are shown in the following table and are based on industry information.

Table 9-1 Age Limiting Curve Parameters - UG Primary Cables

Asset Type	α	β
XLPE cables	**53.13**	**9.03**

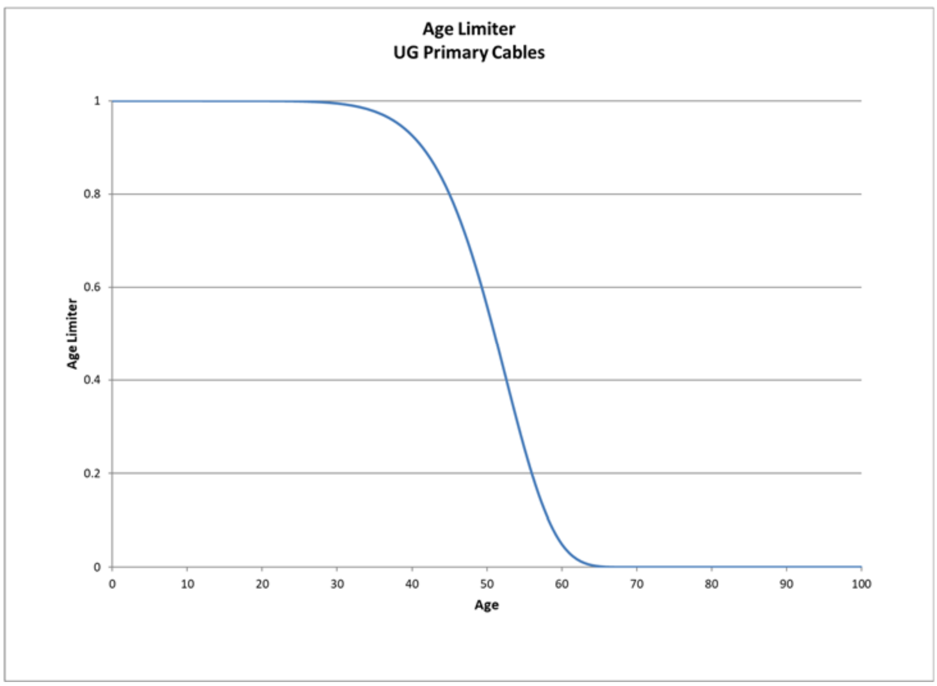

Figure 9-1 Age Limiting Factor Criteria - - UG Primary Cables

9.2 Age Distribution

The average ages of all in service cable segments is 14 years and the age distributions for UG Primary Cables is as follows:

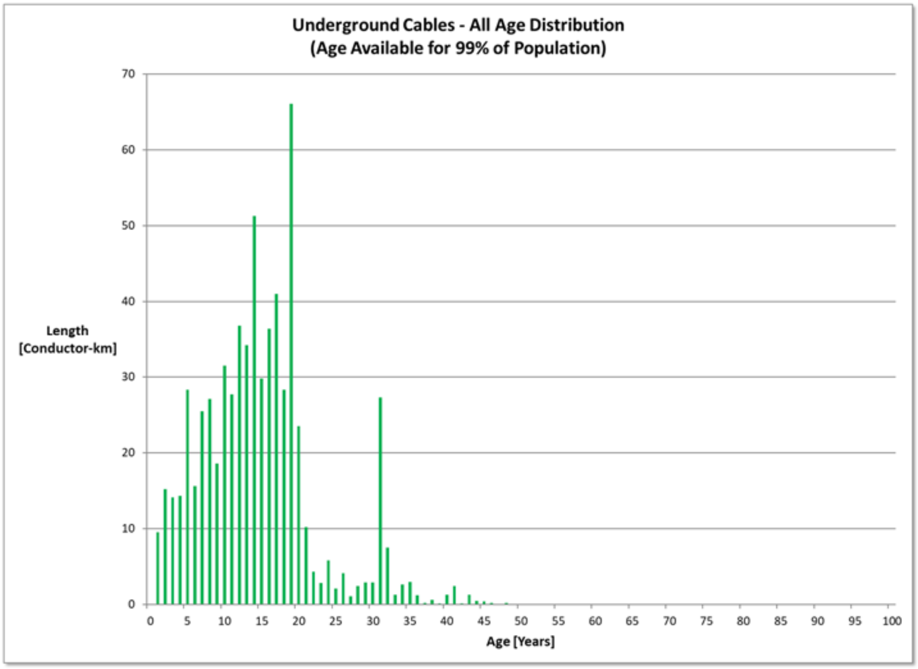

Figure 9-2 Age Distribution - UG Primary Cables

9.3 Health Index Results

There are 671 km UG Primary Cables. Among them, 663 km have age data used for Health Indexing and the average Health Index for this asset category is 100%.

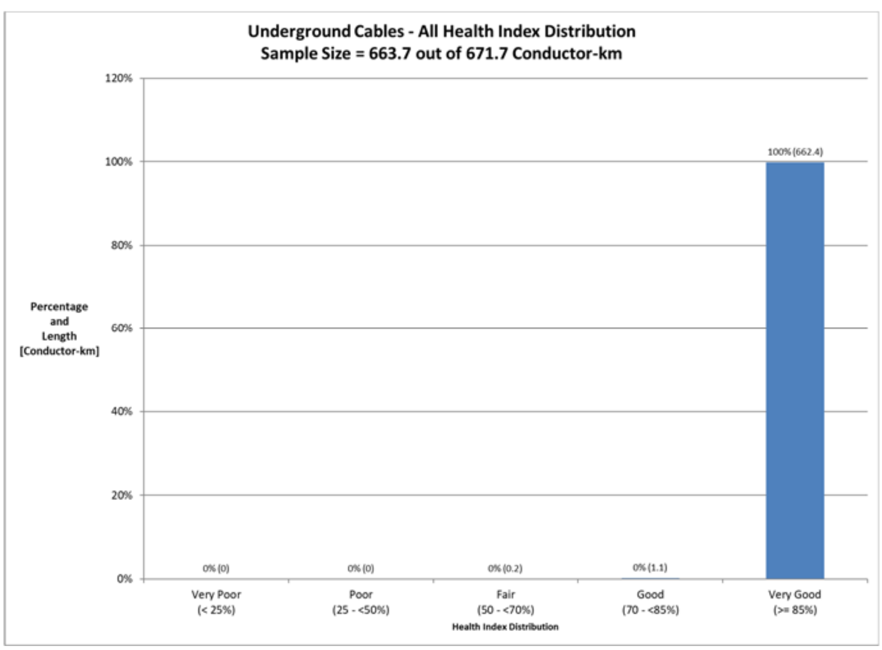

Figure 9-3 Health Index Distribution - UG Primary Cables

9.4 Flagged-for-action plan

The flagged-for-action plan for UG Primary Cables is based on asset removal rate and age distribution and is extrapolated to the entire population.

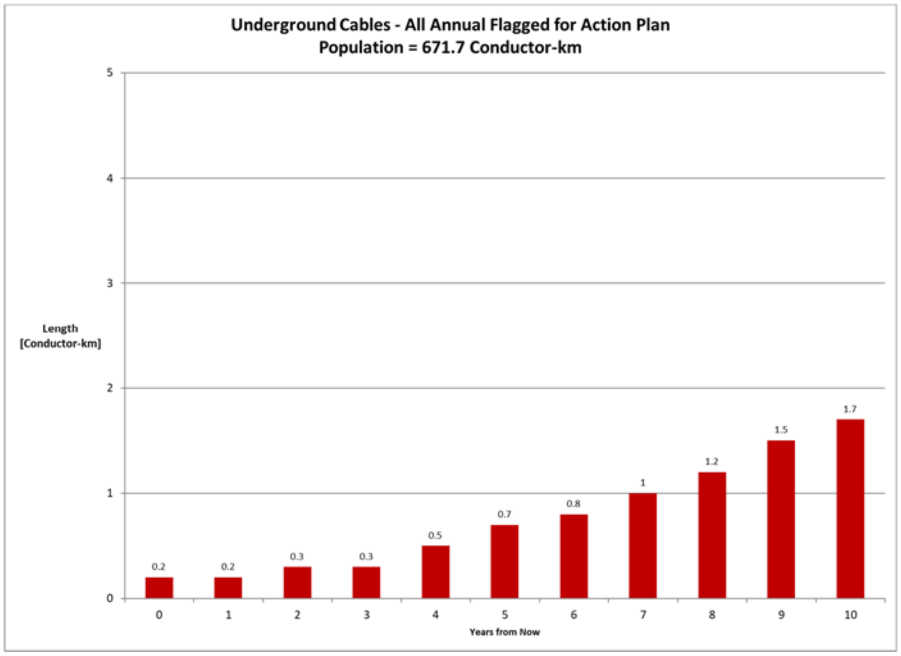

Figure 9-4 Flagged-for-action plan – UG Primary Cables

9.5 Data Gaps

The data used for assessing condition of UG Primary Cables assessment include age only.

The data gaps are as follows:

Table 9-2 Data Gap for UG Primary Cables

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Object or Component Addressed**	**Description**	**Source of Data**
Dielectric Loss	Insulation	☆☆	Cable	Insulation defect	On-site test
Splices	Accessories	☆☆	Cable Connection	Connection defect	On-site test
Terminations		☆☆			
Neutral Corrosion		☆	Other Component	Neutral defect	
Fault rate at Segment Level	Service Record	☆☆	Cable	Failure records	Historic records

* Data available for small portion

MH has historic removal records available for a small subset of the population, as the asset category has relatively young age profile. This is not sufficient for generating degradation curve. MH is recommended to continue collecting removal statistics in the future.

10 SUBMERSIBLE TRANSFORMERS

10.1 Health Index Formula

The HI assessment for this asset category is based on age and the cumulative likelihood of survival at a given age.

Age is used as a limiting factor to reflect the degradation over time as described in section 1.1.2.

10.1.1 Condition and Sub-Condition Parameters

Table 10-1 Condition Parameter and Weights – Submersible Transformers

m	Condition Parameter	WCP_m	Sub-Condition Parameters
	Age Limiting		Figure 10-1

10.1.2 Condition Criteria

<u>Age Limiting Factor</u>

The parameters of Submersible Transformers age limiting curve are shown in the following table and are based on MH historic removal data.

Table 10-2 Age Limiting Curve Parameters - Submersible Transformers

Asset Type	α	β
Submersible Transformers	**31.47**	**4.81**

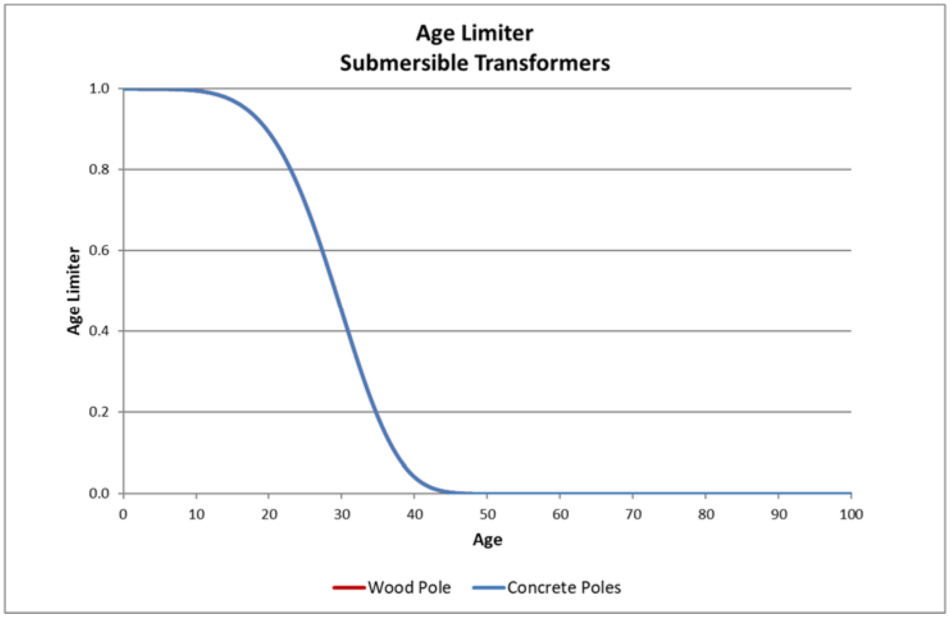

Figure 10-1 Age Limiting Factor Criteria - - Submersible Transformers

10.2 Age Distribution

The average age is 15 and the age distribution is as follows.

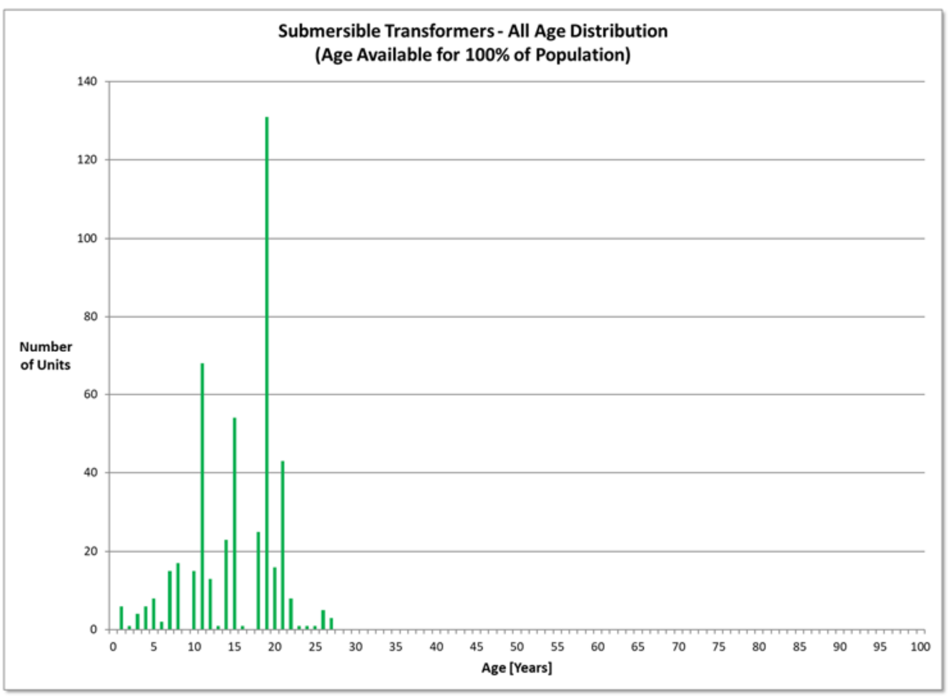

Figure 10-2 Age Distribution –Submersible Transformers

10.3 Health Index Results

There are 468 Submersible Transformers. All of them have sufficient data for determining Health Indexing score.

The average Health Index is 94%.

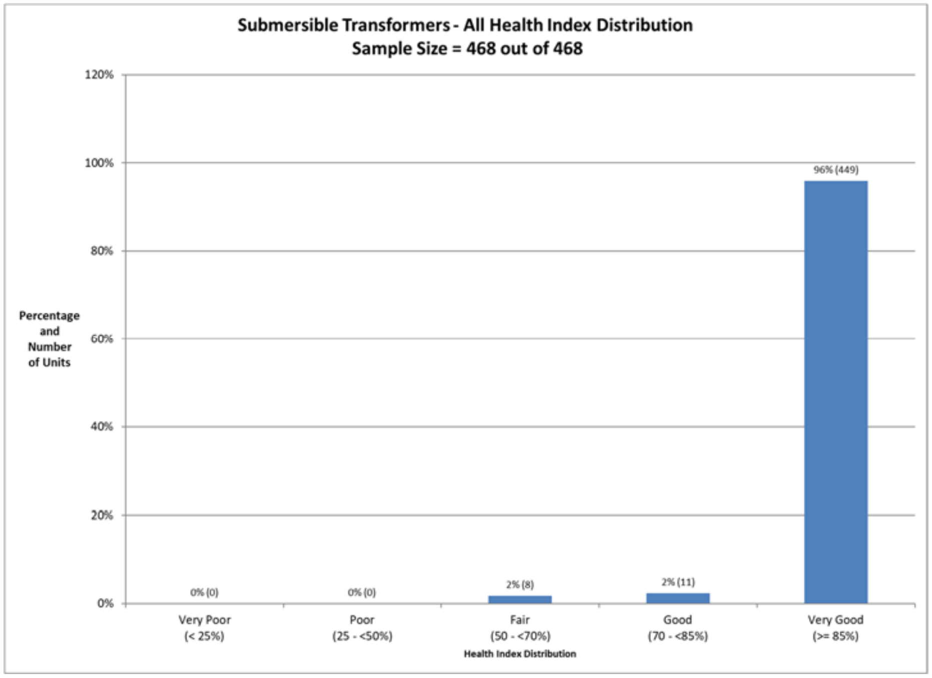

Figure 10-3 Health Index Distribution –Submersible Transformers

10.4 Flagged-for-action plan

The flagged-for-action plan of Submersible Transformers is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

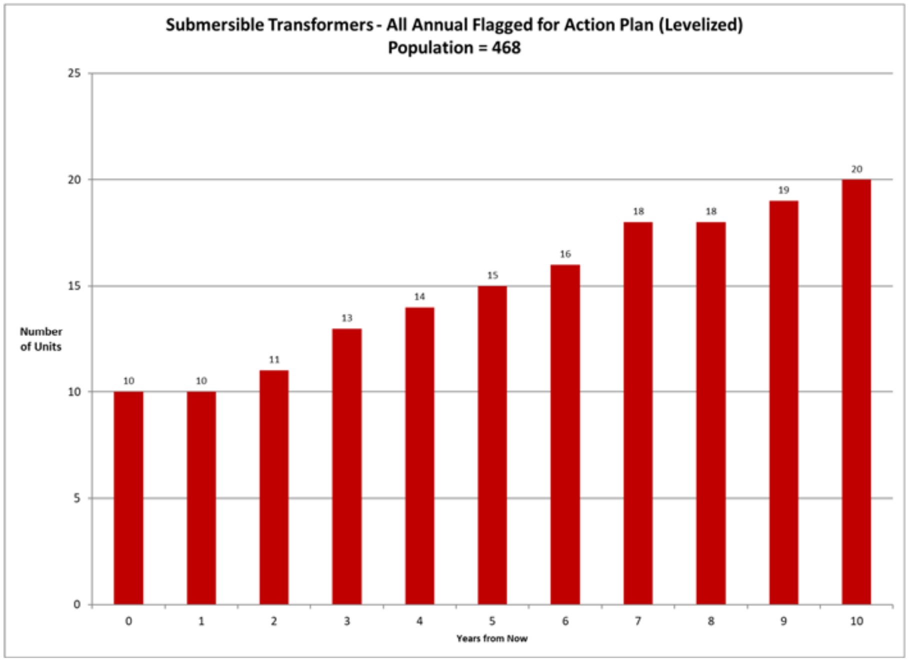

Figure 10-4 Flagged-for-action plan - Submersible Transformers

10.5 Data Gaps

The data used for Submersible Transformers assessment include age only.

Due to inspection accessibility limitation, it is difficult to conduct visual inspections this asset category.

Table 10-3 Data Gap for Submersible Transformers

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
Loading	Service Record	✯✯	Monthly 15 min peak load throughout years	Operation Record

11 VAULT TRANSFORMERS

11.1 Health Index Formula

Assume a parameter scoring system of 0 through 4, where 0 and 4 represent the “worst” and “best” scores respectively. Thus, the maximum score for any condition or sub-condition parameter (maximum CPS and CPF) is “4”.

11.1.1 Condition and Sub-Condition Parameters

Table 11-1 Condition Parameter and Weights - Vault Transformers

m	Condition parameter	WCP_m	Sub-Condition Parameters
1	Physical Condition	3	Table 11-2
2	Connection and Insulation	5	Table 11-3
3	Service Record	5	Table 11-4
	Age Limiting Factor		Figure 11-1

Table 11-2 Physical Condition Sub-Condition Parameters and Weights (m=1) - Vault Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Tank Corrosion	3	Table 11-5
2	Access	1	Table 11-5

Table 11-3 Connection and Insulation Sub-Condition Parameters and Weights (m=2) - Vault Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Oil Leak	2	Table 11-5
2	Grounding	1	Table 11-5

Table 11-4 Service Record Sub-Condition Parameters and Weights (m=3) - Vault Transformers

n	Sub-Condition Parameter	$WSCP_n$	Condition Criteria Table
1	Overall	1	Table 11-5

11.1.2 Condition Criteria

Individual Inspection

The score based on individual inspection in the past years is calculated as:

$$Average\ Score = \frac{\sum W_i Score_i}{\sum W_i}$$

Equation 11-1

Where *i* represents the year of inspection

Table 11-5 Individual Inspection Criteria - Vault Transformers

Score	Inspection Defect
4	No follow-up required, MH grading 1
3	MH grading 2
2	Follow-up, MH grading 3
1	MH grading 4
0	Yes

And the weights for different inspection years are as follows

Year (i)	Weight (W_i)
2021	1
2020	0.9
2019	0.8
2018	0.7
2017	0.6
2016	0.5
2015	0.4
2014	0.3
2013	0.2
2012	0.1
2011	0

Age Limiting Factor

In this project, age is used as a limiting factor to reflect the degradation over time as described in in Equation 1-2 of Section 1.1.2.

The parameters of Vault Transformers age limiting curve are shown in the following table and are based on industry information.

Table 11-6 Age Limiting Curve Parameters - Vault Transformers

Asset Type	α	β
Vault Transformers	**50.55**	**6.41**

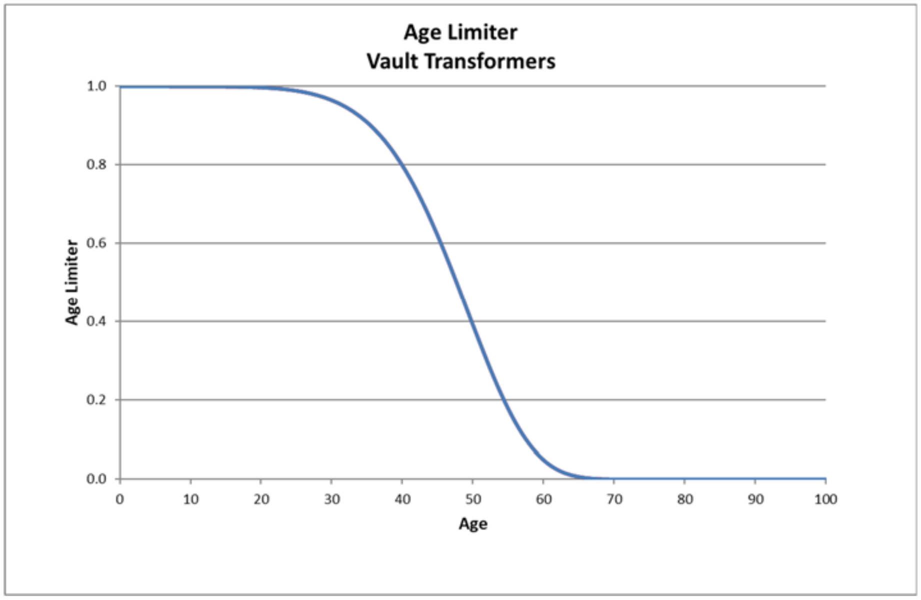

Figure 11-1 Age Limiting Factor Criteria - - Vault Transformers

11.2 Age Distribution

The average age of the units is 27 years.

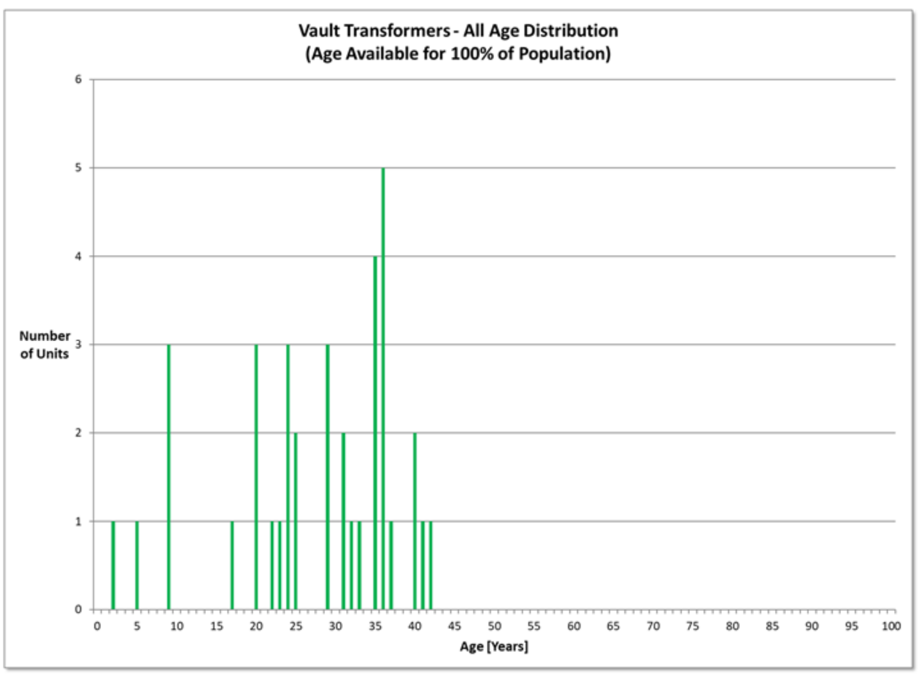

Figure 11-2 Age Distribution - Vault Transformers

11.3 Health Index Results

There are 38 units of Vault Transformers. All of them have sufficient data for determining Health Index score.

The average Health Index score for this asset category is 81%.

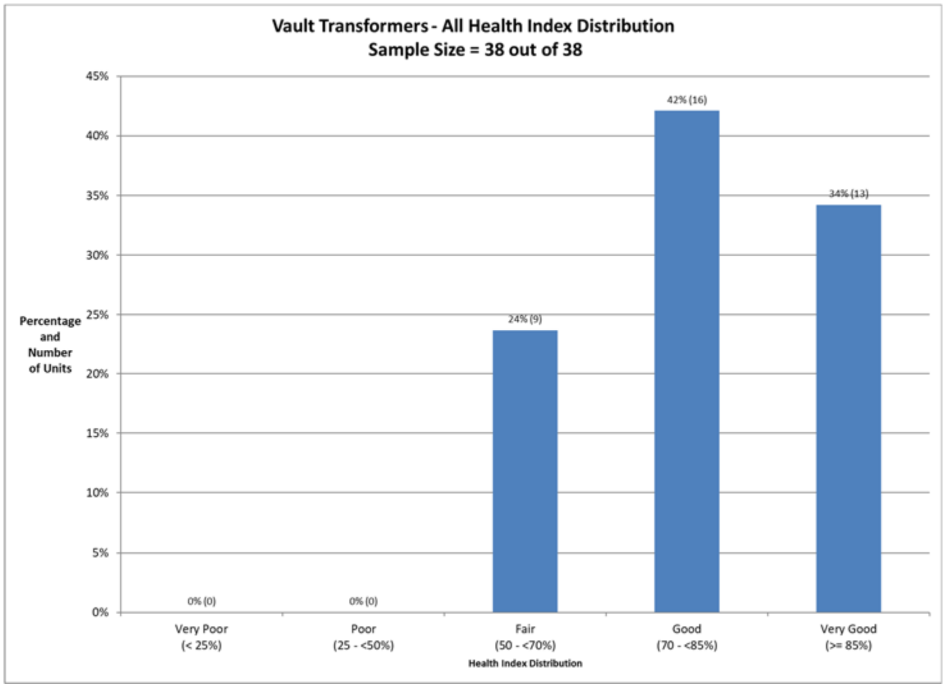

Figure 11-3 Health Index Distribution - Vault Transformers

11.4 Flagged-for-action plan

The flagged-for-action plan of Vault Transformers is based on the asset removal rate and age distribution.

The following diagram shows the flagged-for-action plan:

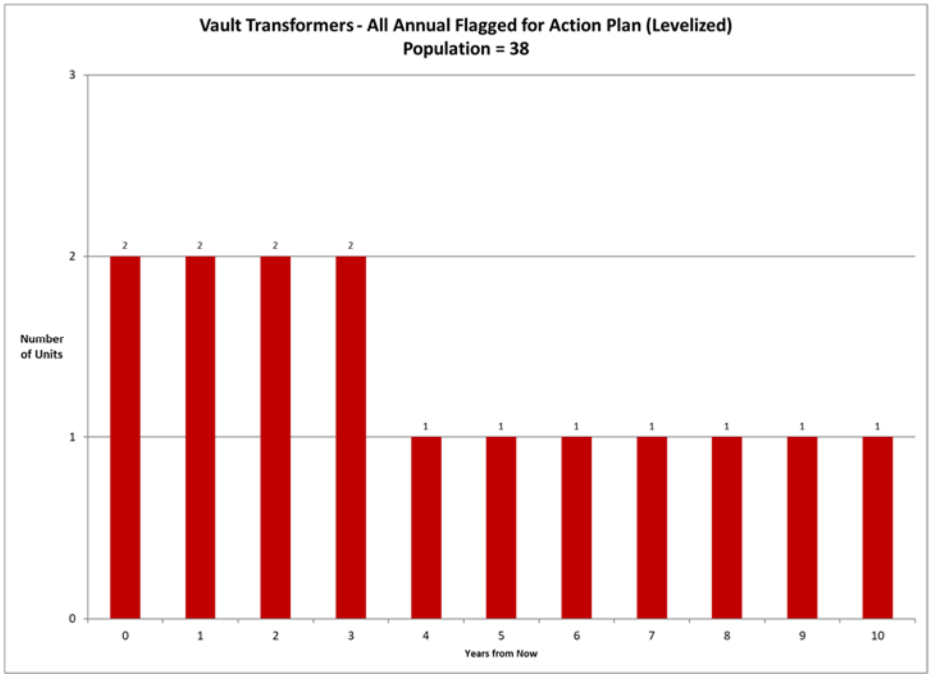

Figure 11-4 Flagged-for-action plan - Vault Transformers

11.5 Data Gaps

The data used for Vault Transformers assessment include age and inspection results for some components.

The data gaps are as follows.

Table 11-7 Data Gap for Vault Transformers

Data Gap (Sub-Condition Parameter)	**Parent Condition Parameter**	**Priority**	**Description**	**Source of Data**
Loading	Service Record	☆ ☆	Monthly 15 min peak load throughout years	Operation Record

Given the age profile and population size of this group, historic removal record (age at removal) is not a data gap at this stage but needs to be collected for future usage.

Appendix F PwC Information Technology Roadmap

Milton Hydro

Appendix F

PwC Information Technology Roadmap

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[Note: A copy of this Appendix has been filed confidentially with the OEB in accordance with the *Practice Direction on Confidential Filings*]

Appendix G GSAI Projected Growth Analysis Study (2021)

Town of Milton

Growth Projection Analysis

2016-2027 Population, Housing, Employment and Infrastructure Expansion

Prepared for:
Milton Hydro Distribution Inc.

November, 2021
GSAI File # 1418-001

Table of Contents

Town of Milton Growth Projection Report:
2016-2027 Population, Housing, Employment and Infrastructure Expansion

1.0 Introduction

Glen Schnarr & Associates Inc. has been retained by Milton Hydro Distribution Inc. to prepare this Growth Projection Report to prepare an analysis of projected residential and employment growth as well as infrastructure expansions in the Town of Milton between 2016 and 2027. This analysis is required to support Milton Hydro Distribution Inc.'s 2023 cost of service rate application to the Ontario Energy Board.

2.0 Projection Data

The following documents and/or data sources have been extensively reviewed and used to determine current and projected growth conditions for each of the following subjects:

Housing

- 2016 Statistics Canada Census of Dwelling Characteristics
- Town of Milton Building Permit Data (2016-2021)
- Best Planning Estimates of Population, Occupied Dwelling Units and Employment, 2011-2031 as prepared for the Regional Municipality of Halton, dated June 2011
- Region of Halton 2020 State of Housing Report, dated 2019

Population

- 2016 Statistics Canada Census of Population, as prepared by StatsCan
- Best Planning Estimates of Population, Occupied Dwelling Units and Employment, 2011-2031 as prepared for the Regional Municipality of Halton, dated June 2011

Employment

- Best Planning Estimates of Population, Occupied Dwelling Units and Employment, 2011-2031 as prepared for the Regional Municipality of Halton, dated June 2011
- 2016 Region of Halton Employment Survey

Infrastructure Expansion

- Best Planning Estimates of Population, Occupied Dwelling Units and Employment, 2011-2031 as prepared for the Regional Municipality of Halton
- Town of Milton Development Charges Background Study, as prepared by Watson and Associates, dated March 2021
- Town of Milton 2021 Approved Capital and Operating Budget, dated December 2020
- Halton Region Budget and Business Plan 2021, dated November 2020
- 2019-2023 Milton Transit Services Review & Master Plan Update, dated June 2019

In our opinion, the above documents and/or data sources represent reputable and reliable resources for primary and secondary statistical data which can be used to compile refined growth projections for Milton Hydro Distribution Inc.'s use.

The information above has been assessed and screened based on our practical experience on growth timing trends working as planning consultants for several developers and builders in the Town of Milton. In addition, we have also held a number of interviews/meetings with key senior planning and building staff regarding growth trends in the Town of Milton.

3.0 Methodology

The data in this report was compiled and synthesized from a variety of federal, regional and local municipal reports and datasets. The 2016 Census data from Statistics Canada was used as the baseline for population and dwelling unit count due to its accuracy as well as the inclusion of locational indicators for various data sets. In addition, Building Permit data from the Town of Milton during the years 2016-2021 has been used to detail the number of housing units approved annually, as well as provide the square footage of new employment uses in the Town. This data was used as the baseline data to the present year. In order to ensure an accurate baseline was established, the building permit data has been cross referenced with the Statistics Canada Census data. Using the Region of Halton's person per unit (PPU) and employment densities combined with the Building Permit data, population and employment growth numbers were determined between 2016-2021. The PPU and employment density numbers were then cross referenced with the Region of Halton Best Planning Estimates (BPE's) to ensure accuracy.

In order to provide projections on anticipated growth beyond 2021, active and pending development applications were reviewed with Town of Milton Planning Staff to determine anticipated levels of housing unit and employment growth within the Town. Additionally, we included a review of the Town of Milton's approvals of new Secondary Plan areas within the Town to determine anticipated levels of residential and employment growth as well as the locations of this growth. This data was supplemented through interviews with various developers and Planning Staff, to confirm anticipated timing of advancing development approvals within the new Secondary Plan areas.

This data has been compiled and presented in mapping form to illustrate the locations where future growth is anticipated to occur. A series of maps have been prepared presenting the data representing the 2016 baseline condition, the 2021 existing growth condition and 2027 growth projections. In addition to the mapping, an annualized breakdown of the anticipated growth between 2022 and 2027 has been prepared in table format. Finally, identified capital works projects that are anticipated to impact Milton Hydro operations have been presented in mapping form to illustrate location and timing of anticipated road works/widenings. These capital works projects have also been summarized in table form to identify location, timing and allocated budget for utility relocation.

With respect to the projections contained in this report, it should be noted that the projections have a higher degree of certainty for 2022 and 2023. The degree of certainty is largely based on data and information regarding active and pending development applications for which the Town of Milton has been consulted. Additionally, financial commitments for servicing capacity through the Region of Halton's 2021 Allocation program indicate a level of certainty for developments within this timeframe.

Beyond 2024 and into 2027, the accuracy of the projections begins to diminish as there are a greater amount of factors that can influence the timing of development. Such factors could include changes in political governments, residential housing market fluctuations affecting housing demand and the ongoing and uncertain impact of COVID 19 on the residential housing market through supply chain and labour disruptions.

4.0 Housing Growth Projections

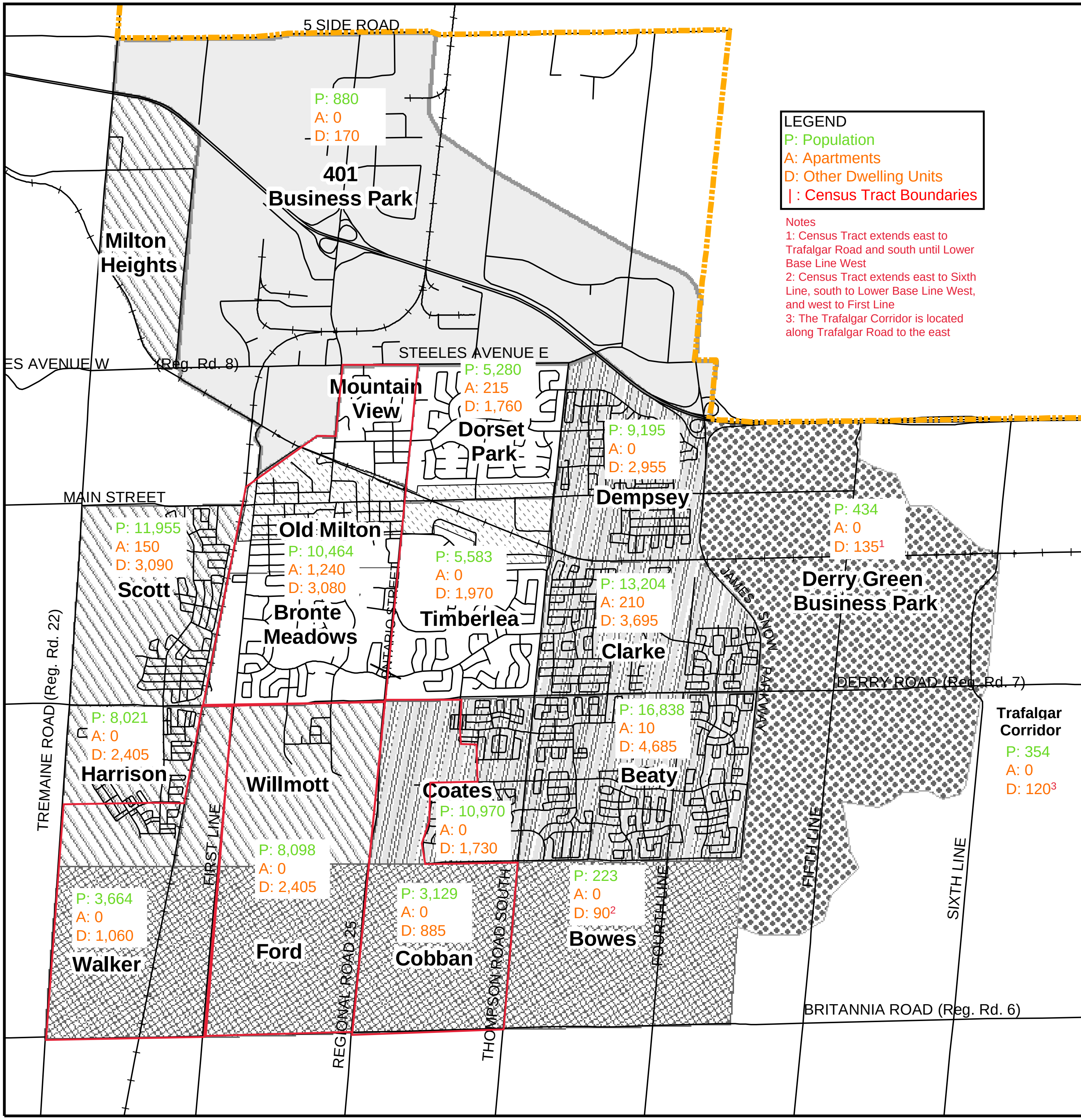
In determining projections for housing growth and total housing unit counts within the Town of Milton, our initial focus was to establish the most accurate count for existing units by type. The 2016 Census conducted by Statistics Canada offers a breakdown of occupied dwellings by structural type for small geographic areas (Dissemination Areas [DA's]) across the entire country.

We have organized the DA's in a manner that is consistent with the Urban Districts and Neighbourhoods areas as identified in Schedule D2 of the Town of Milton Official Plan. The data has been compiled according to these districts. Where DA's overlap the boundary of an Urban District/ Neighborhood area, the DA was considered part of the area in which the majority of its residential area is located. See Table 1 below for the 2016 Census Data from Statistics Canada:

Table 1: 2016 Census Dwelling Unit Data

Location	Apartment Units	Other Dwelling Units
401 Business Park	0	170
Old Milton+ Mountain View+ Bronte Meadows	1,240	3,080
Dorset Park	215	1,760
Timberlea	0	1,970
Dempsey	0	2,955
Clarke	210	3,695
Beaty	10	4,685
Derry Green	0	135
Trafalgar Corridor	0	120
Bowes	0	90
Cobban	0	885
Coates	0	1,730
Ford + Willmott	0	2,405
Walker	0	1,060
Harrison	0	2,405
Scott	150	3,090
Other rural areas	0	2,455
TOTAL	**1,825**	**32,690**

This data is also displayed on the two maps below. The first map (Schedule D2 from the Town of Milton Official Plan) has an overlay which shows the population and dwelling unit data retrieved from the 2016 Census. The DA boundaries that were larger than the Urban District/ Neighbourhoods identified on the map have been redrawn in red. The second map (Schedule K from the Town of Milton Official Plan) has another overlay which shows the extent of where development has taken place in 2016 and the population, dwelling units, and number of jobs that year.



TOWN OF MILTON OFFICIAL PLAN

Schedule D2

URBAN DISTRICTS AND NEIGHBOURHOODS

TOWN OF MILTON BOUNDARY

ROADS

RAILWAY

POLICY AREAS

Central Business District

DISTRICTS

401 Business Park

Boyne

Bristol Survey

Derry Green Industrial / Business Park

Existing Urban Area

Sherwood Survey

NEIGHBOURHOODS

401 BP	Ford
Beaty	Harrison
Bowes	Milton Heights
Bronte Meadows	Mountain View
Clarke	Old Milton
Coates	Scott
Cobban	Timberlea
Dempsey	Derry Green BP
Walker	Dorset Park
Willmott	

0 0.125 0.25 0.5 0.75 1 Kilometres

NAD 1983 - UTM Zone 17N

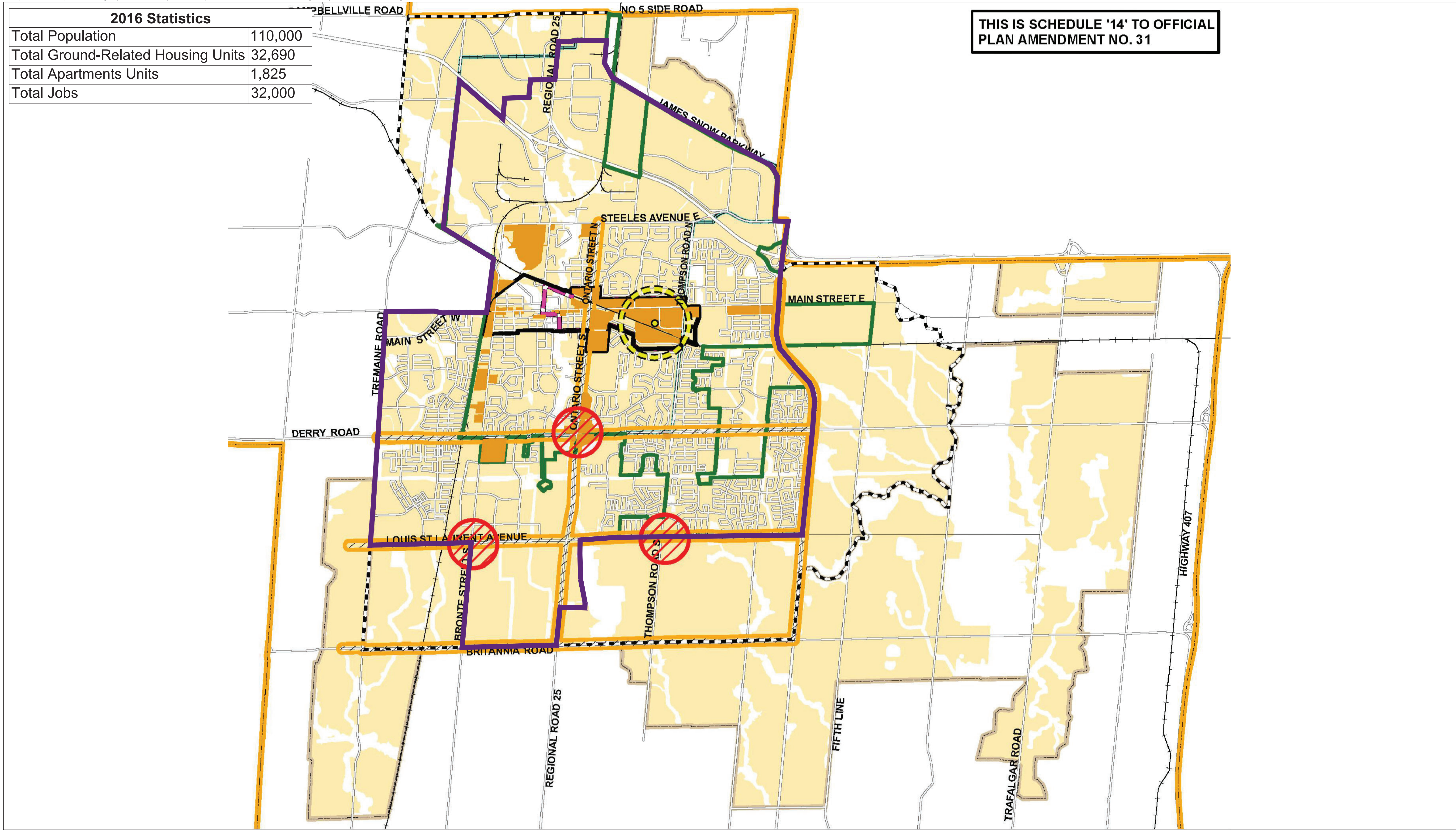
This Schedule Forms Part Of The Official Plan And Should Be Read Together With The Text.

Consolidated August 2008

P:\1418-001\4. Drawings\2021 09 September\Milton Schedule K Overlay Map Sept 30 21.dwg

2016 Statistics	
Total Population	110,000
Total Ground-Related Housing Units	32,690
Total Apartments Units	1,825
Total Jobs	32,000

THIS IS SCHEDULE '14' TO OFFICIAL PLAN AMENDMENT NO. 31



EXCERPT FROM TOWN OF MILTON OFFICIAL PLAN - SCHEDULE "K"

2016 Census

Legend

The extent of the community where development has taken place (2016)

Scale: NTS
September 30, 2021

GSAI
Glen Schnarr & Associates Inc.

The 2016 Census data on dwelling units was then compiled into two separate categories: "Total Ground Related Housing Units" and "Total Apartment Units." The Building Permit data also contained these categories so was used to calculate the growth of dwelling units from 2016 to 2021. The difference in the dwelling unit count between the years was then used to extrapolate the number of dwelling units to 2027:

Table 2: Town of Milton Data - Total ground related housing and apartment units from 2016 to 2027

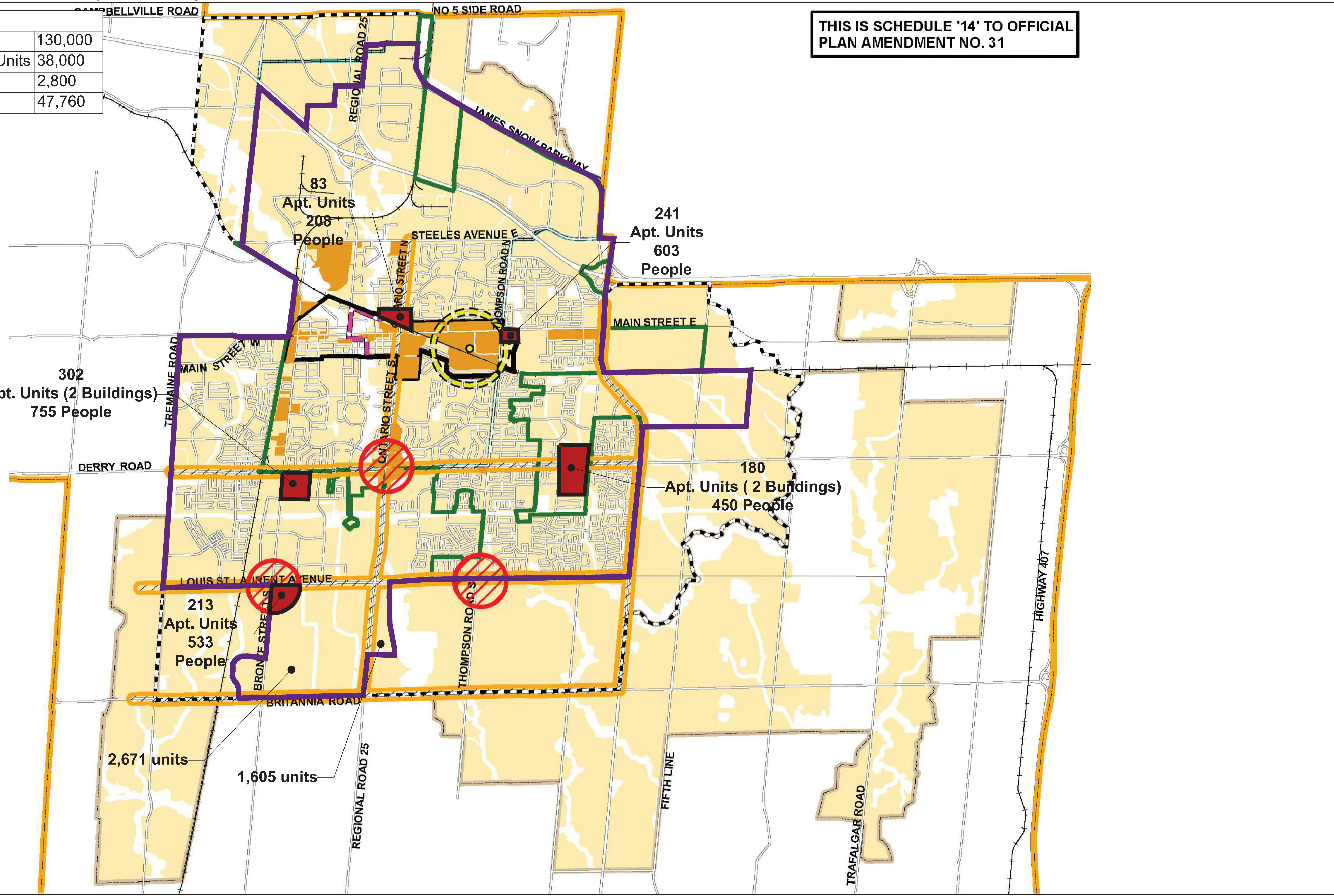
	2016	2021	2027
Total Ground Related Housing Units	32690	38000	47200
Total Apartment Units	1825	2800	5100

The change in apartment unit growth from 2016 to 2021 was mainly derived from the Building Permit data. The locational information in the dataset allowed us to map out where growth is projected to occur. In this case, the apartment unit growth is concentrated in a few key areas. Along with the number of apartment units anticipated, the anticipated number of people living in these units is also indicated on the following 2021 Projection Map and 2027 Projection Map:

P:\1418-001\4. Drawings\2021 09 September\Milton Schedule K Overlay Map Sept 30 21.dwg

2021 Statistics	
Total Population	130,000
Total Ground-Related Housing Units	38,000
Total Apartments Units	2,800
Total Jobs	47,760

THIS IS SCHEDULE '14' TO OFFICIAL PLAN AMENDMENT NO. 31



EXCERPT FROM TOWN OF MILTON OFFICIAL PLAN - SCHEDULE "K"

2021 Projection

Legend

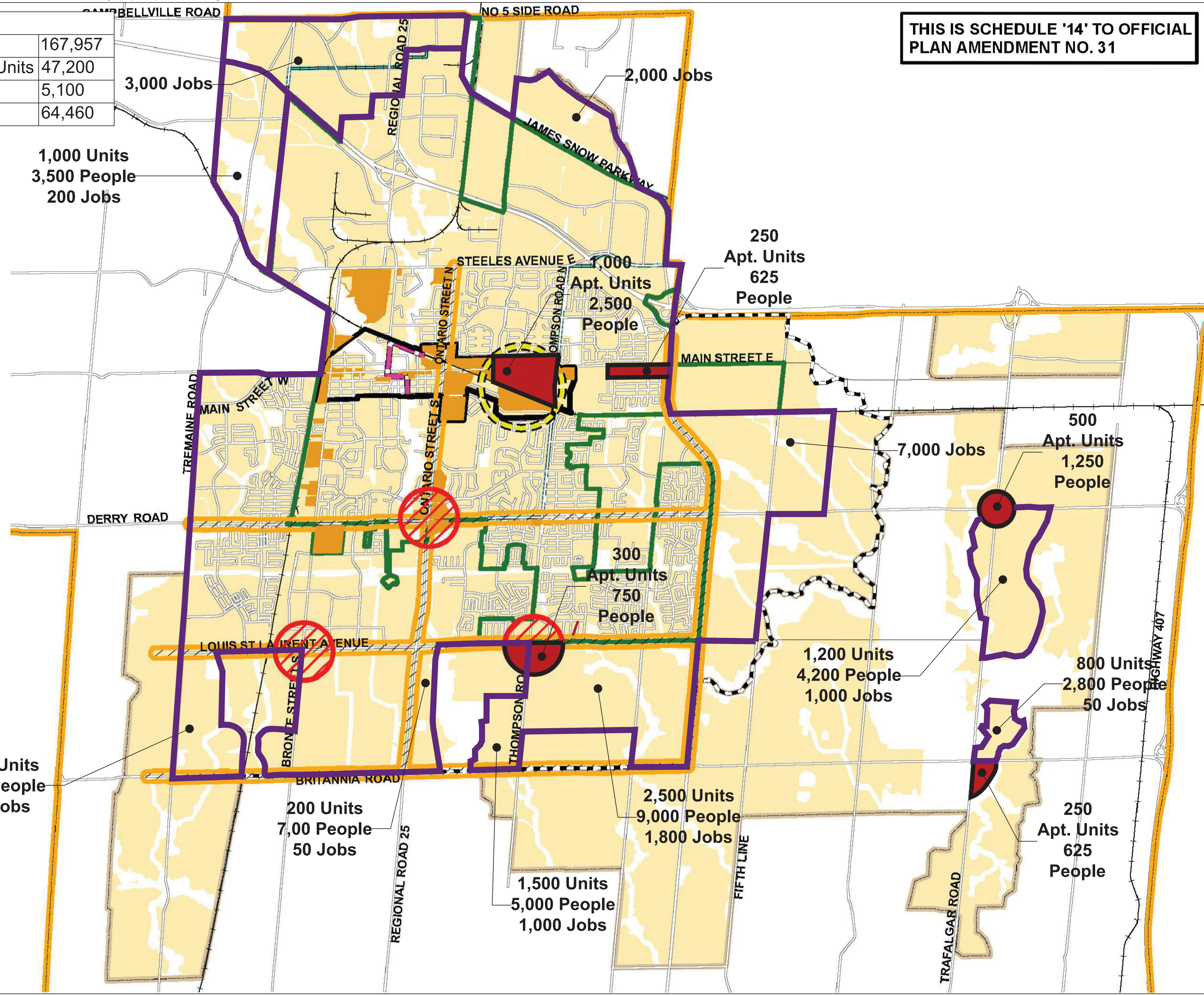
- The extent of the community where development has taken place (2016-2021)
- Sites where apartment units are built (2016-2021)

Scale: NTS
September 30, 2021

GSAI
Glen Schnarr & Associates Inc.

2027 Statistics	
Total Population	167,957
Total Ground-Related Housing Units	47,200
Total Apartments Units	5,100
Total Jobs	64,460

THIS IS SCHEDULE '14' TO OFFICIAL PLAN AMENDMENT NO. 31



EXCERPT FROM TOWN OF MILTON OFFICIAL PLAN - SCHEDULE "K"

2027 Projection

Legend

- The extent of the community where development has taken place (2021-2027)
- Sites where apartment units are built (2021-2027)

Scale: NTS
September 30, 2021

GSAI
Glen Schnarr & Associates Inc.

The anticipated annualized increase in dwelling units from 2022 to 2027 is detailed in the below charts:

Table 3: 2022 to 2027 - Annualized Apartment Unit Breakdown

High Density Node Location	2022	2023	2024	2025	2026	2027
Downtown Milton	200	200	200	200	200	250
Louis St. Laurent & Thompson	0	0	0	150	150	0
Derry & Trafalgar	0	0	0	0	250	250
Britannia & Trafalgar	0	0	0	0	250	0
TOTAL	**200**	**200**	**200**	**350**	**850**	**500**
TOTAL APARTMENT UNITS IN 2027	**5,100**					

Table 4: 2022 to 2027 - Annualized Ground Related Housing Units Breakdown

Location	2022	2023	2024	2025	2026	2027
JSP / Louis St. Laurent/ Britannia/Thompson	0	0	650	650	600	600
Thompson & Britannia (NW cnr)	250	250	250	250	250	250
Milton Heights	0	0	250	250	250	250
Louis St. Laurent/Britannia/Tremaine	500	500	500	500	0	0
Trafalgar Secondary Plan (North)	0	0	0	0	600	600
Trafalgar Secondary Plan (Mattamy)	0	0	0	400	400	0
Louis St. Laurent & Hwy 25	0	200	0	0	0	0
TOTAL	**750**	**950**	**1,650**	**2,050**	**2,100**	**1,700**
TOTAL GROUND RELATED UNITS IN 2027	**47,200**					

5.0 Population Growth Projections

In determining projections for population growth within the Town of Milton, our initial focus was to establish the latest and most accurate population count on record. The 2016 Census conducted by Statistics Canada offers a breakdown of population by DA as per the structural housing types identified in Section 4.0 of this report.

The DA's were organized according to the Urban Districts and Neighbourhoods areas (as identified in Schedule D2 of the Town of Milton Official Plan) and the data compiled accordingly. Where DA's overlap the boundary of an Urban District/ Neighborhood area, the DA was considered part of the area in which the majority of its residential area is located. See Table 5 below for the 2016 Census Data from Statistics Canada:

Table 5: 2016 Census, Population Data

Location	Population
401 Business Park	880
Old Milton+ Mountain View+ Bronte Meadows	10,464
Dorset Park	5,280
Timberlea	5,583
Dempsey	9,195
Clarke	13,204
Beaty	16,838
Derry Green	434
Trafalgar Corridor	354
Bowes	223
Cobban	3,129
Coates	10,970
Ford + Willmott	8,098
Walker	3,664
Harrison	8,021
Scott	11,955
Other rural areas	2,708
TOTAL	**111,000**

Using the Region of Halton's Best Planning Estimates (BPE's) as a cross reference, the population growth was extrapolated to 2027 as seen in Table 6 below:

Table 6: Town of Milton Data - Total cumulative population from 2016 to 2027

	2016	2021	2027
Total Population	**111000**	**130000**	**167950**

The anticipated annualized increase in projected population growth from 2016 to 2027 is further broken down into different geographical areas as shown in Table 7 below:

Table 7: 2022 to 2027 - Annualized Population Breakdown

Location	2022	2023	2024	2025	2026	2027
JSP / Louis St. Laurent/ Britannia/Thompson	0	0	2,525	2,275	2,100	2,100
Trafalgar Secondary Plan (North)	0	0	0	0	2,100	2,100
Louis St. Laurent/Britannia/Tremaine	1,750	1,750	1,750	1,750	0	0
Thompson & Britannia (NW cnr)	825	825	825	825	850	850
Milton Heights	0	0	875	875	875	875
Trafalgar Secondary Plan (Mattamy)	0	0	0	1,400	1,400	0
Downtown Milton (Apts.)	500	500	500	500	500	625
Derry & Trafalgar (Apts.)	0	0	0	0	625	625
Louis St. Laurent & Thompson (Apts.)	0	0	0	0	375	375
Louis St. Laurent & Hwy 25	0	700	0	0	0	0
Britannia & Trafalgar (Apts.)	0	0	0	0	625	0
TOTAL	**3,075**	**3,775**	**6,475**	**7,625**	**9,450**	**7,550**
TOTAL POPULATION IN 2027				**167,950**		

6.0 Employment Growth Projections

In determining projections for employment growth within the Town of Milton, we utilized the Halton Region's Best Planning Estimates (BPE) job numbers as baseline data for 2016. The Urban Districts/Neighbourhoods map areas (as identified in Section 4.0 of this report) was aligned with the Traffic Zones identified in the BPEs. Each identified Traffic Zone (TZ) contains unit count data and number of jobs for the years 2016, 2021, 2026 and 2031. The job count in the Town of Milton for 2016 was extracted from the BPEs and then the number was extrapolated based on what would be anticipated to support the projected housing and population such as schools, retail/commercial stores, and community services. See Table 8 below for the total jobs in 2016, and the projected numbers in 2021 and 2027:

Table 8: Town of Milton Data - Total jobs 2016 to 2027

	2016	2021	2027
Total Jobs	**32000**	**47760**	**64460**

The projected employment data from 2022 to 2027 data was then broken down into smaller geographical areas on an annualized basis as shown in the table below:

Table 9: 2022 to 2027 - Annualized Employment Breakdown

Location	2022	2023	2024	2025	2026	2027
Derry Green	1,200	1,200	1,200	1,200	1,200	1,000
401 Business Park - West (JSP & No. 5 Side Rd.)	0	0	0	1,000	1,000	1,000
401 Business Park - North (Orlando)	0	0	1,000	500	500	0
JSP / Louis St. Laurent/ Britannia/Thompson	0	0	0	600	600	600
Trafalgar Secondary Plan (North)	0	0	0	0	500	500
Thompson & Britannia (NW cnr)	0	200	200	200	200	200
Louis St. Laurent/ Britannia/Tremaine	100	100	100	100	100	100
Milton Heights	0	0	0	50	75	75
Louis St. Laurent & Hwy 25	0	25	25	0	0	0
Trafalgar Secondary Plan (Mattamy)	0	0	0	0	25	25
TOTAL	**1,300**	**1,525**	**2,525**	**3,650**	**4,200**	**3,500**
TOTAL JOBS IN 2027				**64,460**		

The 2027 Projection Map included in Section 4.0 of this report depicts the general locations of where the job numbers are expected to increase.

7.0 Infrastructure Expansion Projections

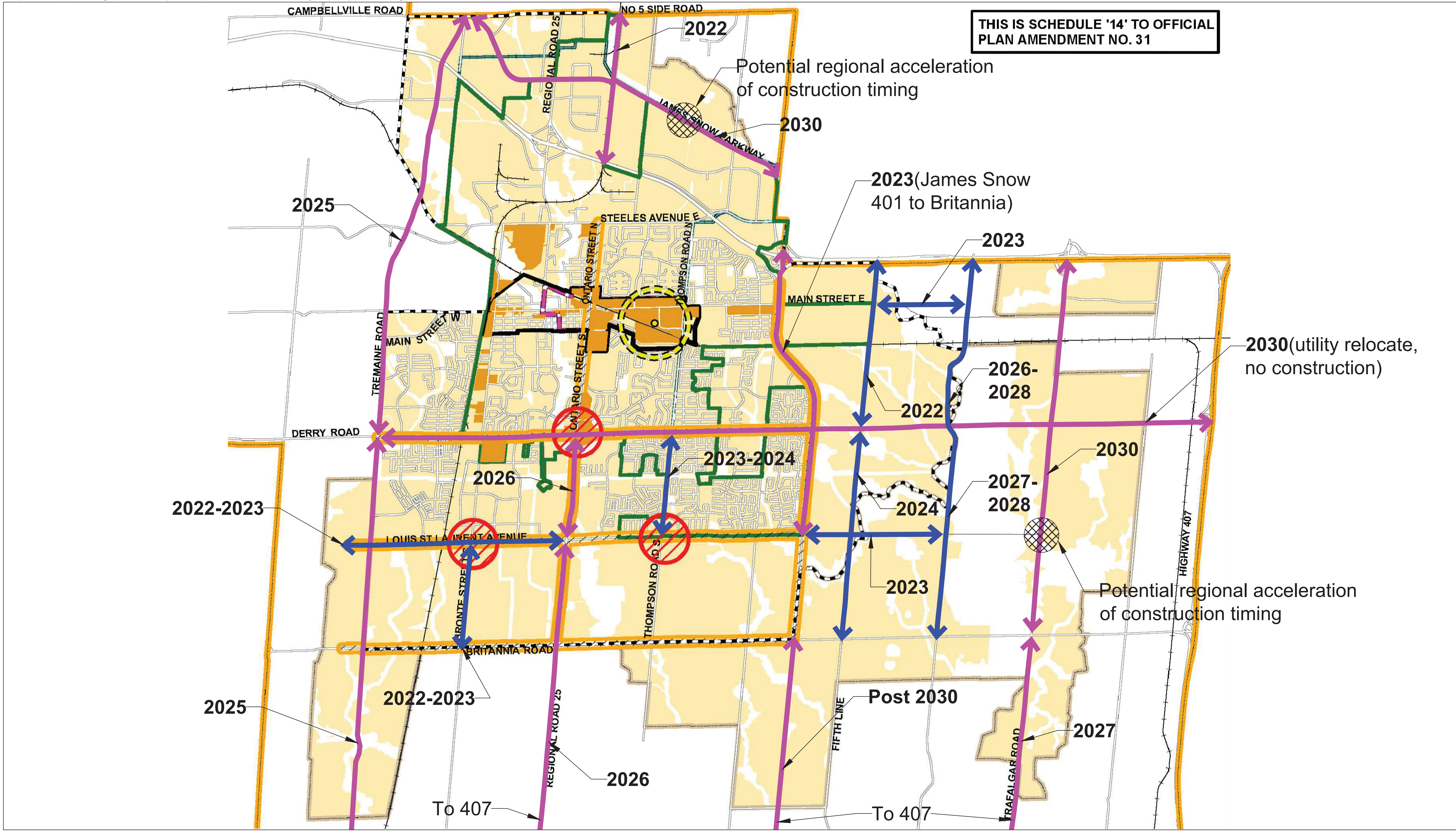
In determining the timing of infrastructure expansion projects within the Town of Milton we analyzed numerous Region of Halton and Town of Milton reports (see Section 2.0 for a full list). The two reports heavily relied upon in our analysis are the Town of Milton 2021 Approved Capital and Operating Budget, and the Halton Region Budget and Business Plan 2021. The Halton Region Plan has a utility relocate component which includes details on expected road widenings, the anticipated year in which they are expected to occur, and the budget allocated for them. The regional road widenings, and the utility relocation budget allocation within the Town of Milton are summarized in the below chart:

Table 10: 2022-2027 Regional Capital Works

UID	Regional Road Widening Project Description - Utility Relocate Component Only	Year	Budget Allocation
6823	Trafalgar Road - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 3)	2026	$ 618,000.00
5839	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Britannia Road (MIL) (Regional Road 4)	2022	$ 887,000.00
6806	James Snow Parkway - New 6 lane road from Highway 407 to Britannia Road (MIL) (Regional Road 4)	2029	$ 710,000.00
6807	James Snow Parkway - Widening from 4 to 6 lanes from Highway 401 to Tremaine Road (MIL) (Regional Road 4)	2027	$ 1,124,000.00
6757	5 1/2 Line - New 6 lane road from Britannia Road to Steeles Avenue & Interchange at Highway 401 (MIL)	2030	$ 855,000.00
6804	Derry Road - Widening from 4 to 6 lanes from Tremaine Road to Highway 407 (MIL) (Regional Road 7)	2030	$ 1,876,000.00
6819	Steeles Avenue - Widening from 2 to 4 lanes from Tremaine Road to Industrial Drive (MIL) (Regional Road 8)	2021	$ 226,000.00
6821	Steeles Avenue - Widening from 4 to 6 lanes from Regional Road 25 to Trafalgar Road (MIL) (Regional Road 8)	2023	$ 1,069,000.00
5845	Tremaine Road - Widening from 4 to 6 lanes from Highway 401 to Derry Road (MIL) (Regional Road 22)	2023	$ 1,248,000.00
6834	Tremaine Road - Widening from 2 to 4 lanes from Lower Base Line to Britannia Road (MIL) (Regional Road 22)	2024	$ 477,000.00
6814	Regional Road 25 - Widening from 4 to 6 lanes from Highway 407 to Britannia Road (MIL) (Regional Road 25)	2025	$ 919,000.00
6815	Regional Road 25 - Widening from 4 to 6 lanes from Britannia Road to Derry Road (MIL) (Regional Road 25)	2026	$ 474,000.00
6817	Regional Road 25 - Widening from 4 to 6 lanes from Steeles Avenue to 5 Side Road (MIL) (Regional Road 25)	2022	$ 1,700,000.00

The Town of Milton Road Widening Capital Forecast along with the Region of Halton Capital Forecast is displayed on the following map:

P:\1418-001\4. Drawings\2021 09 September\Milton Schedule K Overlay Map Sept 30 21.dwg



EXCERPT FROM TOWN OF MILTON OFFICIAL PLAN - SCHEDULE "K"

Road Widening Capital Forecast

Legend

- Region of Halton Capital Project
- Town of Milton Capital Project

Scale: NTS

September 30, 2021

GSAI

Glen Schnarr & Associates Inc.

8.0 Findings

Based on our housing growth projections, we note a considerable increase between 2021 and 2027 in housing development in the northern, central, eastern and southern parts of Milton around the periphery of the existing built up area. The western portion of Milton has largely developed to the extent of the built up area, while the remainder of the Town outside of the built up area remains as rural and is not anticipated to accommodate much new development.

Resident population is projected to increase a considerable amount in the northern, central, eastern and southern parts of Milton coincidental to the projected housing development in these areas.

Employment growth projections show a significant increase from 2021 to 2027. The northern and eastern portions of Milton around the periphery of the built up area will accommodate the majority of new jobs due to the availability of serviced and development ready employment land.

The majority of road widenings are projected around the periphery of the Town's built up area where new housing and/or employment growth are projected to occur. Some infrastructure improvements are planned within the built-up areas due to overall anticipated intensification growth.

The projections in this report are based on our practical experience on growth timing trends working as planning consultants for several developers and builders in the Town of Milton. The projections generally require on-going monitoring and updates on a bi-annual basis to ensure accuracy and correspondence with private development initiatives and municipal capital projects.

As previously discussed, the projections for 2022 and 2023 carry the highest degree of certainty of the projections materializing as they are based in part on active development applications, servicing and financial obligations for pending developments and contemporary data. As the projections progress into 2024 through 2027, the projections have less certainty given the potential for unknown factors to influence levels of growth, these include changes in government and corresponding political priorities, residential housing market fluctuations affecting housing demand and the ongoing and uncertain impact of COVID 19 on the residential housing market through supply chain and labour disruptions.

Respectfully submitted,

GLEN SCHNARR & ASSOCIATES INC.

Colin Chung, MCIP, RPP **Partner**	**David Capper, MCIP, RPP** **Associate**

Appendix H Hydro One Planning Status Letter

Hydro One Networks Inc.
483 Bay Street
13th Floor, North Tower
Toronto, ON M5G 2P5
www.HydroOne.com

Tel: (416) 345-5420
Fax: (416) 345-4141
Ajay.Garg@HydroOne.com

January 25, 2022

Mr. Ray Bou
Milton Hydro
200 Chisholm Dr.
Milton, ON L9T 3G9

Dear Mr. Bou,

Subject: Regional Planning Status

As per your request, this Planning Status letter is provided to meet one of the requirements of your upcoming Rate Application to the Ontario Energy Board (OEB).

As you are aware, the Province of Ontario is divided into 21 Regions for the purpose of Regional Planning (RP), a map of Ontario showing the 21 Regions and the list of Local Distribution Companies (LDCs) in each of the Region are attached as Appendix A and B respectively. Milton Hydro is an LDC within the GTA West region and the Kitchener-Waterloo-Cambridge-Guelph (KWCG) region and Hydro One Networks Inc. (Hydro One) is the lead transmitter.

This letter confirms that the first cycle of RP for GTA West region was completed in 2016. The second cycle for the region is in progress with the Needs Assessment Report[1] published in May 2019, followed by the Integrated Regional Resource Plan (IRRP)[2] in July 2021. Work on the Regional Infrastructure Plan (RIP) is now underway and is expected to be completed by early Q1 2022.

Similarly, the first cycle of RP for KWCG region was completed in 2015. The second cycle for the region is also complete with the Needs Assessment Report[3] published in December 2018 followed by the Integrated Regional Resource Plan (IRRP)[4] in May 2021. The second cycle Regional Infrastructure Plan (RIP) report was issued in December 2021[5].

GTA West Region

The GTA West region area comprises the municipalities of Brampton, Burlington, Halton Hills, Milton, Mississauga, Oakville and South Caledon.

The status of the transmission projects recommended in the first cycle of RIP is as follows:

---

[1] Needs Assessment Report GTA West, May 2019
[2] GTA West Integrated Regional Resource Plan, July 2021
[3] Needs Assessment Report KWCG Region December 2018
[4] KWCG Integrated Regional Resource Plan May 2021
[5] KWCG RIP Report - Second Cycle, December 2021

- New Halton Hills Hydro MTS – In-serviced in June 2019
- Halton TS # 2 – In-service date revised to Q2 2033 per second cycle RIP
- Upgrade (reconductor) circuits H29/H30 to Pleasant TS – In-service date revised to Q2 2027 per second cycle RIP

As mentioned above, the second cycle for GTA West region is nearing completion with the second cycle GTA West RIP report expected to be completed soon. The new needs identified in the Region are as follows:

<u>Increase capacity</u>

- Palermo TS: Refurbish and Upgrade Transformers T3 and T4 and add new 27.6 kV yard (2026)
- Hurontario TS x Pleasant TS: Reconductor circuits H29/H30 with higher ampacity conductor (2027)

<u>Infrastructure Renewal</u>

- Bramalea TS: Replace Transformers T3 and T4 (2028)
- Tomken TS: Replace Transformers T1 and T2 (2029)
- Lorne Park TS: Replace Transformer T2 (2030)

The only project with cost implications for Milton Hydro is the Palermo TS project where the existing 230/27.6kV, 50/83 transformers are to be replaced with larger 75/125MVA units. Milton Hydro will be responsible for the incremental costs as per the transmission System Code for this upgrade. The Halton TS #2 project has been deferred to 2033 as a result of the Palermo TS upgrade work and will be reassessed in next cycle.

Kitchener-Waterloo-Cambridge-Guelph Region

The KWCG region includes the municipalities of Kitchener, Waterloo, Cambridge and Guelph, as well as portions of Perth and Wellington Counties and the Townships of Wellesley, Woolwich, Wilmot and North Dumfries.

While the primary supply for Milton Hydro is from stations in the GTA West area, it is also connected at the distribution level to two feeders from Fergus TS in the KWCG region. No planned work in that region affects Milton Hydro and no capital contribution is required from Milton Hydro for the projects developed by Hydro One in the KWCG Region.

Milton Hydro is an active participating member on the regional Study Teams and Hydro One is looking forward to continue working with Milton Hydro in executing the regional planning process. Please feel free to contact me if you have any questions.

Sincerely,

Ajay Garg, Senior Manager – Transmission Planning & Regional Planning Coordination
Hydro One Networks Inc.

Appendix A. Map of Ontario's Planning Regions

Northern Ontario

Southern Ontario

Greater Toronto Area (GTA)

Burlington to Nanticoke	East Lake Superior	Chatham/Lambton/Sarnia
Greater Ottawa	London area	Greater Bruce/Huron
GTA East	Peterborough to Kingston	Niagara
GTA North	South Georgian Bay/Muskoka	North of Moosonee*
GTA West	Sudbury/Algoma	North/East of Sudbury
Kitchener- Waterloo- Cambridge- Guelph ("KWCG")	Northwest Ontario	Renfrew
Toronto	Windsor-Essex	St. Lawrence

*This region is not within Hydro One's territory.

Appendix B. List of LDCs for Each Region

(Hydro One as Upstream Transmitter)

Region	LDCs
1. Burlington to Nanticoke	• Energy+ Inc. • Brantford Power Inc. • Burlington Hydro Inc. • Haldimand County Hydro Inc.** • Alectra Utilities Corporation • Hydro One Networks Inc. • Norfolk Power Distribution Inc.** • Oakville Hydro Electricity Distribution Inc.
2. Greater Ottawa	• Hydro 2000 Inc. • Hydro Hawkesbury Inc. • Hydro One Networks Inc. • Hydro Ottawa Limited • Ottawa River Power Corporation • Renfrew Hydro Inc.
3. GTA North	• Alectra Utilities Corporation • Hydro One Networks Inc. • Newmarket-Tay Power Distribution Ltd. • Toronto Hydro Electric System Limited • Elexicon Energy Inc.
4. GTA West	• Burlington Hydro Inc. • Alectra Utilities Corporation • Halton Hills Hydro Inc. • Hydro One Networks Inc. • Milton Hydro Distribution Inc. • Oakville Hydro Electricity Distribution Inc.
5. Kitchener- Waterloo-Cambridge-Guelph ("KWCG")	• Energy+ Inc. • Centre Wellington Hydro Ltd. • Alectra Utilities Corporation • Hydro One Networks Inc. • Kitchener-Wilmot Hydro Inc. • Milton Hydro Distribution Inc. • Waterloo North Hydro Inc. • Wellington North Power Inc.

6. Toronto	• Alectra Utilities Corporation • Hydro One Networks Inc. • Toronto Hydro Electric System Limited • Elexicon Energy Inc.
7. Northwest Ontario	• Atikokan Hydro Inc. • Chapleau Public Utilities Corporation • Fort Frances Power Corporation • Hydro One Networks Inc. • Kenora Hydro Electric Corporation Ltd. • Sioux Lookout Hydro Inc. • Thunder Bay Hydro Electricity • Distribution Inc.
8. Windsor-Essex	• E.L.K. Energy Inc. • Entegrus Power Lines lnc. [Chatham- Kent] • EnWin Utilities Ltd. • Essex Powerlines Corporation • Hydro One Networks Inc.
9. East Lake Superior* *Hydro One Sault Ste. Marie L.P. is the Lead Transmitter for the region.	• Algoma Power Inc. • Chapleau PUC • Sault Ste. Marie PUC • Hydro One Networks Inc.
10. GTA East	• Hydro One Networks Inc. • Oshawa PUC Networks Inc. • Elexicon Energy Inc.
11. London Area	• Entegrus Power Lines lnc. [Middlesex] • Erie Thames Power Lines Corporation • Hydro One Networks Inc. • London Hydro Inc. • Norfolk Power Distribution Inc.** • St. Thomas Energy Inc. • Tillsonburg Hydro Inc. • Woodstock Hydro Services Inc.**
12. Peterborough to Kingston	• Eastern Ontario Power Inc. • Hydro One Networks Inc. • Kingston Hydro Corporation • Lakefront Utilities Inc. • Peterborough Distribution Inc.** • Elexicon Energy Inc.

13. South Georgian Bay/Muskoka	• EPCOR • Hydro One Networks Inc. • InnPower Corporation • Lakeland Power Distribution Ltd. • Midland Power Utility Corporation • Orangeville Hydro Limited • Orillia Power Distribution Corporation** • Alectra Utilities Corporation • Elexicon Energy Inc. • Elexicon Energy Inc. • Wasaga Distribution Inc.
14. Sudbury/Algoma	• Espanola Regional Hydro Distribution Corp. • Greater Sudbury Hydro Inc. • Hydro One Networks Inc.
15. Chatham/Lambton/Sarnia	• Bluewater Power Distribution Corporation • Entegrus Power Lines lnc. [Chatham- Kent] • Hydro One Networks Inc.
16. Greater Bruce/Huron	• Entegrus Power Lines lnc. [Middlesex] • Erie Thames Power Lines Corporation • Festival Hydro Inc. • Hydro One Networks Inc. • Wellington North Power Inc. • West Coast Huron Energy Inc. • Westario Power Inc.
17. Niagara	• Canadian Niagara Power Inc. [Port Colborne] • Grimsby Power Inc. • Haldimand County Hydro Inc.** • Alectra Utilities Corporation • Hydro One Networks Inc. • Niagara Peninsula Energy Inc. • Niagara-On-The-Lake Hydro Inc. • Welland Hydro-Electric System Corp. • Niagara West Transformation Corporation* * Changes to the May 17, 2013 OEB Planning Process Working Group Report

19. North/East of Sudbury	• Greater Sudbury Hydro Inc. • Hearst Power Distribution Company Limited • Hydro One Networks Inc. • North Bay Hydro Distribution Ltd. • Northern Ontario Wires Inc.
20. Renfrew	• Hydro One Networks Inc. • Ottawa River Power Corporation • Renfrew Hydro Inc.
21. St. Lawrence	• Cooperative Hydro Embrun Inc. • Hydro One Networks Inc. • Rideau St. Lawrence Distribution Inc.

**This Local Distribution Company (LDC) has been acquired by Hydro One Networks Inc.

Appendix I Cresa Strategic Facilities Plan

cresa

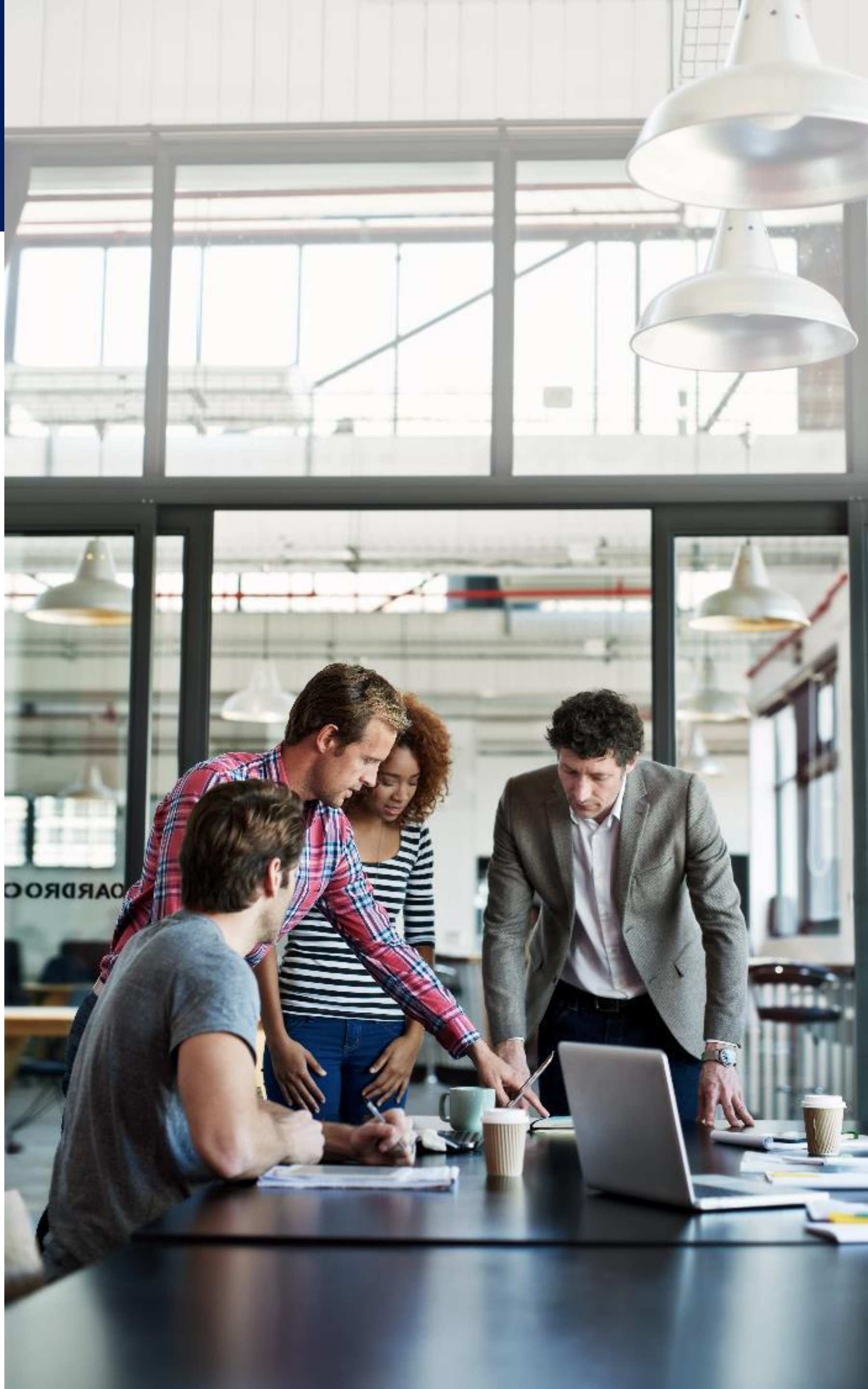
Strategic Facility Plan

Prepared For:

MILTON HYDRO

February 22, 2022

Table of Contents



Executive Summary

Executive Summary

- Milton Hydro engaged Cresa to complete a Strategic Facilities Plan for its current head office and operations facility located at 200 Chisholm Drive, Milton (“Premises”). Cresa was selected based upon its experience within the power distribution industry including completing similar work for Alectra, Toronto Hydro and other organizations.
- Milton Hydro recognizes that the layout of the Premises are inefficient and requires a plan to better align the Premises with Milton Hydro’s near and long-term business objectives over the next 5 years.
- The current facility can accommodate dedicated seats for 63 employees. Preliminary space programming suggests that Milton Hydro will require approximately 80 seats to accommodate its forecasted FTE growth over the next 5 years.
- Employees have indicated that there is not enough collaborative spaces within the current facilities, due to meeting rooms being converted to offices as a result of FTE growth.
- Milton Hydro has also suggested that the location of the Customer Service desk is not ideal as it requires visitors to the building to use the stairs or elevator.
- A feasibility plan was completed by Cresa that demonstrated that [redacted] could accommodate [redacted] and the forecasted FTE growth. Additional formal and informal meeting space was added [redacted] of the existing premises.
- A feasibility plan was completed to demonstrate how the Customer Service desk could be relocated to the ground floor.
- The total cost of the renovations is estimated to be $1.5 million based upon Class “D” estimates prepared by Cresa.
- Cresa also observed that the windows throughout the office area of the building are original, and Milton Hydro should develop a plan to have these replaced. The estimated cost of replacement is approximately $750,000.

Introduction

Introduction

Background

- Milton Hydro engaged Cresa to complete a Strategic Facilities Plan for its current head office and operations facility located at 200 Chisholm Drive, Milton ("Premises").
- The Premises are comprised of a total of 91,828 SF broken down as following:
  - 59,028 SF of Warehouse/Operations Space
  - 32,800 SF of Office/Administration Space
- The current layout provides assigned seating for 63 employees.
- Milton Hydro recognizes that the layout of the current Premises is inefficient, and that better planning could allow it to achieve a better utilization rate across the office portion of the Premises.
- Milton Hydro would like to construct its own [redacted]
- Mezzanine space utilized for additional FTE growth.
- Meeting space created in open areas throughout office
- Cresa was selected based upon its experience within the power distribution industry including completing similar work for Alectra, Toronto Hydro and other organizations.

Introduction

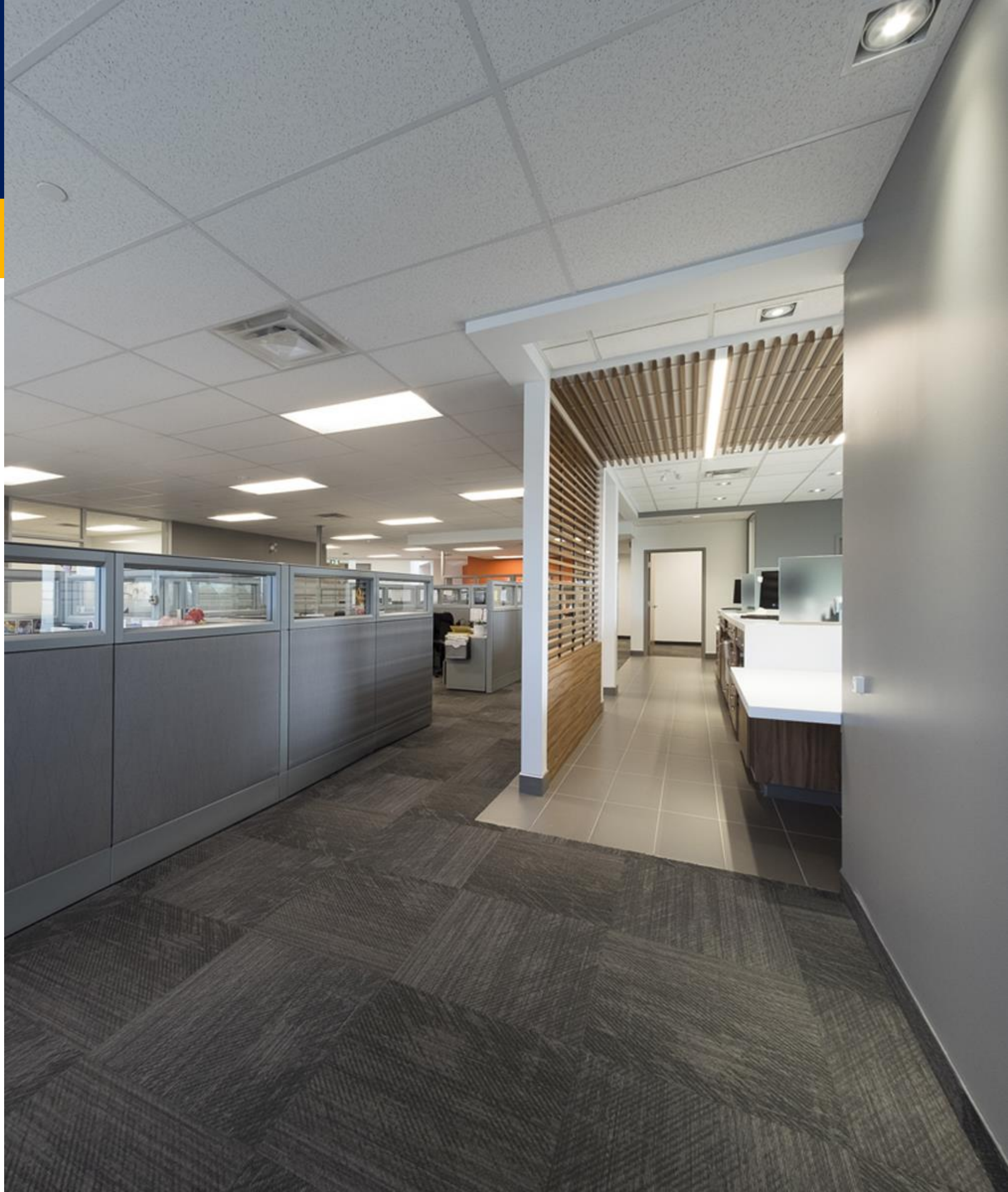
Our Process

- Cresa met with Milton Hydro’s Senior Management to review overall requirements of the Strategic Facility Plan.
- Cresa toured the existing Premises.
- A ‘Future of Work’ survey was distributed to all Milton Hydro employees to gather information on how well the Premises supported employees' current requirements and to better understand future requirements. This information was used to inform Senior Management in the development of an overall space program.
- Departmental Space Programming questionnaires were completed by Department heads.
- Based upon feedback from Milton Hydro Senior Management, Cresa developed a space program.
- Cresa completed feasibility plans for the construction of the Control Room and the additional workstations and offices to accommodate forecasted FTE growth.
- Cresa completed Class “D” estimates for the proposed renovations.

Introduction

Objectives of the Strategic Facility Plan

- Understand and analyze Milton Hydro’s current situation.
- Develop an understanding of Milton Hydro’s goals and objectives as they relate to the Premises.
- Review Milton Hydro’s forecasted FTE growth projections.
- Identify Milton Hydro’s future requirements for the Premises.
- Develop a plan and budget to create a Control Room within the Premises.
- Develop a plan and budget to accommodate Milton Hydro’s forecasted FTE growth within the Premises and any other requirements identified by Milton Hydro Senior Management.

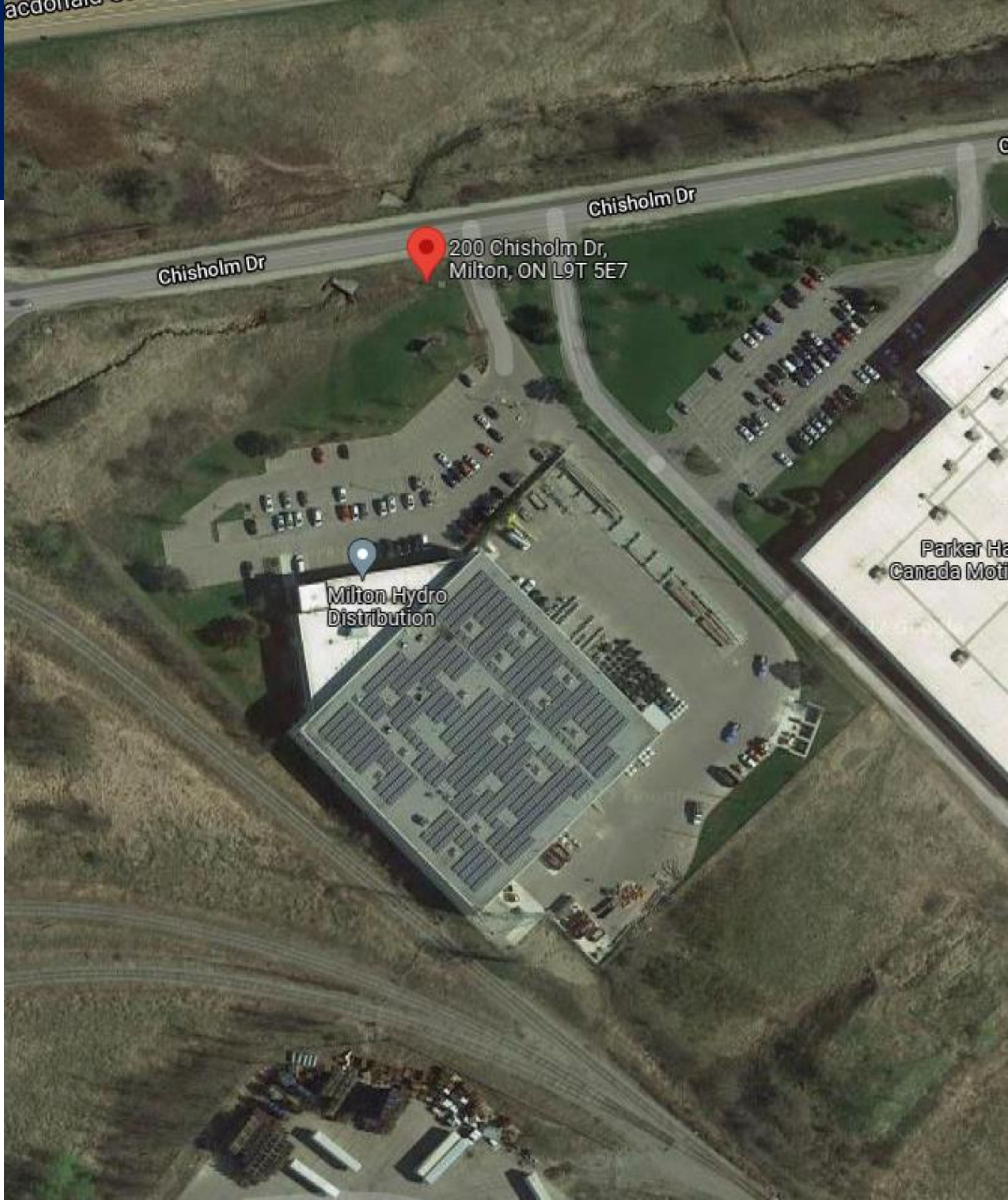


Current Situation

Current Situation

Building Overview

Address:	200 Chisholm Drive, Milton
Size:	Approximately 91,828 SF
Office/Administration:	32,800 SF
Warehouse/Operations::	59,028 SF
Year Built:	1991
Land:	Approximately 7 acres
Building Cost:	$7,700,000
Car Parking:	127 car parking spaces



Current Situation

Summary (Office & Administration)

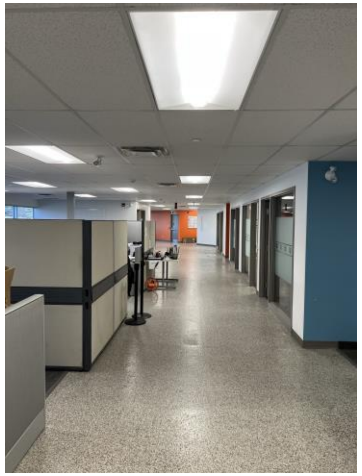
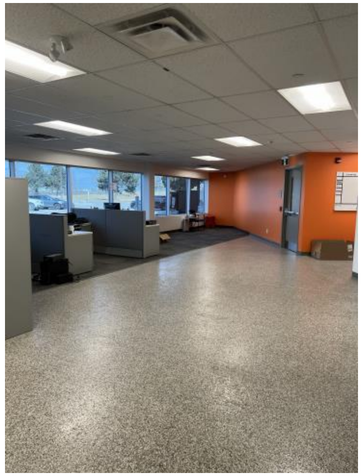
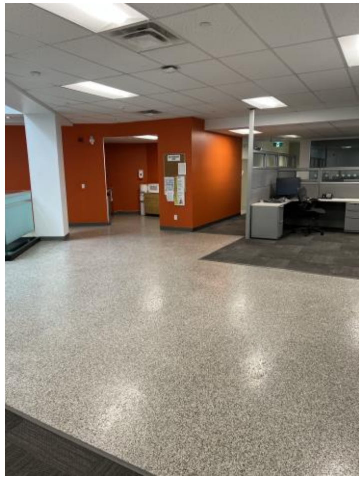
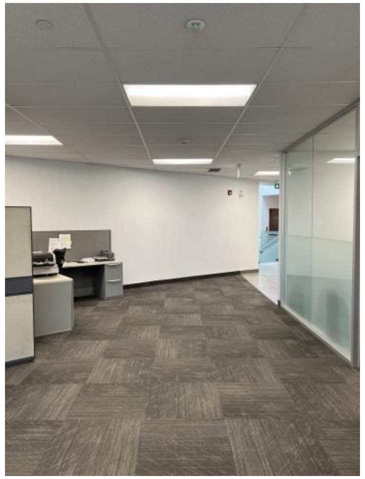
- The Office & Administration Area as highlighted in blue is comprised of 32,800 SF.
- The total building provides for 63 seats as shown on the adjacent plans.
- There are currently only 3 meeting rooms throughout the Premises including the executive boardroom. The balance of meeting rooms throughout the Premises have been converted to offices as a result of FTE growth.
- The Customer Service desk is currently located on the 2nd floor which is not ideal as customers need to either take the stairs or elevator to reach the desk.

	Count
Ground Floor Offices	12
Ground Floor Workstations	18
Second Floor Offices	13
Second Floor Workstations	20
Total Seats	63

Current Situation

Comments & Observations (Office & Administration)

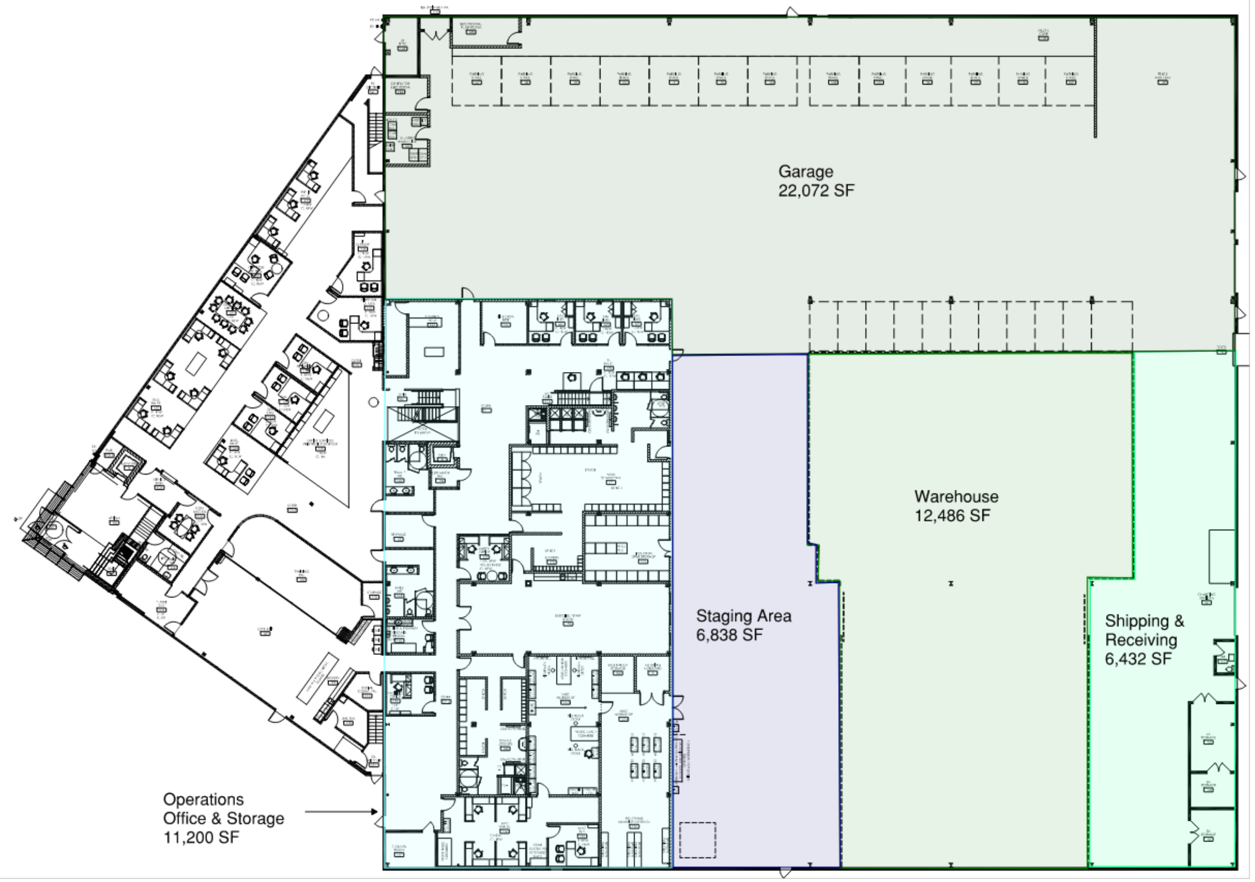
- The current layout of the Office & Administration is inefficient due to the previous design and the unique, triangular shape of the area as shown on the adjacent pictures.
- The location of the Service Desk on the second floor is not ideal as customers must take the elevator or stairs to reach it. Given changes in customer patterns, the Service Desk and surrounding area is larger than likely required in the future.
- There are currently only three functional meeting rooms located throughout the space. Meeting rooms have been converted to offices to accommodate FTE growth.

Current Situation

Comments & Observations (Warehouse & Operations)

- Warehouse & Operations area is broken down as follows:
  - Garage 22,072 SF
  - Warehouse 12,486 SF
  - Staging Area 6,838 SF
  - Office & Storage 11,200 SF
  - Shipping & Receiving 6,432 SF
  - Total 59,028 SF
- The Warehouse & Operations area is functional and well utilized.
- The garage area provides access for covered parking for service vehicles and includes a wash bay.
- The balance of the area is comprised of operations office area, storage, fenced warehouse area, staging area and shipping and receiving area.
- Based upon discussions with Management, the garage and warehouse area are appropriately sized to accommodate growth over the next 5 years.

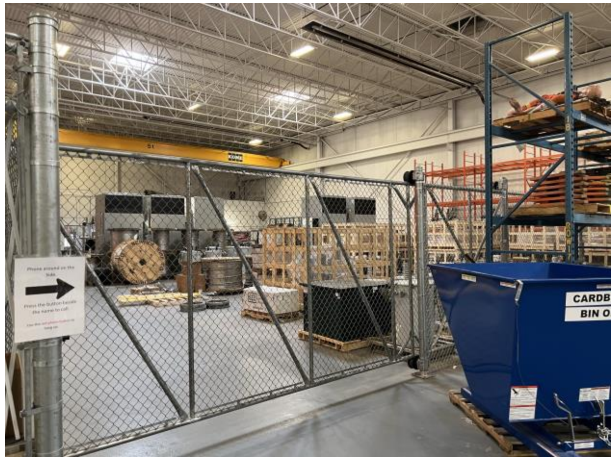


Current Situation

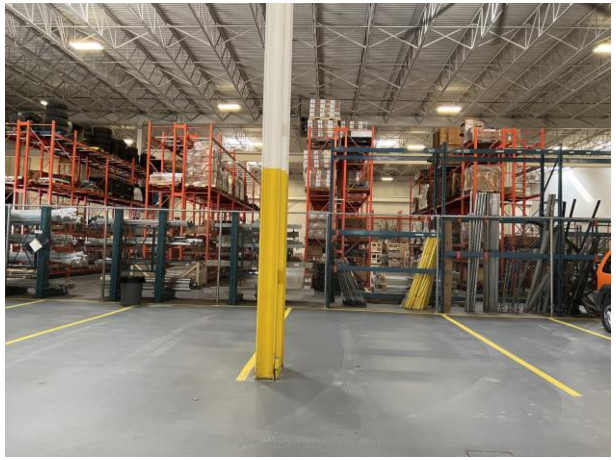
Comments & Observations (Warehouse & Operations)

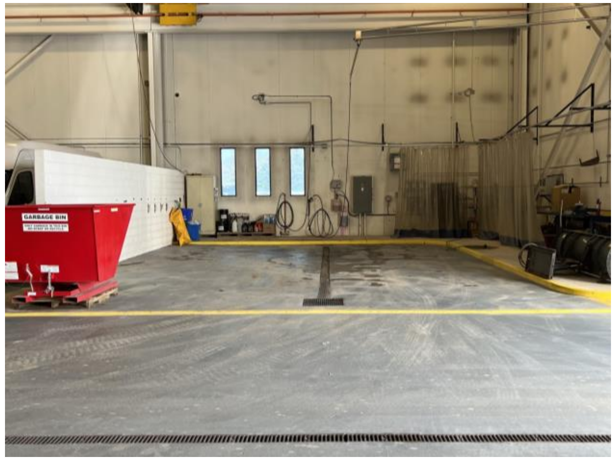

Warehouse

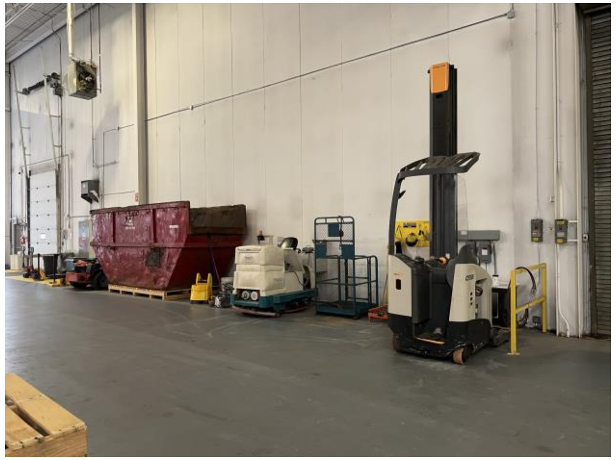

Staging Area

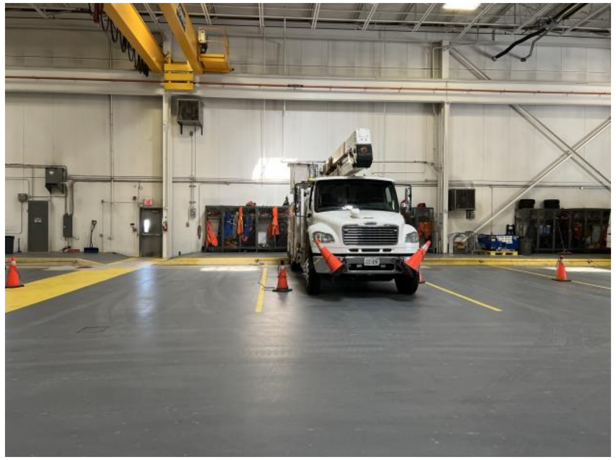

Warehouse


Garage


Warehouse


Wash Bay

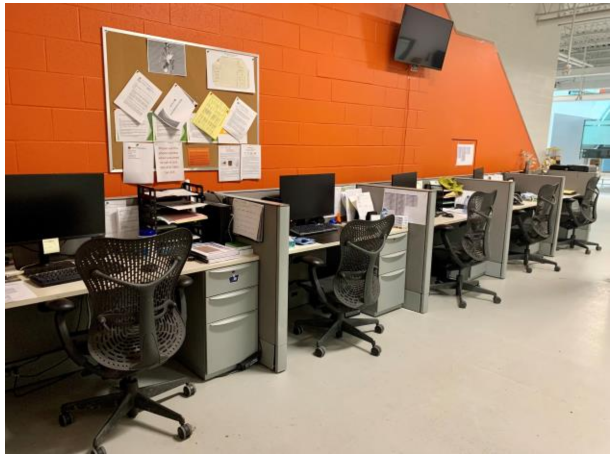

Shipping & Receiving


Garage

Current Situation

Comments & Observations (Warehouse & Operations)

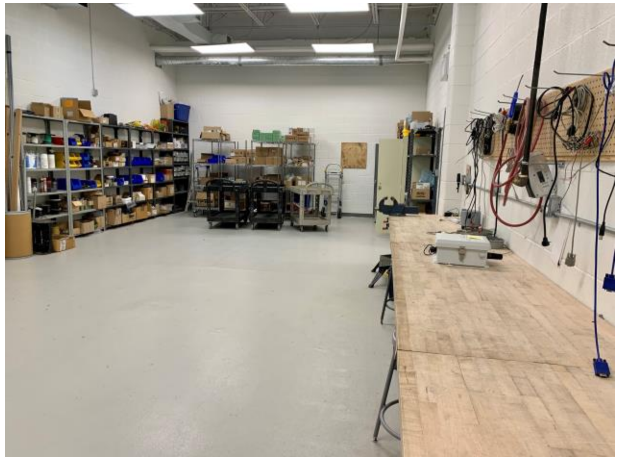

Meter Staging


PLT Workstations

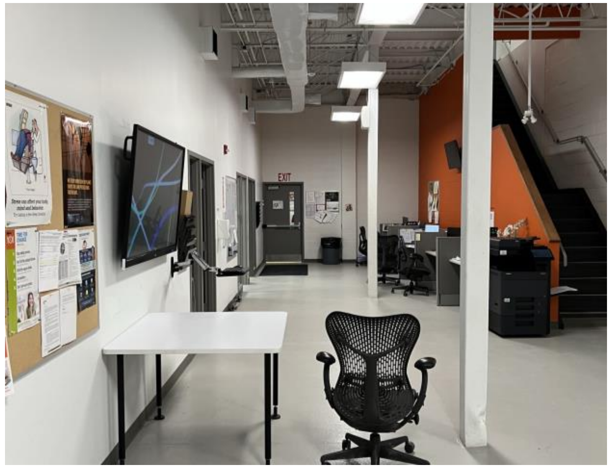

Metering Workstations


Operations Area


Metering Supervisor


Metering Lab

Metering Datapull


Lines Meeting Area

Future Objectives

Future Objectives

Space Programming

- Preliminary space programming by Cresa indicates that by 2026 Milton Hydro will require seating for approximately 80 employees as follows: 23 Offices, 45 Workstations, and 9 Hoteling Stations.

Space Requirement	2021 Staff	2021 Seats	2023 Staff	2023 Seats	2024 Staff	2024 Seats	2025 Staff	2025 Seats	2026 Staff	2026 Seats
Office	18	18	22	22	23	23	23	23	23	23
Workstation	29	29	34	34	34	34	36	36	39	39
Student Workstations	4	4	6	6	6	6	6	6	6	6
Hoteling - Lines	10	5	13	5	16	7	16	7	17	8
Hoteling - General Labour	2	1	2	1	2	1	2	1	2	1
Control Room Shared	0	0	6	3	6	3	6	3	6	3
Totals	**63**	**57**	**83**	**71**	**87**	**74**	**89**	**76**	**93**	**80**

Future Objectives

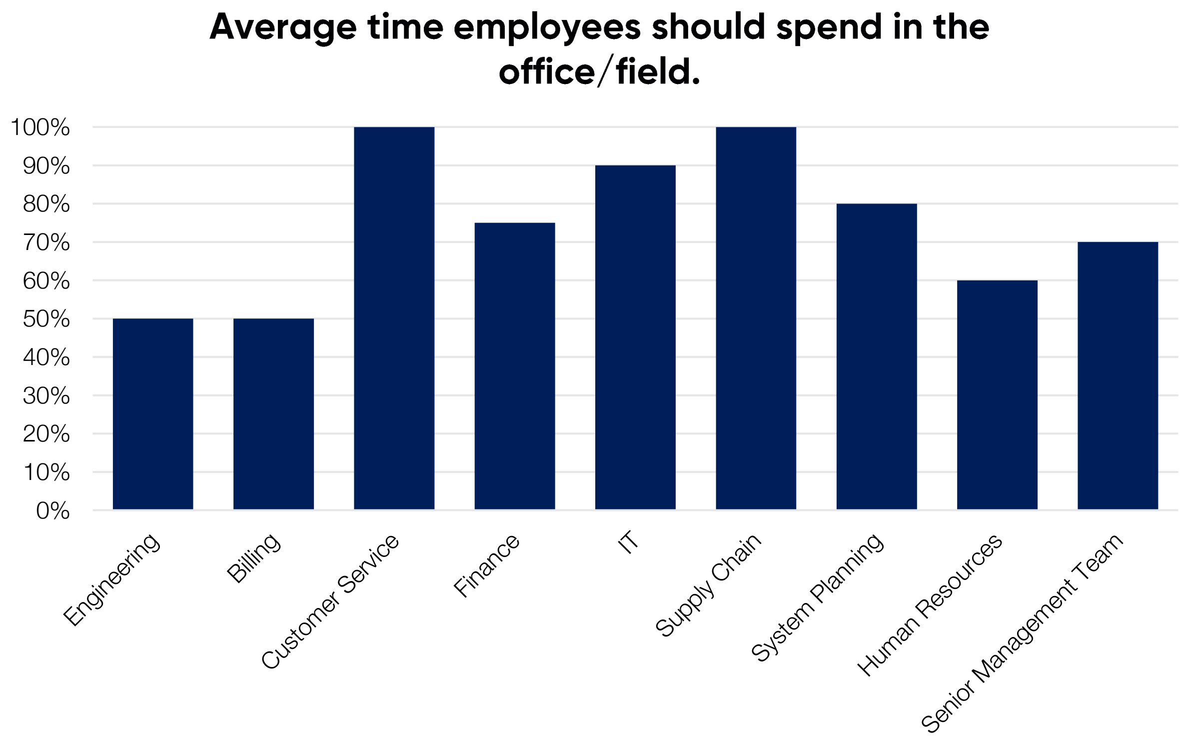
Employee Future of Work Survey

- A 'Future of Work Survey' was distributed to all employees to gather feedback on the current premises and how they would like to work in the future.
- 27 employees responded to the survey distributed as follows: 2 Senior Leaders, 6 Managers, 19 Individual Contributors.
- The following is a summary of the survey findings.
  - When working from home, 66.7% of employees have either a dedicated room or office or dedicated work area.
  - Space suitable for individual focus work is most important to employees.
  - Employees responses were equally split as to whether they were more or less productive working from home.
  - Reasons why employees felt they were more productive working from home included better work-life balance, fewer distractions and less time spent commuting.
  - The number one reason by far that employees felt they were less productive was the inability to connect with team members.
  - 52% of respondents would prefer to work 3 or more days from the office and 30% of respondents would prefer to work from the office 100% of the time.
  - 30% of employees felt they would need a dedicated workspace at the office and 40% had concerns with potentially sharing workspaces.

Future Objectives

Planning Objectives

- In the Departmental Programming questionnaire distributed to Managers, Cresa asked to respondents to indicate where time should be spent on a typical week.
- The results of this analysis indicate that most Departments will require that employees work most of the time from the office (3.5 days per week)



Future Objectives

Role Evaluation for Remote or Hybrid Work

- Milton Hydro Management reviewed the various roles or positions and identified those positions that:
    1. Positions that must work at the workplace.
    2. Students that must work at the workplace.
    3. Positions that could work remotely part of the time but require dedicated space at the workplace.
    4. Could have the option to work remotely and could utilize non-assigned seating when in the office.
- The table below indicates the results of the evaluation completed by Milton Hydro.
- Base upon the number of positions that require employees to work in the office and/or have a dedicated office and management's preference to have employees working in the office most of the time, it was determined by Senior Management that Milton Hydro would continue with a 1:1 assignment of workspaces to employees.

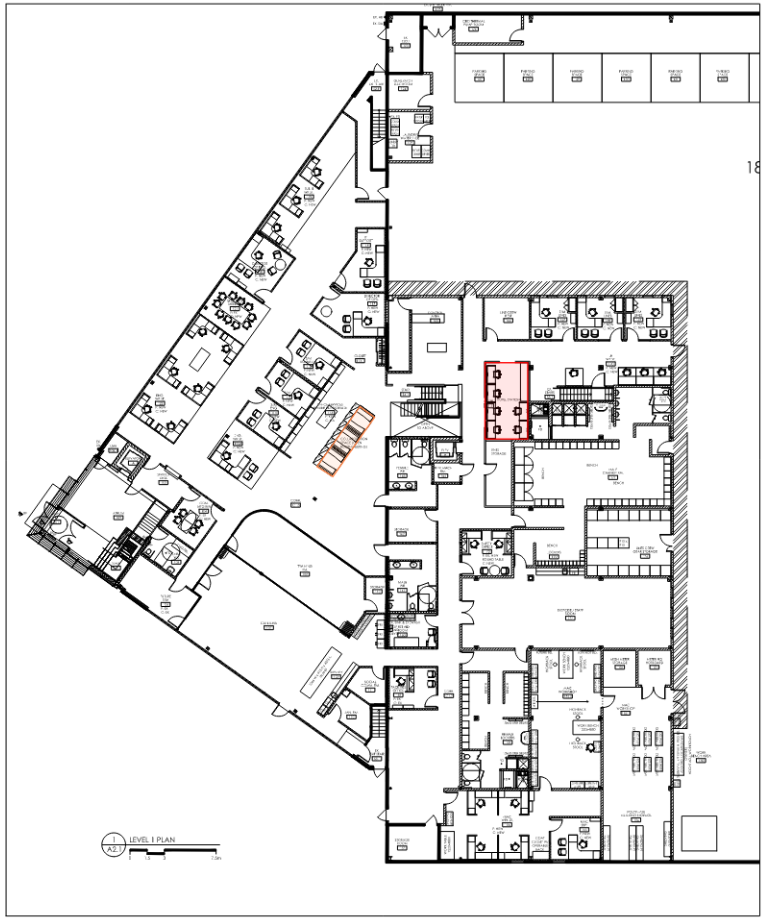
	2023 Staff	2024 Staff	2025 Staff	2026 Staff
Positions that must work at workplace	42	46	48	51
Students that must work at workplace	8	8	8	8
Need dedicated space at workplace	8	8	8	9
Management Staff with Direct Reports	19	19	19	19
Assessment for Flexible Workspace	6	6	6	6
	83	**87**	**89**	**93**

Recommendations

Recommendations

Phase I – Control Room & FTE Growth

- Cresa has prepared a feasibility plan to demonstrate how the premises can be modified to meet Milton Hydro's requirements over the next 5 years. Modifications include:
  - [redacted]
  - Added new workstations and offices in [redacted] on the 2nd floor to accommodate forecasted FTE growth (3,800 SF).
  - Added additional hoteling on the ground floor for Lines.
  - Added informal collaboration spaces in the open areas of the plan.



[redacted]

Additional Hoteling | Open Collaboration Areas | Additional Meeting Rooms | Expansion Space | Control Room

Recommendations

Phase I - Control Room & FTE Growth

- The Class "D" budget was prepared by Cresa based upon the feasibility plan on the preceding page.
- The budget assumes that all the work would be completed in one phase. Note that if the work is completed in multiple phases, costs would likely be higher overall.
- Please note that the budget for the Control Room includes professional fees and construction only. It **DOES NOT** include Control Room furniture, IT requirements or Audio-Visual. Our understanding from Milton Hydro is that these items are covered in a separate budget.
- We have also not included an allowance for an additional back-up generator that may be required for the Control Room. Additional engineering will be required to determine if existing generator has capacity or if Milton Hydro will have to add separate generator to accommodate its requirements.
- Furniture and Audio-Visual allowances have been included for other areas of the Premises.

Item	Total
Professional Fees	$57,564
Construction	$738,950
Furniture, Fixtures & Equipment	$144,340
Technology (Security & Cabling)	$26,000
Project Contingency	$145,028
Total Project Cost	$1,111,882

Recommendations

Phase II – Relocate Customer Service Desk

- Cresa prepared a feasibility plan to relocate the Customer Service Desk to the ground floor in order to provide a more customer centric experience for visitors and customers to the building.
- A Class "D" budget was prepared for the proposed changes as summarized below.

Item	Total
Professional Fees	$44,190
Construction	$252,430
Furniture, Fixtures & Equipment	$7,000
Technology (Security & Cabling)	$17,500
Project Contingency	$48,168
Total Project Cost	$369,288

[redacted]

Recommendations

Phase III - Exterior Window Replacement

- While a detailed building condition assessment was not requested as part of scope of this report, given the age of the building, Milton Hydro should start planning for proactive repairs and replacements. The building was constructed in 1991 which makes the building approximately 31 years old.
- Milton Hydro has indicated that the windows in the building are original. Windows typically have a useful life of 20 to 30 years. Reviewing the outside of the building, it appears that some of the seals may be failing already. To cover the cost of removal and supply of new windows, Cresa would recommend a budget of approximately $750,000. These replacements can be staged over time.

Capital Budgets & Phasing

Recommended Modifications

Item	Phase I Control Room & Expansion	Phase II Customer Service Desk	Phase III Window Replacement
Professional Fees	$57,564	$44,190	
Construction	$738,950	$252,430	$650,000
Furniture, Fixtures & Equipment	$144,340	$7,000	
Technology	$26,000	$17,500	
Project Contingency	$145,028	$48,168	$97,500
Total Project Cost	**$1,111,882**	**$369,288**	**$747,500**

Appendix J Customer Engagement Summary Report on Milton Hydro's Investment Planning

decision · partners
insight · judgment · decision making

Milton Hydro

Customer Engagement Summary Report on Milton Hydro's Investment Planning

By Decision Partners Canada Inc.

January 2022

Table of Contents

Executive Summary

Overview of the Customer Engagement Process

In February 2021, the Milton Hydro engaged Decision Partners to support Milton Hydro's investment planning by designing and conducting an effective Customer Engagement Process. The goal was to provide Milton Hydro an opportunity to engage their customers, provide information about the company and give customers an opportunity to provide input on the company's investment planning. Decision Partners objective was to design and conduct a meaningful and respectful engagement process that provided the Milton Hydro team with insight into customer needs, values, priorities, and preferences that they could incorporate into their decision-making.

The Customer Engagement was conducted in two Phases: Phase I – Foundational Customer Research with a smaller number of customers but in an open, in-depth process designed to *discover* customers' needs, values, interests, and priorities; and Phase II – Broader Customer Engagement, designed to broaden the engagement to include all customers.

Foundational interviews were conducted between May 1 and June 10, 2021, with 25 Milton Hydro Customers, a typical number of interviews for a foundational research step. Building on the results of the Foundational Research, Phase II focused on reaching out to all Milton Hydro customers and offering all an opportunity to provide input via a Web Survey. The Web Survey, conducted between October 8 and November 11, 2021, was open to all customers, but was primarily designed to engage Residential Customers, who were incentivized to participate by offering participation in a draw for 1 of 2 Apple iPads. A total of 4,178 customers opened the survey and answered at least one question, and 2,845 customers answered all survey questions; of these, 98% were Residential Customers.

Also in Phase II, larger commercial and industrial customers were invited to attend the Larger Customer Webinar, where members of the Milton Hydro team presented information similar to that presented in the Customer Web Survey but with descriptions focused more specifically on spending relevant to Larger Customers. Participants in the Webinar were then given the opportunity to provide feedback in an online survey similar to the Customer Web Survey. The Larger Commercial and Industrial Customer Webinar was conducted on November 3, 2021. Milton Hydro invited 366 Larger Commercial/Industrial Customers (all commercial/industrial customers in service classifications above GS<50) via email or direct phone call. The Webinar had 17 Participants, representing 11 different companies attend the Webinar. Of the 17 Participants, 11 (representing 8 companies) provided survey responses.

In Phase III, Decision Partners developed this Customer Engagement Summary Report.

Customer Engagement Top Line

- Customers and Milton Hydro are aligned on the fundamental priorities – safety, reliability, and affordability. A key message from Customers: don't compromise safety and reliability – *but be prudent with spending.*
- Customers are thinking about the future and are aware of the drivers for change to the electricity system – growth in Milton; new types of use/demand such as electric vehicles (EV), Solar and storage; more significant weather events due to climate change, etc.
    - » They expect Milton Hydro to be prepared for extreme weather events and incorporate new technologies to address climate change.

» Many are thinking about green energy and most think they will have an EV electric vehicle in 10 years.

» Larger Customers in particular, are thinking about the infrastructure required to meet future demand, especially their own, which most of them think will be growing.

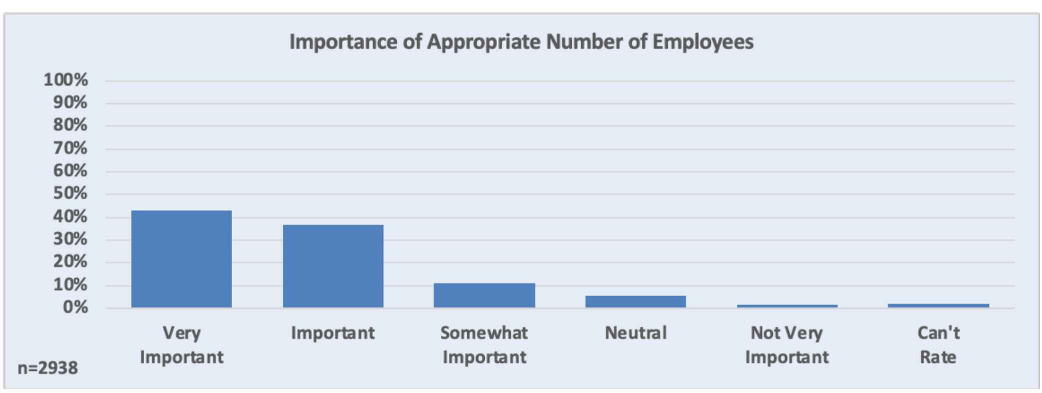
- After being presented with descriptions of each type of Capital Spending and the rationale for associated spending, Most Customers in the Web Survey rated the importance of spending as 'very important' or 'important'.

Summary of Customer Web Survey Ratings of Importance of Capital Spending Categories						
% Rating As:	Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate
System Access (n=3142)	26.1%	42.7%	16.2%	8.8%	2.7%	3.5%
System Renewal (n=3079)	27.8%	40.6%	16.8%	7.9%	2.6%	4.4%
System Service (n=3014)	31.6%	39.3%	15.7%	7.0%	2.0%	4.3%
General Plant (n=2961)	27.8%	39.3%	16.8%	8.2%	3.6%	4.2%

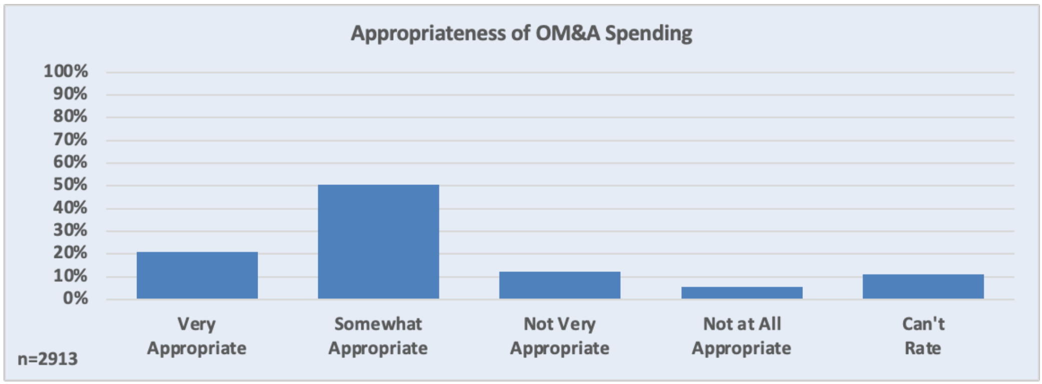
- After being presented with descriptions of each type of Capital Spending and the rationale for associated spending, Most Customers in the Web Survey and the Large Customer Webinar rated the level of spending and the impact on their bills as 'very' or 'somewhat appropriate'.

Summary of Customer Web Survey Ratings of Appropriateness of Capital Spending					
% Rating As:	Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate
System Access (n=3142)	20.5%	55.2%	8.3%	2.9%	13.2%
System Renewal (n=3079)	22.6%	54.1%	8.1%	3.1%	12.1%
System Service (n=3014)	27.0%	53.2%	6.6%	2.1%	11.2%
General Plant (n=2961)	22.2%	53.7%	9.4%	3.7%	11.0%

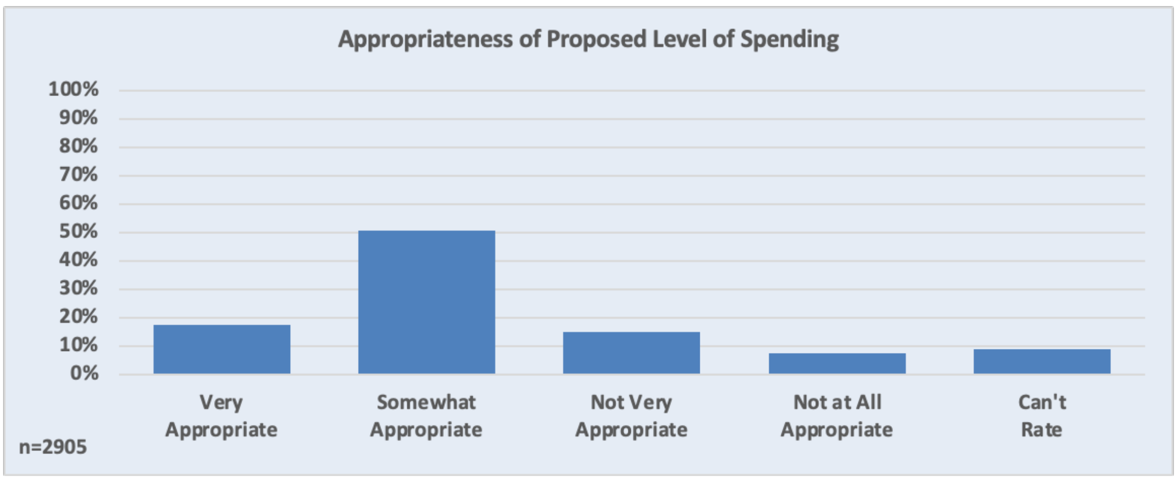
- On OM&A Spending, nearly all Customers in the Web Survey (79.6%) rated ensuring that "Milton Hydro have an appropriate number of employees to effectively and efficiently manage the distribution system as the Milton community continues to grow" as 'Very Important' or 'Important'.



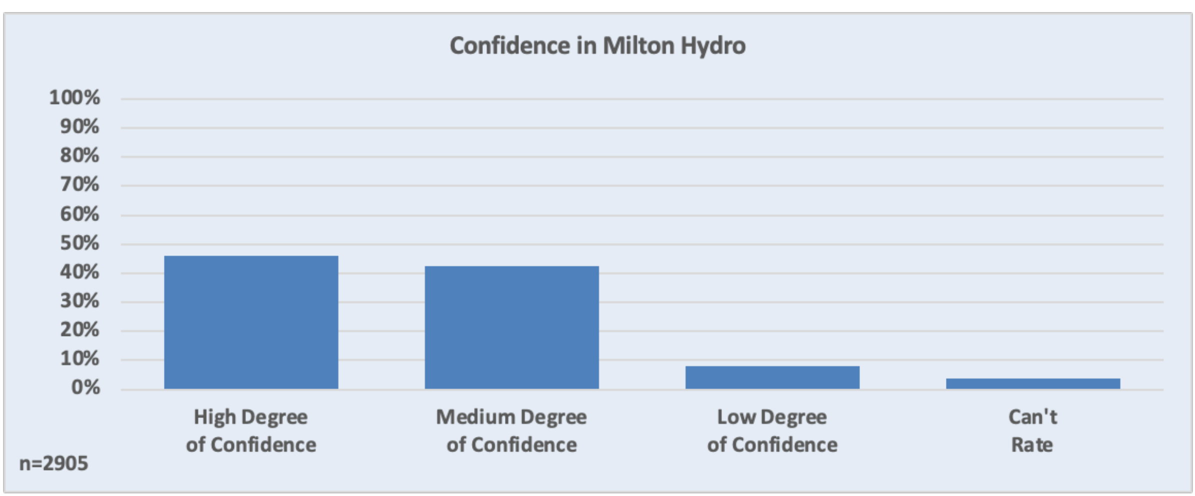
- When asked to what degree the level of OM&A spending is appropriate, Most Survey Respondents (71.4%) rated it as Very or Somewhat Appropriate.



- After being presented with the proposed capital and OM&A spending and the potential overall impact on their bills, most Survey Respondents rated the proposed spending as Very (17.7%) or Somewhat Appropriate (50.7%).



- When asked to consider everything that had been presented in the survey, Respondents were asked how confident they were that Milton Hydro will continue to provide safe, reliable and affordable electricity, nearly all rated it as High (45.9%) or Medium (42.4%).



Section 1: Overview of Milton Hydro Investment Planning Customer Engagement

In February 2021, Milton Hydro engaged Decision Partners to support Milton Hydro's investment planning by designing and conducting an effective Customer Engagement Process. The goal was to provide Milton Hydro an opportunity to engage its customers, provide information about the company and give customers an opportunity to provide input on the company's investment planning. Decision Partners objective was to design and conduct a meaningful and respectful engagement process that provided the Milton Hydro team with insight into customer needs, values, priorities, and preferences that they could incorporate into their decision-making. The customer engagement process is shown in Figure 1.

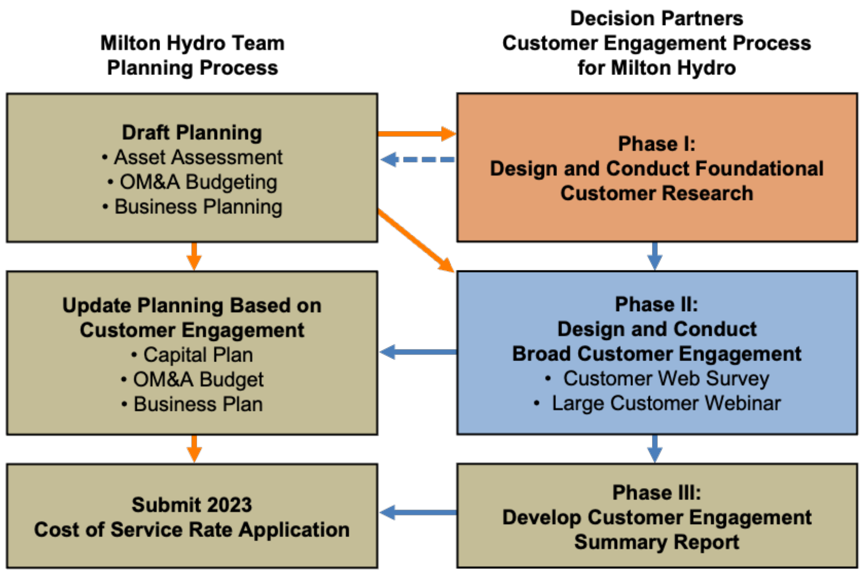


Figure 1. Overview of Decision Partners' Customer Engagement Process for Milton Hydro.

The Customer Engagement Process uses Decision Partners' proven, science-informed, evidence-based Mental Modeling Insight™ (MMI™) based on the foundational mental models research approach developed by a team at Carnegie Mellon University led by Dr. Baruch Fischhoff, Decision Partners' Chief Scientist.[1] Decades of research demonstrate that people's judgments about complex issues are guided by "mental models" – the tacit webs of belief people draw upon to interpret and make inferences about issues that come to their attention. Additional background on MMI is provided in Appendix A.

Section 2: Phase I – Design and Conduct Foundational Customer Research

Research Purpose

Foundational (mental models) interviews were conducted between May 1 and June 10, 2021, with 25 Milton Hydro Customers, a typical number of interviews for a foundational research step. As foundational research, the purpose was to *discover* customers' needs, values, interests, and priorities related to Milton Hydro's investment planning broadly and to their capital planning

[1] Morgan, M.G., B. Fischhoff, A. Bostrom, and C.J. Atman. 2002. "Risk Communication: A Mental Models Approach." New York: Cambridge University Press.

more specifically. This is accomplished by using conversational, open-ended questions and encouraging in-depth responses, allowing for unanticipated results to emerge.

Because the foundational interviews were conducted early in Milton Hydro's investment planning process, general descriptions of capital and OM&A spending were used. Consequently, the results of this phase are preliminary *qualitative* indicators of Interviewees' preferences and priorities. The foundational research informed the design of the Customer Engagement Web Survey in Phase II, which does provide *quantitativ*e evidence of customer priorities and preferences.

Note: Customers in this phase of the research are referred to as "Interviewees".

Foundational Research Interviewees

Interviewees comprised of a cross section of Milton Hydro's customer classes: 12 Residential Customers; 7 Commercial Customers (GS<50, GS>50) and 6 Larger Customers (GS>1000; GS>5000). Residential and Commercial customer Interviewees were selected randomly from lists of customers grouped by postal code to provide a diverse group of customers in the foundational interviews from across Milton Hydro's service territory.

Interview Topics

The interviews were designed and conducted in a confidential and conversational manner that provided customers the opportunity provide candid, in-depth input. Interviews averaged 33 minutes in length, which is considered typical for a foundational phase of customer engagement research. To provide Interviewees a common frame of reference of the parts of the electricity industry and Milton Hydro's role, the interviews started with a general discussion of the electricity industry in Ontario. Interviewees were then asked for their general thoughts about Milton Hydro. Broadly, the conversational interviews covered the following:

- Principles that underly Milton Hydro's investment planning including its Mission Statement, which enabled Interviewees to discuss their priorities related to electricity delivery.
- Future changes in customer electricity needs and potential changes to "future ready" Milton Hydro's distribution system, which was included to inform and get Interviewees' consideration on the drivers of Milton Hydro's planning and spending.
- Key Elements of Milton Hydro's Investment Planning, which was included to inform and elicit Interviewees' input on the various spending categories included in Capital and OM&A Spending.
- Communications and engagement preferences, which was included to inform Milton Hydro's customer communications and engagement activities.

2.1 Foundational Research Highlights

The following is a summary of the highlights of the Phase I Foundational Interviews that were provided to the Milton Hydro team to inform their planning efforts.

Principles for Milton Hydro's Investment Planning

Interviewees were presented with Milton Hydro's Mission Statement to: "Provide safe, reliable, stable delivery of electricity and associated services to our growing community at an appropriate cost" then asked to rate the qualities in terms of importance. Nearly all Interviewees rated each of those qualities – 'Safe', 'Reliable' and 'Affordable' – as 'Very Important' qualities that are critical principles that should underly Milton Hydro's investment planning.

Future changes in customer electricity needs

When discussing how their electricity needs might change in the next 10 years, most Interviewees, particular the Larger Customers, said that they anticipated that they would have electric vehicles for themselves or their business. When asked about solar panels and electricity storage systems, most Interviewees did not anticipate that they would have these. Overall, Commercial and Residential Customer Interviewees were about evenly divided between their electricity consumption increasing or staying about the same. Larger Customers more frequently said that they would likely be increasing their consumption.

Nearly all Interviewees thought it was very important for Milton Hydro to prepare for extreme weather events, with some noting the benefits of being "proactive", and some suggesting such preparation is a key to reliability. Most Interviewees, particularly Larger Customers, also thought it was very important for Milton Hydro to help address climate change by supporting new technologies such as electric vehicles and solar power that reduce carbon emissions.

Key Elements of Milton Hydro's Investment Planning – Capital Spending

Interviewees were then provided descriptions of the categories of Capital Spending that are part of Milton Hydro's investment planning. Interviewees considered each of the Capital Spending categories as 'important' to varying degrees, citing various reasons:

- System Access: was seen to be necessary given the rapid growth in Milton though some interviewees suggested that the costs of connecting new customers should be covered by developers and the new customers, not existing customers.
- System Renewal: was generally seen as positive because it was seen to demonstrate that Milton Hydro is being proactive in managing assets. Some noted that this can be beneficial if it is less expensive to make upgrades in a planned manner rather than as "emergency replacements", with some suggesting that using components with longer lifespans would be preferred, even if they are more expensive. Some wanted assurances that infrastructure was not being replaced unnecessarily.
- System Service: spending to modernize and automate the distribution system was seen as important in order to increase operational efficiency by keeping assets "up to date", and through increased automation.
- General Plant: was seen as important because tools, equipment and utility trucks were seen to be integral parts of the distribution system, "where the rubber hits the road". Some noted that equipment needs to be "decent", but not always brand new.

Summary of Foundational Interview Ratings of Importance of Capital Spending Categories						
% Rating As*: N=25	Very Important 1	2	3	4	Not Very Important 5	Didn't Rate
System Access	70%	25%	0%	0%	5%	5%
System Renewal	70%	10%	15%	0%	0%	10%
System Service	65%	15%	5%	5%	0%	10%
General Plant	50%	20%	10%	5%	0%	10%

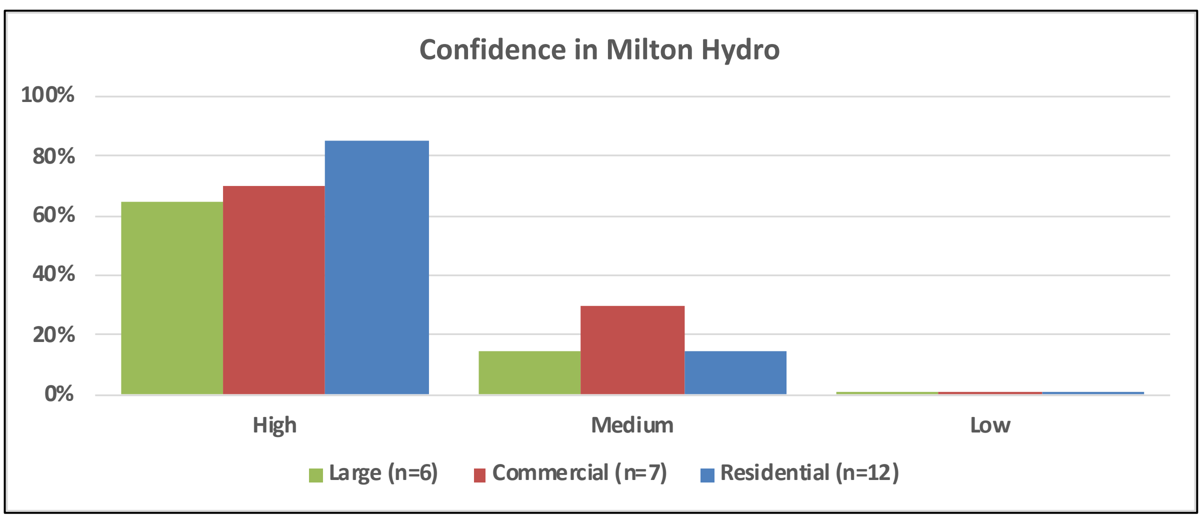
* To highlight the qualitative nature of the Foundational Research results, frequencies are rounded to the nearest 5% and thus do not always total to 100%.

Key Elements of Milton Hydro's Investment Planning – OM&A Spending

Next Interviewees were provided with descriptions of Milton Hydro's OM&A spending and specifically the company's need to increase its staffing level in order to meet the needs of its growing customer base. Nearly all Interviewees acknowledged the importance of having an appropriate number of employees, citing the need to having enough employees for service and proper system maintenance and hiring employees before other retire to assure effective knowledge transfer. Some noted that software and automation could reduce the need for more employees.

Key Elements of Milton Hydro's Investment Planning – Confidence in Milton Hydro

At the end of the interview, Interviewees were asked to rate their confidence in Milton Hydro's ability to continue to provide safe, reliable, and affordable electricity. Most interviewees rated it as High.



Section 3: Phase II – Design and Conduct Broad Customer Engagement

Building on the results of the Foundational Research, Phase II focused on reaching out to all Milton Hydro customers and offering all an opportunity to provide input via a Web Survey. The Web Survey was open to all customers, but primarily designed to engage Residential Customers, who were incentivized to participate by offering participation in a draw for 1 of 2 Apple iPads. Medium and larger Commercial and Industrial Customers were invited to attend the Larger Customer Webinar, where members of the Milton Hydro team presented information similar to that presented in the Customer Web Survey but with descriptions focused more specifically on spending relevant to Larger Customers. Participants in the Webinar were then given the opportunity to provide feedback in an online survey similar to the Customer Web Survey.

Note: Web Survey respondents are referred to as Respondents. Webinar participants are referred to as Participants. Where the Customer Web Survey and Webinar questions are the same, the results are presented together with charts of Customer Web Survey results shown with a blue background and charts of Webinar results shown with a green background.

Customer Web Survey

The Web Survey was open between October 8 and November 11, 2021[2]. Milton Hydro sent email invitations (and 2 reminders) to over 30,000 Customers who had previously provided their email addresses. Customers who received paper billing, received a bill insert announcement. Milton Hydro also promoted the Web Survey with a banner on their website homepage and announcements on Twitter. See Appendix B for Customer engagement invitations and announcements, and Appendix C for the Customer Web Survey and Appendix D for Webinar questions.

A total of 4,178 customers opened the survey and answered at least one question, and 2,845 customers answered all survey questions. The number of Respondents decreased as the survey progressed (as is expected for a web survey). The number of Respondents for each question is noted as "n=#" in the presentation of results. Survey responses were confidential, with only aggregate results reported. Respondents were given opportunities throughout the Survey to provide open ended comments to explain their survey responses or provide additional comments.

Most respondents noted their customer type as Residential Customers:

- 4127 (98.8%) Residential Customers
- 39 (0.9%) Small Commercial Customers (GS<50)
- 12 (0.3%) Larger Commercial & Industrial Customers (GS>50; GS>1000; GS>5000)

[2] One customer contacted Milton Hydro about not being able to complete the survey before it was closed and was permitted to provide responses that are included in the results. Two customers requested a paper version of the survey; one returned the survey and the responses are included in the results.

The demographic information at the end of the survey indicates that the survey reached a broad range of customers of varying gender, age, and tenure as Milton Hydro customer. About half have children under 18 living at home.

Survey Respondent Demographics (n=2845)	
Gender	Female (1133); Male (1710); Identified as He/Him (1); Prefer not to answer (1)
Age	20s (56); 30s (526); 40s (846); 50s (660); 60 and above (757)
Length of time as Milton Hydro customer	Less than 2 years (366); 2-5 years (525); 6 to 10 years (626); 11 to 15 years (512); More than 15 years (816)
Children under 18 living at home	No (1423); Yes (1422)

Larger Commercial and Industrial Customer Webinar

The Larger Commercial and Industrial Customer Webinar was conducted on November 3, 2021. Milton Hydro invited 366 Larger Commercial/Industrial Customers (all commercial/industrial customers in service classifications above GS<50) via email or direct phone call. The Webinar had 17 Participants, representing 11 different companies attend the Webinar. Of the 17 Participants, 11 (representing 8 companies) provided survey responses.

The Webinar was designed by Milton Hydro in consultation with Decision Partners. It was conducted by Milton Hydro, with Decision Partners facilitating the comment segments. During the Webinar, Decision Partners administered a survey to collect Webinar Participants' responses to questions asked in the Webinar. The results are integrated below.

The number of Participants who provided responses to each question is noted as "n=#" in the results that follow. Survey responses were confidential, with only aggregate results reported. The survey associated with the Larger Customer Webinar can be found in Appendix D.

Note: Results from the Larger Customer Webinar are shown with a green background to better differentiate them from the results of the Customer Web Survey which are shown with a blue background.

Customer Engagement Web Survey Results Summary

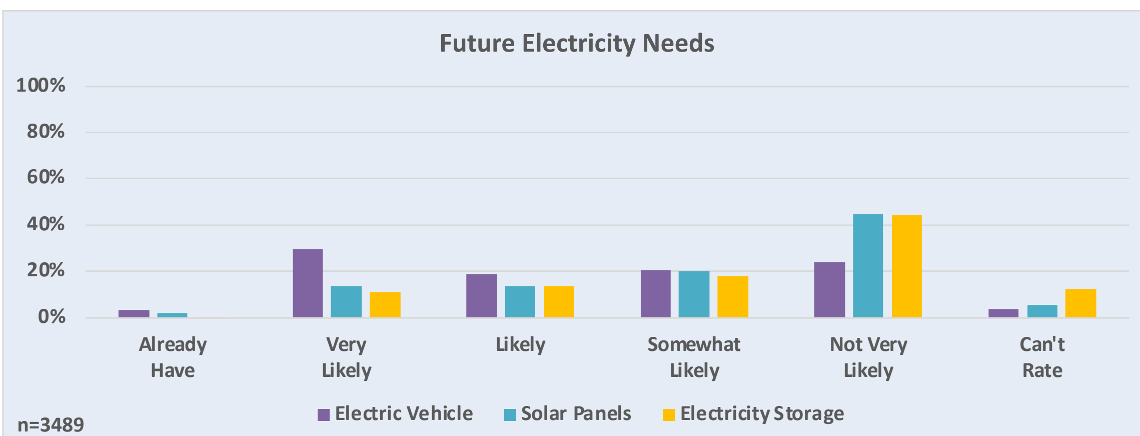
3.1 Looking Forward and Milton Hydro 2.0

At the start of the Web Survey Customers were asked to look forward and think about how their needs as an electricity customer may change over the next decade, and to respond to Milton Hydro's forward-looking strategy, "Milton Hydro 2.0".

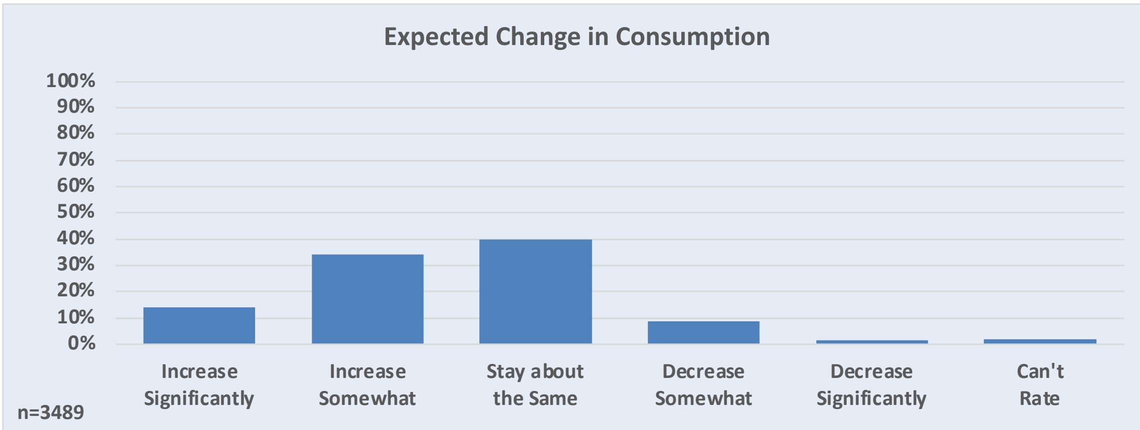
Respondents were provided the following description of Milton Hydro's plan to "Future Ready" the company, part of Milton Hydro 2.0. **Note**: Where text provided in the survey to Respondents is presented it is formatted in italics.

> *An essential part of effective planning is to prepare for the changes that are coming in society and our industry. At Milton Hydro, we are transforming our business to be "Future Ready" by developing what we are calling, "Milton Hydro 2.0", which we describe as:*
>
> *A forward looking and resilient company, Milton Hydro will be able to adapt to changes in society and the electricity sector. We will be able to meet the increasing demand for electricity and respond to the challenges of climate change.*

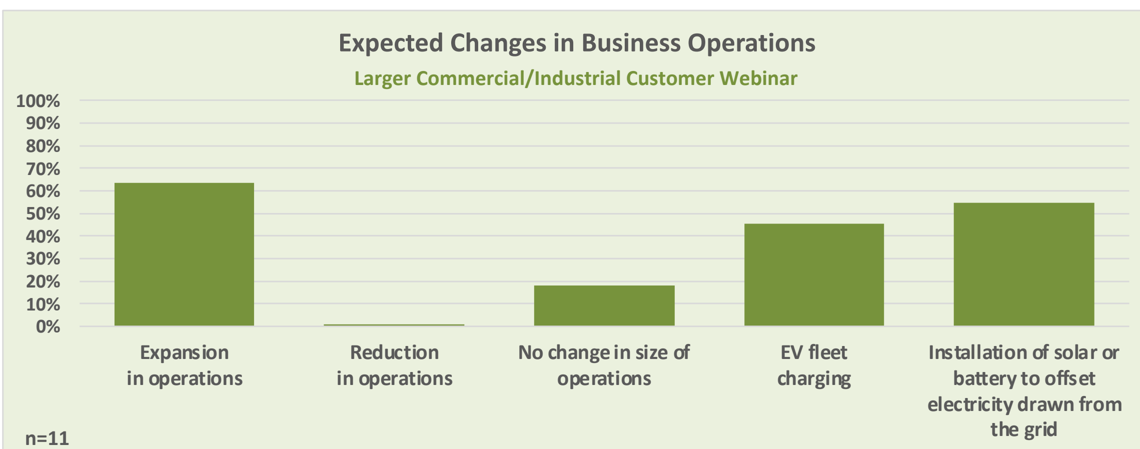
Respondents were asked to rate how likely, over the next 10 years, they are to have: an electric vehicle; solar panels; or electricity storage system. Electric Vehicles rated as the most likely, followed by Solar Panels and Electricity Storage. Only a few Respondents reported already having Electric Vehicles (3%) or Solar Panels (2%).



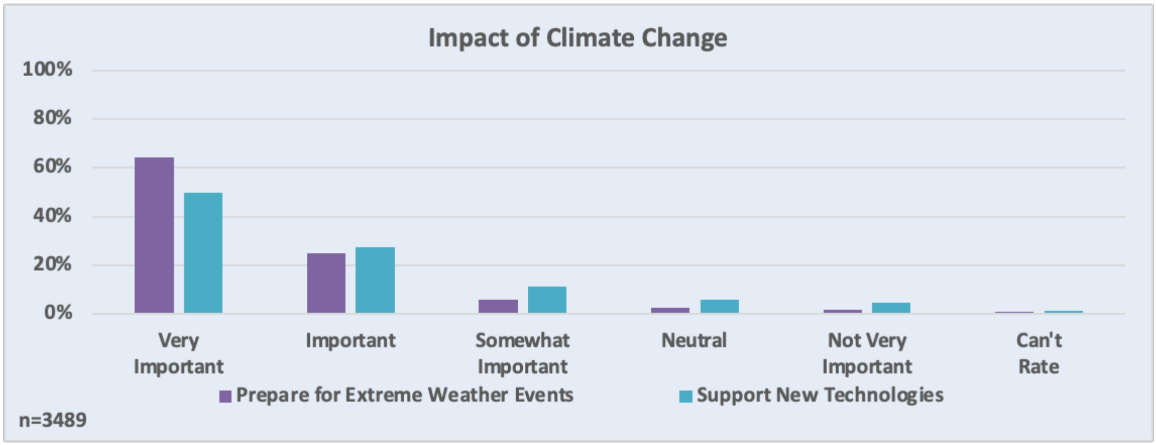
When asked to rate how their electricity consumption may change over the next 10 years, Respondents were fairly evenly split, with 39.9% believing it would stay the same and 34.1% believing it would increase somewhat. Only a few thought that it would increase significantly (14.0%) or decrease (10%).



Participants in the Larger Commercial/Industrial Customer Webinar were asked how they think their business will change in the next 5 to 10 years. Most expected an expansion of operations. None expected a reduction in operations. Many anticipated EV fleet charging and electricity storage.



When asked to rate how important it is for Milton Hydro to address climate change by preparing for extreme weather events to minimize service disruptions and supporting new technologies like electric vehicles and solar power that reduce carbon emissions, most Respondents rated both as Very Important or Important.

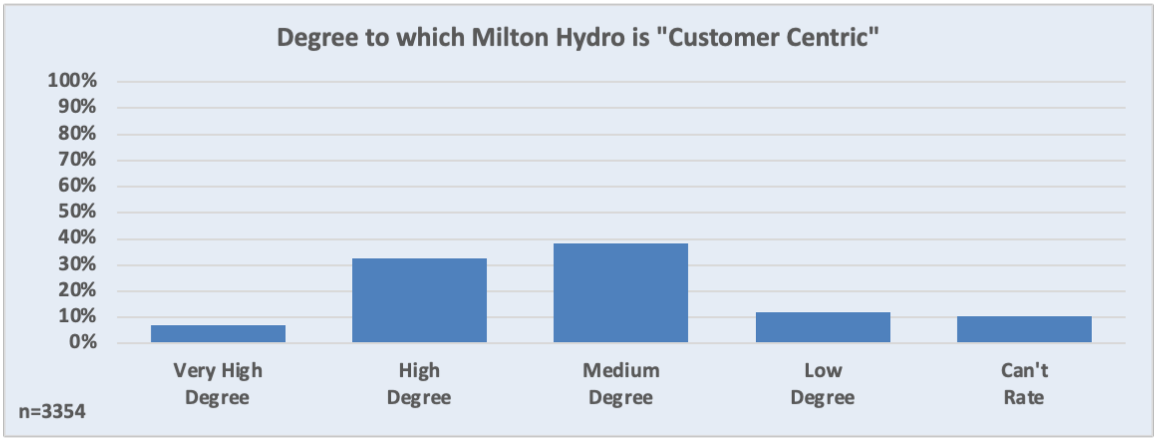


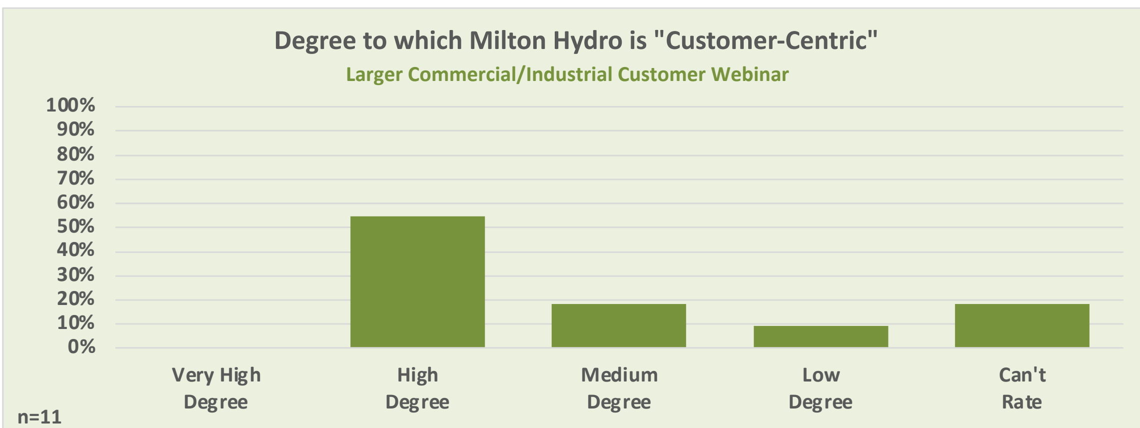
3.2 Milton Hydro as a Customer-Centric Organization

As a part presenting Milton Hydro's forward-looking "Milton Hydro 2.0" strategy, Customers were asked about Milton Hydro as a "Customer-Centric Organization". This section of the web Survey started with a description of how Milton Hydro values being "Customer-Centric":

> *Another focus of being "Future Ready" is ensuring that Milton Hydro is a "Customer-Centric Organization" which we describe as:*
>
> *Treating customers like their needs matter – because they do. We will protect and grow customer loyalty and trust through a positive experience using many different service and communications channels.*

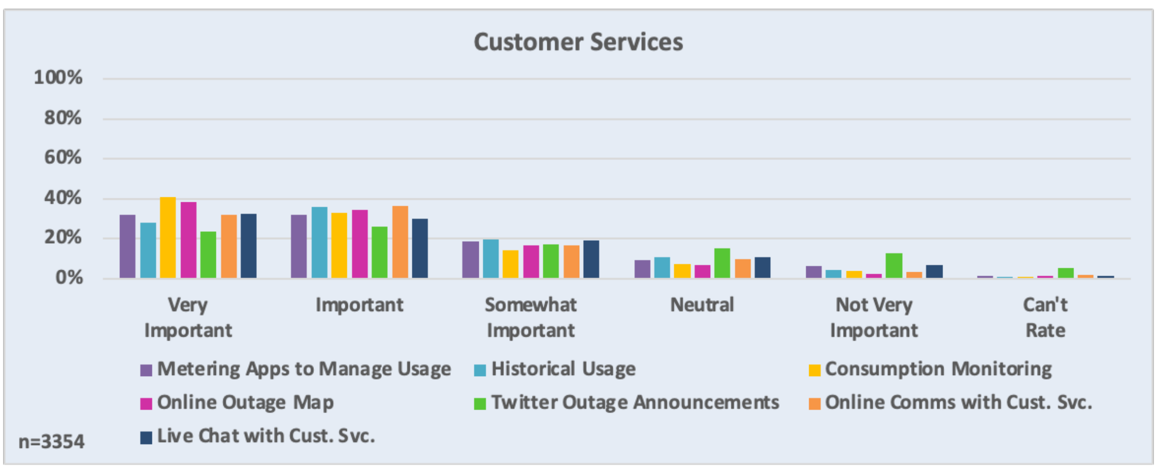
When asked to rate the degree to which Milton Hydro is a customer-centric organization today, most Respondents rated it High Degree (32.5%) or Medium Degree (38.1%). Participants in the Larger Customer Webinar rated it similarly.



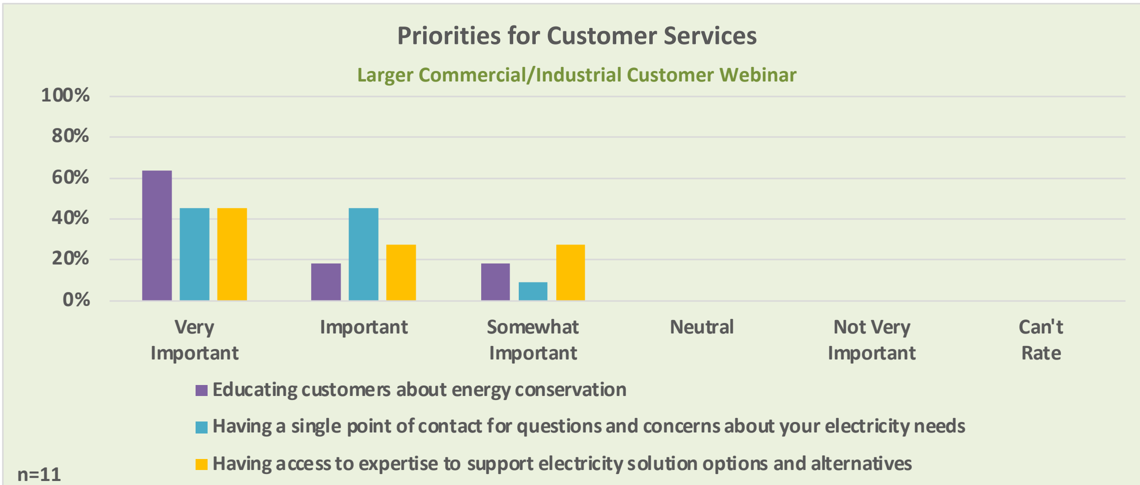


When asked to rate their experience as a customer of Milton Hydro, most Respondents (61.6%) rated it as “Extremely” or “Very Satisfied”.

Respondents were then asked to rate the importance of several online services that Milton Hydro is currently providing or could provide in the future. The highest rated options were Consumption Monitoring, to allow customers to better control their usage and cost (41.0% Very Important), and an improved Online Outage Map (38.3% Very Important).



Webinar Participants rated the importance of educating customers about energy conservation and having a single point of contact for customer service as Very Important or Important.



3.3 Introduction to Key Elements of Milton Hydro's Capital Spending

In the next section of the Web Survey, Respondents were introduced to the categories of Milton Hydro's Capital Spending.

> *Capital investments include the poles, wires, and transformers that you see (overhead) and those that you don't see (underground cables, transformer vaults), substations and the meters outside your homes and businesses that measure consumption. Capital investments include programs that are mandatory and required pursuant to statutory obligations. It also includes establishing our own control room so we can manage the rapid growth of our customer base and the future Distributed Energy Resources that will be available to customers.*
>
> *Capital Spending is divided into the following four OEB investment categories:*
>
> - *System Access*
> - *System Renewal*
> - *System Service*
> - *General Plant*

They were provided additional context on historic and overall planned Capital Spending levels (see the Customer Web Survey copy included in Appendix B). Respondents where then provided detailed descriptions of each of the Capital Spending categories and asked to rate the importance and appropriateness of proposed spending for each.

3.3.1 System Access

System Access encompasses activities such as: new connections for a subdivision; the cost of a building having its electricity service upgraded; or line reconstruction work due to road widening projects if, for instance the Region decides to widen the roads at Derry Rd. and Bronte St. All of this work is needed due to the level of growth in the Town of Milton and falls under the mandatory work that Milton Hydro is required by regulation to carry out.

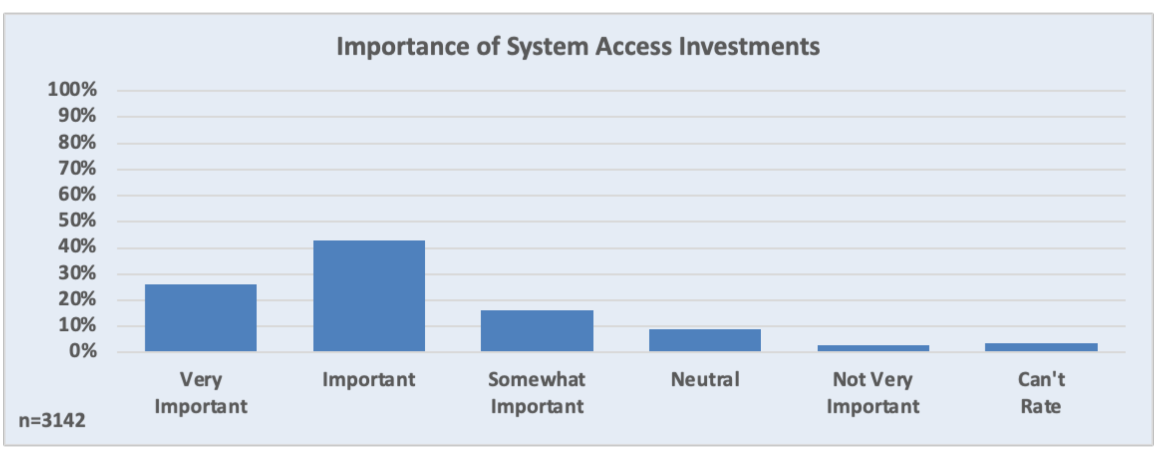
Sample projects include:

- *Widening of Britannia Rd (RR25 to James Snow Parkway) requires 47 poles to be relocated.*
- *Widening of Fifth Line (Derry to Britannia) requires 79 poles to be relocated.*
- *Connection of new residential housing developments*
- *Connection of new multi-unit residential buildings*

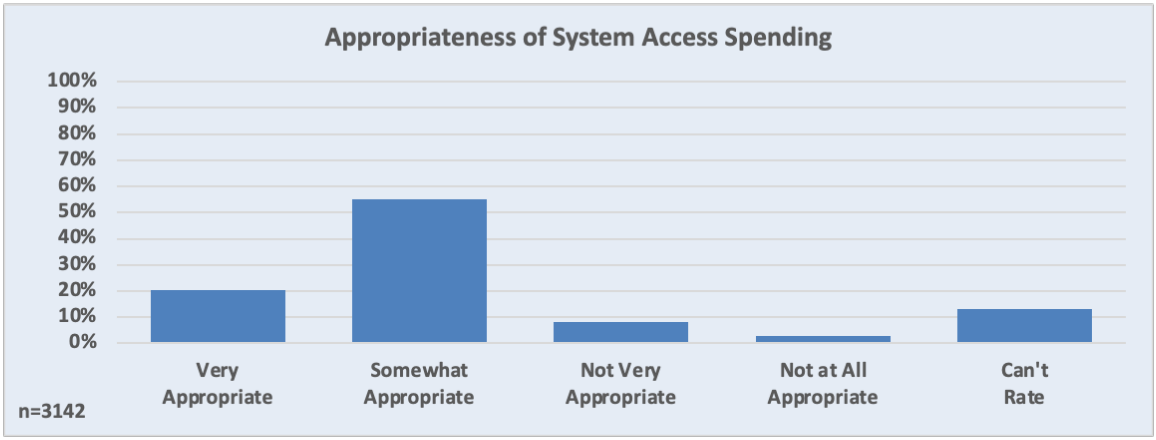
System Access investment summary:

- *Between 2016 to 2020, spending on System Access has been about $3.3 Million per year on average, accounting for about 41% of our total Capital Spending.*
- *In 2023, we are planning to spend $3.3 Million on System Access. Over the next 5 years from 2023 to 2027 we are expecting to spend about $3.0 Million per year on average, accounting for about 30% of our total Capital Spending.*
- *This will add about 6 cents per month to the typical residential customers' bill and about 12 cents per month to the typical General Service < 50 kW small business bill. Note: While average spending over the previous 5 year and next 5 years are about the same, the OEB process for setting rates is based on a "reference year" (in this case 2023), which results in a small increase in rates.*

When asked to rate System Access investments, Most Respondents (68.9%) rated them as Very Important or Important.



Most Respondents (75.6%) rated the proposed level of investment as Very or Somewhat Appropriate.

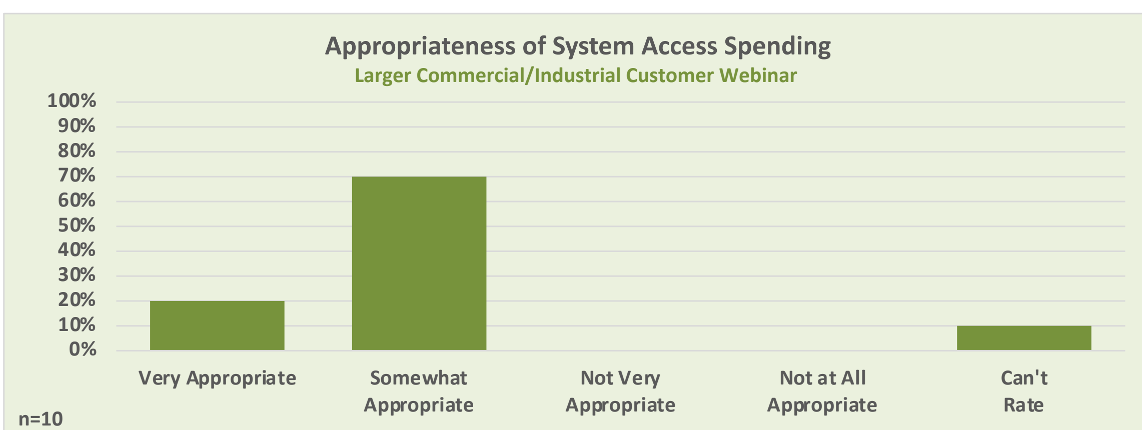


Webinar Participants were given a similar summary of System Access investments, with the following description of sample projects and bill impacts.

Sample projects include:

- *New/upgraded connections for commercial/ industrial customer*
- *Line reconstruction work due to road widening projects*
- *This will add about $1.27 per month to the typical General Service 50 to 999 kW customer's bill and about $10.58 per month to the typical General Service 1,000 to 4,999 kW customer's bill.*

When asked: "Given the importance of this work to enable businesses to operate and the Town to grow, how appropriate do you think the proposed level of investment in System Access spending is?" nearly all Webinar Participants rated it as Somewhat (70%) or Very (20%) Appropriate.



3.3.2 System Renewal

System Renewal is the replacement and refurbishment of distribution system assets so that they continue to provide safe and reliable power. All assets are assessed regularly as part of our Asset Management Program to maximize the value of the asset before reaching the end of its useful life. Our pole replacement program falls under this category, as do overhead line rebuilds, and replacing underground transformers and old meters. System Renewal supports Milton Hydro extracting the most value from each piece of equipment, while maintaining a robust system.

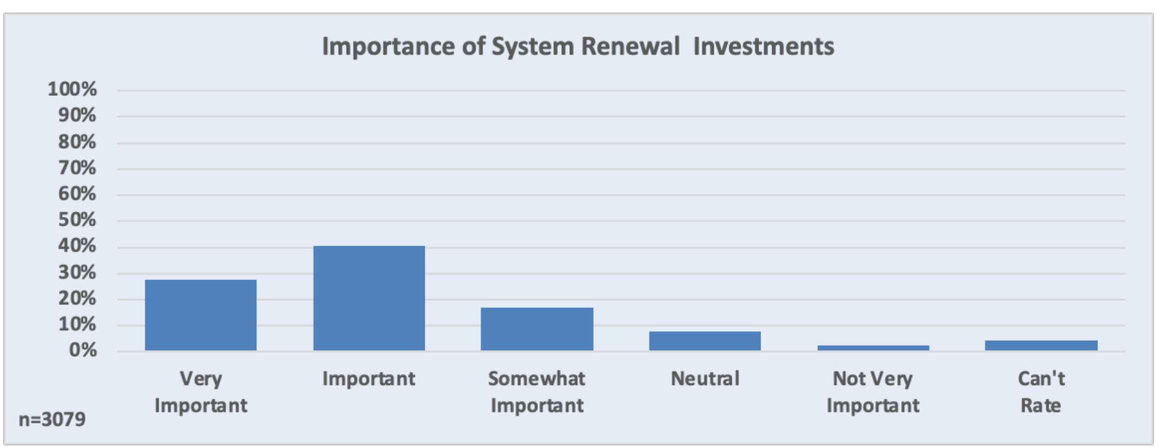
Sample projects include:

- *Overhead line rebuild on First Line, north of Lower Base Line Rd., replaces 36 poles, 1500m of wire, 5 transformers, 12 switches, 36 arresters and 20 anchors.*
- *Voltage conversion program (multi-year) converts existing 13.8 kV load to 27.6 kV, which reduces line losses (a cost that is passed through to all customers) and saves future costs of rebuilding end-of-life stations*
- *Milton Hydro was part of the pilot program that rolled out Smart Meters (in or about 2010). The meters that were installed at that time have begun to fail and require replacement. The program proactively replaces blocks of meters in a systematic manner; we plan on replacing 7,600 meters in 2023.*

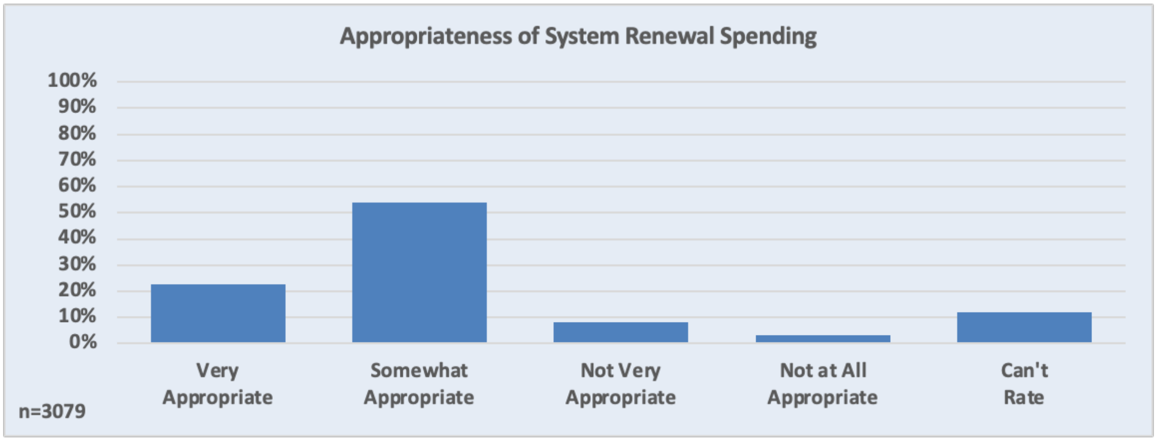
System Renewal investment summary:

- *Between 2016 to 2020, spending on System Renewal has been about $2.0 Million per year on average, accounting for about 25% of our total Capital Spending.*
- *In 2023, we are planning to spend $4.7 Million on System Renewal. Over the next 5 years from 2023 to 2027 we are expecting to spend about $4.0 Million per year on average, accounting for about 41% of our total Capital Spending.*
- *This will add about 16 cents per month to the typical residential customers' bill and about 30 cents per month to the typical General Service < 50 kW small business bill.*

When asked about System Renewal investments Most Respondents (68.4%) rated them as Very Important or Important



Most Respondents (76.8%) rated the proposed level of investment as Very or Somewhat Appropriate

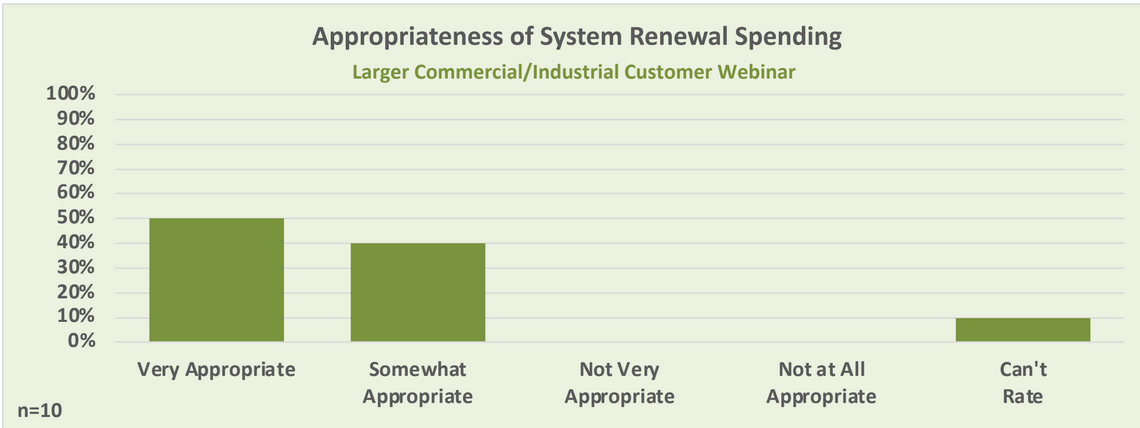


Webinar Participants were given a similar summary of System Renewal investments, with the following description of Sample Projects and bill impacts.

Sample projects include:

- *Proactive replacement of wood poles to minimize unplanned failures, especially during storm conditions; poles are installed to current standards making them more resilient.*
- *Switchgear replacements happen when the asset reaches end-of-life. Newer models have lower operating costs, are more cost effective to maintain, and can have the provision for remote operation which reduces the durations of outages.*
- *The porcelain to polymer insulator replacement program replaces end-of-life insulators, switches and lightning arresters with better technology that is safer and self-cleaning.*
- *This will add about $3.11 per month to the typical General Service 50 to 999 kW customer's bill and about $25.94 per month to the typical General Service 1,000 to 4,999 kW customer's bill.*

When asked: “Given the need to invest in infrastructure systems that will improve electricity delivery reliability, how appropriate do you think the proposed level of investment in System Renewal is?”, nearly all Participants rated it as Very (50%) or Somewhat (40%) Appropriate.



3.3.3 System Service

System Service includes purchasing equipment that modernizes and automates the distribution system. Faulted circuit indicators (FCIs) are an example – they allow staff in the system control room to reconnect the power grid faster, remotely from a desk, rather than dispatching staff to the site. Our distribution communications system, SCADA, also falls in this category. It enables faster response time to power grid issues and supports the outage map. This spending supports fewer outages of shorter duration – strengthening the system’s resilience. It also supports future proofing of the grid as technology and society advances.

Sample projects include:

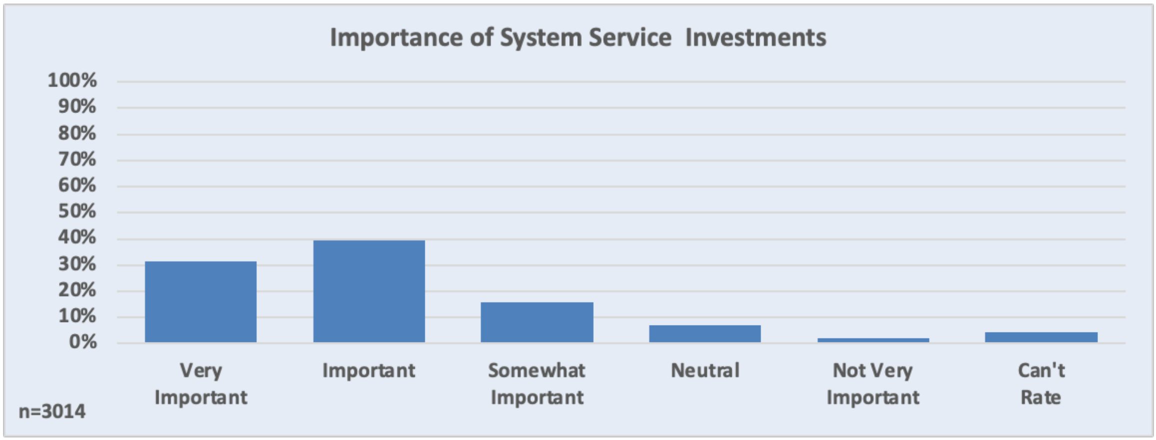
- *Adding Outage Management System (OMS) functionality to the existing SCADA allows for more efficient and effective dispatch of crews during significant system outages*
- *Adding more automated overhead/underground switches and FCIs provides system control room operators and the SCADA/OMS system with greater visibility of the distribution system, to quickly isolate faulted lines and restore power.*
- *Adding a second 27.6 kV circuit on Tremaine Road (14th Side Road to Steeles Avenue), which will provide load transfer and back-up capability for an existing 27.6 kV circuit*

System Service investment summary:

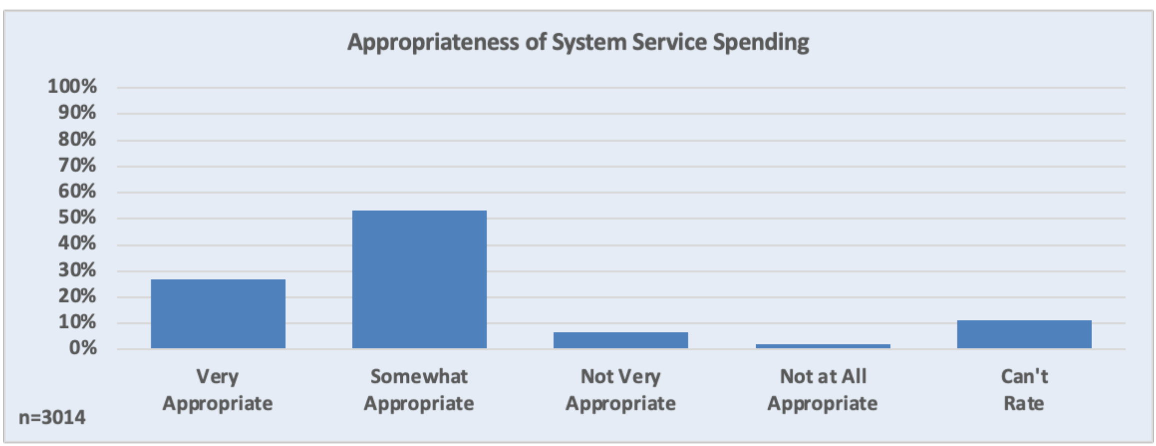
- *Between 2016 to 2020, spending on System Service has been about $1.6 Million per year on average, accounting for about 21% of our total Capital Spending.*
- *In 2023, we are planning to spend $1.3 Million on System Service. Over the next 5 years from 2023 to 2027 we are expecting to spend about $1.0 Million per year on average, accounting for about 10% of our total Capital Spending.*

- *This will reduce a typical residential customer's bill by about 5 cents per month and will reduce a typical General Service < 50 kW small business customer's bill by about 9 cents per month.*

When asked about System Service investments, Most Respondents (70.9%) rated them as Very Important or Important.



Nearly all Respondents (80.2%) rated the proposed level of investment as Very or Somewhat Appropriate.



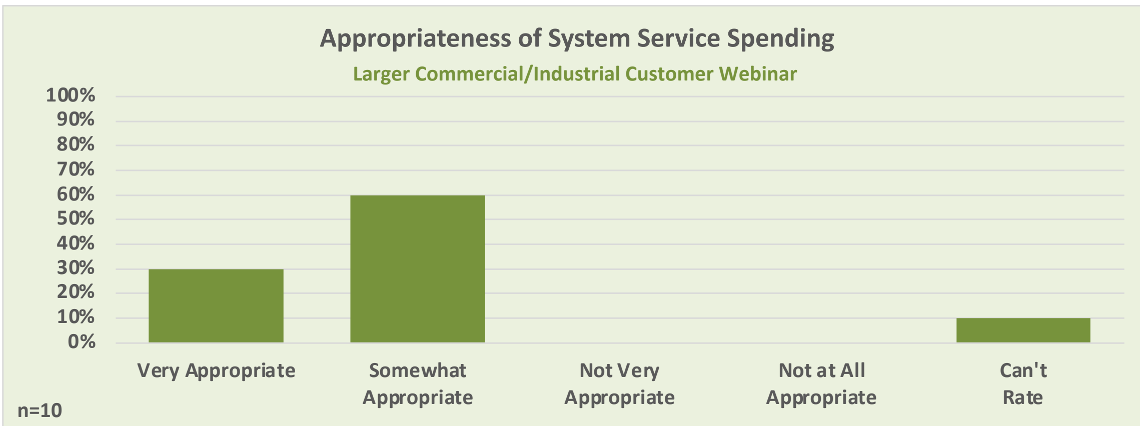
Webinar Participants were given a similar summary of System Service investments, with the following sample projects and description of bill impacts.

Sample projects include:

- *SCADA system provides visibility of the distribution system, enables faster response time, remote control of equipment, and supports the outage map*
- *Automated overhead/underground switches and faulted circuit indicators enable isolation of faulted lines and remote power restoration*

- *Voltage line conversions reduce line losses making the system more efficient; enables backup supply and enhances reliability.*
- *This will reduce a typical General Service 50 to 999 kW customer's bill by about $0.89 per month and will reduce a typical General Service 1,000 to 4,999 kW customer's bill by about $7.38 per month.*

When asked, "Given the need to invest in infrastructure systems that will improve electricity delivery reliability, how appropriate do you think the proposed level of investment in System Service is?" nearly all Webinar Participants rated it as Very (30%) or Somewhat (60%) Appropriate.



3.3.4 General Plant

General Plant is a broad category that includes our buildings, trucks, tools and equipment, all of the IT systems (communications, customer billing, cyber security, functional services, etc.).

Our General Plant spending and IT investments have been low over the past 5 years considering the rapidly increasing customer base. To date, we have been able to manage this and provide good service, but we now have to 'catch up' and ensure our IT systems meet current and future needs.

*This portion of the budget **ensures that we have the digital systems needed to service customers adequately and line trucks are maintained and properly equipped to quickly restore power**. So, even if a storm hits at 2 AM, our line staff can safely head out to restore power, to try and make your morning 'normal'. It also helps ensure that: your bills are accurate; our functional support systems are adequately automated; your data is safe; and that we can communicate with you in timely manner, when it matters most.*

Sample projects include:

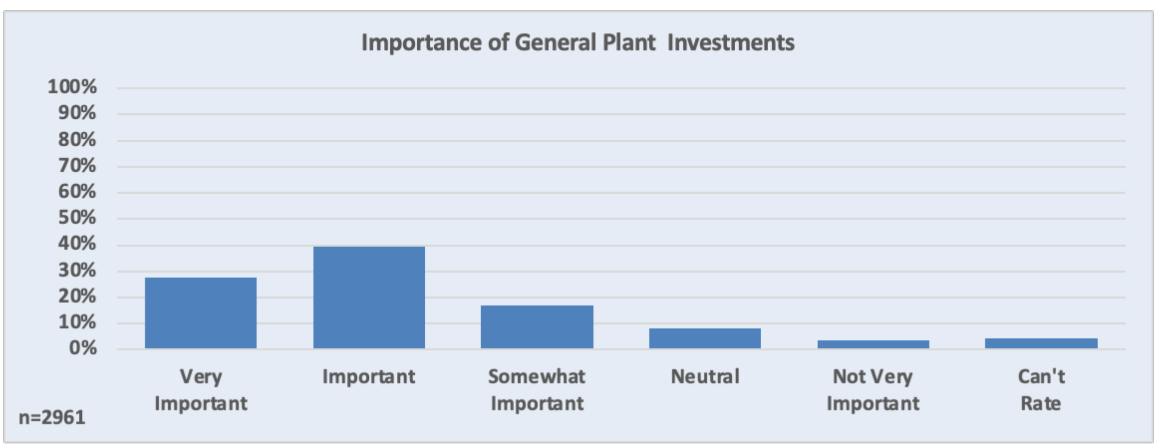
- *Purchase a large truck that strings the hydro lines along poles. MH currently rents or borrows from another utility; the purchase will ease project scheduling conflicts and ensure faster installation.*

- *Building upgrades that address safety issues (vehicle entrance replacement); energy efficiency projects to reduce hydro consumption and gain future savings; improve server room HVAC, which protects/supports business continuity.*
- *Building renovations for and implementation of an in-house system control room.*
- *New Enterprise Resource Planning (ERP) system that will optimize performance and efficiencies of finance, procurement, supply chain, work management departments, and other functional services.*
- *Leverage existing software capabilities to support streamlining of tasks, processes, and workflows*

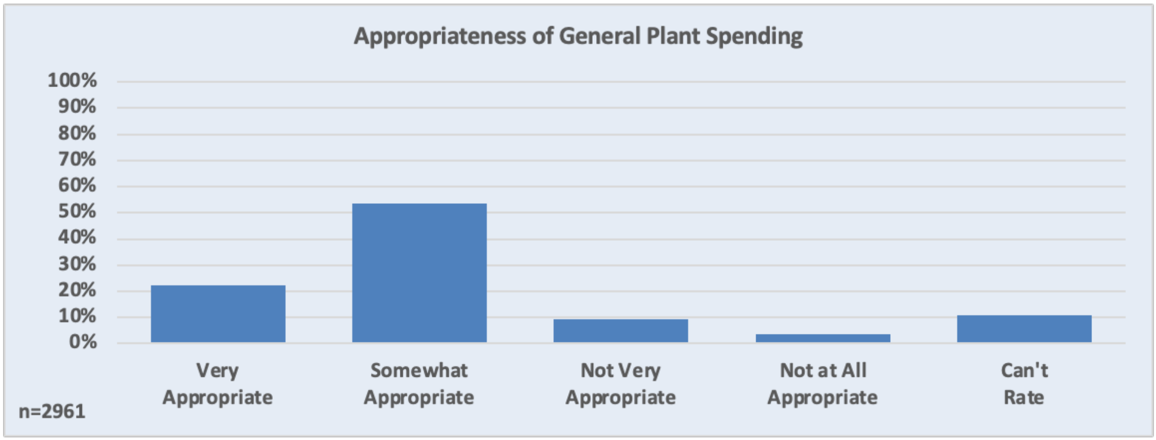
General Plant investment summary:

- *Between 2016 to 2020, spending on General Plant has been about $1.0 Million per year on average, accounting for about 13% of our total Capital Spending.*
- *In 2023, we are planning to spend $3.1 Million on General Plant. Over the next 5 years from 2023 to 2027 we are expecting to spend about $1.9 Million per year on average, accounting for about 19% of our total Capital Spending.*
- *This will add about 80 cents per month to the typical residential customers' bill and will add about $1.52 per month to the typical General Service < 50 kW small business bill. Note: While distribution assets in the other three asset categories for the most part last on average about 45 years. General Plant assets don't last as long, therefore this increase in spending results in a relatively larger impact on bills.*

When asked about General Plant investments Most Respondents (67.2%) rated them as Very Important or Important.



Most Respondents (75.9%) rated them as Very or Somewhat Appropriate

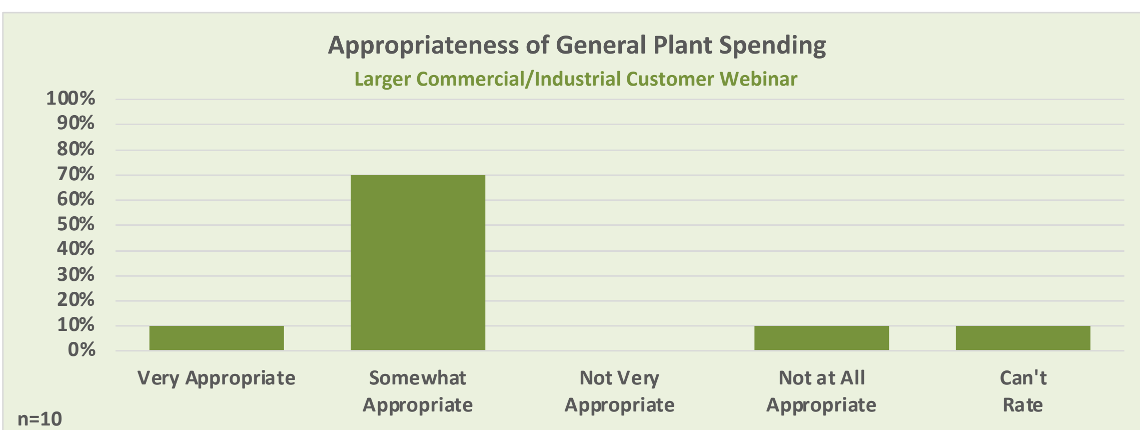


Webinar Participants were given a similar summary of General Plant investments, with the following description of bill impacts.

Sample projects include:

- *Buildings*
- *IT systems (communications, customer billing, cyber security, functional services, etc.).*
- *Trucks, tools, and equipment*
- *This will add about $15.73 per month to the typical General Service 50 to 999 kW customer's bill and will add about $131.03 per month to the typical General Service 1,000 to 4,999 kW customer's bill.*

When asked, "Understanding the requirement to have accurate bills, secure data, a properly equipped and maintained fleet, and IT processes that promote efficiencies, reduce the potential for errors and empower our workforce, how appropriate do you think the proposed level of investment in General Plant is?", most Webinar Participants (70%) rated it as Somewhat Appropriate.



3.3.5 Summary of Capital Spending Results

Survey Respondents' responses to the various categories of Capital Spending were fairly consistent across the four Capital Spending categories.

Summary of Customer Web Survey Ratings of Importance of Capital Spending Categories						
% Rating As:	Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate
System Access (n=3142)	26.1%	42.7%	16.2%	8.8%	2.7%	3.5%
System Renewal (n=3079)	27.8%	40.6%	16.8%	7.9%	2.6%	4.4%
System Service (n=3014)	31.6%	39.3%	15.7%	7.0%	2.0%	4.3%
General Plant (n=2961)	27.8%	39.3%	16.8%	8.2%	3.6%	4.2%

Summary of Customer Web Survey Ratings of Appropriateness of Capital Spending					
% Rating As:	Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate
System Access (n=3142)	20.5%	55.2%	8.3%	2.9%	13.2%
System Renewal (n=3079)	22.6%	54.1%	8.1%	3.1%	12.1%
System Service (n=3014)	27.0%	53.2%	6.6%	2.1%	11.2%
General Plant (n=2961)	22.2%	53.7%	9.4%	3.7%	11.0%

Summary of Larger Customer Webinar Ratings of Appropriateness of Capital Spending					
% Rating As*: n=10	Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate
System Access	20%	70%	0%	0%	10%
System Renewal	50%	40%	0%	0%	10%
System Service	30%	60%	0%	0%	10%
General Plant	10%	70%	0%	10%	10%

** Webinar Participants not asked to rate "Importance" of Spending Categories*

3.4 Introduction to Key Elements of Milton Hydro's OM&A Spending

The next section of the Web Survey focused on Milton Hydro's OM&A spending. (The complete contextual information provided to Survey Respondents can be seen in the Customer Web Survey included in Appendix B).

OM&A Spending includes:

- *Operations and Maintenance spending to inspect, operate, repair, and maintain the physical assets in our system, as well as the cost to operate and maintain our fleet of trucks, as well as the system control room and related facilities; and*
- *Administrative spending on wages and materials for staff along with the costs to operate and maintain our buildings, and IT systems/software licenses and support services.*

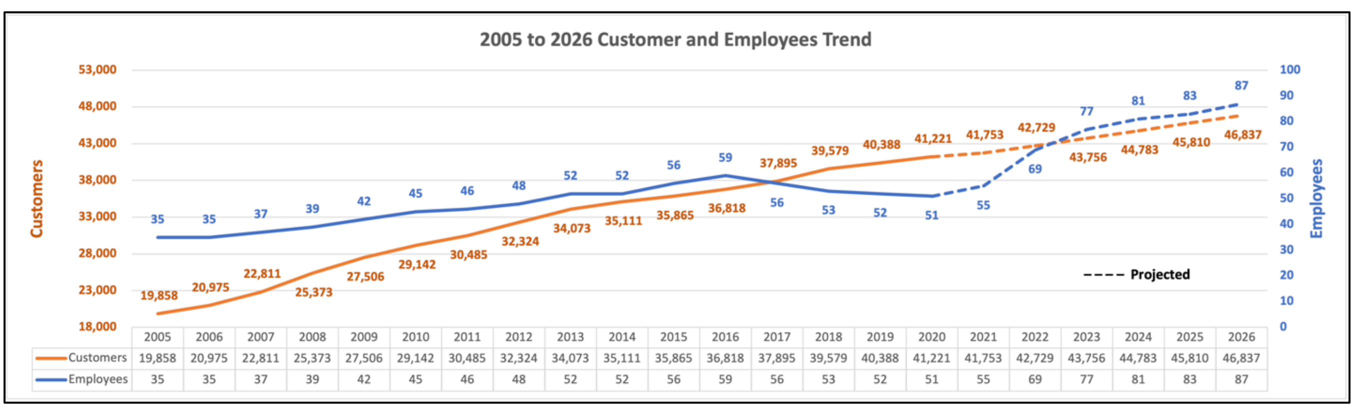
3.4.1 Milton Hydro Workforce

Respondents were next presented information about Milton Hydro's historical workforce size and plans for the future.

Milton Hydro has been operating as a small-sized electricity distributor for many years. Over the past 15 years, the community has grown to the point that we must now operate as a medium-sized electricity distributor so we can properly service our growing customer base. According to Halton Region's Integrated Growth Management Strategy 2041, within 10 years, the Town of Milton's population is forecasted to exceed the City of Burlington's projected population. To support this growth, we're transforming the company into what we call "Milton Hydro 2.0". This transformation significantly impacts OM&A spending.

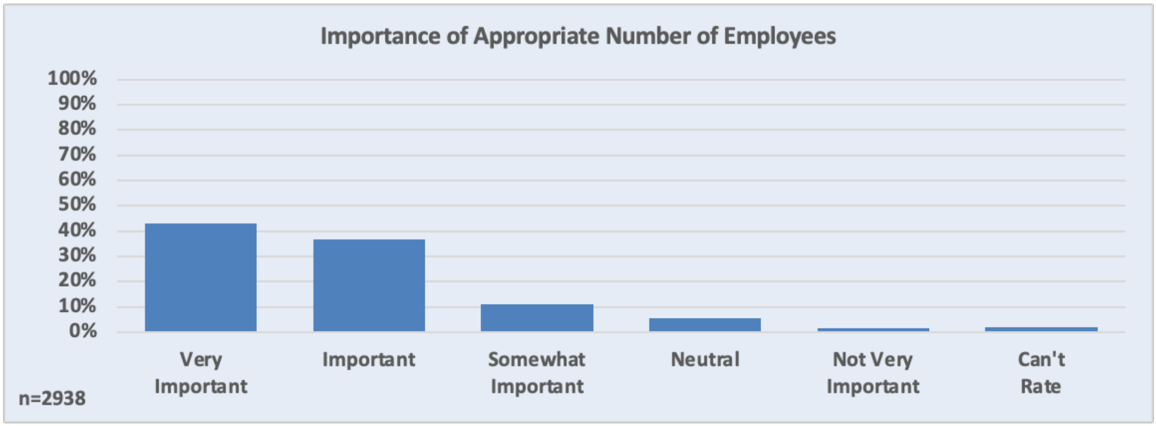
Being customer-centric means having the right number and kinds of employees who are capable and empowered and the right digital systems to operate and maintain the distribution system, respond to outages, and communicate effectively with customers.

Currently, our resources are really stretched. Since 2005, the number of employees has remained relatively flat despite the rapid growth of our customer base. From 2021 to 2026 we plan to adjust our staffing levels to bring them in line with what is needed to support our growing customer base.

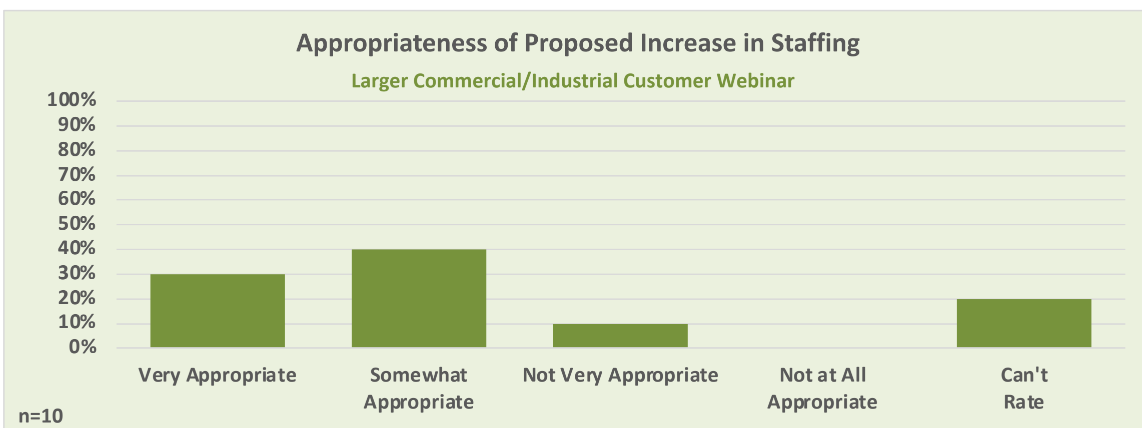


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Customers	19,858	20,975	22,811	25,373	27,506	29,142	30,485	32,324	34,073	35,111	35,865	36,818	37,895	39,579	40,388	41,221	41,753	42,729	43,756	44,783	45,810	46,837
Employees	35	35	37	39	42	45	46	48	52	52	56	59	56	53	52	51	55	69	77	81	83	87

When asked how important it is for Milton Hydro to ensure that they have an appropriate number of employees to effectively and efficiently manage the distribution system as the Milton community continues to grow, most Respondents (79.6%) rated it as Very Important or Important.



When Webinar Participants were asked, “To ensure Milton Hydro has the appropriate workforce (staff and training) and are properly equipped to deliver reliable electricity and manage internal operations, how appropriate do you think the proposed increase in staffing is?”, Most rated it as Very (30%) or Somewhat (40%) Appropriate.



3.4.2 Software and Control Systems

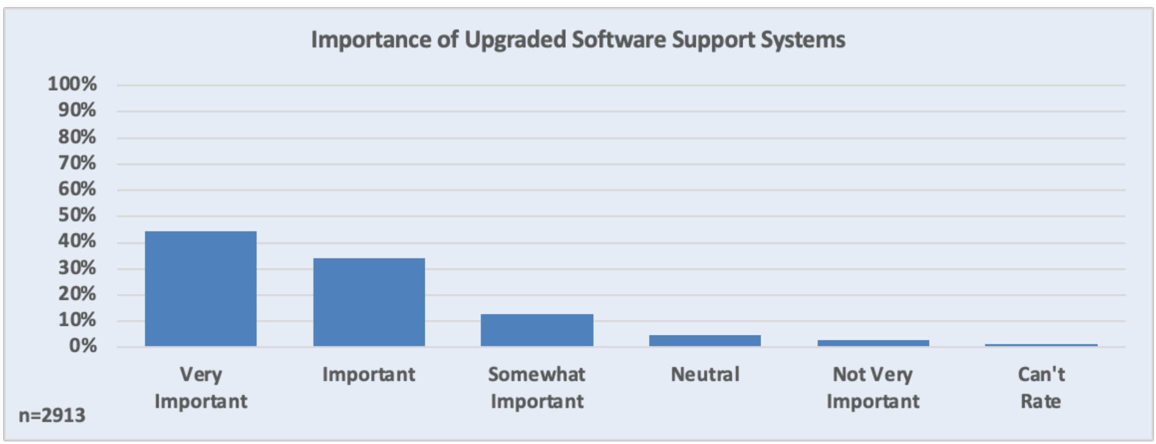
Respondents were next provided the following description of potential changes to software, and systems:

> *Some of our computer systems are outdated and are approaching their end-of-life. They are not performing at the level needed, and the software can no longer be supported adequately by the vendors due to obsolescence. We are remedying this.*

We currently outsource our system control room services (an OM&A expense) to another utility who monitors and helps manage our power distribution system. The electricity landscape is evolving and will incorporate microgrids, distributed energy resources, conservation, and net zero residences. Recognizing the community's growth and the changing landscape, we realize that we need our own system control room (a Capital expense) and people and software to run the control room (an OM&A expense) to properly meet the needs of our community.

We will reduce our risk and improve operational resiliency by developing our own system control room. It would be designed to safely operate the grid and withstand external threats including extreme weather events and cyber-attacks. As we prepare for distributed generation and take on a distribution grid control function, having our own system control room will be important to ensuring reliability.

When asked how important it is for Milton Hydro to upgrade software and systems to support customer services like outage maps, billing and communications, and functional services, most Respondents (78.6%) rated it as Very Important or Important.

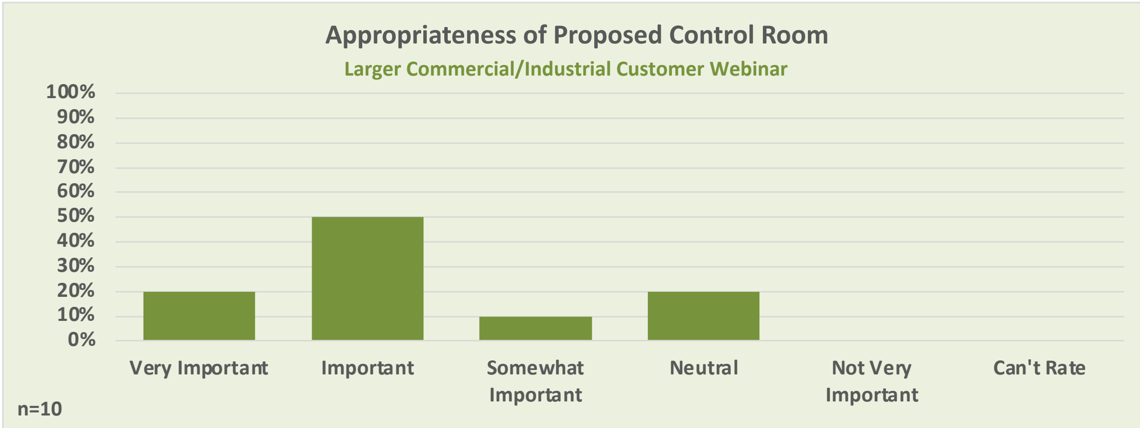


Webinar Participants were asked specifically about the importance of a proposed Control Room.

Milton Hydro plans to invest in an in-house System Control Room to maximize value of grid automation assets, allowing the team and work crews to respond faster and more effectively. We also need to be able to respond to the needs of the evolving electricity landscape that will incorporate microgrids, distributed energy resources, conservation, and net zero residences

"In recognition of the changing electricity landscape, the community's growth, the need to be able to maximize the value of its investments, and ensure swift response capabilities to reduce outages and outage duration, how important do you think it is to invest in an in-house System Control Room?"

Most Participants rated it as Very Important (20%) or Important (50%).

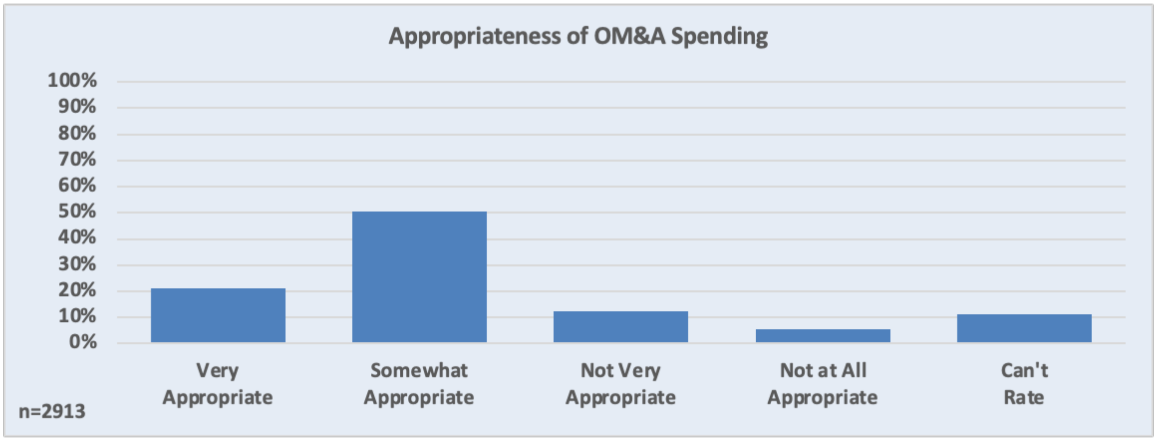


3.4.3 OM&A Total Spending

Respondents were next presented with Milton Hydro's plans for overall OM&A Spending.

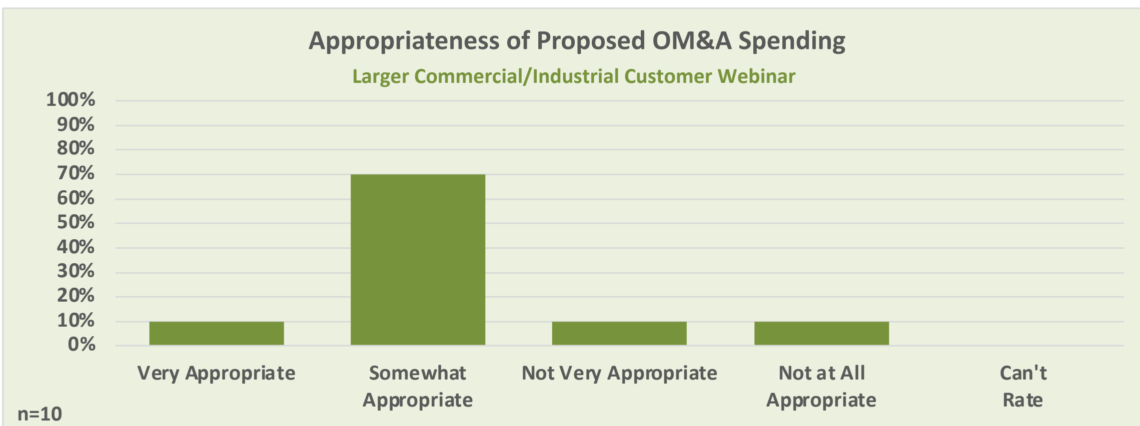
> *Through "Milton Hydro 2.0", we're focused on right-sizing our resources so we can be more customer-centric and deliver a better and quicker customer experience.* ***To achieve the objectives of "Milton Hydro 2.0", we need to increase our OM&A spending in the following areas:***
>
> - *Better communications with customers and enhancing the customer experience.*
> - *An Enterprise Resource Planning (ERP) system that will create internal efficiencies, eliminate/reduce manual processes, increase accuracy, and share data across departments and functions.*
> - *Hardening systems, promoting better cyber security.*
> - *An in-house system control room that will enable staff to respond to outages more quickly improving power reliability.*
> - *Hiring and training staff so that they are empowered to respond to customers effectively, support operations and react in a timely manner to emergencies.*
>
> ***OM&A Spending Summary:***
>
> - *Between 2016 to 2020, OM&A spending has been about $10.1 Million per year on average.*
> - *In 2021 and 2022 Milton Hydro's OM&A expenses are planned to be $11.38 Million, and $12.85 Million, respectively.*
> - *In 2023, we expect OM&A spending to be $14.96 million and account for a little over half of Milton Hydro's annual budget.*
> - *This will add about $4.21 per month to the typical residential customers' bill and about $8.04 per month to the typical General Service < 50 kW small business customer bill.*

When asked to what degree the level of OM&A spending is appropriate, Most Respondents (71.4%) rated it as Very or Somewhat Appropriate.



Participants were given a similar summary of OM&A Spending, with the following description of bill impacts.

- *This will add about $83.22 per month to the typical General Service 50 to 999 kW customer's bill and about $693.28 per month to the typical General Service 1,000 to 4,999 kW customer's bill.*



3.4.4 Summary of OM&A Engagement Results

Customer responses on OM&A Spending were fairly consistent across the Web Survey and Webinar with most rating the proposed spending as Very or Somewhat Appropriate.

3.5 Overall Impact of Spending on Customer Bills and Confidence in Milton Hydro

Customers were presented a summary of the overall impact of spending and asked about it's appropriateness and about their confidence in Milton Hydro.

3.5.1 Overall Impact of Spending

Overall Bill Impact Summary

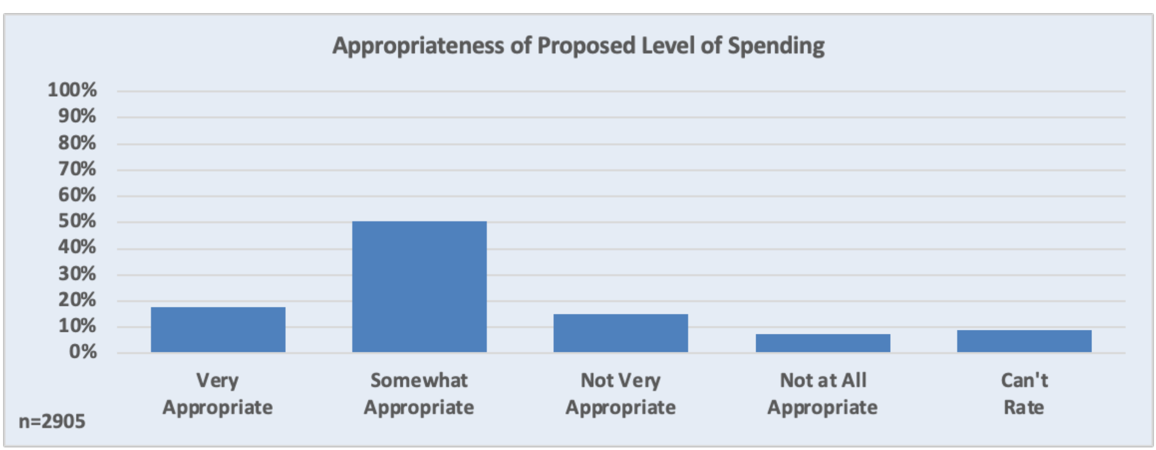
- *Starting in 2023 a typical Residential customer would see an increase in distribution charges of $5.33 (an increase of about 18% of the distribution portion of their bill). After adjustment for the Ontario Electricity Rebate and HST, this results in a net increase in their electricity bill of $5.01 (an increase of about 4.1% of their total electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).*
- *Starting in 2023 a typical General Service < 50 kW small business customer would see an increase in distribution charges of $10.16 (an increase of about or 18% of the distribution portion of their bill). After adjustment for the Ontario Electricity Rebate and HST, this results in a net increase in their electricity bill of $9.56 (an increase of about 3.2% of their total electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).*

Once we reset our Distribution Rates in 2023, the ***subsequent annual rate changes for the years 2024 to 2027 will be limited to less than inflation.***

For a typical residential customer, *Milton Hydro's portion of the total electricity bill that is currently being proposed for 2023 is a fixed amount of $34.89 per month, amounts to approximately 22% of the total electricity bill.*

For a typical small business customer, *Milton Hydro's portion of the total electricity bill that is currently being proposed for 2023 is based on a fixed monthly charge of $21.46, and a variable charge of $0.0226 per kWh for a total of $66.75 per month, which amounts to approximately 18% of the total electricity bill.*

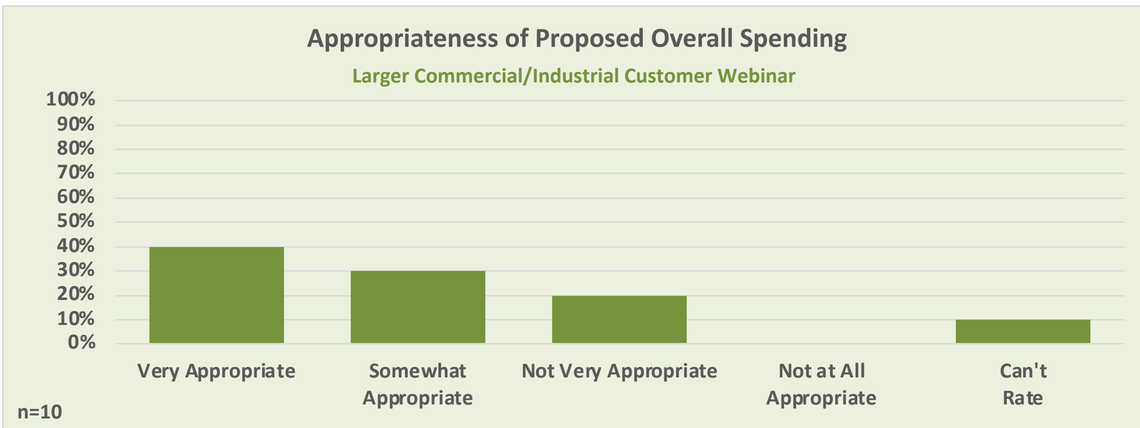
When asked, given everything that was presented, how appropriate they think the proposed level of spending is, most Respondents rated it as Very (17.7%) or Somewhat Appropriate (50.7%).



Webinar Participants were given a similar summary of the overall impact of spending, with the following description of bill impacts.

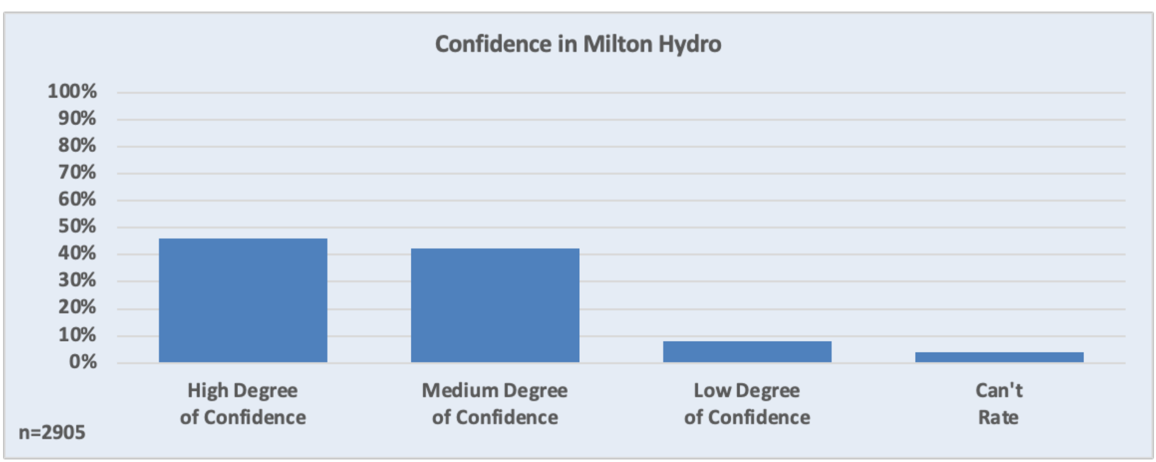
Starting in 2023 a typical GS 50 to 999 kW business customer would see a net increase in their overall electricity bill of $119.02 (an increase of about 1.2% of their overall electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).

Starting in 2023 a typical GS 1,000 to 4,999 kW business customer would see an net increase in their electricity bill of $991.41 (an increase of about 0.44% of their overall electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).

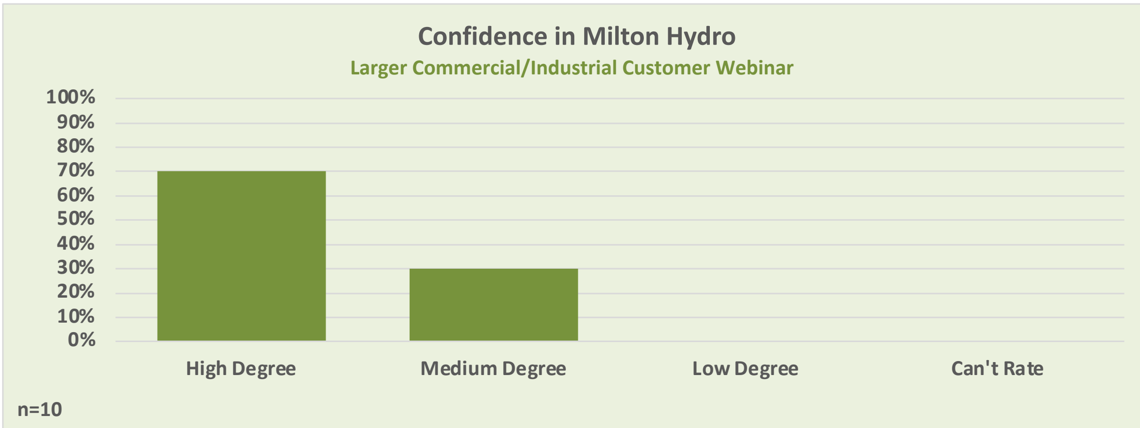


3.5.2 Confidence in Milton Hydro

When asked to consider everything that had been presented in the survey, Respondents were asked how confident they were that Milton Hydro will continue to provide safe, reliable and affordable electricity, nearly all rated it as High (45.9%) or Medium (42.4%).

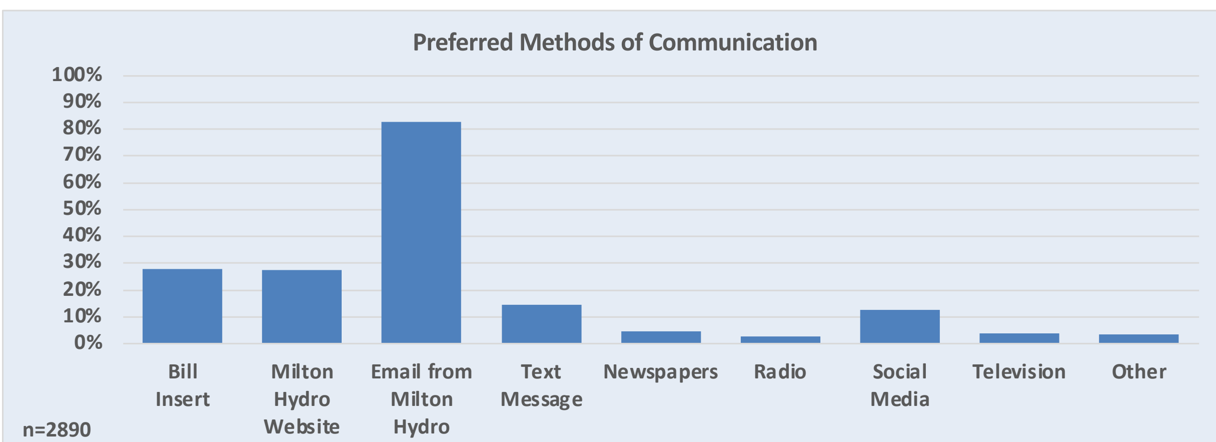


When asked, “Thinking about everything that has been presented, how confident are you that Milton Hydro will continue to provide safe, reliable and affordable electricity?”, most Participants (70%) rated it as High Degree.

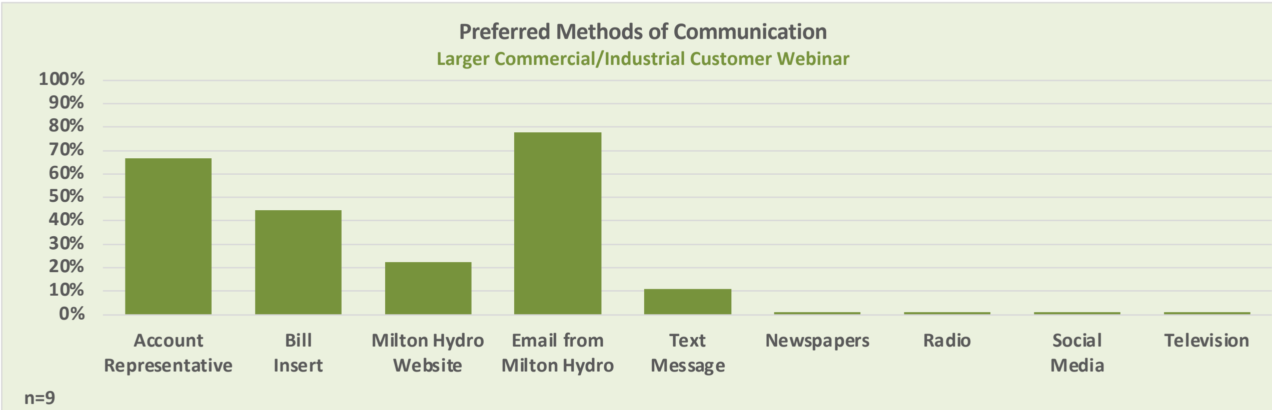


3.6 Milton Hydro Customer Engagement and Communications

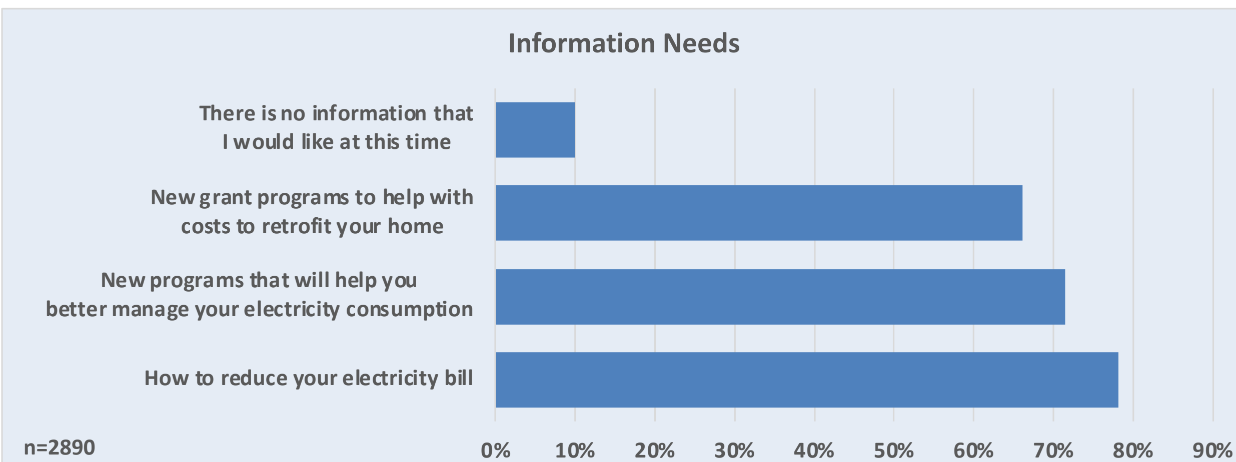
To complete the Web Survey, Customers were asked about Milton Hydro’s customer engagement and communications. Most Respondents (60.1%) said that they would like to hear from Milton Hydro on a regular basis. When asked the best way for Milton Hydro to communicate with them, nearly all Web Survey Respondents (83.0%) preferred email.



Nearly all Webinar Participants (80%) also preferred email, though Most (65%) also suggested communications from an Account Representative.



When asked what kinds of information they would like to receive Respondents noted several topics, especially how to reduce their electricty bill.



Appendix A: Mental Modeling Approach to Customer Engagement

Decision Partners' science-informed, evidence-based Mental Modeling methods and tools are specifically designed for understanding influences on customers' judgment, decision making and behaviour.

The Mental Modeling Insight™ approach is based on the foundational mental models research approach developed by a team at Carnegie Mellon University led by Dr. Baruch Fischhoff, Decision Partners' Chief Scientist.[3] It is well established in the fields of decision sciences, cognitive behavioural psychology, risk analysis and risk communications.[4] It is the premier method for eliciting, analyzing, and modeling people's thinking on complex issues and using that insight to inform the development of evidence-based strategies, policies and tools that address them.[5]

What are mental models?

A person's "mental model" can be thought of as a complex web of deeply – and often subconsciously – held beliefs that affect how an individual defines a situation, reacts to information, forms judgments and makes decisions. These sets of beliefs may be complete and correct, or they may have gaps or misunderstandings that are consequential to decision making and action. People's mental models vary in important and often unpredictable ways.

Benefits of this Approach

One-on-one conversational mental models interviews, typically conducted over the phone, are respectful and designed to elicit the full thinking of interviewees on the topic at hand. This enables an in-depth discovery and characterization of what interviewees believe and why they believe it – that is, what influences their judgment and decision-making about topics at hand.

Sample Size

According to Dr. Fischhoff, one of the fundamental questions determining the design of such research projects involves finding an appropriate trade-off between data quality (depth of insight) and data quantity (statistical representativeness). If the primary objective of the research is to explore an issue, to discover and understand in depth the spectrum of beliefs that are "out there" and only a reasonable level of precision is needed regarding the prevalence of such beliefs in the target population to advance to appropriate next steps (e.g., additional research, policy or planning options), then qualitative research with a small sample size is reasonable and often preferred. If, however, the primary research objective is to estimate the prevalence with which specific beliefs are held by a target population, then conducting a statistical power analysis to estimate the appropriate sample size needed to provide the required precision may be the most suitable option. This typically requires a larger sample and is likely best achieved through structured surveys.

---

[3] Morgan, M.G., B. Fischhoff, A. Bostrom, and C.J. Atman. 2002. "Risk Communication: a Mental Models Approach." New York: Cambridge University Press.

[4] Baruch Fischhoff, Noel Brewer and Julie S. Downs (editors) (2011) "Communicating Risks and Benefits: An Evidence Based User's Guide" Department of Health and Human Service, U.S. Food and Drug Administration. http://www.fda.gov/AboutFDA/ReportsManualsForms/Reports/ucm268078.htm

[5] Wood, M.D, S. Thorne, D. Kovacs, G. Butte, and I. Linkov. 2017. "Mental Modeling Approach: Risk Management Application Case Studies." New York: Springer Science+Business Media.

Appendix B: Solicitation of Customers for Engagement

Milton Hydro

Your Input Is Important

Dear Customer,

We'd like your help. Our team at Milton Hydro Distribution Inc. (Milton Hydro) is preparing an application for the Ontario Energy Board (OEB) which regulates how much Milton Hydro can charge customers for delivery of electricity. As part of the process, we'd like to hear your needs and preferences about Milton Hydro's investment priorities for the coming years, which will in turn determine the base rates that will apply for, and if approved, will be in effect for 2023 through 2027. I hope you'll take the time – 30 to 40 minutes – to complete our **survey** by November 11, 2021. If you complete the survey, you will be eligible for a draw for one of two Apple iPads.

Here is a bit of background.

Milton Hydro is responsible for the electricity distribution system that brings power to homes and businesses in the Town of Milton. Our OEB application will contain our proposed investment plans over the 2023-2027 period that will ensure that we can continue to deliver power safely, reliably and deliver high value for money to our customers. As we develop our investment plans, we'd like to hear what is important to you.

I'm inviting you to share your comments by completing our survey. For our residential customers, to thank you for completing the survey, you'll be entered into a draw for one of two Apple iPads. Subject to the rules (available **here** and at the end of the survey), you need to answer the required questions and provide your contact information; after which, you will be entered into the draw. Winners will be selected randomly from eligible survey respondents† and will be notified by a member of our Team at Milton Hydro.

Please be assured that your survey responses are confidential. You will not be identified as the source of any feedback that you provide. Decision Partners, an independent research company retained by Milton Hydro, will collect the data, analyze it, and produce a summary report which will be submitted to the OEB as part of Milton Hydro's application. Decision Partners will conduct the random draw and provide the winners' names to Milton Hydro separately from the survey results (see contest rules here and in the survey).†† If you prefer to complete a paper survey and mail it in, you can request one from Decision Partners at (519) 344-3232 or from Milton Hydro at (289) 971-8177.

On behalf of our team at Milton Hydro, I'd like to thank you for taking the time to learn about our investment planning and providing your feedback through this survey. Your input is important to us. We look forward to hearing from you.

Thank you in advance for your participation. Have a safe and happy autumn season!

Troy Hare
President and CEO
Milton Hydro

† The survey is open to all Milton Hydro residential and commercial customers, however, **the draw is limited to residential customers only**. One entry per customer account. Prize will be awarded to the person listed as the contact name associated with the customer account.

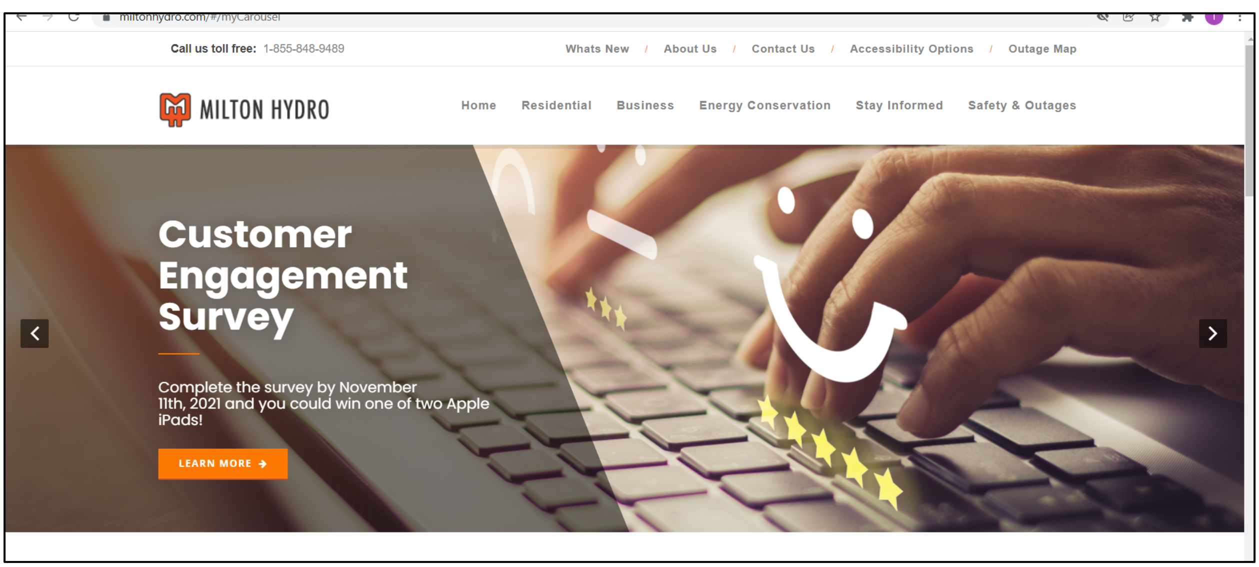
†† If you would like more information on Decision Partners' Privacy Policy, you can view it at: www.decisionpartners.co/Images/PrivacyPolicy.pdf

Start Survey

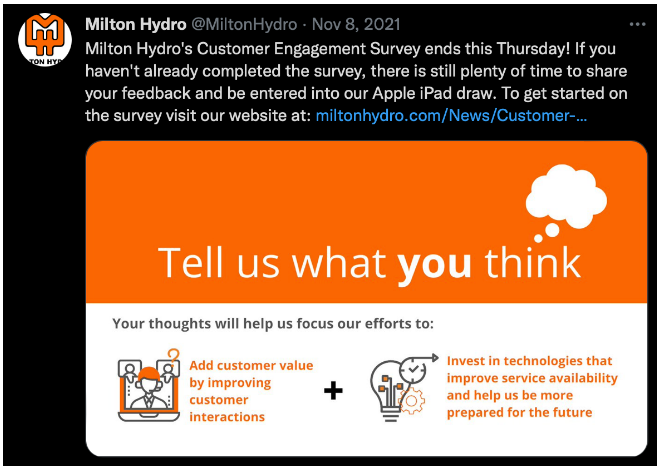
Milton Hydro Distribution Inc. | miltonhydro.com

Customer Web Survey Email Invitation

Customer Web Survey Bill Insert Invitation



Milton Hydro Website Banner Invitation



Customer Web Survey Twitter Notification. Similar notifications were posted to Facebook and LinkedIn to reach as many customers as possible through multiple channels.

Milton Hydro

Your Input Is Important

Dear Valued Customer,

We'd like your help. Our team at Milton Hydro Distribution Inc. (Milton Hydro) is preparing a cost-of-service rate application for the Ontario Energy Board (OEB) for an approval of electricity distribution rates for 2023. The OEB regulates how much Milton Hydro can charge customers for delivery of electricity. As part of the process, we'd like to hear your needs and preferences regarding Milton Hydro's investment priorities for the coming years.

Please join us in a virtual meeting **November 3, 2021 from 10:00 am to 12:00 pm** to contribute your input in our planning process. The Microsoft Teams meeting will be open to Milton Hydro's commercial/ industrial customers. Our senior management team will make brief presentations, then we'll ask you to contribute your feedback openly or anonymously. Sarah Thorne of Decision Partners, an independent research company retained by Milton Hydro, will facilitate the feedback sessions.

Here is a bit of background.

Milton Hydro is responsible for the electricity distribution system that brings power to homes and businesses in the Town of Milton. Our OEB application will contain our proposed investment plans over the 2023-2027 period that will ensure that we can continue to deliver power safely, reliably and deliver high value for money to our customers. As we develop our investment plans, we'd like to hear what is important to you. Your input will help our team as we finalize our plans and prepare our submission to the OEB.

On behalf of our team at Milton Hydro, I'd like to thank you for taking the time to learn about our investment planning and providing your feedback during our virtual meeting. Your input is important to us. We look forward to seeing you November 3.

Have a safe and happy autumn season!

Troy Hare
President and CEO
Milton Hydro

Please let us know if you will be attending.

DATE AND TIME
11/03/21 10:00am - 11/03/21 12:00pm

Yes, I will be attending | **No, I will not be attending**

Milton Hydro Distribution Inc. | miltonhydro.com

Larger Customer Webinar Invitation

Appendix C: Customer Engagement Web Survey Copy

Your Input Is Important

Dear Customer,

Thank you for participating in our Customer Engagement Survey.

Our team at Milton Hydro (MH) is currently working on preparing our 2023 Rate Application for the Ontario Energy Board (OEB) which regulates how much Milton Hydro can charge customers for delivery of electricity. As part of our planning process, we'd like your thoughts on our investment priorities for the coming years, which in turn, will determine the rates that we will apply for, and if approved, will become the basis used to set rates from 2023 through 2027.

Our survey covers five areas. We provide some context, and then ask for your input:

1. *Brief background on Milton Hydro and the Ontario electricity industry*
2. *Your priorities for electricity delivery*
3. *Milton Hydro 2.0 - Your future electricity needs and how we are transforming the company to be future ready, resilient, digitally modernized, and customer-centric.*
4. *Your feedback on our proposed investment plans and the bottom line – how this affects your electricity bill.*
5. *Your thoughts on how we can best communicate with you in the future about these plans and some demographic questions.*

We want to assure you that your survey responses are confidential. You will not be identified as the source of any feedback that you provide. Decision Partners, an independent research company retained by Milton Hydro, will collect the data and produce a summary report which will be submitted to the OEB as part of our Rate Application. The report will not identify anyone as the source of any feedback.[††] If you have any questions about the survey, you can contact Decision Partners at (519) 344-3232 or Milton Hydro at (289) 971-8177.

On behalf of our team at Milton Hydro, I'd like to thank you for taking the time to learn about our planning and providing your feedback through this survey. Your input is important to us. We look forward to hearing from you.

Thank you in advance for your participation. Have a safe and happy autumn!

Troy Hare
President and CEO
Milton Hydro

[††] If you would like more information on Decision Partners' Privacy Policy, you can view it at: www.decisionpartners.co/Images/PrivacyPolicy.pdf

***1. To start off, please tell us what kind of an electricity customer you are. (Select One)**

☐ Residential

☐ Small Business or Organization (Described on bill as GS<50. Not a high user of electricity. Example: office, retail, restaurant, small shop, organization etc.")

☐ Commercial/Industrial Business (Described on bill as GS 50-999, GS 1,000-4,999, or Large User. High user of electricity. Example: Large retail or mall, industrial, manufacturing, etc.)

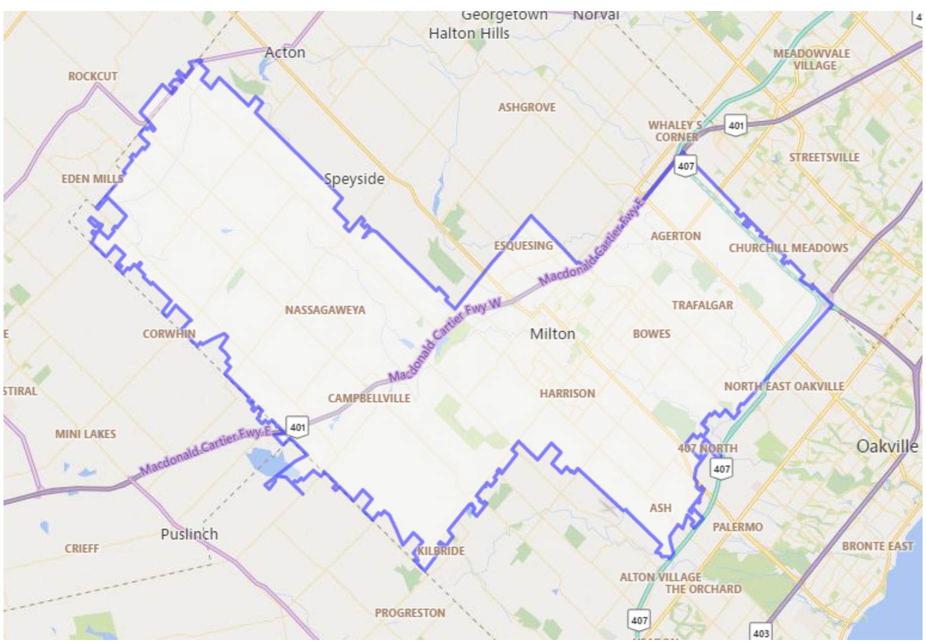
☐ Not a Milton Hydro customer, just curious about the survey (your answers will not be included in survey results and you are not eligible for the Draw).

Background on Milton Hydro

Milton Hydro Distribution Inc. is a local distribution company, which is responsible for distributing electricity to more than 42,000 business and residential customers within the Town of Milton. Milton Hydro Distribution Inc. is a wholly-owned subsidiary of Milton Hydro Holdings Inc., owned by the Town of Milton. Milton Hydro has been providing safe, reliable and affordable electricity service for nearly a century.

Milton Hydro is regulated by the OEB. Part of the regulatory process is that MH is required to submit a Cost-of-Service electricity distribution rate application to the OEB for approval. The application contains our proposed five-year investment plan, which is the subject of this survey.

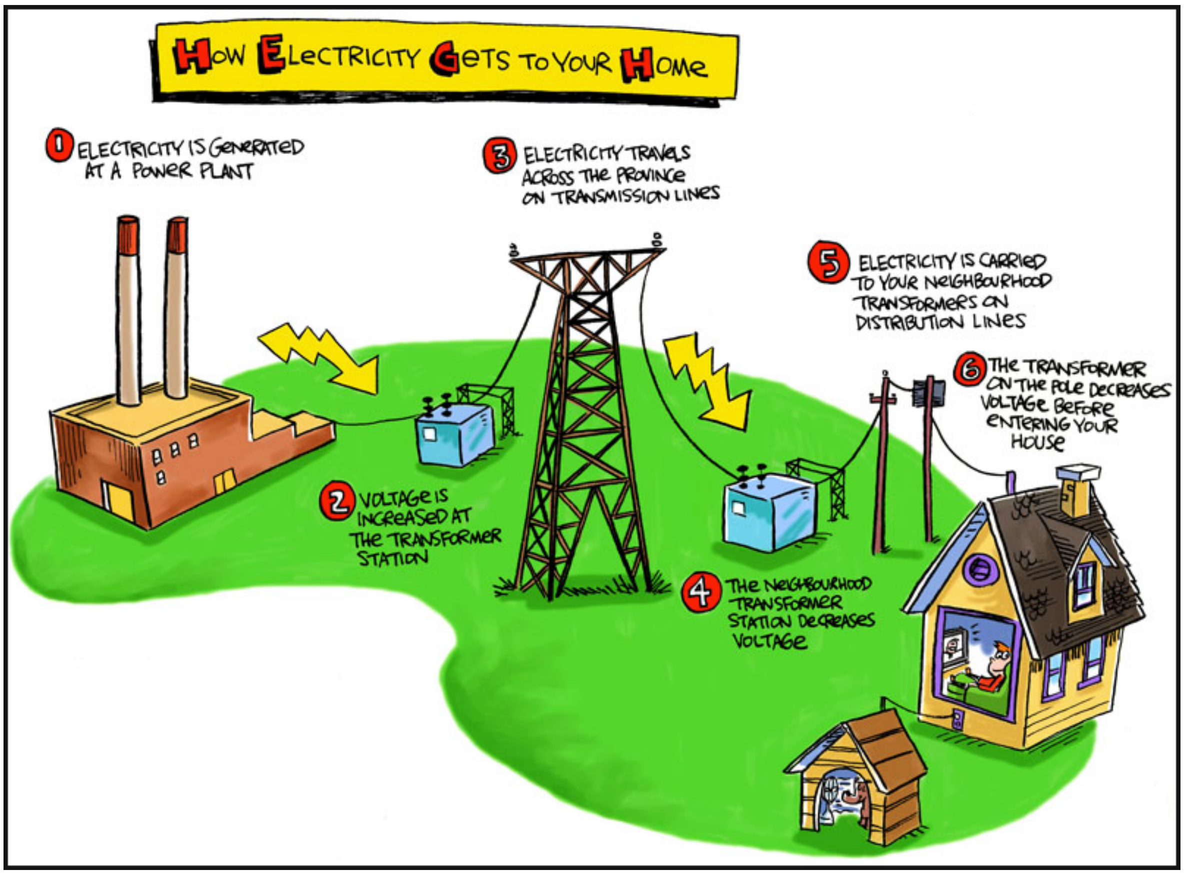
Milton Hydro Distribution Territory



Distribution as a Component of Your Electricity Bill

A little background on the electricity industry. There are three main parts:

- **Electricity Generation:** includes the power plants, wind turbines and solar energy that produce electricity.
- **Electricity Transmission:** sends the electricity over high voltage power lines from generators to electricity distribution companies, and
- **Electricity Distribution:** companies like Milton Hydro deliver power to customers like you. Milton Hydro maintains the low voltage power lines, substations, and transformers in the Town of Milton.



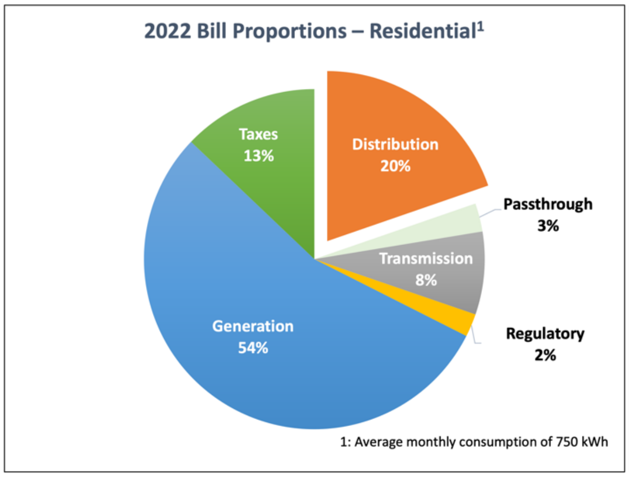
This graphic illustrates how electricity gets to your home

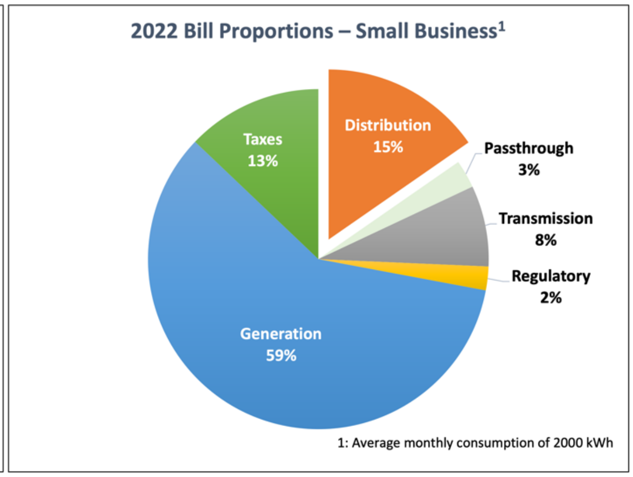
Milton Hydro bills for the three elements of the electricity system – generation, transmission and distribution – but our business only deals with the final step of getting electricity to your home/business – distribution.

For a typical residential customer consuming about 750 kWh per month, Milton Hydro's portion of the total electricity bill as applied for in 2022 is a fixed amount of $29.56 per month, which amounts to **approximately 20% of the total electricity bill**.

For a typical small business customer Milton Hydro's portion of the total electricity bill as applied for in 2022 is based on a fixed monthly charge of $18.19, and a variable charge of $0.0192 per kWh for a total of $56.59 per month, which amounts to **approximately 15% of the total electricity bill**.

Milton Hydro also bills and collects on behalf of the Region of Halton for your water and sewer charges. However, **this survey is ONLY about the distribution portion of your electricity bill**, which is the only part of the bill Milton Hydro uses to run its business.





***2. Does that sound like an appropriate portion of the electricity part of your bill to pay for Milton Hydro to distribute the electricity to you? In terms of the value you get for the money you pay, do you think the distribution portion of the bill is: (check one)**

Too Low About Right Too High Can't Rate

(optional) Comments: ____

Considerations for Business Planning

Next, we'd like to ask about the principles that underlie Milton Hydro's business planning, starting with a statement that describes what the company does:

> ***Provide safe and reliable delivery of electricity and associated services to our growing community, providing high value for money, keeping the customer at the forefront in its decision-making processes.***

***3. How important is it to you that electricity delivery be:**

Safe for customers and Milton Hydro's employees? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Reliable and stable? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

At an appropriate cost? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

***4. Overall, how would you rate your experience as a customer of Milton Hydro? (check one)**

Extremely Satisfied	Very Satisfied	Somewhat Satisfied	Not Very Satisfied	Not Satisfied at All

(optional) Why do you give it this rating? ____________________________________

Looking Forward and Milton Hydro 2.0

An essential part of effective planning is to prepare for the changes that are coming in society and our industry. At Milton Hydro, we are transforming our business to be “Future Ready” by developing what we are calling, "Milton Hydro 2.0", which we describe as:

> **A forward looking and resilient company, Milton Hydro will be able to adapt to changes in society and the electricity sector. We will be able to meet the increasing demand for electricity and respond to the challenges of climate change.**

As part of preparing for these changes, we’d like to hear your thoughts on how your needs as an electricity customer could change over the next 10 years. You can find out more about Milton Hydro 2.0 by going to our website and going to our Twitter feed.

***5. In the next 10 years, how likely are you to have:**

An electric vehicle? (check one)

Already Have	Very Likely	Likely	Somewhat Likely	Not Very Likely	Can’t Rate

Solar panels? (check one)

Already Have	Very Likely	Likely	Somewhat Likely	Not Very Likely	Can’t Rate

An electricity storage system – sometimes called ‘power walls’ – that store power from solar panels or from the electricity grid so it can be used at a future time? (check one)

Already Have	Very Likely	Likely	Somewhat Likely	Not Very Likely	Can’t Rate

(optional) Comments: ____

In recent discussions with some of our customers, we heard that they expect their electricity usage to increase due to things like using more technology, devices, and working from home more.

***6. Do you think your electricity consumption in the next 10 years will … (check one)**

Increase Significantly	Increase Somewhat	Stay about the same	Decrease Somewhat	Decrease Significantly	Can’t Rate

7. (optional) Are there any other significant changes that you think could change how you use electricity in the next ten years? (describe below)

____

***8. Thinking about climate change, how important is it to you that Milton Hydro …**

Prepare now to handle extreme weather events in the future and minimize outages to the extent possible? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Support new technologies, like electric vehicles and solar power that reduce carbon emissions to the extent possible? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

Being a Customer-Centric Organization

Another focus of being "Future Ready" is ensuring that Milton Hydro is a "Customer-Centric Organization" which we describe as:

> **Treating customers like their needs matter – because they do. We will protect and grow customer loyalty and trust through a positive experience using many different service and communications channels.**

***9. To what degree would you say that Milton Hydro is "Customer-Centric" today? (check one)**

Very High Degree	High Degree	Medium Degree	Low Degree	Can't Rate

(optional) Comments: ____

In recent discussions we've had with some of our customers, we asked about the importance of improving online customer services and if they had any suggestions for new services that they thought would be valuable.

***10. How important are or would each of the following be to you?**

Ability to use your metering data in apps to manage your power usage (coming soon)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Access to more detailed historical usage data (suggested)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Real-time monitoring of consumption to allow customers to better control their usage and cost (suggested)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Improved online outage map and communications (suggested)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Milton Hydro Twitter feed with announcements about outages and company news (already available)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Better online communications with customer service (suggested)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Live chat function to get immediate answers to customers' questions (suggested)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

11. (optional) What other online customer services, if any, would be valuable to you? (describe below)

____

How Milton Hydro Uses the Money it Collects from Customers

Money collected through customer billing is used by Milton Hydro to fund: 1) Capital Spending, and 2) Operations, Maintenance and Administration (OM&A) Spending.

1. ***Capital Spending** relates to money spent to construct physical assets that last a "long" time, like poles, transformers, and lines for example, which have an average life cycle of 45 years or more, or meters that have an average life cycle of 15 years. Capital Spending includes spending on both existing infrastructure (e.g., debt interest, depreciation, and a return on equity), and for purchasing new assets. Capital Spending is broken into four categories: System Access, System Renewal, System Service and General Plant. These will be described in more detail below.*

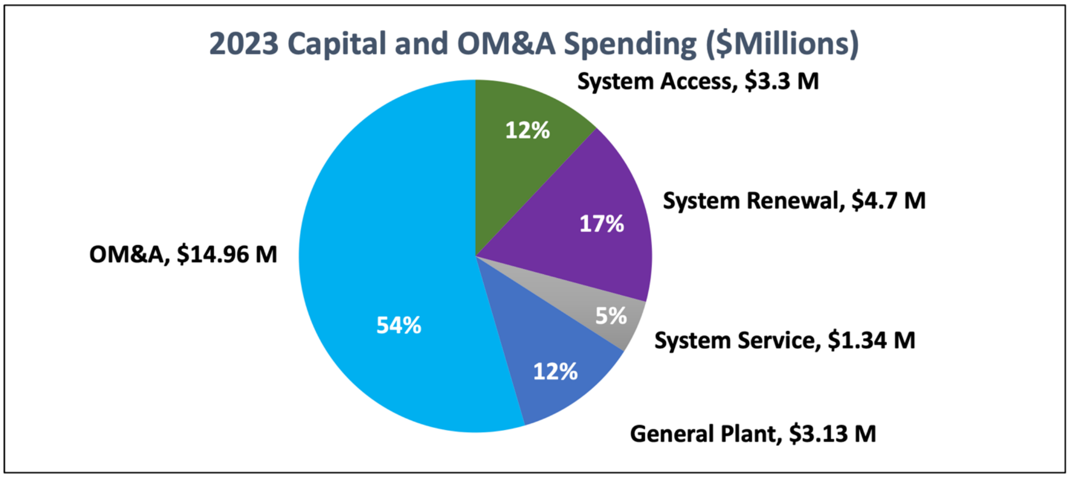
2. ***OM&A Spending** is broken into two categories:*

   - *Operations and Maintenance includes spending to inspect, operate, repair, and maintain the physical assets noted above, as well as the cost to operate and maintain the fleet of trucks and to operate and maintain the system control room and facilities.*

   - *Administration includes wages and materials for staff that support the functional ability of the organization, including engineering, warehousing, customer service, billing, accounting, regulatory affairs, human resources, and information technology (IT). In addition, this category also includes the costs to operate and maintain the general plant buildings, and IT systems/software licenses and support services.*

As part of the Rate Application process, we are sharing a draft of our Capital and OM&A spending plans with customers to help you understand the challenges we are facing. We will use the feedback we receive to update our financial plans before we file our rate application with the OEB.

The chart below shows Milton Hydro's spending on Capital and OM&A budgeted expenses for 2023:



A Little Context as We Grow to Meet the Needs of the Milton Community
To provide a little background, our team at Milton Hydro is changing the way we operate so we can continue to deliver safe and reliable electricity, while:

- *Meeting the needs of the growing community,*
- *Being more customer-centric,*
- *Modernizing our operations through technology, and*
- *Striving to exceed our customers' expectations.*

In 2021 and 2022 we started increasing our Capital and OM&A spending by more than inflation to ensure we had the resources needed to support growth and modernization and to support our vision for the future. One area where we did this was increasing our staffing so we could continue to provide a high level of service to our growing Milton community. Up until now we have been able to make these changes while limiting our annual rate increase to customers to less than inflation. Now, as a medium sized utility in a growing community, we cannot continue to absorb these costs. In our 2023 Cost-of-Service Rate Application to the OEB, we need to reset the level of spending. So going forward, Milton Hydro will need to pass on some of these costs as increased rates.

In the next sections of the survey, we describe our spending plans and ask for your thoughts, starting with the Capital Spending and the four categories under Capital Spending.

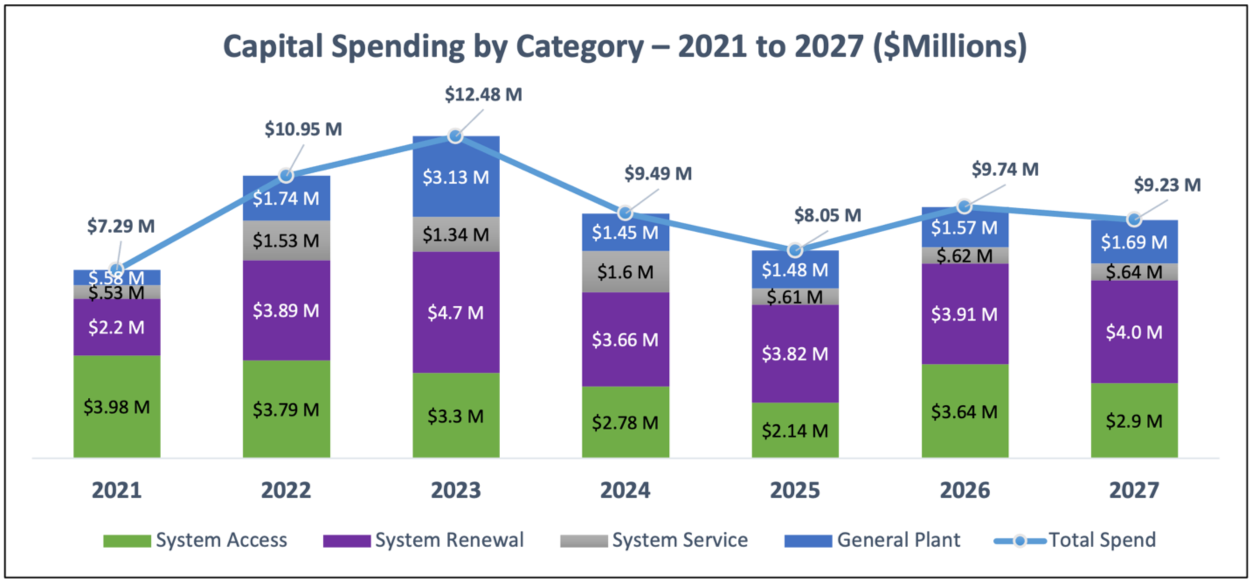
Key Elements of Capital Spending

Capital investments include the poles, wires, and transformers that you see (overhead) and those that you don't see (underground cables, transformer vaults), substations and the meters outside your homes and businesses that measure consumption. Capital investments include programs that are mandatory and required pursuant to statutory obligations. It also includes establishing our own control room so we can manage the rapid growth of our customer base and the future Distributed Energy Resources that will be available to customers.

Capital Spending is divided into the following four OEB investment categories:

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

Over the past 5 years, our capital expenses have averaged about $7.9 million annually and accounted for about half of our total annual budget. While the level of spending varies from year to year (as shown in the chart below), the average Capital Spending from 2023 to 2027 will be $9.8 million annually.

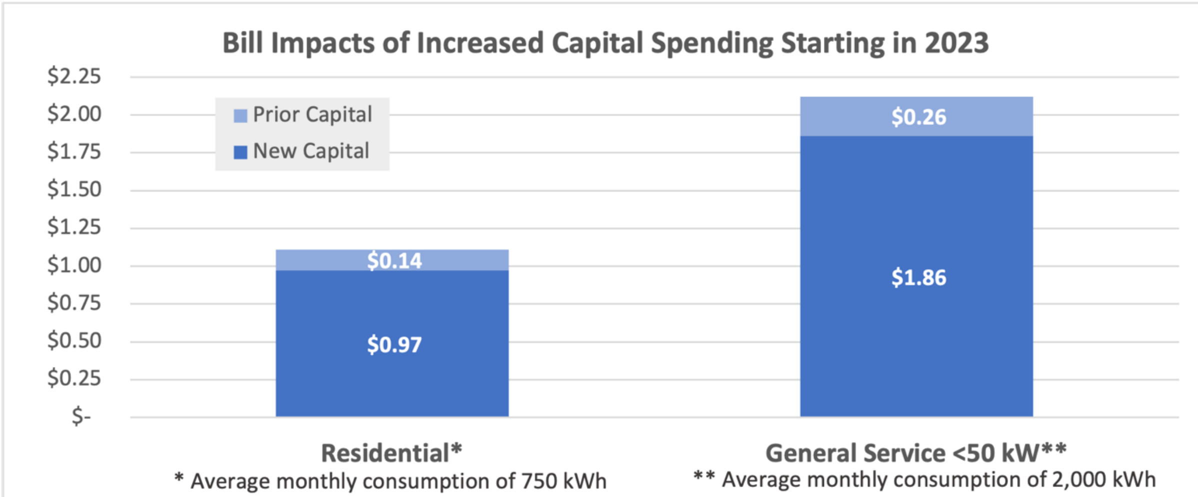


While the total amount of Capital Spending is similar to OM&A spending, the cost of capital expenses can be spread over the life of the assets – on average about 45 years. This means that the impact on your bill of additional Capital Spending is much smaller (though it lasts longer) compared to the OM&A expenses.

There are two components of the rate changes related to capital costs.

1) *The first relates to **new Capital Spending** that impacts the current, and future years. The impact on customer bills starting in 2023 related to the change in the new Capital Spending for the typical Residential customer is about $0.97 per month and the impact for the typical General Service < 50 kW customer is about $1.86 per month. These impacts are shown in the chart below.*

2) *The second relates to **capital investments of prior years** that become a component embedded in rates for many years. The impact on customer bills starting in 2023 related to investments of prior years is about $0.14 per month for the typical Residential customer and about $0.26 per month for the typical General Service < 50 kW customer.*



Electricity distributors including Milton Hydro rebase their distribution rates for 5-year periods. Rates that are established in 2023 form the basis of rates that will be set for the next 5 years. The subsequent annual rate changes for the years 2024 to 2027 will be limited to less than inflation.

To help you better understand our proposed Capital Spending plans and how they affect the quality and reliability of the service we provide, we describe spending in each of the capital categories in more detail below and ask for your feedback and priorities on our planning so that we can further refine it.

System Access

System Access encompasses activities such as: new connections for a subdivision; the cost of a building having its electricity service upgraded; or line reconstruction work due to road widening projects if, for instance the Region decides to widen the roads at Derry Rd. and Bronte St. **All of this work is needed due to the level of growth in the Town of Milton and falls under the mandatory work that Milton Hydro is required by regulation to carry out**.

Sample projects include:

- *Widening of Britannia Rd (RR25 to James Snow Parkway) requires 47 poles to be relocated.*
- *Widening of Fifth Line (Derry to Britannia) requires 79 poles to be relocated.*
- *Connection of new residential housing developments*
- *Connection of new multi-unit residential buildings*

System Access investment summary:

- *Between 2016 to 2020, spending on System Access has been about $3.3 Million per year on average, accounting for about 41% of our total Capital Spending.*
- *In 2023, we are planning to spend $3.3 Million on System Access. Over the next 5 years from 2023 to 2027 we are expecting to spend about $3.0 Million per year on average, accounting for about 30% of our total Capital Spending.*
- *This will add about 6 cents per month to the typical residential customers' bill and about 12 cents per month to the typical General Service < 50 kW small business bill. Note: While average spending over the previous 5 year and next 5 years are about the same, the OEB process for setting rates is based on a "reference year" (in this case 2023), which results in a small increase in rates.*

***12. Given this brief description, how important do you think System Access investments are to connect people to the system as the Milton community continues to grow? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

***13. How appropriate do you think the proposed level of investment in System Access spending is? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

System Renewal

System Renewal is the replacement and refurbishment of distribution system assets so that they continue to provide safe and reliable power. All assets are assessed regularly as part of our Asset Management Program to maximize the value of the asset before reaching the end of its useful life. Our pole replacement program falls under this category, as do overhead line rebuilds, and replacing underground transformers and old meters. **System Renewal supports Milton Hydro extracting the most value from each piece of equipment, while maintaining a robust system**.

Sample projects include:

- Overhead line rebuild on First Line, north of Lower Base Line Rd., replaces 36 poles, 1500m of wire, 5 transformers, 12 switches, 36 arresters and 20 anchors.
- Voltage conversion program (multi-year) converts existing 13.8 kV load to 27.6 kV, which reduces line losses (a cost that is passed through to all customers) and saves future costs of rebuilding end-of-life stations
- Milton Hydro was part of the pilot program that rolled out Smart Meters (in or about 2010). The meters that were installed at that time have begun to fail and require replacement. The program proactively replaces blocks of meters in a systematic manner; we plan on replacing 7,600 meters in 2023.

System Renewal investment summary:

- *Between 2016 to 2020, spending on System Renewal has been about $2.0 Million per year on average, accounting for about 25% of our total Capital Spending.*
- *In 2023, we are planning to spend $4.7 Million on System Renewal. Over the next 5 years from 2023 to 2027 we are expecting to spend about $4.0 Million per year on average, accounting for about 41% of our total Capital Spending.*
- *This will add about 16 cents per month to the typical residential customers' bill and about 30 cents per month to the typical General Service < 50 kW small business bill.*

***14. Given this brief description, how important do you think System Renewal investments are? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

***15. How appropriate do you think the proposed level of investment in System Renewal spending is? (check one)**

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Why do you give it this rating? ____

____

System Service

System Service includes purchasing equipment that modernizes and automates the distribution system. Faulted circuit indicators (FCIs) are an example – they allow staff in the system control room to reconnect the power grid faster, remotely from a desk, rather than dispatching staff to the site. Our distribution communications system, SCADA, also falls in this category. It enables faster response time to power grid issues and supports the outage map. **This spending supports fewer outages of shorter duration – strengthening the system's resilience. It also supports future proofing of the grid as technology and society advances**.

Sample projects include:

- Adding Outage Management System (OMS) functionality to the existing SCADA allows for more efficient and effective dispatch of crews during significant system outages
- Adding more automated overhead/underground switches and FCIs provides system control room operators and the SCADA/OMS system with greater visibility of the distribution system, to quickly isolate faulted lines and restore power.
- Adding a second 27.6 kV circuit on Tremaine Road (14th Side Road to Steeles Avenue), which will provide load transfer and back-up capability for an existing 27.6 kV circuit

System Service investment summary:

- *Between 2016 to 2020, spending on System Service has been about $1.6 Million per year on average, accounting for about 21% of our total Capital Spending.*
- *In 2023, we are planning to spend $1.3 Million on System Service. Over the next 5 years from 2023 to 2027 we are expecting to spend about $1.0 Million per year on average, accounting for about 10% of our total Capital Spending.*
- *This will **reduce** a typical residential customer's bill by about 5 cents per month and will **reduce** a typical General Service < 50 kW small business customer's bill by about 9 cents per month.*

***16. Given this brief description, how important do you think System Service investments are? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

***17. How appropriate do you think the proposed level of investment in System Service spending is? (check one)**

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Why do you give it this rating? ____

____

General Plant

General Plant is a broad category that includes our buildings, trucks, tools and equipment, all of the IT systems (communications, customer billing, cyber security, functional services, etc.).

Our General Plant spending and IT investments have been low over the past 5 years considering the rapidly increasing customer base. To date, we have been able to manage this and provide good service, but we now have to 'catch up' and ensure our IT systems meet current and future needs.

This portion of the budget **ensures that we have the digital systems needed to service customers adequately and line trucks are maintained and properly equipped to quickly restore power**. So, even if a storm hits at 2 AM, our line staff can safely head out to restore power, to try and make your morning 'normal'. It also helps ensure that: your bills are accurate; our functional support systems are adequately automated; your data is safe; and that we can communicate with you in timely manner, when it matters most.

Sample projects include:

- *Purchase a large truck that strings the hydro lines along poles. MH currently rents or borrows from another utility; the purchase will ease project scheduling conflicts and ensure faster installation.*
- *Building upgrades that address safety issues (vehicle entrance replacement); energy efficiency projects to reduce hydro consumption and gain future savings; improve server room HVAC, which protects/supports business continuity.*
- *Building renovations for and implementation of an in-house system control room.*
- *New Enterprise Resource Planning (ERP) system that will optimize performance and efficiencies of finance, procurement, supply chain, work management departments, and other functional services.*
- *Leverage existing software capabilities to support streamlining of tasks, processes, and workflows*

General Plant investment summary:

- *Between 2016 to 2020, spending on General Plant has been about $1.0 Million per year on average, accounting for about 13% of our total Capital Spending.*
- *In 2023, we are planning to spend $3.1 Million on General Plant. Over the next 5 years from 2023 to 2027 we are expecting to spend about $1.9 Million per year on average, accounting for about 19% of our total Capital Spending.*
- *This will add about 80 cents per month to the typical residential customers' bill and will add about $1.52 per month to the typical General Service < 50 kW small business bill. Note: While distribution assets in the other three asset categories for the most part last on average about 45 years. General Plant assets don't last as long, therefore this increase in spending results in a relatively larger impact on bills.*

***18. Given this brief description, how important do you think General Plant investments are? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

***19. How appropriate do you think the proposed level of investment in General Plant spending is? (check one)**

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Why do you give it this rating? ________________________________

Operations, Maintenance, and Administration Spending

As described above, **OM&A Spending** includes:

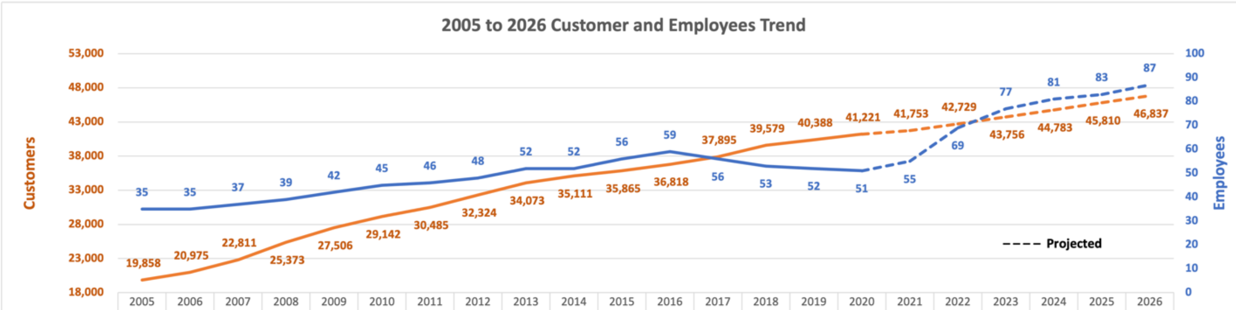
- ***Operations and Maintenance*** *spending to inspect, operate, repair, and maintain the physical assets in our system, as well as the cost to operate and maintain our fleet of trucks, as well as the system control room and related facilities; and*
- ***Administrative*** *spending on wages and materials for staff along with the costs to operate and maintain our buildings, and IT systems/software licenses and support services.*

Here is a little background to help you to understand our OM&A spending plans and how they affect the quality and reliability of the service we provide. We are interested in learning what is important to you and what your priorities are. We'll use your feedback to refine our OM&A spending plans for 2023 to 2027.

Milton Hydro has been operating as a ***small-sized electricity distributor*** for many years. Over the past 15 years, the community has grown to the point that we must now operate as a ***medium-sized electricity distributor*** so we can properly service our growing customer base. According to Halton Region's Integrated Growth Management Strategy 2041, within 10 years, the Town of Milton's population is forecasted to exceed the City of Burlington's projected population. To support this growth, we're transforming the company into what we call **"Milton Hydro 2.0"**. This transformation significantly impacts OM&A spending.

Being customer-centric means having the right number and kinds of employees who are capable and empowered and the right digital systems to operate and maintain the distribution system, respond to outages, and communicate effectively with customers.

Currently, our resources are really stretched. Since 2005, the number of employees has remained relatively flat despite the rapid growth of our customer base. From 2021 to 2026 we plan to adjust our staffing levels to bring them in line with what is needed to support our growing customer base.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Customers	19,858	20,975	22,811	25,373	27,506	29,142	30,485	32,324	34,073	35,111	35,865	36,818	37,895	39,579	40,388	41,221	41,753	42,729	43,756	44,783	45,810	46,837
Employees	35	35	37	39	42	45	46	48	52	52	56	59	56	53	52	51	55	69	77	81	83	87

***20. As the Milton community continues to grow, how important do you think it is that Milton Hydro ensure that we have the appropriate number of employees to effectively and efficiently manage our distribution business? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

A little background on our proposed software and systems changes

Some of our computer systems are outdated and are approaching their end-of-life. They are not performing at the level needed, and the software can no longer be supported adequately by the vendors due to obsolescence. We are remedying this.

We currently outsource our system control room services (an OM&A expense) to another utility who monitors and helps manage our power distribution system. The electricity landscape is evolving and will incorporate microgrids, distributed energy resources, conservation, and net zero residences. Recognizing the community's growth and the changing landscape, we realize that we need our own system control room (a Capital expense) and people and software to run the control room (an OM&A expense) to properly meet the needs of our community.

We will reduce our risk and improve operational resiliency by developing our own system control room. It would be designed to safely operate the grid and withstand external threats including extreme weather events and cyber-attacks. As we prepare for distributed generation and take on a distribution grid control function, having our own system control room will be important to ensuring reliability.

***21. As the Milton community continues to grow, how important do you think it is that Milton Hydro upgrade software and systems to support customer services like outage maps, billing and communications, and functional services? (check one)**

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

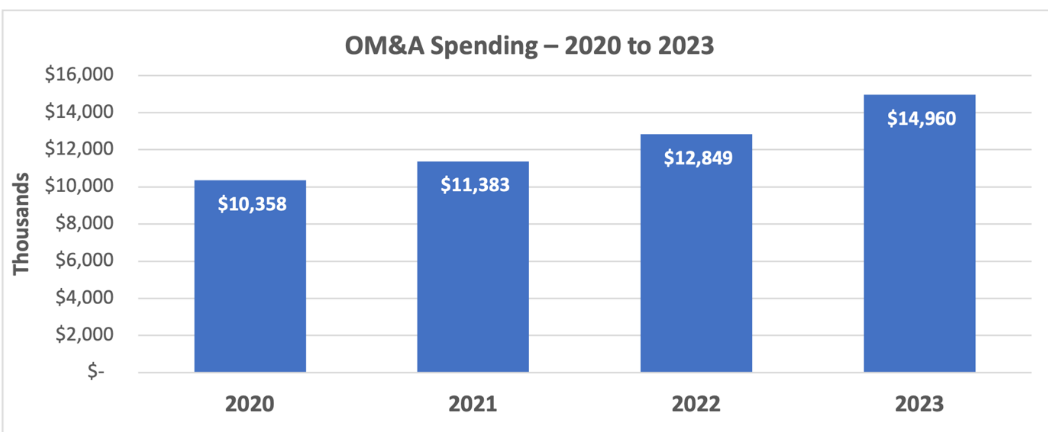
(optional) Comments: ____

OM&A Total Planned Expenditures (2020-2023)

Through "Milton Hydro 2.0", we're focused on right-sizing our resources so we can be more customer-centric and deliver a better and quicker customer experience. **To achieve the objectives of "Milton Hydro 2.0", we need to increase our OM&A spending in the following areas:**

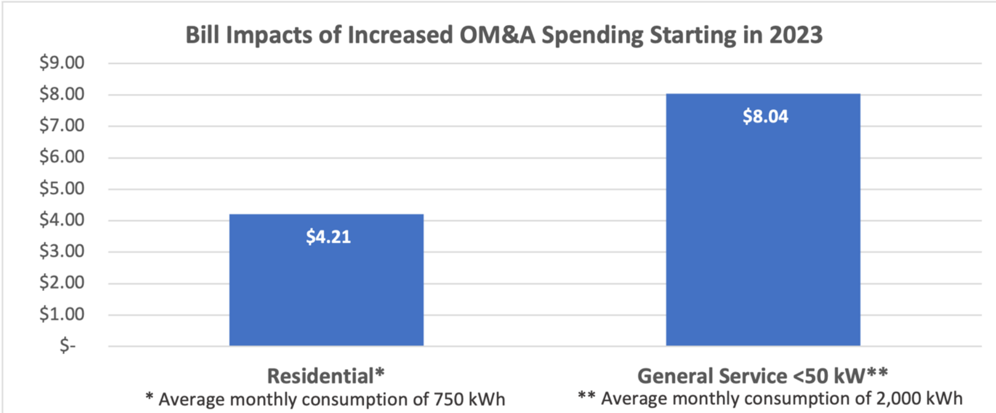
- *Better communications with customers and enhancing the customer experience.*
- *An Enterprise Resource Planning (ERP) system that will create internal efficiencies, eliminate/reduce manual processes, increase accuracy, and share data across departments and functions.*
- *Hardening systems, promoting better cyber security.*
- *An in-house system control room that will enable staff to respond to outages more quickly improving power reliability.*
- *Hiring and training staff so that they are empowered to respond to customers effectively, support operations and react in a timely manner to emergencies.*

In the following chart, you will see the sizable increase in OM&A spending that Milton Hydro is making (9.9% increase in 2021, and a further increase of 12.9% in 2022). **The full increase in 2021 and 2022 costs are NOT being passed on to you.** As mentioned earlier, up until now we were able to do this without increasing the rates we charge to our customers, but Milton Hydro cannot continue to absorb these costs and in our 2023 Cost-of-Service rate application, the level of spending is being reset, and going forward Milton Hydro will pass some of these costs on as increased rates. Note that the planned expenditures beyond 2023 are not included in our rate application to the OEB as the OM&A spending presented for 2023 are being used to set the reference rates as the base to the end of 2027.



Approximate OM&A Impact on Monthly Electricity Bill (2023)

In 2023, distribution charges are planned to increase by $4.21/month for a typical Residential customer and $8.04/month for a typical General Service < 50 kW small business customer due to increased OM&A costs for the system control room, right sizing our staffing requirements and investing in digital modernization.



OM&A Spending Summary:

- Between 2016 to 2020, OM&A spending has been about $10.1 Million per year on average. In 2021 and 2022 Milton Hydro's OM&A expenses are planned to be $11.38 Million, and $12.85 Million, respectively.
- *In 2023, we expect OM&A spending to be $14.96 million and account for a little over half of Milton Hydro's annual budget.*
- *This will add about $4.21 per month to the typical residential customers' bill and about $8.04 per month to the typical General Service < 50 kW small business customer bill.*

***22. How appropriate do you think the proposed level of investment in OM&A spending is? (check one)**

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Why do you give it this rating? ____

The Bottom Line: How this Affects Your Electricity Bill

Drivers for Bill Increases

Considering the investment decisions described in the four Capital Spending categories and OM&A spending, the drivers for the overall proposed increase on average monthly customer bills starting 2023 is summarized below:

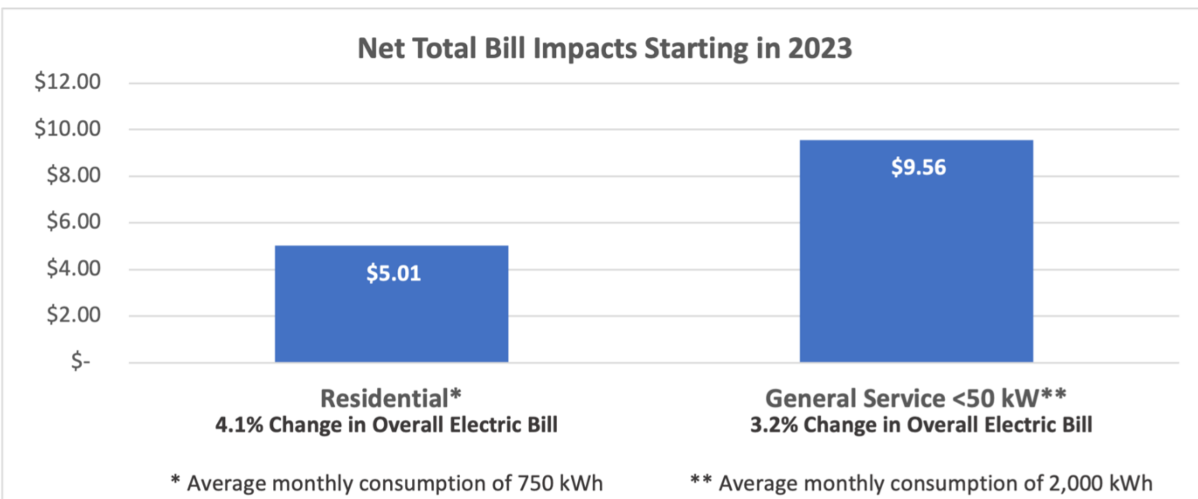
Drivers for Bill Increases	Residential	GS < 50kW Small Business
OM&A	4.21	8.04
Capital (New)	0.97	1.86
Capital (Existing)	0.14	0.26
Total Monthly Increase	**5.33**	**10.16**

Overall Bill Impact Summary

- *Starting in 2023 a typical Residential customer would see an **increase in distribution charges of $5.33** (an increase of about 18% of the distribution portion of their bill). After adjustment for the Ontario Electricity Rebate and HST, this results in a **net increase in their electricity bill of $5.01** (an increase of about 4.1% of their total electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).*
- *Starting in 2023 a typical General Service < 50 kW small business customer would see an **increase in distribution charges** of $10.16 (an increase of about or 18% of the distribution portion of their bill). After adjustment for the Ontario Electricity Rebate and HST, this results in a **net increase in their electricity bill** of $9.56 (an increase of about 3.2% of their total electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).*

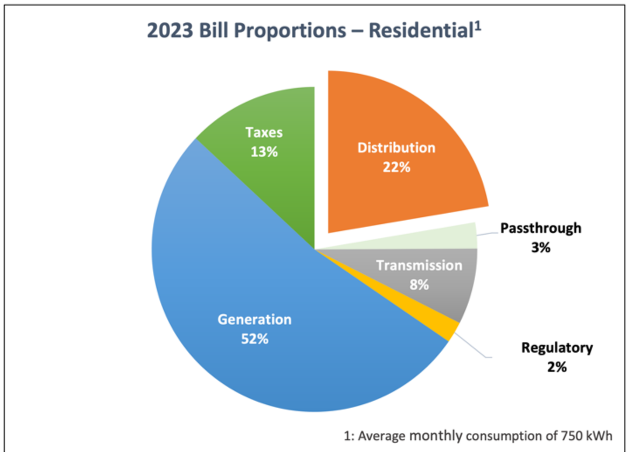
Once we reset our Distribution Rates in 2023, the **subsequent annual rate changes for the years 2024 to 2027 will be limited to less than inflation.**

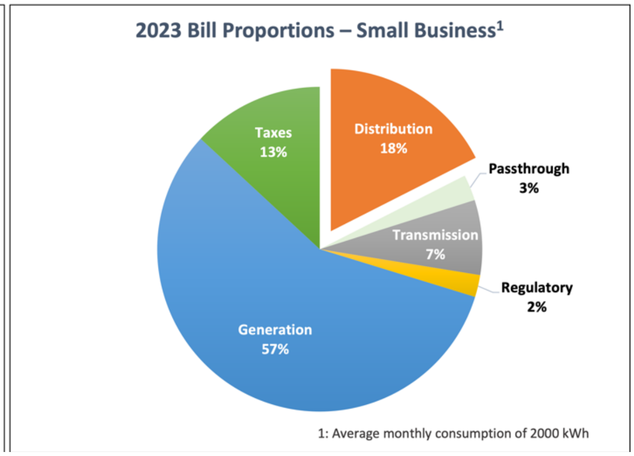
The Total Bill impacts are shown below:



For a typical residential customer, Milton Hydro's portion of the total electricity bill that is currently being proposed for 2023 is a fixed amount of $34.89 per month, amounts to approximately 22% of the total electricity bill.

For a typical small business customer, Milton Hydro's portion of the total electricity bill that is currently being proposed for 2023 is based on a fixed monthly charge of $21.46, and a variable charge of $0.0226 per kWh for a total of $66.75 per month, which amounts to approximately 18% of the total electricity bill.





***23. Given everything that was presented, how appropriate do you think the proposed level of spending is? (check one)**

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

Why do you give it this rating? (optional) ____

We believe in strong fiscal management and operating in a safe and reliable manner. To our customers, this means reasonable costs and dependable electricity. We are excited to be part of a growing community and are doing our part to ensure that residents and businesses prosper through our investments in technology and resources that will support Milton for years to come.

***24. Thinking about everything that has been presented, how confident are you that Milton Hydro will continue to provide safe, reliable and affordable electricity? (circle one)**

High Degree of Confidence	Medium Degree of Confidence	Low Degree of Confidence	Can't Rate

Comments (optional): ____

Milton Hydro Customer Communications

We have just a couple of questions about how you would like Milton Hydro to communicate with you.

***25. Would you like to hear from Milton Hydro on a regular basis?**

☐ Yes

☐ No

***26. What is the best way for Milton Hydro to communicate with you as we go forward? (Check all that apply)**

☐ Bill insert
☐ Milton Hydro website
☐ Email from Milton Hydro
☐ Text message
☐ Newspapers
☐ Radio
☐ Social media
☐ Television
☐ Other (please specify) ____

***27. What sorts of information would you like to receive?**

☐ How to reduce your electricity bill
☐ New programs that will help you better manage your electricity consumption
☐ New grant programs to help with costs to retrofit your home
☐ There is no information that I would like at this time
☐ Other (please specify) ____

Closing

To finish the survey and before we move on to your entering your name into the draw we have just a few general questions.

***28. Approximately how long have you been a customer of Milton Hydro (at your current residence or other previous residences? (check one)**

Less than 2 years   2-5 years   6-10 years   11-15 years   More than 15 years

***29. What is your gender? (check one)**   Male   Female

Note: The following alternative gender question was provide for some survey Respondents upon their request.

***29. What gender pronouns do you identify with? (check one)**

She/Her   He/Him   They/Them   Prefer not to answer

***30. What is your approximate age? (check one)**   20s   30s   40s   50s   60+

***31. Do you have children under 18 living at home? (check one)**   yes   no

***32. Please provide your postal code:** _______________

Thank You

Thank you for taking the time to share your thoughts with us on our system planning. With your input, we're committed to putting the best possible plan forward to the OEB. We will work hard to earn your trust and are committed to work every day to bring you safe, reliable electricity at a reasonable price.

The results of this research will help our team at Milton Hydro finalize our planning and how we communicate with you in the future. Highlights from this research will be included in our Cost-of-Service filing which will become available as a public document upon completion.

Appendix D: Larger Commercial/Industrial Customer Webinar Online Survey

Your Input is Important

Dear Customer,

Thank you for participating in our Business Planning Webinar to support our work on preparing our 2023 Rate Application for the Ontario Energy Board (OEB). The following questions align with webinar presentation.

Troy Hare
President and CEO
Milton Hydro

*1 To start off, please tell us what kind of an electricity customer you are. (Select One)
- ☐ GS 50 to 999 kW
- ☐ GS 1,000 to 4,999 kW
- ☐ Large User

2. Please provide your company name so that we can respond to any questions that you may raise in the survey.

Milton Hydro Priorities

Milton Hydro regularly engages with its customers to understand the priorities as perceived by customers to make sure we are doing our best to meet your expectations. This engagement is one such example. Telephone surveys are another. Pre-pandemic, Milton Hydro held in-person sessions to engage with customers and garner feedback.

3. Listening to our customers is an important way we seek to improve our services. Please rate the importance of the following priorities as they relate to your business.

Proactively maintaining and upgrading equipment

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Reducing the number and duration of outages

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Reducing the environmental impact of the utility's operations

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Ensuring cyber security

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Educating customers about energy conservation

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Having a single point of contact for questions and concerns about your electricity needs

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Having access to expertise to support electricity solution options and alternatives

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

Looking Forward

4. Good business planning takes a forward-looking perspective. Looking forward, how do you think your business will change in the next 5 to 10 years (please check all those that apply):

- ☐ Expansion in operations
- ☐ Reduction in operations
- ☐ No change in size of operations
- ☐ EV fleet charging
- ☐ Installation of solar or battery to offset electricity drawn from the grid

An essential part of effective planning is to prepare for the changes that are coming in society and our industry. At Milton Hydro, we are transforming our business to be "Future Ready"
A critical focus of being "Future Ready" is ensuring that Milton Hydro is a "Customer-Centric Organization".

5. To what degree would you say that Milton Hydro is "Customer-Centric" today? (check one)

Very High Degree	High Degree	Medium Degree	Low Degree	Can't Rate

(optional) Comments: ____

6. Thinking about the past two years, what has been your biggest challenge with your electricity service?

Comments: ____

7. If Milton Hydro could change one thing (not including cost) to improve its service to you, what would that be?

Comments: ____

System Access

System Access is **mandatory work, regulated work that Milton Hydro is required to carry out**: new/upgraded connections for a commercial/industrial customer, or line reconstruction work due to road widening projects. Much of this work is reactive to customer needs. Milton Hydro teams work hard to manage, balancing planned work, maintenance and customer work.

Sample projects include:
- New/upgraded connections for commercial/ industrial customer
- Line reconstruction work due to road widening projects

System Access investment summary:
- Historically (2016 to 2020) spending was $3.3M or 41.4% of total capital spend.
- Planned (2023 to 2027) spending average of $3.0M or 30.1% of total capital spend.
- This will add about $1.27 per month to the typical General Service 50 to 999 kW customer's bill and about $10.58 per month to the typical General Service 1,000 to 4,999 kW customer's bill.

8. Given the importance of this work to enable businesses to operate and the Town to grow, how appropriate do you think the proposed level of investment in System Access spending is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't rate

Comments (optional): ____

System Renewal

System Renewal investments are budgeted for the replacements of distribution system assets. All assets have a life expectancy and assets must eventually be replaced. Some replacements are part of Milton Hydro's planned asset replacement programs and other replacements are reactive, when equipment reaches its end-of-life. The replacement and refurbishment of distribution system assets is critical to the continued distribution of safe and reliable power via a robust system.

Sample projects include:
- Proactive replacement of wood poles to minimize unplanned failures, especially during storm conditions; poles are installed to current standards making them more resilient.
- Switchgear replacements happen when the asset reaches end-of-life. Newer models have lower operating costs, are more cost effective to maintain, and can have the provision for remote operation which reduces the durations of outages.
- The porcelain to polymer insulator replacement program replaces end-of-life insulators, switches and lightning arresters with better technology that is safer and self-cleaning.

System Renewal investment summary:
- Historically (2016 to 2020) spending was $2.0M or 25.1% of total capital spend.
- Planned (2023 to 2027) spending average of $4.0M or 41.0% of total capital spend.
- This will add about $3.11 per month to the typical General Service 50 to 999 kW customer's bill and about $25.94 per month to the typical General Service 1,000 to 4,999 kW customer's bill.

9. Given the need to invest in infrastructure systems that will improve electricity delivery reliability, how appropriate do you think the proposed level of investment in System Renewal is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Comments: ____

System Service

System Service includes purchasing equipment that modernizes and automates the distribution system. This spending supports fewer outages of shorter duration—strengthening the system's resilience. It also supports future proofing of the grid as technology and society advances.

Sample projects include:

- SCADA system provides visibility of the distribution system, enables faster response time, remote control of equipment, and supports the outage map
- Automated overhead/underground switches and faulted circuit indicators enable isolation of faulted lines and remote power restoration
- Voltage line conversions reduce line losses making the system more efficient; enables backup supply and enhances reliability.

System Service investment summary:

- Historically (2016 to 2020) spending was $1.6M or 20.6% of total capital spend.
- Planned (2023 to 2027) spending average of $1.0M or 9.8% of total capital spend.
- This will reduce a typical General Service 50 to 999 kW customer's bill by about $0.89 per month and will reduce a typical General Service 1,000 to 4,999 kW customer's bill by about $7.38 per month.

10. Given the need to invest in infrastructure systems that will improve electricity delivery reliability, how appropriate do you think the proposed level of investment in System Service is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Comments: ____

General Plant

General Plant is a broad category that includes buildings, trucks, tools and equipment, and IT systems (communications, customer billing, cyber security, functional services, etc.). Our building, fleet and equipment budgets are relatively proportionate to previous budget cycles; however, in past to help keep costs low, we deferred different IT investments. We have budgeted for three major IT projects that will improve operational efficiency through simplification/ automation of business processes and workflows, reduce operational cost, increase opportunity for employees to focus on higher value activities, and reduce employee fatigue while improving employee satisfaction.

Sample projects include:

- Buildings
- IT systems (communications, customer billing, cyber security, functional services, etc.).
- Trucks, tools and equipment

General Plant investment summary:

- Historically (2016 to 2020) spending was $1.0M or 12.9% of total capital spend.
- Planned (2023 to 2027) spending average of $1.9M or 19.0% of total capital spend.
- This will add about $15.73 per month to the typical General Service 50 to 999 kW customer's bill and will add about $131.03 per month to the typical General Service 1,000 to 4,999 kW customer's bill.

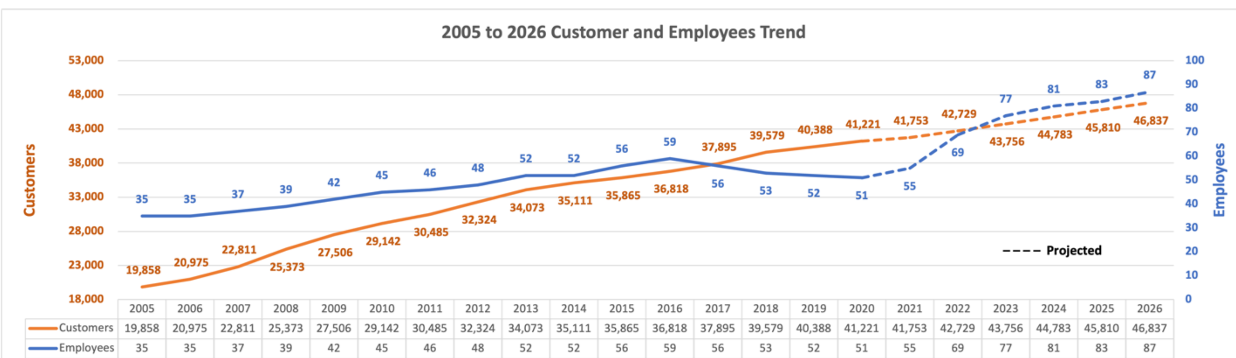
11. Understanding the requirement to have accurate bills, secure data, a properly equipped and maintained fleet, and IT processes that promote efficiencies, reduce the potential for errors and empower our workforce, how appropriate do you think the proposed level of investment in General Plant is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Comments: ____

Operations, Maintenance, and Administration Spending

Currently, our resources are really stretched. Since 2005, the number of employees has remained relatively flat despite the rapid growth of our customer base. From 2021 to 2026 we plan to adjust our staffing levels to bring them in line with what is needed to support our growing customer base.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Customers	19,858	20,975	22,811	25,373	27,506	29,142	30,485	32,324	34,073	35,111	35,865	36,818	37,895	39,579	40,388	41,221	41,753	42,729	43,756	44,783	45,810	46,837
Employees	35	35	37	39	42	45	46	48	52	52	56	59	56	53	52	51	55	69	77	81	83	87

12. To ensure Milton Hydro has the appropriate workforce (staff and training) and are properly equipped to deliver reliable electricity and manage internal operations, how appropriate do you think the proposed increase in staffing is (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Comments: ____

System Control Room

Milton Hydro plans to invest in an in-house System Control Room to maximize value of grid automation assets, allowing the team and work crews to respond faster and more effectively. We also need to be able to respond to the needs of the evolving electricity landscape that will incorporate microgrids, distributed energy resources, conservation, and net zero residences

13. In recognition of the changing electricity landscape, the community's growth, the need to be able to maximize the value of its investments, and ensure swift response capabilities to reduce outages and outage duration, how important do you think it is to invest in an in-house System Control Room? (check one)

Very Important	Important	Somewhat Important	Neutral	Not Very Important	Can't Rate

(optional) Comments: ____

OM&A Total Planned Expenditures (2020-2023)

Milton Hydro is committed to you – our customers – and our staff. We have started on making the necessary investments in OM&A – 9.9% increase in 2021, and a further increase of 12.9% in 2022. As a responsible business operating with prudent fiscal management, **the full increase in 2021 and 2022 costs are NOT being passed on to our customers.**

OM&A Spending Summary

- Between 2016 to 2020, OM&A spending has been about $10.1M per year on average.
- 2021 and 2022 Milton Hydro's OM&A expenses are planned to be $11.38M, and $12.85M, respectively.
- 2023, OM&A spending is estimated to be $14.96M and account for a little over half of Milton Hydro's annual budget.
- This will add about $83.22 per month to the typical General Service 50 to 999 kW customer's bill and about $693.28 per month to the typical General Service 1,000 to 4,999 kW customer's bill.

14. How appropriate do you think the proposed level of investment in OM&A spending is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

(optional) Comments: ___________________________________

The Bottom Line: How this Affects Your Electricity Bill

Drivers for Bill Increases
Considering the combined investment decisions described in the four Capital Spending categories and the OM&A spending, the drivers for the overall proposed increase in distribution charges on average monthly customer bills starting 2023 is summarized below:

Driver of Increase	GS 50 - 999 kW	GS 1,000 - 4,999 kW
OM&A	83.22	693.28
Capital (New)	19.22	160.17
Capital (Existing)	2.88	23.90
Total Monthly Increase	**105.33**	**877.36**

After adding HST:

- Starting in 2023 a typical GS 50 to 999 kW business customer would see an net increase in their overall electricity bill of $119.02 (an increase of about 1.2% of their overall electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).
- Starting in 2023 a typical GS 1,000 to 4,999 kW business customer would see an net increase in their electricity bill of $991.41 (an increase of about 0.44% of their overall electricity bill, which includes generation and transmission, in addition to Milton Hydro's distribution charges).

15. Given everything that was presented, how appropriate do you think the proposed level of spending is? (check one)

Very Appropriate	Somewhat Appropriate	Not Very Appropriate	Not at All Appropriate	Can't Rate

Why do you give it this rating? (optional) ____

We believe in strong fiscal management and operating in a safe and reliable manner. To our customers, this means reasonable costs and dependable electricity. We are excited to be part of a growing community and are doing our part to ensure that residents and businesses prosper through our investments in technology and resources that will support Milton for years to come.

16. Thinking about everything that has been presented, how confident are you that Milton Hydro will continue to provide safe, reliable and affordable electricity?

High Degree of Confidence	Medium Degree of Confidence	Low Degree of Confidence	Can't Rate

Milton Hydro Customer Communications

How you would like Milton Hydro to communicate with you?

17. Would you like to hear from Milton Hydro on a regular basis?

☐ Yes

☐ No

18. How would you like Milton Hydro to communicate with you as we go forward? (Check all that apply)

☐ Account Representative
☐ Bill insert
☐ Milton Hydro website
☐ Email from Milton Hydro
☐ Text message
☐ Newspapers
☐ Radio
☐ Social media
☐ Television
☐ Other (please specify) ____

Thank You

Thank you for taking the time to share your thoughts with us on our system planning. With your input, we're committed to putting the best possible plan forward to the OEB. We will work hard to earn your trust and are committed to work every day to bring you safe, reliable electricity at a reasonable price.

The results of this research will help our team at Milton Hydro finalize our planning and how we communicate with you in the future. Highlights from this research will be included in our Cost-of-Service filing that will become available as a public document upon completion.

Appendix E: Background on Decision Partners Canada Inc.

Decision Partners understands influences on people's judgment, decision making and behaviour. The company is a world leader in advanced behavioural decision research, strategy and communications services for focusing decision making and behaviour. Our methods draw from current understanding in the relevant academic disciplines, including cognitive psychology, decision science, risk perception and risk communication.

Our science-informed, evidence-based, Mental Modeling Insight™ approach is a proven management process for developing policies, strategies, interventions, and communications that deliver measurable behavioural outcomes.

A major component of our energy-related work across North America over the past three decades has focused on stakeholder and customer engagement on a broad range of energy-related challenges, including Customer Engagement on DSPs in Ontario.

www.decisionpartners.co