Exhibit 2

Rate Base | **Underground Voltage Conversion**

Additional Evidence

The following is provided as additional evidence for NOTL Hydro's underground voltage conversion program.

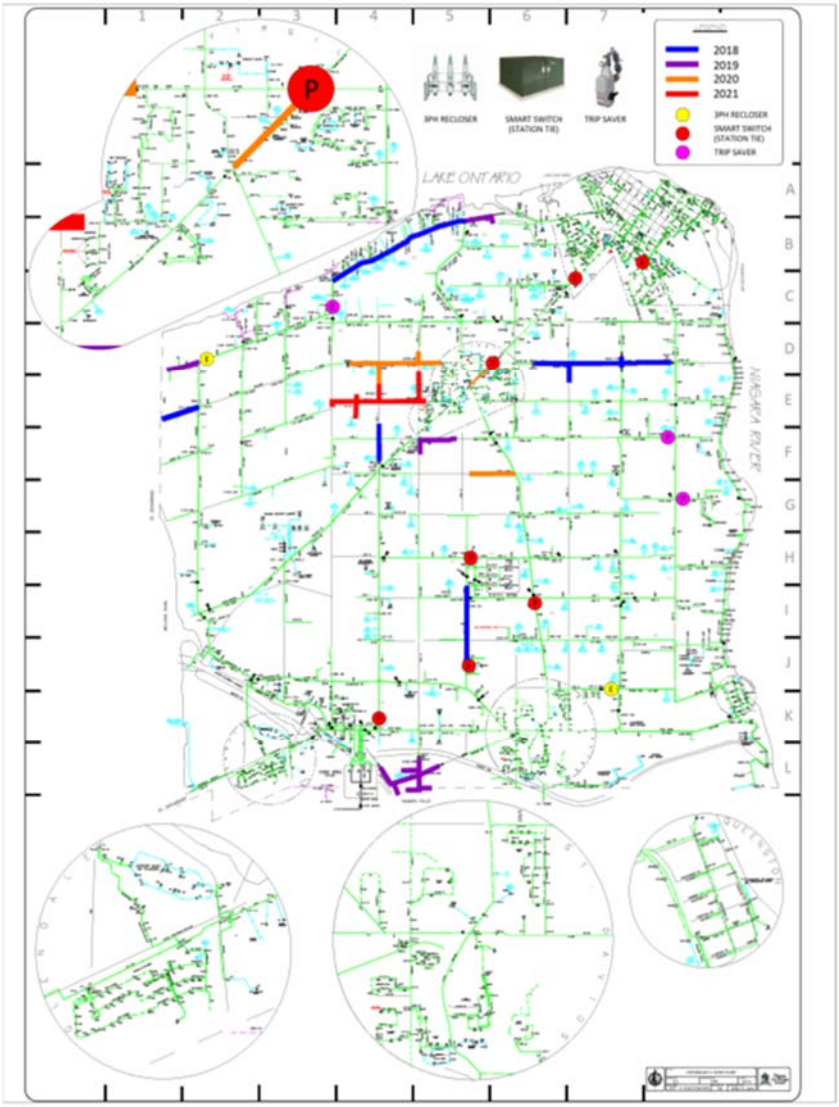
Background

NOTL Hydro commenced its voltage conversion program in 1987. At that time NOTL Hydro was the Niagara-on-the-Lake Hydro Electric Commission. The plan was to convert, over many decades, the existing 4,160 V system to a 27,600 V system. Voltage conversion programs are quite common in local distribution companies as they offer a number of benefits including:

- Helping reduce line losses as the higher voltage means lower losses during distribution. Losses on a 4.16 kV line are 6.6 times greater than on a 27.6 kV line. NOTL Hydro's line losses have fallen from an average 5.35% (1994-1998) to an average 3.73% (2013-2017).
- Simplifying the system. Four distribution substations have been removed as part of the conversion project. Parts are also standardized once the system is all one voltage.
- Greater capacity. 27.6 kV lines can carry much more electricity thus ensuring NOTL Hydro can accommodate the growth in NOTL without having to invest in additional lines. NOTL Hydro customer base has almost doubled since 1987.
- The conversion can be planned at a time when the poles and wires need to be replaced anyway; thus reducing the incremental cost.
- Lower maintenance costs. As 4.16 kV systems are being phased out the manufacturers are no longer making 4.16 kV replacement parts as part of their standard offerings. Parts are therefore becoming more expensive. NOTL Hydro has kept an inventory of the used 4kV transformers that it has removed for this reason.

In terms of kilometers of lines, most of the NOTL Hydro system is rural. The map below shows the final rural segments remaining to be converted. The lines not coloured have already been converted. Rural lines are easier to convert as, being a farming community, there is little tree cover and the roads are long and straight. Though, traffic is more of an issue due to the higher speeds of oncoming vehicles. The taller poles required for the 27.6 kV lines can be relatively easily accommodated.

Map 2.1 NOTL Planned Overhead Voltage Conversion Work



Underground Voltage Conversion Program By-Law

Converting the urban areas was more problematic. These areas tend to be big tourist draws as they are heritage areas (Olde Town, Queenston, Virgil), and as older areas they have developed extensive tree canopies. Installing the higher poles for the 27.6 kV lines would extensively damage this tree canopy and disturb the character of the areas. This would not be acceptable to

the Town residents. Recognizing this, in 1989 the NOTL Hydro Electric Commission passed a by-law requiring that the voltage conversion in these areas be by way of underground installations.

By-law 5.7.1 of the Niagara-on-the-Lake Hydro Electric Commission reads:

> *"That within the Niagara Urban Service Area, all future developments 150 kVA and above must connect to the existing 27.6 kV system by means of underground primary cable in accordance with Niagara-on-the-Lake Hydro; and*
>
> *That all other developments of less than 150 kVA that do not connect to the 27.6 kV system shall be connected to the existing system with the provision of dual ratio transformers; and*
>
> *That all new service connections by underground."*

This by-law was passed on May 23, 1989. A copy of the by-law is attached as Appendix A.

The by-law was passed on the recommendation of the Planning Committee. The recommendation (a copy of which is attached as Appendix B) reads:

> *"On April 24, 1989, the Planning Committee met to review system reliability and system configuration with a long range goal in mind. System configuration was discussed at length with the 27.6 kV feeder arrangement being the focal point. The Committee was in agreement that any long range plan agreed upon would include the eventual conversion of all existing 4160 V load to a new 27.6 kV system given that the existing 4160 V feeders and substations are beyond capacity and in most cases approaching their expected life time.*
>
> *In order for staff to plan an effective 27.6 V feeder supply, direction is required to establish system parameters and place a long range plan in effect.*
>
> *In effectively planning a feeder system, it was realised that replacement of existing 4160 lines with 27.6 kV lines requires higher poles on the present overhead systems. It was felt that this would be unacceptable to the Commission considering aesthetics and the*

eventual requirement to cut back existing trees on Town streets. The Committee agreed that any additions to the feeder systems should be by underground cable and that all future developments should be required to provide underground extensions to the system.

In consideration of the proposed feeder system, the placement of services will require underground installation.

It is the recommendation of the Planning Committee:

That within the Niagara Urban Service Area, all future development must connect to the existing 27.6 kV system by means of underground primary cable in accordance with the requirements of Niagara-on-the-Lake Hydro; and

That all new service connections be by underground cable; and

That all applicants for upgraded service be required to convert their overhead service to underground service.

This by-law was in place from 1989 until 2000 when NOTL Hydro was created. As part of the first Board meeting of NOTL Hydro on October 30, 2000, the following motion was passed:

<u>Adoption of the Policies, Procedures, Rules and Direction of the Niagara-on-the-Lake Hydro Electric Commission</u>
Upon motion duly made, seconded and carried, IT WAS RESOLVED that, all the current administrative policies, rules and directions of the Niagara-on-the-Lake Hydro Electric Commission be adopted by the Corporation as may be applicable to the business activities of the Corporation.

A copy of the relevant minutes from the NOTL Hydro meeting in October 2000 is attached as Appendix C.

The pre-existing undergrounding by-law/policy has continued to govern and apply to NOTL Hydo since 2000. This by-law and/or policy is a policy of the utility corporation, not of the Town.

The tree canopy continues to be an important feature of Niagara-on-the-Lake:

- In 2018, Niagara-on-the-Lake won the Communities in Bloom Heritage Conservation Outstanding Achievement Award. The committee that ran this initiative was a mix of residents and town officials. One of the six criteria for the reward was the *"Urban Forestry which includes policies, by-laws and standards for tree management, tree placement, tree inventory and commemorative trees, as well as pest management practices."* NOTL Hydro was interviewed by the judging panel of Communities in Bloom and the underground voltage conversion program was one of the topics of discussion.
- Niagara-on-the-Lake has several trees that are designated "heritage" and around which great care must be taken.
- The Town of Niagara-on-the-Lake is considering implementing a by-law which would prevent the removal of trees in the urban areas without prior approval. NOTL Hydro was interviewed by the consultant working on this by-law.
- A developer recently removed trees from a property in the urban area. This became a topic of considerable debate and civic unrest for many months.

Underground Voltage Conversion By-Law Confusion

One of the sources of confusion in this proceeding has been the reference in the original evidence to a Town By-law. Page 38 of NOTL Hydro's Consolidated Distribution System Plan includes the sentence "*A Town bylaw prohibits the installation of new overhead plant as a means of preserving the heritage nature of the Olde Town."* This by-law is also referenced in the COS submissions for 2013 and 2009.

The interrogatory VECC-7 requested a copy of the by-law. At that time a copy of the by-law could not be located.

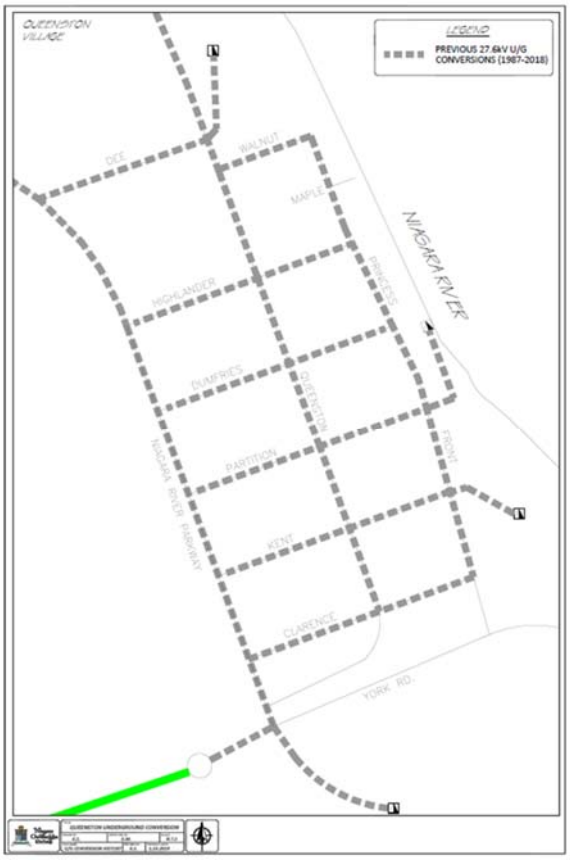
Subsequent investigation including a detailed search through archived records found a copy of the by-law, and it was determined that this was a Niagara-on-the-Lake Hydro Electric Commission by-law, rather than a Town of Niagara-on-the-Lake by-law.

Underground Voltage Conversion Progress

Since 1987, NOTL Hydro has converted to underground all of Queenston and most of the Olde Town. This can be seen on the two maps below. In addition, the Niagara Parkway, which runs from Queenston to the Olde Town was converted from underground 4.16 kV to underground 27.6 kV.

Map 2.2 Past and Future Underground Voltage Conversion in NOTL Olde Town

Map 2.3 Queenston Underground Voltage Conversion



NOTL Hydro estimates it has completed 2/3s of the underground voltage conversion project and that it will be completed by 2034. The remainder of the Olde Town and the main street in Virgil remain to be converted.

Voltage Conversion Expenditures

A summary of the voltage conversion expenditures from 2002 is provided below. Voltage conversion currently represents the majority, though not all, of the system renewal expenditures. This is expected to change in 2022 when the overhead voltage conversion is complete. In that year more expenditures will switch to other projects based on the asset management system.

Table 2.4 Voltage Conversion Expenditures

Year	Overhead Conversion Spend ($000's)	Underground Conversion Spend ($000's)	Total Capital Spend ($000's)	Conversion Spend as a % of Total Capital	Underground Conversion Spend as a % of Total Capital
2002	93	59	1,499	10	4
2003	29	274	4,042	8	7
2004	140	281	1,236	34	23
2005	296	57	3,386	10	2
2006	253	467	1,505	48	31
2007	172	35	1,307	16	3
2008	312	361	1,407	48	26
2009	240	797	1,711	61	47
2010	29	320	1,530	23	21
2011	293	177	1,655	22	11
2012	337	409	1,687	44	24
2013	153	415	1,888	30	22
2014	80	253	2,078	16	12
2015	112	125	3,422	7	4
2016	395	314	832	85	38
2017	345	61	2,035	20	3
2018	282	162	2,697	16	6
2019	400	340	5,061	15	7
Total	$3,861	$4,908	$38,978	22%	13%

On average, the underground voltage conversion costs are 13% of total capital spend and the total voltage conversion program is 22% of total capital spend. The total capital spend in this analysis is net of capital contributions and includes expenditures that would be booked to Capital Work in Progress.

Costs and Benefits

Converting lines underground has additional benefits. These include:

- Tree trimming costs are lower. It is estimated that when the Olde Town is fully converted the tree trimming savings will be around $20,000 for each three year cycle.
- Better reliability. NOTL Hydro is not currently able to calculate the reliability measures for discrete areas of Niagara-on-the-Lake but it is evident that the Olde Town area has more outages than other areas. NOTL Hydro received a call earlier in late 2018 from a customer in the Olde Town to complain he had four outages that year. We were able to provide some reassurance that most of these would no longer occur when his service was converted to underground.

There is an additional cost to installing an underground service compared to overhead but that differential is difficult to quantify. In the rural areas we can use a rule of thumb that the costs of installing overhead could be as little as one third of that if we had gone underground. However, in that scenario, the installations are in farmland or a suburban housing development, both with lots of space. The same multiple cannot be used in older, established urban areas as installing overhead lines is much more difficult:

- In the rural areas, NOTL Hydro can modify the line and the location of the poles to meet road setback requirements or avoid obstacles. In the urban areas, NOTL Hydro will have to put the new, higher poles in the same location as the existing poles. This can be a challenge as obstacles such as trees and structures which are above the existing lines will obstruct the new higher lines. The planning and design costs will be significantly higher.
- Niagara-on-the-Lake has a rigorous review process for any construction in the Olde Town designed to protect its heritage nature. These include public hearings. NOTL Hydro has never had to deal with this as it was moving its wires underground. The cost of this process is likely be significant due to the additional tree trimming, and potential tree removals, that would be required with the higher 27.6 kV lines.
- NOTL Hydro has been converting the Olde Town lines for 30 years as described above. Residents are familiar with this process as updates are provided at all Annual General Meetings and any information sessions. Changing plans could open up NOTL Hydro to potential legal challenges from residents whose service is not being converted to underground and instead see the existing poles on their street be replaced with taller, larger new poles.

Due to the uncertainty in these factors, NOTL Hydro is not able to assign a cost to building an overhead line in the Olde Town.

As noted in the original evidence and in the additional evidence being provided on Operations, Maintenance and Administration costs, NOTL Hydro has the lowest overall rates in the Niagara region and some of the lowest rates in the province despite 30 years of converting services to underground.

ATTACHMENT TO ITEM # 6.7.2 -- UNDERGROUND PRACTICES POLICY

ITEM # 5.7.1 POLICY 23 MAY 1989

UNDERGROUND PRACTICES

On April 24, 1989, the Planning Committee met to review system reliability and system configuration with a long range goal in mind. System configuration was discussed at length with the 27.6kV feeder arrangement being the focal point. The Committee was in agreement that any long range plan agreed upon would include the eventual conversion of all existing 4160 V load to a new 27.6kV system given that the existing 4160 V feeders and substations are beyond capacity limitations and in most cases approaching their expected life time.

In order for staff to plan an effective 27.6kV feeder supply, direction is required to establish system parameters and place a long range plan in effect.

In effectively planning a feeder system, it was realised that replacement of existing 4160 lines with 27.6kV lines requires higher poles on the present overhead systems. It was felt that this would be unacceptable to the Commission considering aesthetics and the eventual requirement to cut back existing trees on Town streets. The committee agreed that any additions to the feeder systems should be by underground cable and that all future developments should be required to provide underground extensions to the system.

In consideration of the proposed feeder system, the placement of services will also require underground installation.

It is the recommendation of the Planning Committee:

That within the Niagara Urban Service Area, all future development must connect to the existing 27.6kV system by means of underground primary cable in accordance with the requirements of Niagara-on-the-Lake Hydro; and

That all new service connections be by underground cable; and

That all applicants for upgraded service be required to convert their overhead service to underground service.

5.6 Deputations

None

5.7 By-laws and Policies

5.7.1 Underground Practices

The manager presented the report and several questions were raised. Mr. Henry expressed concern that there was no option for customers who would be forced to pay the costs. Mr. Carr noted that if legislation would allow, these costs could be charged in a similar manner as public works over an extended time period. Equal treatment of all customers in a class was discussed. Problems with customer owned underground secondary were mentioned.

The recommendation of the Planning Committee was moved as amended.

Moved by Jim Lambert
Seconded by Hartmut Wiens
That within the Niagara Urban Service Area, all future developments 150 kVA and above must connect to the existing 27.6 kV system by means of underground primary cable in accordance with the requirements of Niagara-on-the-Lake Hydro; and

That all other developments of less than 150 kVA that do not connect to the 27.6 kV system shall be connected to the existing system with the provisions of dual ratio transformers; and

That all new service connections be by underground cable.

Carried.

Moved by Jim Lambert
Seconded by Hartmut Wiens
That the recommendation that all applicants for upgraded service be required to convert their overhead service to underground service be referred back to the policy committee for their consideration.

Carried.

5.8 Financial Statements for April 1989

5.8.1 Statement of Operations

The manager pointed out a small gain over last month's position in net income. Budget figures of $7.7 million revenue and $6.094 million power purchases show a 10.3% increase over 1988 revenue and 8.7% increase over 1988 power purchased. Time of use rates are higher in the winter months and this is reflected in the Gross Margin figure.

The controllable expenses are on budget with the exception of distribution station maintenance which will increase in the next month or two.

5.8.2 Capital Expenditures

There has been minor capital work completed to date. Overhead contributions are above budget due to the contribution from Regional Niagara for the Queenston Pump Station.

5.8.3 Change in Financial Position

The manager explained that we are presently operating on the capital contributions funds as shown in Current Cash Assets.

Upon motion duly made, seconded and carried, IT WAS [illegible] declaration dated as of October 27, 2000 executed by The Corporation of the Town of Niagara-on-the Lake relating to the Corporation's parent, Niagara-on-the-Lake Energy Inc.,and its subsidiaries, is acknowledged.

Directors' and Officers' Indemnities

Upon motion duly made, seconded and carried, IT WAS RESOLVED that, the Chair of the Board and one director of the Corporation are authorized and directed in the name of and on behalf of the Corporation, whether under the corporate seal of the Corporation or otherwise, from time to time to execute in favour of and deliver an indemnity agreement to each of the Corporation's directors and officers, in such form as may be approved by the said Chair of the Board and director pursuant to authorization from the Corporation's parent, Niagara-on-the-Lake Energy Inc.

Adoption of the Policies, Procedures, Rules and Directions of the Niagara-on-the-Lake Hydro Electric Commission

Upon motion duly made, seconded and carried, IT WAS RESOLVED that, all the current administrative policies, procedures, rules and directions of the Niagara-on-the-Lake Hydro Electric Commission be adopted by the Corporation as may be applicable to the business activities of the Corporation.

Election to Participate in the OMERS as an Associated Employer incorporated under section 142 of the Electricity Act

The chair advised the meeting that OMERS required the following resolution to be passed: