

Investment Grade Audit for the Township of North Huron

LED Streetlighting Conversion

18/08/2017

O-0247

Primary Contact

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August 18, 2017

The Township of North Huron
274 Josephine St
Wingham, ON N0G 2W0

Dear Mr. Jeff Molenhuis,

We are pleased to present this Investment Grade Audit of the streetlight network for the Township of North Huron.

We have concluded our detailed analysis of your streetlight system to reflect the proposed upgrade to LEDs based on our GIS/GPS mapping. The existing streetlights to be upgraded to LEDs under the scope of work of the IGA presented are currently consuming 340,808 kWh. By upgrading to LEDs, your projected annual energy consumption will fall substantially to 99,333 kWh, resulting in 241,475 kWh of energy savings, equivalent to 71% consumption reduction.

The total project cost of \$220,734 includes an allowance for 100% rewiring, 100% fuse and fuse holder replacement and a 20% refresh compression connection to secondary wiring for Cobrahead type fixtures. The available IESO incentives are \$44,140 for the Cobrahead only.

The main body in this proposal presents the Cobra only scenario. Alternative project options are presented in Appendix A, B, and C, as per the following breakdown:

Appendix A - Decorative Fixtures for Blyth

Appendix B - Decorative Fixtures for Wingham

Appendix C - Complete Inventory (Cobraheads and Decoratives) with an EPC (Energy Performance Contract) Financing Option

We look forward to moving your project to the next phase. We will arrange for a conference call to discuss the contents of this report in the next few days, but until then please feel free to contact us should you have any questions.

Yours truly,



Sean Neely, President
sneely@realtermenenergy.com

1. EXECUTIVE SUMMARY

Technical/ Environmental Assessment	Title	Township of North Huron LED Street Light Conversion
	Baseline	442 HID ⁽¹⁾ Cobrahead fixtures, HID Decorative fixtures (Included in Appendix Options only) Total demand: 79.9 kW Annual energy consumption: 340,808 kWh Annual operating hours: 4,320 (Hydro One), 4,245 (Westario Power)
	Technology Employed	Smart ready LED Fixtures
	Technology Provider(s)	Cree (Cobraheads) King Luminaire, Acuity Brands (Decoratives)
	Technical Specifications	7-PIN, Smart ready fixtures Color temp: 4,000K, Average life ≥ 100,000 hours CRI ≥70, IP ≥ IP 65
	Fixture Warranty	10 years
	Annual Energy Savings	241,475 kWh (71%)
Financial Assessment	Financing Scheme	Capital Purchase (North Huron-financed)
	Total Project Cost	\$220,734
	IESO Incentive	\$44,140
	Net Project Cost	\$176,594
	Net Price per Fixture	\$399.53
	Project Reference Period	23 Years
	Payback Period	3.6 Years
Organizational Assessment	Time Schedule	TBD

(1) – High Intensity Discharge

The above baseline and project breakdown is for the Cobra-only scenario. Please refer to the appendices for alternative scenarios including decorative fixtures.

2. INTRODUCTION

RealTerm Energy has examined in detail the Township of North Huron's existing streetlight network records to produce this Investment Grade Audit. Our analysis included the following stages:

- Evaluate existing GPS/GIS data of the entire streetlight inventory of the Township
- Apply appropriate LED-based lighting designs
- Update the replacement LED fixtures from the desktop review
- Examine in detail the Township's utility bills
- Examine detailed maintenance records of the Township
- Establish baseline results for energy consumption and maintenance costs
- Revision of estimated project costs and savings potential

A summary of our findings is outlined below:

IGA RESULT	
Number of Fixtures	442
Type of Fixture	HPS/MV
Energy Savings (%)	70.9%
Energy Consumption (kWh)	340,808
Projected Annual Energy Costs	\$80,313
Annual Maintenance Cost (2-year average)	\$7,676
Average Annual Cost per Fixture	\$199.07
Total Annual Operating Cost	\$87,989
Total Project Costs	\$220,734
Incentives (IESO)	\$44,140
Net Project Costs <u>after</u> Incentives	\$176,594

3. GPS MAPPING

RealTerm Energy conducted a complete GIS inventory of the Township of North Huron's streetlights and used the information derived from this review to develop a detailed picture of North Huron's current street lighting network, including the following:

- Accurate count of all fixtures and fixture types
- Wattage of each existing fixture
- Length of fixture arms, fixture heights, setbacks from roadway, pole spacing, etc.
- Exact GPS coordinates
- Road classifications
- Hydro pole ID numbers (when available)

From this data, we established a profile of North Huron's streetlight inventory and defined key parameters such as demand and energy consumption. This then allowed us to accurately estimate energy savings potential associated with the LED upgrade.

A detailed breakdown of the revised lighting inventory, obtained from the GIS/GPS audit appears below:

3.1 GPS Inventory (Actual)

TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
COBRAHEAD FIXTURES			
HPS 100W (Westario Power)	130	1	0.1
HPS 150W (Westario Power)	190	302	57.4
HPS 250W (Westario Power)	310	2	0.6
HPS 70W (Hydro One)	100	8	0.8
HPS 100W (Hydro One)	130	59	7.7
HPS 150W (Hydro One)	190	70	13.3
Subtotal (Cobrahead)		442	79.9

4. LED REPLACEMENT INVENTORY

The reduced demand following the LED streetlight upgrade will directly impact the annual energy consumption, measured in kWh. Our findings show that the demand will be reduced by 56.6 kW. This will result in energy savings 71% over the current consumption, equivalent to 23.3 kWh annually. The table below illustrates the proposed changes to North Huron's inventory, based on our examination of the GPS data and lighting design results (see next page for more details on our design methodology).

4.1 LED Replacements (Actual, Post-Upgrade)

TYPE	WATTAGE	QTY	DEMAND (kW)	DESIGNLIGHTS CONSORTIUM*
COBRAHEAD FIXTURES				
62W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q9	62	10	0.6	Yes
43W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q6	43	192	8.3	Yes
62W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q9	62	35	2.2	Yes
43W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q6	43	6	0.3	Yes
88W_BXSP1-HO-HT-3ME-100W-40K-UL-SV-N-Q8	88	31	2.7	Yes
79W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q7	79	7	0.6	Yes
88W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q8	88	4	0.4	Yes
112W_BXSP2-HO-HT-3ME-165W-40K-UL-SV-N-Q5	112	10	1.1	Yes
55W_BXSPR-HO-HT-2ME-60W-40K-UL-BK-N-Q8	55	2	0.1	Yes
55W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q8	55	8	0.4	Yes
43W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q6	43	96	4.1	Yes
79W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q7	79	2	0.2	Yes
61W_BXSP1-HO-HT-3ME-100W-40K-UL-SV-N-Q5	61	14	0.9	Yes
62W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q9	62	9	0.6	Yes
61W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q5	61	15	0.9	Yes
62W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q9	62	1	0.1	Yes
Subtotal (Cobrahead)		442	23.3	

*DLC listed products are LED products that have been tested at a DLC approved laboratory and comply with specified performance and energy efficiency criteria. These products are eligible for IESO incentive. For further information please visit the DesignLights Consortium website at www.designlights.org.

5. LED LIGHTING DESIGN

RealTerm Energy's technical evaluation team reviewed the collected geospatial dataset and formulated a hybrid approach to completing roadway designs for North Huron. After evaluating the configuration of each light fixture for road classification, pedestrian activity, pole spacing, mounting height, arm length and curb setback, we have concluded that North Huron can achieve the same or better lighting levels than those under its current streetlights. The suggested lighting design would mostly meet RP-8-2014 lighting levels. (RP-8 is a recommended, though not required, practice for roadway illumination).

The reason that a portion of North Huron's luminaires do not meet RP-8 could be because of several factors, including:

- Inadequate Pole Spacing (poles are spaced too far apart),
- Insufficient Mounting Height, or
- Missing Light Fixtures (at essential locations to eliminate gaps).

Our analysis concludes that in all instances where RP-8 could not be achieved with a new LED fixture, this was already the case for the existing fixture. In such instances, photometric design has been utilized to select an LED luminaire in which the wattage and distribution pattern combine to meet or exceed the existing lighting levels.

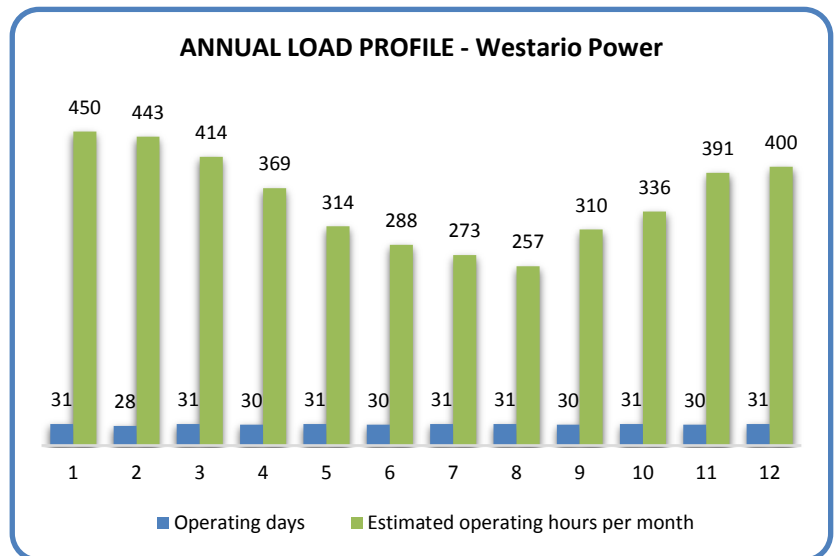
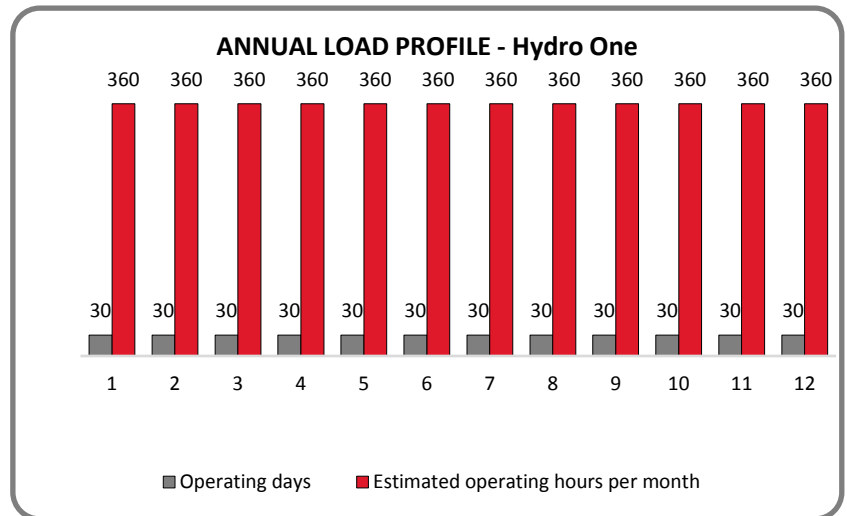
Based on the replacement luminaires detailed in the following pages, we anticipate that the impact on the Township's annual energy consumption will be as follows:

PARAMETER	IGA Results
Current Annual Energy Consumption (kWh)	340,808
Projected LED Annual Energy Consumption (kWh)	99,333
Annual Savings (kWh)	241,475

6. ENERGY COST ANALYSIS

6.1 Hydro One and Westario Power's Load Profile

Streetlights are generally not metered, but rather deemed to be 'on' and are therefore billed based on a Load Profile, determined by the LDC/Utility Company. The annual load profile is a critical part of the Baseline calculation, used to project the actual energy consumption and future energy savings that will be realized after the upgrade. The load profile utilized by Hydro One and Westario Power, North Huron's LDC/Utility Companies, appears on the right.



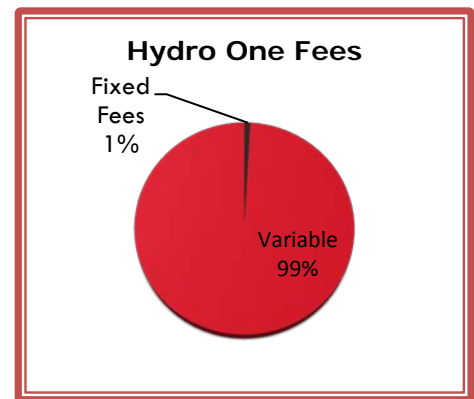
This data is a critical part of the Baseline calculation, used to project the actual energy consumption and savings that will be realized after the upgrade. Our projections and guaranteed energy savings figures take these differing load profiles into account.

6.2 Baseline Energy Calculations

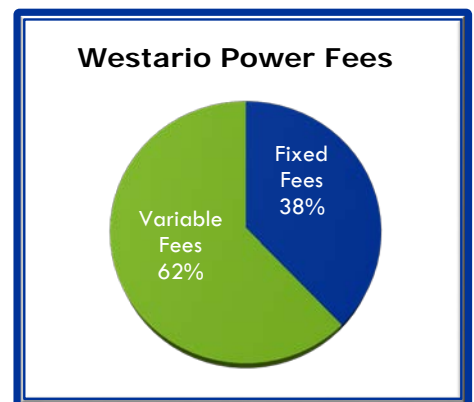
Utilities charge two types of fees: fixed and variable. Fixed fees are constant both before and after the upgrade as they are charged on a per connection basis. Variable fees are based on consumption and therefore decrease following an upgrade to LEDs. Higher fixed fees as a percentage of the total bill represents less dollar savings potential from the upgrade due to a change in energy consumption.

In the case of Hydro One, the fixed fees are almost negligible, close to 1%. Since Hydro One has very low fixed fees, almost all the demand savings will show up in the municipalities billing.

	Fixed Fees	Variable Fees	Total Energy Cost
Before	\$54	\$22,257	\$22,311
After	\$54	\$6,718	\$6,772
Savings			(\$15,539)



	Fixed Fees	Variable Fees	Total Energy Cost
Before	\$21,960	\$36,042	\$58,002
After	\$21,960	\$10,297	\$32,257
Savings			(\$25,745)



7. MAINTENANCE ANALYSIS

7.1 Baseline Maintenance

We have examined the maintenance costs for the past 2 years when data was provided by the municipality. The average is \$7,676 per annum, which equates to roughly a cost per fixture of \$17.40 (prorated for the scope of fixtures included in this IGA). This average is in line with the average expenditure we have compiled for Ontario communities of similar size.

We conservatively estimate that ongoing LED maintenance will equate to 80% savings over current HPS expenditures, or approximately \$6,141 in the first year. Different manufacturers propose varying estimates for ongoing maintenance costs for LED fixtures. While it is unrealistic to assume that no annual maintenance will be required, the fixtures themselves do not contain components that require periodic replacement (such as HPS bulbs and ballasts). While actual maintenance costs are likely to be a mere fraction of our estimate in any given year, we recommend incorporating this figure into municipal budgets to account for periodic cleaning or other eventualities over the life of the fixture and not covered under the manufacturer's 10-year warranty.

Parameter	Before	After	Savings
Energy	\$80,314	\$39,029	\$41,285
Maintenance	\$7,676	\$1,535	\$6,141
Total	\$87,990	\$40,564	\$47,426

8. PROJECT COSTS: CAPITAL PURCHASE

In a Capital Purchase financing option, or a "Design, Upgrade and Transfer", the Township arranges the financing of the project. Typically, this would be from a source like Infrastructure Ontario which has low-cost interest rates

8.1 Project Costs, Savings and Investment Return

PROJECT COSTS	
Number of Fixtures	442
Total Project Costs	\$220,734
IESO Incentive	\$44,140
Net Project Costs	\$176,594
Price per Fixture	\$399.53

Note regarding the available incentives:

The above incentive amount is calculated using the 2015 SOE guidelines. This amount may vary in 2017 at the sole discretion of the LDC/Utility.

Investment Return

The payback period of the project, before including any financing costs is **3.6 years**.

Energy and Maintenance Cost Comparison

PARAMETER	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
Number of Fixtures	442	442		
Annual Electricity Consumption (kWh)	340,808	99,333	241,475	71%
Annual Electricity Costs	\$80,313	\$39,029	\$41,285	51%
Annual Maintenance Cost	\$7,676	\$1,535	\$6,141	80%
Total Streetlights Expenditures	\$87,989	\$40,564	\$47,425	54%
Average Annual Cost per Fixture	\$199	\$92	\$107	54%

8.2 Allowances

The total project cost includes provisional allowances as detailed below:

Provisional Items	Cobrahead	
	%	Quantity
Re-wiring	100%	442
Re-fusing	100%	442
Fuse Holder Replacement	100%	442
Secondary Connection Refresh	20%	88
Fixtures Near High Tension	5%	22

Billing of Provisional Items

The work covered by the allowances listed above are recommended as they will minimize the likelihood of service calls over the life of the fixtures, greatly reducing maintenance costs. Following the installation phase, should fewer than the estimated provisional amounts be required (rewiring, refusing, arm replacement, etc.), the costs shall be adjusted in the final billing, based on actual work performed. During the installation phase, if additional work is required, the Township will be notified first before allowances are exceeded. Any additional work must first be authorized by the municipality and will be handled as a change order.

Luminaires near high tension wires within a restricted zone:

In the case of Cobrahead fixtures located near high tension wires within a restricted zone, we identify 3 different approaches to address and solve the issue while ensuring safety. The exact quantity of the fixtures located within the restricted zone can only be identified in the installation phase.

1. Safety is always the number one priority, and to that end, we will assess each location with the goal of relocating the affected luminaire to a safe location. This may involve the services of an engineer and additional costs imposed by the LDC/utility both of which will become a pass-through to the Municipality. However, we anticipate that there is a return to the Municipality through lower maintenance costs (fewer service calls) to the luminaire in the future.
2. Engage the services of high voltage crews to replace the existing luminaires, however, this comes at a premium price. This option is not recommended, as it does not solve any future access issues.
3. RealTerm Energy supplies the fixtures only (uninstalled), and the Municipality can work in conjunction with the local utilities to organize the installation.

If, during the installation, we find luminaires near high tension wires within a restricted zone, we will work with your municipal staff to determine which approach the Township prefers.

9. FINANCIAL APPRAISAL OF THE CAPITAL OPTION

CAPITAL OPTION *	
Payback Period (Years)	3.6
IRR	26.3%
NPV (Discount rate: 5%)	\$236,061

(*) Excluding financing costs

9.1 Loan Costs

Infrastructure Ontario offers loans at favorable rates to most municipalities seeking to improve their civic infrastructure. Interest rates vary with market conditions and are set at the prevailing rate at the time the loan is advanced. The table below summarizes payment options which would be available to fund the project through Infrastructure Ontario. Please note these rates change daily and are submitted below for evaluative and budgeting purposes.

CAPITAL COST*	TERM (YEARS)	INTEREST RATE	ANNUAL PAYMENT	COST OF BORROWING
\$176,594	10	2.79%	\$20,242	\$25,826
\$176,594	15	3.09%	\$14,706	\$43,997

* Investment cost less IESO rebate

9.2 Net Savings After Financing Costs

Year	1	2	3	4	5	6	7	8	9	10
Annual Savings	\$47,426	\$48,787	\$50,188	\$51,630	\$53,113	\$54,640	\$56,212	\$57,829	\$59,493	\$61,206
Loan Repayment	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242	\$20,242
Net Savings	\$27,184	\$28,545	\$29,946	\$31,388	\$32,871	\$34,398	\$35,970	\$37,587	\$39,251	\$40,964

We have assumed that, an Infrastructure Ontario loan with an amortization term of 10 years would optimize the overall savings potential to the Township.

As can be seen, there are significant net savings from the outset of the project, net of financing costs.

9.3 Calculation Assumptions

1. The electricity cost savings were calculated based on Hydro One and Westario Power's current rates valid at the date of the preparation of this IGA. This information can be obtained online on the Ontario Energy Board website¹. The annual energy savings and the new LED street lighting system were calculated based on the data collected by the GIS/GPS mapping. Any changes in the data obtained will change the energy consumption and cost savings.
2. In Ontario, all electricity rates reflect the wholesale electricity price. In the streetlight rate, the variations of the wholesale electricity prices are reflected by the Monthly Average Hourly Price and the Global Adjustment (updated monthly). In our calculation for Monthly Average Hourly Price we used \$0.01767/kWh and for Global Adjustment we used \$0.09575/kWh. These prices are the average prices of the last 12 months. The current and the historic Monthly Average Hourly Prices and Global adjustment prices are available on the IESO website².
3. We have assumed that the saveONenergy program will continue to be in effect as promised, using the currently published rates (those used for the preapproval), and that there will be no unexpected delays on the part of our partners, which would prevent us from meeting the deadline for the Township to receive this incentive. While we will do everything we can to meet the requirements of this program and to gain this incentive for the Township, RealTerm Energy cannot take responsibility for those aspects which are outside of its control.
4. After the first year, energy and maintenance cost's inflation rate is 3% and 2% respectively.

¹ Ontario Energy Board. Electricity Distribution Rate Applications. Retrieved July, 2017, from <http://www.ontarioenergyboard.ca/OEB/Industry/Regulatory+Proceedings/Applications+Before+the+Board/Electricity+Distribution+Rates>

² Independent Electricity System Operator. Price Overview - Monthly Average Hourly Prices, By Year. Retrieved July, 2017, from <http://www.ieso.ca/Pages/Power-Data/price.aspx>

10. GREENHOUSE GAS REDUCTION

ESTIMATED GREENHOUSE GAS REDUCTION*	IGA Results
Current Annual Energy Consumption (kWh)	340,808
Projected LED Annual Energy Consumption (kWh)	99,333
Annual kWh Savings	241,475
Estimated Annual GHG Reduction (metric tonnes)	10
GHG Reduction over Luminaire Life (metric tonnes)	222

* GHG emissions depend on the electricity supply mix of the jurisdiction and time of use. These have been calculated using the most current, verified emissions factors found in the average emissions for 2014, released by Environment Canada in the 2016 National Inventory Report.



11. CONCLUSION AND RECOMMENDATION

We have implemented a designed solution of selected LED luminaires that conforms to RP-8-2014 guidelines for as many of the streetlight locations as possible.

This combination of LED luminaires will result in energy consumption savings of 241,475 kWh per year over the incumbent HPS fixtures, which is equivalent to 71% energy savings.

If the Township of North Huron chooses to move forward with the Design, Upgrade and Transfer option, the total project cost will be \$220,734 which includes the upgrade of some elements of the lighting infrastructure such as fuses, fuse holders, wiring and secondary connections as stated in section 8.2 - Allowances. The Township should expect a payback period of 3.6 years with an IESO Incentive of \$44,140.

The next steps to start the implementation of this new technology and start seeing energy and maintenance savings are as follows:

- Meeting to review IGA with staff and RealTerm Energy team
- Approval of the IGA
- Submit IESO rebate (prepared by RealTerm, but municipal staff must submit)
- Review contract to proceed with project
- Sign contract

12. TERMS AND CONDITIONS

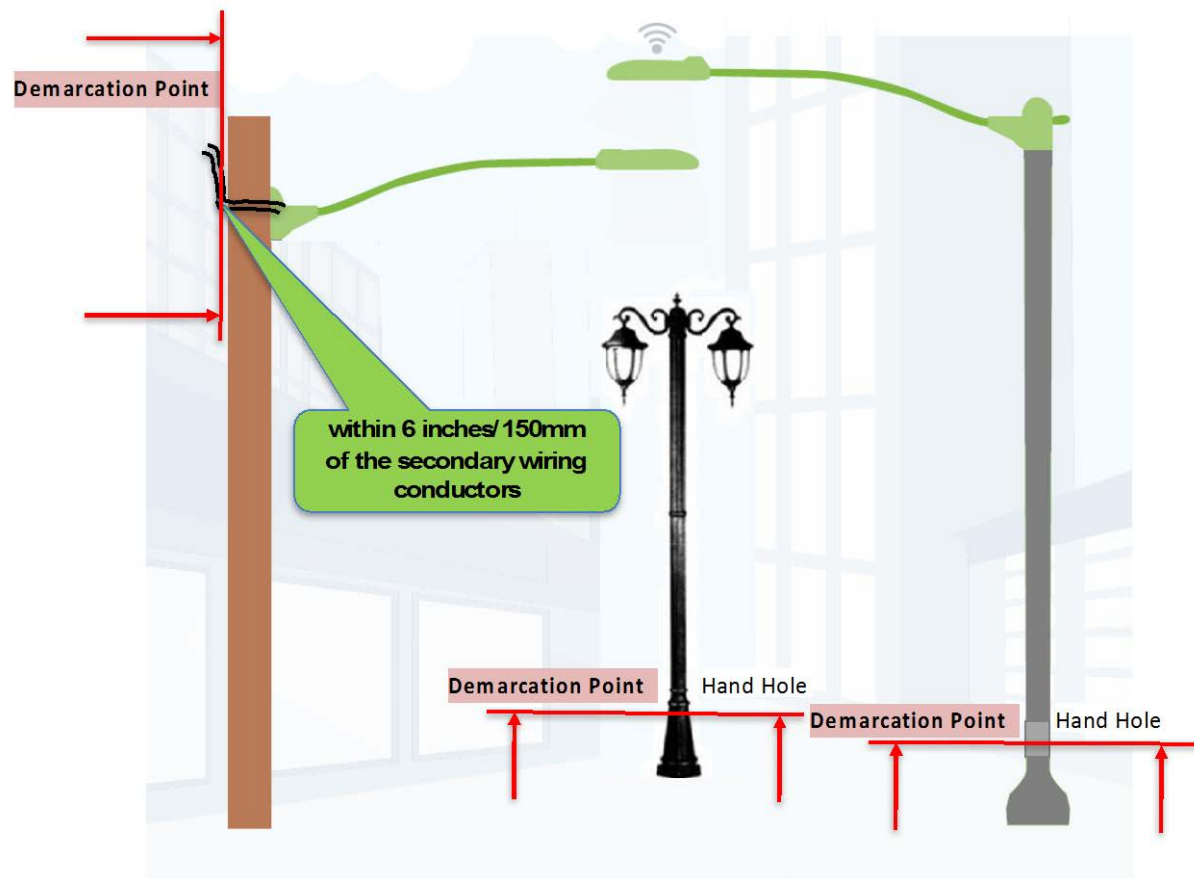
The total project cost includes the following scope of work:

1. Data collection including GIS/GPS mapping of the existing and proposed luminaires.
2. Photometric Lighting Designs.
3. Remove 442 existing HID Cobrahead luminaires and supply and install 442 Cobrahead LED luminaires with photocell controllers.
4. All provisions and allowance detailed on Section 8.2 – Allowances.
5. ESA permits and inspection of work.
6. Recycling of the removed HID luminaires.
7. Project management
8. The Municipality GIS database will be updated once installation is complete to include final LED Inventory installed, date, type, location, etc.
9. Commissioning
10. Completing billing change(s) on your behalf based on the new LED lighting system installed by RealTerm Energy and based on the information provided by the Municipality and LDC/Utility regarding the metered and unmetered lights. RealTerm Energy assumes that the information provided by both parties are accurate and reflects the current state of the actual inventory.
11. Third party quality control for a sample of 20 LED fixtures. Based upon this sample, should further action be required to correct any deficiencies observed in the installation, remedial work and any associated costs shall be borne by the installer.
12. Applying on your behalf for the available IESO incentives. The final incentive amount will be determined by the LDC/Utility and is not guaranteed by RealTerm Energy.
13. RealTerm Energy and our Installation Contractor warrant all workmanship completed within the work area for a period of one (1) year following the completion date of the installation.
14. The Luminaire and Photocell are covered by their manufacturer's warranties for 10 and 12 years, respectively.
15. This IGA is valid until October 31, 2017.
16. The total project cost is in Canadian dollars and does not include the HST.

For greater clarity, the scope of work set forth herein shall constitute the sole and entire scope of work for the Project and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to the Project. The Parties have not relied on any statement, representation, warranty or agreement of the other Party or of any other person acting on such Party's behalf, including any representations, warranties, or agreements arising from statute or otherwise in law, except for the representations, warranties, or agreements expressly contained in this Agreement. Without limitation of the foregoing, the parties acknowledge and agree that the following items are not included in the scope of work and nor the total project cost:

1. Any cost related to upgrading your existing lighting/electrical systems to provincial and or federal standards
2. Any cost related with the replacement of the existing relays for the group-controlled streetlights (controller box)
3. Any fees related to the connections to the secondary bus in the unlikely case that your LDC/Utility insists on charging a fee
4. Any other fees which may be charged by a third party
5. Any costs related to works beyond the Demarcation Point, described as follows:
 - Work performed on the electrical system by RealTerm Energy will be confined to the Luminaire and an area between the agreed upon "*Demarcation Point*" (in the majority of cases a point within 6 inches/150mm of the secondary wiring conductors) on what is referred to as the "Tail". This is the location at which a Fuse and Fuse Holder should exist and acts as a disconnect to allow easy service, protect the new luminaire and wiring from voltage surges and provide a safe working environment. In the event that a Fuse and Fuse Holder do not exist, they will be installed.
 - For Decorative Poles and Stand-Alone underground fed units the "*Demarcation Point*" is located at the base of the pole in the "Hand Hole". Where Overhead feeds are in use, the "*Demarcation Point*" is located at the base of the arm holding the fixture, where the connection is made to the secondary wires.
 - If RealTerm Energy dispatches a maintenance contractor and the required repairs are outside of the work areas, we will recommend a solution and communicate this information to the Client for approval before proceeding.

13. SCOPE OF WORK DIAGRAM



The foregoing excluded items and any other items not included within the scope of work may be provided by RealTerm Energy at an additional cost pursuant to a separate written agreement or amendment between the parties only. The above list of exclusions is not meant to be exhaustive, as network site conditions vary, and shall not operate in any way to limit the exclusions of this paragraph or imply any obligation or duty on the party of RealTerm Energy to complete any work other than the specifically defined scope of work set forth herein.

APPENDIX A: DECORATIVE FIXTURE (BLYTH ONLY)

Existing Inventory

TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
DECORATIVE FIXTURES			
Decorative Top Hat HPS 150W	190	4	0.8
Villa Lantern Post top HPS 150W	190	35	6.7
Subtotal		39	7.4

LED Replacements (Actual, Post-Upgrade)

TYPE	WATTAGE	QTY	DEMAND (kW)	DLC
DECORATIVE FIXTURES				
71W_245L 20LEDE10 MVOLT 4K R2 RNA P7 PCLL HSS	71	4	0.3	No
60W_GVD2 P30 40K AS M BK 3 R P BK M P7 PCS	60	35	2.1	Yes
Subtotal		39	2.4	

Project Cost: Capital Purchase

PROJECT COSTS	
Number of Fixtures	39
Total Project Costs	\$70,540
IESO Incentive	\$3,080
Net Project Costs	\$67,460
Price per Fixture	\$1,729.75

Investment Return

The payback period of the project, before including any financing costs is **10.3 years**.

Energy and Maintenance Cost Comparison

PARAMETER	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
Number of Fixtures	39	39		
Annual Electricity Consumption (kWh)	32,011	10,299	21,712	68%
Annual Electricity Costs	\$7,528	\$2,354	\$5,174	69%
Annual Maintenance Cost	\$677	\$135	\$542	80%
Total Streetlights Expenditures	\$8,205	\$2,489	\$5,716	70%
Average Annual Cost per Fixture	\$210	\$64	\$147	70%

The Total project cost includes the following costs:

- Refusing Each new LED fixture to include a new fuse
- Fuse Holder Replacement 50% of Inventory to require a new fuse holder
- Rewiring 20% of Inventory to require rewiring
- Disposal Included at no additional cost

Pricing provided in this Appendix is valid only if added to the Cobraheads.

APPENDIX B: DECORATIVE FIXTURE (WINGHAM ONLY)

Existing Inventory

TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
DECORATIVE FIXTURES			
Decorative Top Hat HPS 150W	190	60	11.4
Deco Downlighting Bell HPS 150W	190	41	7.8
Subtotal		101	19.2

LED Replacements (Actual, Post-Upgrade)

TYPE	WATTAGE	QTY	DEMAND (kW)	DLC
DECORATIVE FIXTURES				
71W_245L 20LEDE10 MVOLT 4K R3 RNA P7 PCLL HSS	71	15	1.1	No
71W_245L 20LEDE10 MVOLT 4K R2 RNA P7 PCLL HSS	71	45	3.2	No
60W_K823-P4NL-III-60(SSL)8060-120: 277-KPL21-PR7 BEIGE SMOOTH FINISH	60	41	2.5	No
Subtotal		101	6.7	

Project Cost: Capital Purchase

PROJECT COSTS	
Number of Fixtures	101
Total Project Costs	\$167,462
IESO Incentive	\$0
Net Project Costs	\$167,462
Price per Fixture	\$1,658.04

Investment Return

The payback period of the project, before including any financing costs is **15.0 years**.

Energy and Maintenance Cost Comparison

PARAMETER	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
Number of Fixtures	101	101		
Annual Electricity Consumption (kWh)	81,462	28,526	52,936	65%
Annual Electricity Costs	\$19,226	\$11,491	\$7,735	40%
Annual Maintenance Cost	\$1,754	\$351	\$1,403	80%
Total Streetlights Expenditures	\$20,980	\$11,842	\$9,138	44%
Average Annual Cost per Fixture	\$208	\$117	\$90	44%

The Total project cost includes the following costs:

- Refusing Each new LED fixture to include a new fuse
- Fuse Holder Replacement 50% of Inventory to require a new fuse holder
- Rewiring 20% of Inventory to require rewiring
- Disposal Included at no additional cost

Pricing provided in this Appendix is valid only if added to the Cobraheads.

APPENDIX C: COMPLETE INVENTORY (COBRAHEAD & DECORATIVES) WITH EPC FINANCING OPTION

Existing Inventory

TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
COBRAHEAD FIXTURES			
HPS 100W (Westario Power)	130	1	0.1
HPS 150W (Westario Power)	190	302	57.4
HPS 250W (Westario Power)	310	2	0.6
HPS 70W (Hydro One)	100	8	0.8
HPS 100W (Hydro One)	130	59	7.7
HPS 150W (Hydro One)	190	70	13.3
Subtotal (Cobrahead)		442	79.9
DECORATIVE FIXTURES			
Decorative Top Hat HPS 150W (Wingham)	190	60	11.4
Deco Downlighting Bell HPS 150W (Wingham)	190	41	7.8
Decorative Top Hat HPS 150W (Blyth)	190	4	0.8
Villa Lantern Post top HPS 150W (Blyth)	190	35	6.7
Subtotal (Decorative)		140	26.6
TOTAL (Cobras & Decos)		582	106.5

LED Replacements (Actual, Post-Upgrade)

TYPE	WATTAGE	QTY	DEMAND (kW)	DLC
COBRAHEAD FIXTURES				
62W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q9	62	10	0.6	Yes
43W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q6	43	192	8.3	Yes
62W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q9	62	35	2.2	Yes
43W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q6	43	6	0.3	Yes
88W_BXSP1-HO-HT-3ME-100W-40K-UL-SV-N-Q8	88	31	2.7	Yes
79W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q7	79	7	0.6	Yes
88W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q8	88	4	0.4	Yes
112W_BXSP2-HO-HT-3ME-165W-40K-UL-SV-N-Q5	112	10	1.1	Yes
55W_BXSPR-HO-HT-2ME-60W-40K-UL-BK-N-Q8	55	2	0.1	Yes
55W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q8	55	8	0.4	Yes
43W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q6	43	96	4.1	Yes
79W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q7	79	2	0.2	Yes
61W_BXSP1-HO-HT-3ME-100W-40K-UL-SV-N-Q5	61	14	0.9	Yes
62W_BXSPR-HO-HT-2ME-60W-40K-UL-SV-N-Q9	62	9	0.6	Yes
61W_BXSP1-HO-HT-2ME-100W-40K-UL-SV-N-Q5	61	15	0.9	Yes
62W_BXSPR-HO-HT-3ME-60W-40K-UL-SV-N-Q9	62	1	0.1	Yes
Subtotal (Cobrahead)		442	23.3	
DECORATIVE FIXTURES				
71W_245L 20LEDE10 MVOLT 4K R3 RNA P7 PCLL HSS (Wingham Deco)	71	15	1.1	No
71W_245L 20LEDE10 MVOLT 4K R2 RNA P7 PCLL HSS (Wingham Deco)	71	45	3.2	No
60W_K823-P4NL-III-60(SSL)8060-120:277-KPL21-PR7 BEIGE SMOOTH FINISH (Wingham Deco)	60	41	2.5	No
71W_245L 20LEDE10 MVOLT 4K R2 RNA P7 PCLL HSS (Blyth Deco)	71	4	0.3	No
60W_GVD2 P30 40K AS M BK 3 R P BK M P7 PCS (Blyth Deco)	60	35	2.1	Yes
Subtotal (Decorative)		140	9.1	
TOTAL (Cobras & Decos)		582	32.4	

Project Cost: Option 1 - Capital Purchase

PROJECT COSTS	
Number of Fixtures	582
Total Project Costs	\$448,993
IESO Incentive	\$47,220
Net Project Costs	\$401,773
Price per Fixture	\$690.33

Investment Return

The payback period of the project, before including any financing costs is **6.0 years**.

Energy and Maintenance Cost Comparison

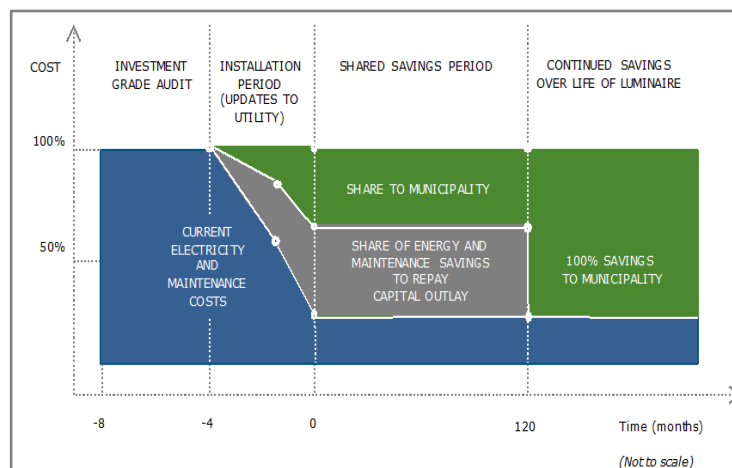
PARAMETER	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
Number of Fixtures	582	582		
Annual Electricity Consumption (kWh)	454,281	138,158	316,123	70%
Annual Electricity Costs	\$107,114	\$52,920	\$54,194	51%
Annual Maintenance Cost	\$10,108	\$2,022	\$8,086	80%
Total Streetlights Expenditures	\$117,222	\$54,942	\$62,280	53%
Average Annual Cost per Fixture	\$201	\$94	\$107	53%

Project Cost: Option 2—Energy Performance Contract

With an accurate inventory, as well as a breakdown of the energy bills and the utility rate structure, we have established a Baseline, which gives an accurate statement of cost associated with operating Township's existing streetlight network (subject to changes by the utility).

The establishment of the Baseline is critical in computing the energy and cost savings that will accrue from upgrading the system to LEDs and determining the split of the shared savings between the Township and RealTerm Energy.

An Energy Performance Contract option would have RealTerm Energy provide all of the upfront capital required to complete the project, and share in the savings with the Township over a 10-year term.



ENERGY PERFORMANCE CONTRACT OPTION DETAILS	IGA Results
Up-front Capital Requirement	Nil
Township's Savings Portion	3.3%
REALTERM ENERGY's Savings Portion**	96.7%
Annual Share of Savings to Client*	\$2,114
Estimated Value of Energy Savings (Over 10 years)	\$24,239
Contract Period	10 years
Warranty maintenance of the fixtures and photocell	Included








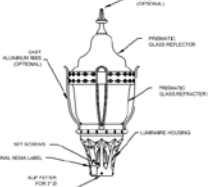




**** Important note:** The share of the cost savings between the Township and RealTerm Energy was calculated based on a IESO incentive of \$47,220 which will be paid to RealTerm Energy and applied directly to reduce the initial project costs. In the event that the actual IESO approved amount paid by the LDC/Utility changes, RealTerm Energy will be required to recalculate (increase or decrease) the share of the cost savings in order to conserve the commercial viability of the contract.

*Year One Combined Electricity and Maintenance Savings

What is Included in the Energy Performance Contract Option:

- The same deliverables included in the Design, Upgrade and Transfer Option PLUS
- Guaranteed energy savings throughout the Term
- RealTerm Energy ensures that the network operates to established parameters
- RealTerm Energy is responsible for all luminaires warranty maintenance over the Term
- At end of Term, operations revert back to the Township who then benefits from 100% of the savings

APPENDIX D: SITE SPECIFIC FIXTURE REPLACEMENTS

Type	Qty.	Replacement	Sample Before Picture	After Picture
HPS Cobra	359	Cree HO Cobra BXSPR		
HPS Cobra	73	Cree HO Cobra BXSP1		
HPS Cobra	10	Cree HO Cobra BXSP2		
Victorian Lantern Post Top (Type 1)	35	Acuity Brands 245L		
Decorative Top Hat 150W HPS	64	Acuity Brands 72W_AVPL2 20LEDE10		
Decorative Downlighting Bell 150W HPS	41	King Luminaire K823		

APPENDIX E: LUMINAIRE SPEC SHEETS

- The Luminaire Spec Sheets are attached in a separate electronic file.

APPENDIX F: LUMINAIRE PRODUCT WARRANTY

- We are sending all the Luminaire Spec Sheets in a separate electronic file.

APPENDIX G: LIGHTING DESIGN LAYOUTS

- We are sending the details of the designs of the proposed LED luminaires in a separate electronic file.

APPENDIX H: WARRANTY SERVICE AGREEMENT

- Refer to the Warranty Service Agreement, attached as a separate PDF document. The Municipality will be required to sign it.

APPENDIX I: STANDARD CONTRACT

- Our standard contract document is included with our electronic attachments to this report.