

# 2019 Energy Conservation and Demand Management Plan

## **O.Reg. 507/18**

Town of Arnprior

June 2019



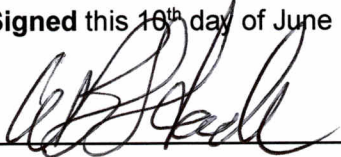
**ARNPRIOR**  
• WHERE THE RIVERS MEET •



**2019 Energy Conservation and Demand Management Plan**  
**The Corporation of the Town of Arnprior**

I hereby certify and endorse the Town of Arnprior's Energy Conservation and Demand Management Plan as required under O.Reg. 507/18 "*Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*", filed under the Electricity Act, 1998

**Signed** this 16<sup>th</sup> day of June 2019.



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Walter Stack, Mayor

*for:* 

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Maureen Spratt, Town Clerk

## Executive Summary

The Town of Arnprior has developed an Energy Conservation and Demand Management Plan aligning with the requirements outlined in Ontario Regulation. 507/18 “*Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*”, filed under the Electricity Act, 1998. Under this regulation, municipalities are required to annually report energy consumption from all municipally owned facilities, including, but not limited to, administrative offices, council chambers, public libraries, cultural facilities, sports facilities, buildings or facilities related to the treatment of water, etc. Municipalities are also required to update their Energy Conservation and Demand Management Plans every five years, on or before July 1<sup>st</sup>.

Arnprior’s plan outlines targets of reducing energy consumption, GHG emissions and overall energy related costs from the 2017 baseline. The plan discusses various goals and objectives that should be considered throughout the next five years in order to meet these targets.

### List of Acronyms

AMP – Asset Management Plan  
BAS – Building Automation System  
BPS – Broader Public Sector  
CFL – Compact Fluorescent Light  
EPT – Energy Planning Tool  
GHG – Greenhouse Gas  
HVAC – Heating, Ventilation, and Air Conditioning  
LAS – Local Authority Service  
LED – Light Emitting Diode  
LRFC – Long Range Capital Forecast  
MEP - mechanical, electrical, and plumbing  
VFD – Variable Frequency Drive  
WFP – Water Filtration Plant  
WPCC – Water Pollution Control Center

### List of Units

btu – British Thermal Units  
ekWh – Equivalent Kilowatt Hours  
kWh – kilowatt hours  
m<sup>2</sup> – Cubic Meters  
sqft – Square feet

### Definitions

**Building Envelop** – The roof, walls, foundation, doors and windows of a building.

**Public Agency** – Per O.Reg. 507/18, public agencies are described as every municipality, municipal service board, post-secondary educational institution, public hospital and school board.

**Reportable Buildings** – O.Reg. 507/18 outlines all operation types that public agencies are required to report on, including the following:

- All administrative offices, municipal council chambers, cultural facilities, indoor recreational facilities and community centers, including art galleries, performing arts facilities, auditoriums, indoor sports arenas, indoor ice rinks, indoor swimming pools, gyms and indoor courts for playing tennis, basketball or other sports.
- Fire stations and associated offices and facilities.
- Police stations and associated offices and facilities.
- Storage facilities where equipment or vehicles are maintained, repaired or stored.
- Buildings or facilities related to the treatment of water or sewage.

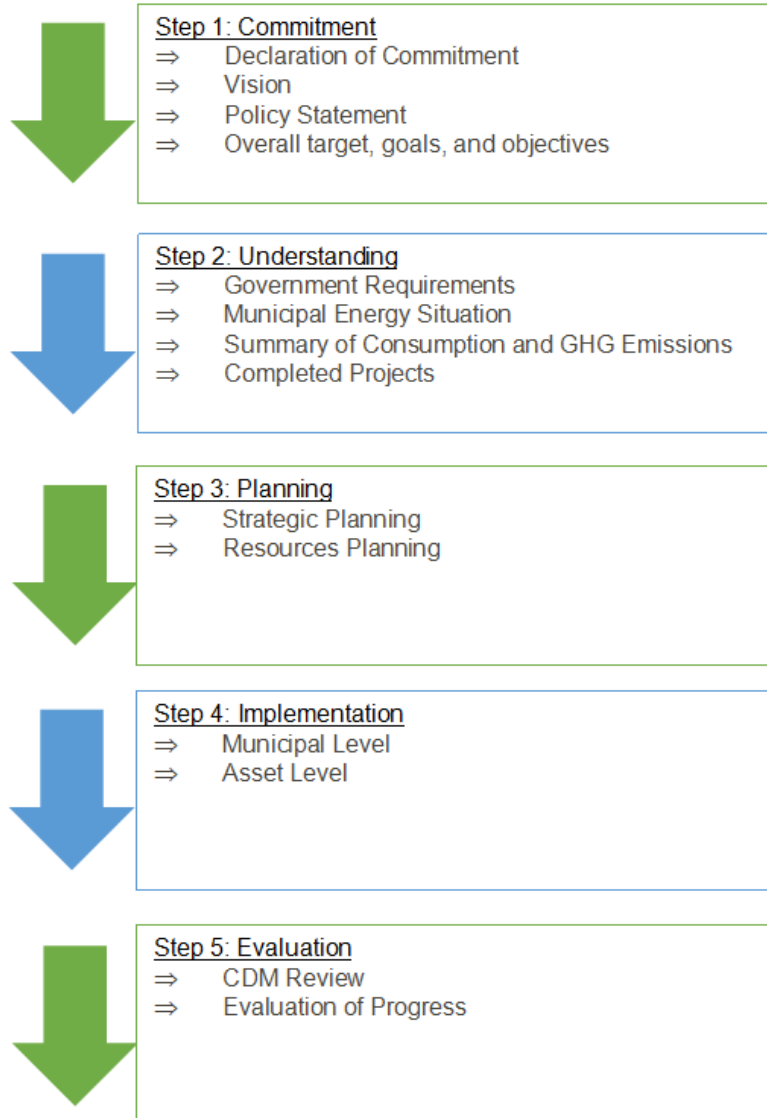
**O.Reg. 507/18** – Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans.

**GHG Emissions** – compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. Greenhouse gases are responsible for the greenhouse effect.

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## Energy Conservation and Demand Management Plan Flow Diagram



## Introduction

The Corporation of the Town of Arnprior (the “Town”) has developed an Energy Conservation and Demand Management Plan (the “Plan”, CDM) aligning with the requirements outlined in O.Reg. 507/18 “*Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*”, filed under the Electricity Act, 1998 [1]. The objective of this plan is to summarize the Town’s current energy consumption compared to the previous CDM plan, to analyze all energy management accomplishments over the last five years and develop a new plan for 2019 – 2023.

## Commitment

### Declaration of Commitment

Resolution: That Council shall direct Staff to allocate the necessary resources to implement a strategic energy management plan aimed at reducing Arnprior’s energy consumption and overall environmental impact.

### Vision

The Town of Arnprior’s vision is to reduce overall energy consumption, emissions and to mitigate energy associated costs.

### Policy Statement

In January of 2019, the Province of Ontario enacted O.Reg. 507/18: “*Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans*”, filed under the Electricity Act, 1998. The regulation states that all public agencies (Municipalities, Hospitals, and School Boards) must prepare a CDM. Further, Section 4 (2) the O.Reg. 507/18 specifies that CDM Plans must be composed of the following two components:

- “1. A summary of the public agency’s annual energy consumption and greenhouse gas emissions for its operations.*
- 2. A description of previous, current and proposed measures for conserving and otherwise reducing the amount of energy consumed by the public agency’s operations and for managing the public agency’s demand for energy, including a forecast of the expected results of current and proposed measures.”*

### Overall Target and Goals

The Town of Arnprior has developed a CDM focused on reducing energy consumption. The overall target is to reduce consumption and GHG emissions to below 2017 baseline levels, at all Town owned properties. In order to achieve this target, the following goals have been set fourth:

1. Improve energy efficiencies at all facilities via active or passive means.



2. Reduce GHG emissions at all facilities.
3. Meet the requirements of Ontario Regulation 507/18 under the Electricity Act, 1998.
4. Improve Energy Management processes at the Town of Arnprior.

## Objectives

In order to meet the above goals, the following objectives have been set forth. The ability to meet each specific objective will be largely dependent on available staffing, budget, grant opportunities, etc.

1. Explore the feasibility of implementing renewable energy technologies,
2. Continual improvement to behavioural change efforts,
3. Upgrade infrastructure including, but limited to HVAC, lighting, building envelop, etc.,
4. Streamline the energy management process into everyday work,
5. Develop an energy policy,
6. Perform in depth benchmarking of energy consumption patterns,
7. Align the Energy Conservation and Demand Management Plan with existing plans, and;
8. Execute an updated Energy Assessment of all facilities.

## Understanding

### Government Requirements

The Town's 2014 - 2019 CDM was created under Reg. 397/11 "*Energy Conservation and Demand Management Plans*", filed under the former Green Energy Act, 2009. The Green Energy Act along with O.Reg. 397/11 was repealed January 1, 2019 and was replaced with O. Reg. 507/18: "*Broader Public Sector: Reporting and Conservation and Demand Management Plans*", filed under the Electricity Act, 1998.

Under O.Reg. 507/18, municipalities are required to report energy consumption for all public facilities. The Town reports on the following buildings:

- Arnprior Public Library
- Arnprior Water Pollution Control Center
- Arnprior Water Filtration Plant
- Fire Hall/OPP Station
- Nick Smith Centre
- Arnprior & District Museum
- Pump Stations 1-5
- Robert Simpson Park Concession
- Robert Simpson Park Washrooms
- Town Hall
- Water Tower

Under Section 5 of O.Reg. 507/18, municipalities must report the following criteria for each of its reportable buildings. Appendix A – Building Information, outlines the address, operation type, floor area, hours of operation and type of energy used for each reportable building.

## Stakeholder Needs

The Town recognizes internal stakeholders as Council, various Committees, the CAO and Staff. Internal Stakeholder needs are as follows:

- An up-to-date and relevant CDM plan with vision, goals and targets in order to communicate the Town's commitment to energy efficiency.
- Annual reporting requirements of yearly energy consumption and regular updates to the CDM plan.
- Support to develop the skills and knowledge required to implement energy management practices and measures.

The Town recognizes external stakeholders as residents, various community organizations, and the Provincial and Federal Governments. External stakeholder needs are as follows:

- Minimizing energy costs through reductions in both electricity and natural gas consumption
- Minimizing the municipality's carbon footprint and overall impact on the environment.

## Municipal Energy Situation

### **Energy Data Management**

The Town of Arnprior tracks energy costs through the finance department. The Energy Leaders are responsible for tracking all energy data and reporting annually prior to July 1.

The Town has incorporated Local Authority Service's (LAS) Energy Planning Tool (EPT) and Hydro One's 'My Account' login to track energy usage and costs.

### **Energy Supply Management**

The Town of Arnprior has been proactive in ensuring that it receives the best possible rates for electricity and natural gas. The Town is enrolled in a program through LAS's Electricity Procurement Program.

The LAS Program was created by municipalities, for municipalities providing the Town a means to ensure predictable electricity costs through a professionally managed program that leverages aggregated purchasing (i.e., group purchasing power) and "spot market" exposure. The primary goals of the program are to help municipalities realize predictable prices for electricity and to provide municipalities with cost savings through purchase of this required commodity.

### **Energy Management Today**

The management of the Town's energy data has typically been the responsibility of the finance department in relation to paying invoices. By increasing the flow of information (such as consumption data) out of the finance department and into the hands of those that control the

processes that utilize energy, operations department staff will be able to monitor consumption more easily.

### Summary of 2012 – 2017 Energy Consumption, and GHG Emissions

As per Section 6 of O.Reg. 507/18 of The Town of Arnprior is required to report on all energy consumption for which complete information is available for a full year. It should be noted that per Section 5 of the regulation, the Town is required to report the energy consumption two years behind the current year. Thus, Arnprior has reported all energy consumption from 2012 to 2017.

#### Electricity Consumption

Combined electricity consumption at all Town facilities in 2012 was 4,627,617 kWh. Electricity consumption in 2017 was 4,438,530.35 kWh. This is a decrease of 189,086.65 kWh, approximately 4%.

The below figure displays 2012 versus 2017 electricity usage profiles, with the largest users being the WFP, WPCC and the Nick Smith Centre. The water treatment section includes the WFP, WPCC, pump stations 1-5 and the water tower. Other recreation includes the library, museum, and Robert Simpson Park concession and washrooms.

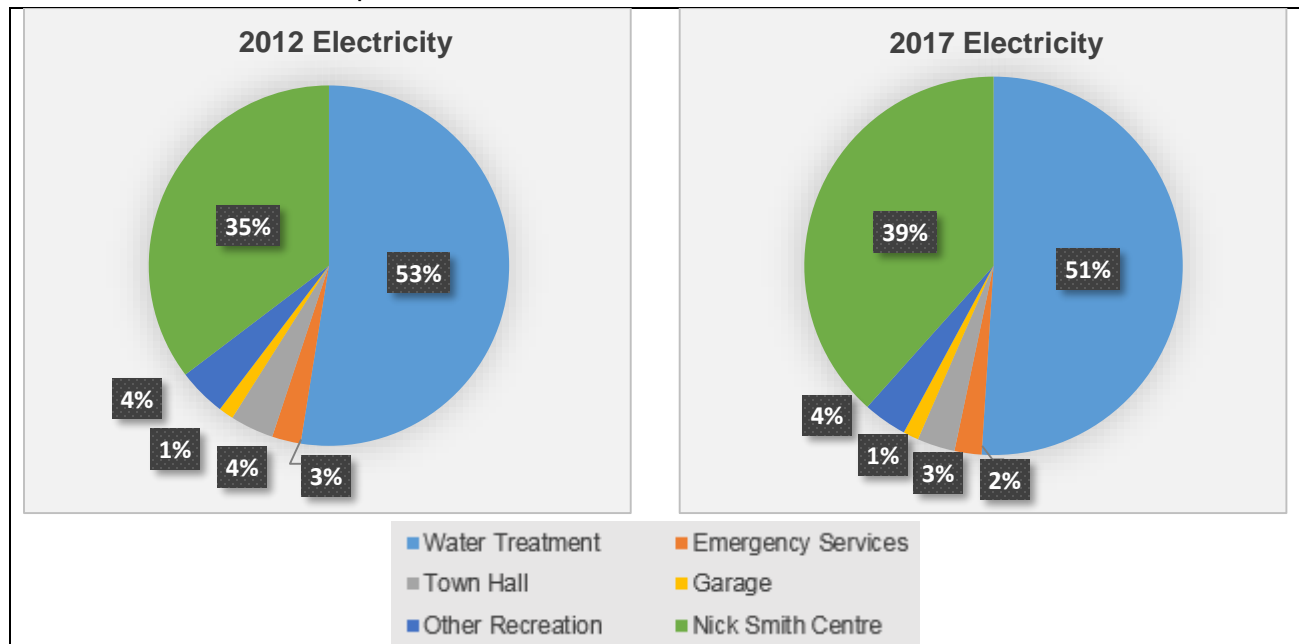


Figure 1: 2012 vs. 2017 Electricity Consumption

#### Natural Gas

Combined natural gas consumption at all town facilities in 2012 was 421,159 m3. Natural gas consumption in 2017 was 468,159 m3. This is an increase of 47,000 m3, approximately 10%.

This increase can be attributed to a variety of factors, including weather patterns, aging infrastructure, aging HVAC, etc.

The below figure displays 2012 versus 2017 natural gas usage profiles, with the largest users being the WFP and WPCC and the Nick Smith Centre.

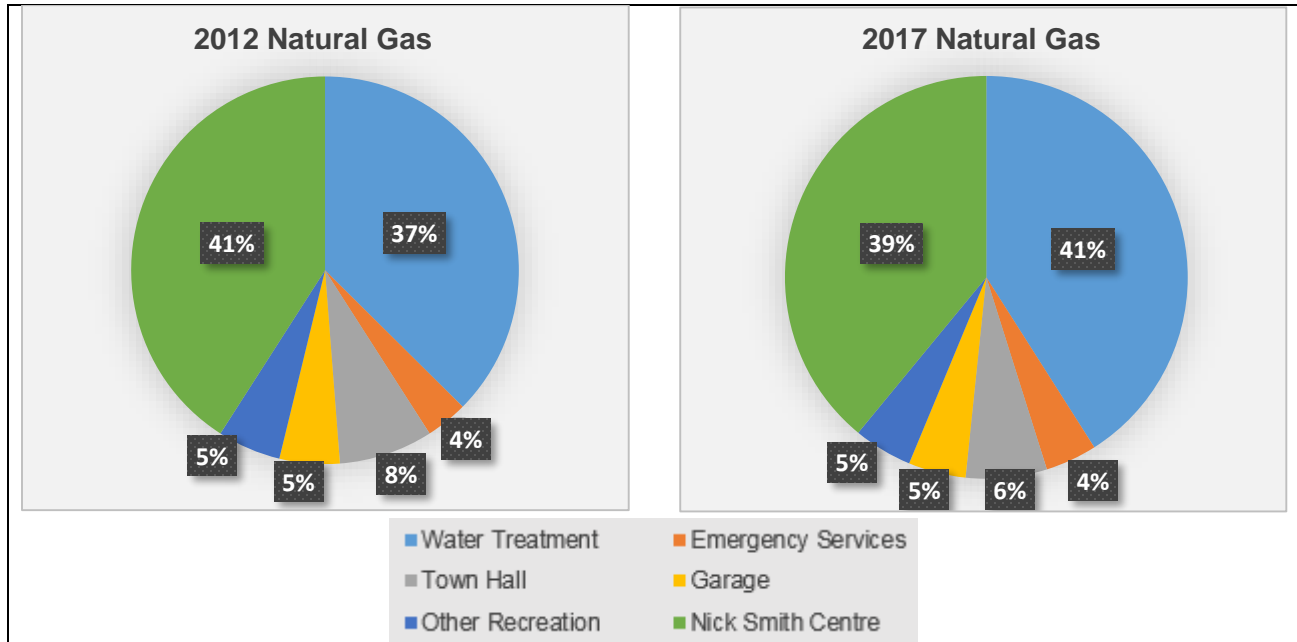


Figure 2: 2012 vs. 2017 Natural Gas Consumption

### Green House Gas Emissions

Combined GHG emissions from all Town facilities in 2012 was 1,223,936.81 kg. GHG emissions in 2017 was 962,056.11 kg. This is a decrease of 261,880.70 kg, approximately 12%.

The following two plots display GHG emission trends comparing facilities between 2012 and 2017. The blue bar shows 2012 data, the yellow bar shows 2017 data and the black line shows a 5- year average of 2012 to 2017.

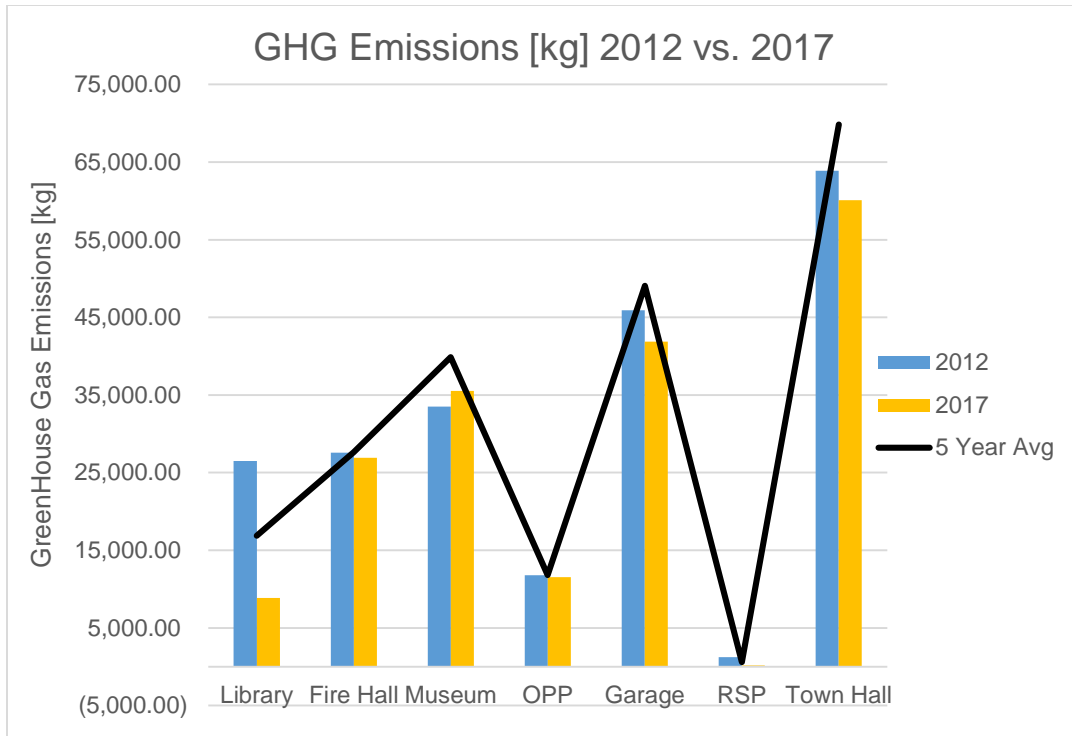


Figure 3: 2012 vs. 2017 GHG Emissions, including a tread line representing a 5-year average.

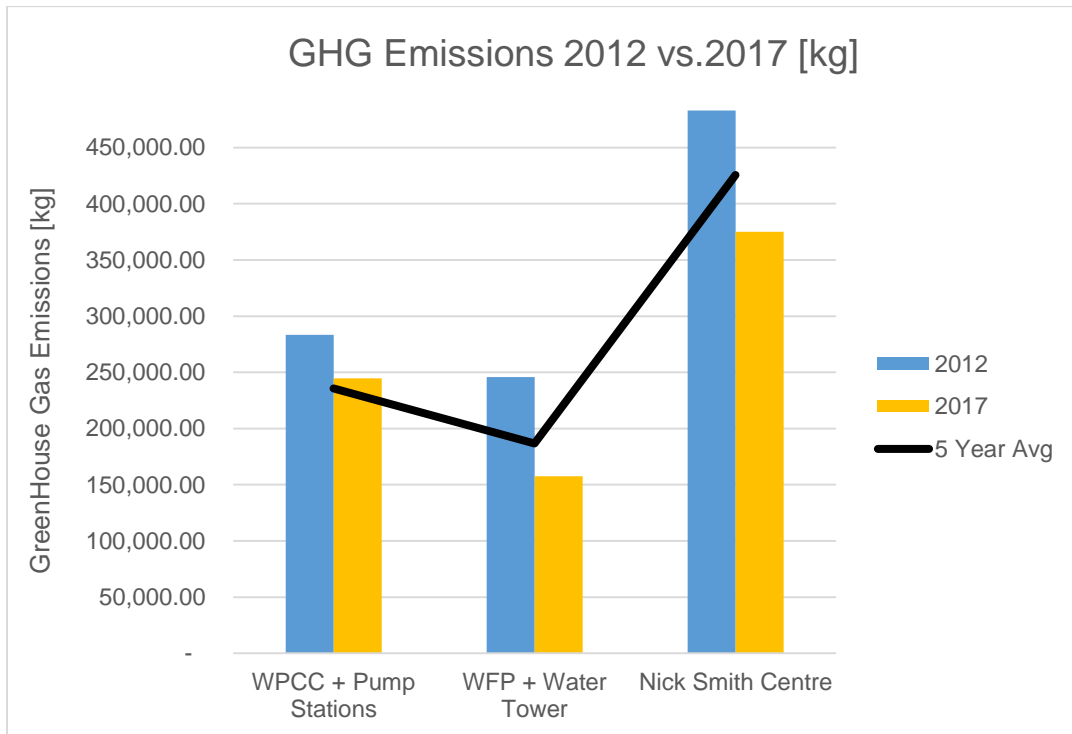


Figure 4: 2012 vs. 2017 GHG Emissions, including a tread line representing a 5-year average.

## Summary of Completed Projects

The following section includes a summary of all energy reduction related projects completed since implementation of the 2014-2019 CDM. The below table summarizes the location, a brief description of the project, the year of implementation, the motivation for the change and the expected effect on energy consumption.

Table 1: Summary of completed projects

Building	Project	Year	Motivation	Expected Effect on Energy Usage
<b>Arnprior Public Library</b>	Replacement 4 Furnaces	2018	AMP, LRCF 2014-2019 CDM Plan	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected
	Replacement 4 AC Units	2018	AMP, LRCF 2014-2019 CDM Plan	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected
	LED Lighting and Fixture Upgrades	2018	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage
	Replacement one AC unit	2014	AMP, LRCF	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected
	LED Lighting and Fixture Upgrades	2017	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected
<b>Museum</b>	LED Lighting and Fixture Upgrades	2018	Ainsworth Report	Reduction in electricity usage is expected
	Extensive Window Upgrade	2013	AMP, LRCF	Insulation improvements, reduction of natural gas usage is expected
<b>Fire Hall/ OPP</b>	LED Lighting and Fixture Upgrades	2018	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected
	Replacement of one rooftop unit, and repairs to a second rooftop unit	2014	AMP, LRCF	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected

	Replacement of one rooftop unit	2016	AMP, LRCF	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected
<b>Town Hall</b>	LED Lighting and Fixture Upgrades to approximately 1/3 of the building	2018	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected
	Replacement of rooftop units	2017	AMP, LRCF 2014-2019 CDM Plan	Appliances are energy star rated, reduction in energy usage and GHG emissions is expected
	LED Lighting upgrades to exit/emergency fixtures	2015	Ainsworth Report	Reduction in electricity usage is expected
	LED Lighting upgrades to exterior lighting	2015	Ainsworth Report	Reduction in electricity usage is expected
<b>Nick Smith Centre</b>	Entire building retrofitted to LED lighting and fixtures (community hall, pool, 2 ice surfaces)	2018	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected
	Full Replacement of sections 1.1, 8.0 & 9.0  All existing insulation replaced with 3" of Polyisocyanurate. ~R18.5	2018	AMP/LRCF	Insulation improvements resulting in reduction of heating and cooling costs.
<b>Streetlights</b>	Complete retrofit to LED lighting	2014	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected
<b>Water Tower</b>	LED Lighting upgrades	2014	Ainsworth Report	Reduction in electricity usage is expected
<b>Robert Simpson Park Concession and</b>	LED Lighting upgrades	2014	Ainsworth Report, 2014-2019 CDM Plan	Reduction in electricity usage is expected

<b>Washrooms</b>				
<b>All Facilities</b>	Behavioural change reminders in meeting settings	Ongoing	2014-2019 CDM	Reduction in energy usage and GHG emissions is expected
	Night Watch Program (Last person to leave turns off lights)	Ongoing	2014-2019 CDM Plan	Reduction in energy usage and GHG emissions is expected
	Behavioural change reminders in new employee orientation	Ongoing	2014-2019 CDM Plan	Reduction in energy usage and GHG emissions is expected
<b>WPCC Blower Building</b>	Full roof replacement  All existing insulation replaced with 2.5" of Polyisocyanurate. ~R15	2017	AMP/LRCF	Insulation improvements resulting in reduction of heating and cooling costs.
<b>Garage</b>	Roof Section #2, Full Replacement Roof Sections #1 & #3 Repairs  All existing insulation replaced with 2.5" of Polyisocyanurate. ~R15	2017	AMP/LRCF	Insulation improvements resulting in reduction of heating and cooling costs.

### Renewable Energy Utilized

Currently the Town does not utilize renewable energy technologies; however, has been in communication with a consultant regarding the possibility of retrofitting existing buildings to include solar panels. The initial investment of purchasing solar panels is generally high, yet if the building and location are a good fit, the payback period can be within 5 years [2].

## Planning

### Strategic Planning

To increase the effectiveness of the CDM plan, the Town should consider integrating the plan into existing Town documents, such as the Asset Management Plan (AMP) and Long Range Capital Forecast (LRCF). The AMP, LRCF and the CDM could act hand-in-hand, as both plans discuss municipal infrastructure and operations.



## Resources Planning

### **Energy Leaders**

The Town of Arnprior has unofficially appointed two energy leaders, including the Environmental Engineering Officer and the Engineering Officer, Facilities & Civil. The energy leaders are responsible for annual energy reporting, development of the five-year energy management plan and ensuring commitment to the plan.

### **Energy Team**

The energy team will consist of the two Energy Leaders, along with the General Manager, Operations. The team will discuss energy conservation initiatives and will ensure environmentally friendly options are considered throughout all operations.

## Implementation Plan

### **Municipal Level**

The administration and implementation of this plan will be the responsibility of the Energy Team, which consists of the Environmental Engineering Officer the Engineering Officer, Facilities & Civil and the General Manager, Operations. The finance department is responsible for energy cost tracking and bill payments. All town staff and facility users are responsible for the day to day improvements towards behavioural change.

### **Asset Level**

In order for the Town to meet the target of reducing energy consumption to below 2017 levels, the following objectives have been set forth.

1. Explore the feasibility of implementing renewable energy technologies,
2. Continual improvement to behavioural change efforts,
3. Upgrade infrastructure including, but limited to HVAC, lighting, building envelop, etc.,
4. Streamline the energy management process into everyday work,
5. Develop an energy policy,
6. Perform in depth benchmarking of energy consumption patterns,
7. Align the Energy Conservation and Demand Management Plan with existing plans, and;
8. Execute an updated Energy Assessment of all facilities.

The following table breaks down each of the seven objectives and outlines specific projects that can be implemented in order to achieve the objectives. The ability to achieve the seven objectives is limited by available staffing, available budget, and grant opportunities.

Table 2

Objective	Description	Responsibility	Cost Range
<b>1. Renewable Energy</b>	<u>Solar Panel Installations</u> This project idea has been discussed in the past, however, due to high initial costs and large return on investment periods, the project has not yet been determined as feasible. However, staff will continue to look into the idea.	Operations	High
	<u>Wind Energy</u> Similarly, to solar energy, the implementation cost of wind energy technologies is extremely high.	Operations	High
<b>2. Behavioural Change</b>	<u>Day to day activities:</u> Staff should continue to turn lights off when leaving a room, turn off computers off at night, ensure that electronic devices with physical switches are turned off at night to avoid unnecessary power draw, turn thermostats down in offices during heating season overnight, turn on power saving features on printers, computers, etc.	All Staff	Low
	<u>New Employee Orientation:</u> HR should continue to communicate the day to day expectations to new staff	All Staff	Low
	<u>Addition of stickers/ posters:</u> Town staff should investigate the feasibility and potential effectiveness of adding stickers and posters to educate staff and regular users of town facilities of the importance of turning off lights/ computers/ etc.	All Staff	Low
<b>3. Equipment and Building Upgrades</b>	Continuing LED lighting and fixture replacements.	Operations	Medium - High
	Upgrade HVAC equipment to energy efficient products.	Operations	Medium - High
	Purchase energy efficient replacements for white goods.	Operations	Medium - High

	Install variable frequency drives where applicable in large consumer buildings.	Operations	Medium - High
	Implement building automation systems in large consumer buildings	Operations	Medium - High
	Lighting controls	Operations	Medium - High
	Fleet monitoring	Operations	Low
	Caulking to reduce building air loss	Operations	Low
	Energy efficient windows [3]	Operations	Medium - High
<b>4. Energy Management Processes</b>	Improvement to the energy management processes could result in more accurate samples of data	Operations	Low
<b>5. Energy Policy</b>	The development of a commitment policy and Staff education.	Operations/ Senior Management	Low
<b>6. Benchmarking</b>	Once all the new plans are out, benchmark the Town of Arnprior to others similar municipalities and find comparisons.	Energy Leaders	Low
<b>7. Alignment</b>	Align to CDM to existing plans such as DWQMS, AMP, and LRCP	All Staff	Low
<b>8. Updated Energy Assessment</b>	Retain a consultant to perform an updated energy assessment of all facilities to determine important energy saving methods.	Operations	High

#### **Variable Frequency Drive Installations:**

Variable frequency drives (VFDs) are devices that can be added to existing equipment that contain a motor. The VFD works by optimizing motor speeds, ensuring the piece of equipment is operating at an ideal frequency [4]. For example, adding a VFD to a fan will force the fan to work at the speed that is required, to ensure the fan does not overwork, which ultimately reduces energy consumption [4].

#### **Building Automation Systems:**

Most of the older Town owned buildings currently have no or only partial building automation. Building automation may include mechanical, electrical, and plumbing (MEP) systems, and in many instances, retrofit options are available. Building automation can improve building system controls resulting in increased energy efficiency from automated MEP components [5].

#### **Lighting Controls/ Occupancy Sensors:**

Occupancy sensors are low cost additions that generally require very little investment to install; however, are proven to reduce energy consumption. Occupancy sensors are best used in buildings where certain rooms or areas are used at intermittent periods of the day, such as a meeting room in an office building, or a hall in a recreation facility. Occupancy sensors can be programmed to turn off lighting after certain period of time, which ultimately reduces electricity consumption and prolongs the life cycle of light fixture components, including the bulbs [6].

#### **Fleet Monitoring:**

The Town will improve processes related to tracking the efficiency of the fleet. The Town's fleet includes trucks, vans, ice resurfacers, ride on lawn mowers, utility vehicles, sidewalk vehicles, loaders, dump trucks, snowplows, street sweepers, etc. Currently, fuel consumption of the fleet is tracked for each vehicle; however, within the next five years the Town should begin completing regular reviews of fuel consumption. Further, when purchasing new vehicles, the Town shall strive to choose energy efficient options for replacements and should consider purchasing electric or hybrid vehicles where appropriate.

#### **Updated Energy Assessments:**

Energy Assessments of each of the Town owned facilities were conducted in 2008. Since then, many of the energy saving recommendations included in each report have been undertaken. Considering the duration of time lapsed since the previous assessments and overall improvements to energy saving technology over that period the Town should consider reassessing each of the facilities. An up to date assessment would allow Staff to recognize the most significant, and current, issues within each of the facilities while providing sufficient information for budgeting and funding purposes.

#### **New Building Construction:**

Although new building construction is not anticipated within the timeframe of this plan (5 years), new construction may become an item that is part of the 5-10-year long range forecast. If, or when, planning activities for new building construction commence, renewable energy options such as solar, ground source thermal, and heat pump technology should be included in any option evaluated. The Town should also consider incorporating the Leadership in Energy and Environmental Design (LEED) building practices and investigate the possibility of LEED certification.

## Evaluation

#### **CDM Review**

As per O.Reg. 507/18, the Town is required to report annual energy usage by July 1 of each year. Further, the Town is required to update the CDM plan on each 5-year anniversary of July 1, 2019. The Town should review the plan annually to ensure its accuracy and should review

the plan when beginning all new energy related projects (building retrofits, HVAC upgrades, vehicle replacements, building construction).

Through benchmarking neighbouring municipalities energy goals, it is evident that a goal to reach total consumption and cost reductions of 2% is common. If the town were to reach this goal, we would achieve the following:

- In 2017, Town facilities/assets consumed 4,438,530.35 kWh of electricity, resulting in a total cost of \$ 786,741.08. With a 2% reduction, these values would drop to 4,349,759.74 kWh and \$771,006.26.
- In 2017, Town facilities consumed 468,159 m3 of natural gas, resulting in a total cost of \$ 176,073.95. With a 2% reduction, these values would drop to 458,795.82 m3 and \$172,552.47.

### **Evaluation of Progress**

The 2019 – 2023 CDM plan will be considered successful when there is a decrease in overall energy consumption from the 2017 levels displayed in this report and when the following goals are met:

1. Improve energy efficiencies at all facilities via active or passive means.
2. Reduce GHG emissions at all facilities.
3. Meet the requirements of Ontario Regulation 507/18 under the Electricity Act, 1998.
4. Improve Energy Management processes at the Town of Arnprior.

When developing the next CDM plan in 2023, the Energy Team should review the success of this plan and evaluate any achievements or shortcomings in order to achieve continual improvement.

## References

- [1] Government of Ontario, "O. Reg. 507/18: BROADER PUBLIC SECTOR: ENERGY REPORTING AND CONSERVATION AND DEMAND MANAGEMENT PLANS," 14 December 2018. [Online]. Available: <https://www.ontario.ca/laws/regulation/r18507>.
- [2] E. Informative, "Solar Panels," [Online]. Available: <https://energyinformative.org/solar-panels-cost/>.
- [3] E. Saver, "Update or Replace Windows," [Online]. Available: <https://www.energy.gov/energysaver/design/windows-doors-and-skylights/update-or-replace-windows>.
- [4] N. R. Canada, "Variable frequency drives," 06 03 2019. [Online]. Available: <https://www.nrcan.gc.ca/energy/products/categories/commercial/motors/14814>.
- [5] C. Services, "Building Automation," [Online]. Available: [http://www.controls-services.com/learning\\_automation.htm](http://www.controls-services.com/learning_automation.htm).
- [6] B. H. P. Smart, "Occupancy sensors help save energy in the workplace," 2012. [Online]. Available: <https://www.bchydro.com/news/conservation/2012/occupancy-sensors.html>.

## Appendix A – Building Information

*Table 3: Summary of Arnprior's Reported Buildings*

<b>Operation Name</b>	<b>Building Type as per O.Reg. 507/18</b>	<b>Address</b>	<b>Total Floor Area [m2]</b>	<b>Hours of Operation/ Week</b>	<b>Natural Gas</b>	<b>Electricity</b>
Arnprior Public Library	Public libraries	21 Madawaska St	1,473.00	35	Yes	Yes
Arnprior Wastewater Treatment Plant	Facilities related to the treatment of sewage	233 Albert St.	3,813.00	168	Yes	Yes
Arnprior Water Filtration Plant	Facilities related to the treatment of water	74 James St	1,829.00	168	Yes	Yes
Fire Hall	Fire stations and associated offices and facilities	67 Meehan St.	895.00	42.15	Yes	Yes
Arnprior & District Museum	Cultural facilities	35 Madawaska St	1,263.00	30	Yes	Yes
Nick Smith Centre	Indoor recreational facilities	77 James St.	7,432.00	87	Yes	Yes
OPP Police Station	Police stations and associated offices and facilities	67 Meehan St.	383.00	168	Yes	Yes
Public Works Garage	Storage facilities where equipment or vehicles are maintained, repaired or stored	73 James St.	743.00	35	Yes	Yes
Pump Station 1	Other	50 Elgin St E	-	4.2	No	Yes
Pump Station 2	Other	251 McNab St	5.00	55.3	No	Yes
Pump Station 3	Other	68 Madawaska Blvd	150.00	114.8	No	Yes
Pump Station 4	Other	207 Riverview	5.00	31.5	No	Yes

		Drive				
Pump Station 5	Other	110 Wolff Cres	5.00	23.1	No	Yes
Robert Simpson Park - Concession	Other	400 John St	138.00	49	No	Yes
Robert Simpson Park - Washrooms	Other	400 John St	70.00	49	No	Yes
Town Hall	Administrative offices and related facilities, including municipal council chambers	105 Elgin St W	1,523.00	35	Yes	Yes
Water Tower	Other	435 Hartney St.	130.00	94.5	No	Yes



## Appendix B – Annual Energy Reporting Submissions 2012 - 2017

### 2012 Reporting Submission

Operation	Address	Floor Space [m2]	Hrs/ Week	Annual Flow [ML]	Electricity [kwh]	Natural Gas [m3]	Calculated, Weather Normalized				
							GHG Emissions [KG]	Energy Intensity [ekWh/ sqft]	Energy Intensity [ekWh/ ML]	Energy Intensity [GJ/m2]	Energy Intensity [GJ/ML]
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	146,352.00	6,582.00	26,499.75	13.64	-	0.53	-
Arnprior Water Pollution Control Centre	233 Albert St.	3,813.00	168.00	2,352.03	1,099,281.00	85,764.00	267,722.68	48.99	854.91	1.90	3.08
Arnprior Water Filtration Plant	74 James St	1,829.00	168.00	2,173.17	1,143,479.00	71,858.00	245,676.40	96.87	877.60	3.75	3.16
Fire Hall	67 Meehan St.	895.00	42.15	-	83,648.18	10,329.62	27,563.03	20.08	-	0.78	-
Museum	35 Madawaska St	1,263.00	30.00	-	40,945.00	15,650.00	33,520.67	15.25	-	0.59	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,634,992.00	172,378.00	482,927.13	43.34	-	1.68	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	35,795.82	4,420.38	11,795.12	20.08	-	0.78	-
Public Works Garage	73 James St.	743.00	35.00	-	61,923.00	21,143.00	45,920.61	35.84	-	1.39	-
Pump Station 1	50 Elgin St E	-	4.20	5.48	13,271.00	-	1,274.55	-	2,423.93	-	8.73
Pump Station 2	251 McNab St	5.00	55.30	217.91	72,541.00	-	6,966.84	1,347.86	332.90	52.23	1.20
Pump Station 3	68 Madawaska Blvd	150.00	114.80	517.21	61,250.00	-	5,882.45	37.94	118.42	1.47	0.43
Pump Station 4	207 Riverview Drive	5.00	31.50	5.84	2,841.00	-	272.85	52.79	486.47	2.05	1.75
Pump Station 5	110 Wolff Cres	5.00	23.10	34.68	14,276.00	-	1,371.07	265.26	411.71	10.28	1.48

Robert Simpson Park - Concession	400 John St	138.00	49.00	-	8,556.00	-	821.72	5.76	-	0.22	-
Robert Simpson Park - Washrooms	400 John St	70.00	49.00	-	4,340.00	-	416.81	5.76	-	0.22	-
Town Hall	105 Elgin St W	1,523.00	35.00	-	14,859.95	33,034.00	63,882.12	22.32	-	0.86	-
Water Tower	435 Hartney St.	130.00	94.50	503.70	1,920.81	-	184.47	1.37	3.81	0.05	0.01

## 2013 Reporting Submission

Operation	Address	Floor Space [m2]	Hrs/ Week	Annual Flow [ML]	Electricity [kwh]	Natural Gas [m3]	Calculated, Weather Normalized				
							GHG Emissions [KG]	Energy Intensity [ekWh/ sqft]	Energy Intensity [ekWh/ ML]	Energy Intensity [GJ/m2]	Energy Intensity [GJ/ML]
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	125,826.32	6,529.00	21,908.21	12.31	-	0.48	-
Arnprior Water Pollution Control Centre	233 Albert St.	3,813.00	168.00	2,352.03	1,101,600.00	84,145.99	242,823.50	48.63	848.58	1.88	3.05
Arnprior Water Filtration Plant	74 James St	1,829.00	168.00	2,380.27	998,968.68	79,260.00	225,784.70	93.53	773.58	3.62	2.78
Fire Hall	67 Meehan St.	895.00	42.15	-	70,617.15	13,118.77	30,170.45	21.80	-	0.84	-
Museum	35 Madawaska St	1,263.00	30.00	-	30,939.13	20,020.51	40,203.07	17.93	-	0.69	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,498,297.00	215,358.00	521,050.20	47.34	-	1.83	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	30,219.41	5,613.95	12,910.93	21.80	-	0.84	-
Public Works Garage	73 James St.	743.00	35.00	-	69,590.09	22,322.67	47,493.53	38.37	-	1.49	-
Pump Station 1	50 Elgin St E	5.00	4.20	-	15,924.38	-	1,210.44	295.88	-	11.47	-
Pump Station 2	251 McNab St	5.00	55.30	-	62,985.13	-	4,787.63	1,170.30	-	45.35	-
Pump Station 3	68 Madawaska Blvd	150.00	114.80	-	60,971.28	-	4,634.55	37.76	-	1.46	-

Pump Station 4	207 Riverview Drive	5.00	31.50		3,234.97	-	245.90	60.11	-	2.33	-
Pump Station 5	110 Wolff Cres	5.00	23.10		14,892.63	-	1,132.02	276.71	-	10.72	-
Robert Simpson Park - Concession	400 John St	138.00	49.00	-	10,668.19	-	810.91	7.18	-	0.28	-
Robert Simpson Park - Washrooms	400 John St	70.00	49.00	-	1,110.74	-	84.43	1.47	-	0.06	-
Town Hall	105 Elgin St W	1,643.00	35.00	-	145,180.20	37,419.38	81,781.52	30.70	-	1.19	-
Water Tower	435 Hartney St.	130.00	168.00		27,430.60	-	2,085.05	19.60	-	0.76	-

## 2014 Reporting Submission

Operation	Address	Floor Space [m2]	Hrs/ Week	Annual Flow [ML]	Electricity [kwh]	Natural Gas [m3]	Calculated, Weather Normalized				
							GHG Emissions [KG]	Energy Intensity [ekWh/ sqft]	Energy Intensity [ekWh/ ML]	Energy Intensity [GJ/m2]	Energy Intensity [GJ/ML]
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	126,056.81	6,817.00	17,932.06	12.52	-	0.49	-
Arnprior Water Pollution Control Centre	233 Albert St.	-	168.00	2,305.89	1,460,900.75	75,530.00	201,251.16	-	981.67	#DIV/0!	3.53
Arnprior Water Filtration Plant	74 James St	-	168.00	1,979.50	921,859.00	80,454.00	188,993.01	-	897.66	#DIV/0!	3.23
Fire Hall	67 Meehan St.	895.00	42.15	-	79,309.29	13,505.54	28,707.18	23.13	-	0.90	-
Museum	35 Madawaska St	1,263.00	30.00	-	43,921.40	22,391.00	44,090.37	20.73	-	0.80	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,468,154.81	186,986.00	412,263.12	43.19	-	1.67	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	33,939.06	5,779.46	12,284.75	23.13	-	0.90	-
Public Works Garage	73 James St.	743.00	35.00	-	62,504.22	26,124.00	51,891.60	42.53	-	1.65	-
Pump Station 1	50 Elgin St E	5.00	4.20	-	16,156.94	-	646.46	300.21	-	11.63	-
Pump Station 5	110 Wolff Cres	5.00	23.10	-	20,241.96	-	809.90	376.11	-	14.57	-
Robert Simpson Park - Concession	389 John Street N	138.00	49.00	-	12,138.18	-	485.66	8.17	-	0.32	-

McLean Park Ball Diamond Washrooms	143 McLean Avenue	70.00	49.00	-	951.20	-	38.06	1.26	-	0.05	-
Pump Station 2	251 McNab St	5.00	55.30	-	47,856.38	-	1,914.78	889.20	-	34.46	-
Pump Station 3	68 Madawaska Blvd	150.00	114.80	-	55,443.81	-	2,218.36	34.34	-	1.33	-
Pump Station 4	207 Riverview Drive	5.00	31.50	-	2,953.90	-	118.19	54.89	-	2.13	-
Town Hall	105 Elgin St W	1,643.00	35.00	-	152,309.50	32,841.00	68,184.14	28.35	-	1.10	-
Water Tower	435 Hartney St.	130.00	168.00	-	32,066.45	-	1,283.01	22.92	-	0.89	-

2015 Reporting Submission

Operation	Address	Floor Space [m2]	Hrs/ Week	Annual Flow [ML]	Electricity [kwh]	Natural Gas [m3]	Calculated, Weather Normalized				
							GHG Emissions [KG]	Energy Intensity [ekWh/ sqft]	Energy Intensity [ekWh/ ML]	Energy Intensity [GJ/m2]	Energy Intensity [GJ/ML]
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	123,628.29	4,189.00	12,932.72	10.61	-	0.41	-
Arnprior Water Pollution Control Centre	233 Albert St.	-	168.00	2,041.49	1,029,600.00	93,760.00	219,013.41	-	992.44	#DIV/0!	3.57
Museum	35 Madawaska St	1,263.00	30.00	-	40,831.05	19,319.00	38,180.64	18.11	-	0.70	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,536,963.47	165,374.00	374,981.34	41.18	-	1.60	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	31,464.64	5,100.97	10,919.86	20.78	-	0.81	-
Pump Station 3	68 Madawaska Blvd	150.00	114.80	-	50,001.75	-	2,027.47	30.97	-	1.20	-
Pump Station 4	207 Riverview Drive	5.00	31.50	-	2,341.98	-	94.96	43.52	-	1.69	-
Pump Station 5	110 Wolff Cres	5.00	23.10	-	12,192.70	-	494.39	226.55	-	8.78	-
Arnprior Water Filtration Plant	74 James St	-	168.00	1,958.36	948,476.00	66,963.00	165,060.86	-	847.72	#DIV/0!	3.05

Fire Hall	67 Meehan St.	895.00	42.15	-	73,527.04	11,920.03	25,517.70	20.78	-	0.81	-
McLean Park Ball Diamond Washrooms	143 McLean Avenue	70.00	49.00	-	297.21	-	12.05	0.39	-	0.02	-
Public Works Garage	73 James St.	743.00	35.00	-	66,744.73	26,467.00	52,745.59	43.52	-	1.69	-
Pump Station 1	50 Elgin St E	5.00	4.20	-	14,736.13	-	597.52	273.81	-	10.61	-
Pump Station 2	251 McNab St	5.00	55.30	-	51,197.76	-	2,075.97	951.29	-	36.86	-
Robert Simpson Park - Concession	389 John Street N	138.00	49.00	-	10,477.08	-	424.82	7.05	-	0.27	-
Town Hall	105 Elgin St W	1,643.00	35.00	-	139,630.67	31,985.00	66,133.45	27.12	-	1.05	-
Water Tower	435 Hartney St.	130.00	168.00	-	21,994.75	-	891.84	15.72	-	0.61	-



## 2016 Reporting Submission

Operation	Address	Floor Space [m2]	Hrs/ Week	Annual Flow [ML]	Electricity [kwh]	Natural Gas [m3]	Calculated, Weather Normalized				
							GHG Emissions [KG]	Energy Intensity [ekWh/ sqft]	Energy Intensity [ekWh/ ML]	Energy Intensity [GJ/m2]	Energy Intensity [GJ/ML]
Fire Hall	67 Meehan St.	895.00	42.15	-	70,917.28	12,870.35	26,854.00	21.56	-	0.84	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	30,347.84	5,507.65	11,491.72	21.56	-	0.84	-
Public Works Garage	73 James St.	743.00	35.00	-	56,304.30	27,749.00	54,464.51	43.92	-	1.70	-
Pump Station 1	50 Elgin St E	5.00	4.20	-	14,138.05	-	502.58	262.69	-	10.18	-
Pump Station 5	110 Wolff Cres	5.00	23.10	-	13,104.38	-	465.83	243.49	-	9.44	-
Robert Simpson Park - Concession	389 John Street N	138.00	49.00	-	8,435.69	-	299.87	5.68	-	0.22	-
Town Hall	105 Elgin St W	1,643.00	35.00	-	150,521.40	38,901.00	78,898.02	31.89	-	1.24	-
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	119,925.84	4,617.00	12,992.15	10.66	-	0.41	-
McLean Park Ball Diamond Washrooms	143 McLean Avenue	70.00	49.00	-	823.14	-	29.26	1.09	-	0.04	-
Museum	35 Madawaska St	1,263.00	30.00	-	41,572.47	24,501.00	47,800.07	22.21	-	0.86	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,695,304.14	173,320.00	387,948.14	44.22	-	1.71	-

Pump Station 2	251 McNab St	5.00	55.30	-	45,455.23	-	1,615.84	844.59	-	32.73	-
Pump Station 3	68 Madawaska Blvd	150.00	114.80	-	48,786.24	-	1,734.25	30.22	-	1.17	-
Pump Station 4	207 Riverview Drive	5.00	31.50	-	2,504.28	-	89.02	46.53	-	1.80	-
Arnprior Water Pollution Control Centre	233 Albert St.	-	168.00	2,243.74	1,012,680.00	108,019.00	240,222.39	-	962.98	-	3.47
Arnprior Water Filtration Plant	74 James St	-	168.00	1,907.86	906,743.34	55,972.00	138,055.09	-	787.06	-	2.83
Water Tower	435 Hartney St.	130.00	168.00	-	16,868.54	-	599.64	12.05	-	0.47	-

2017 Reporting Submission

Operation Name	Address	Floor Area [m]	Hrs/ Week	Annual Flow [ML]	Electricity Quantity [kWh]	Natural Gas [m3]	Calculated, Weather Normalized		
							GHG Emissions [Kg]	Energy Intensity [ekWh/sqft]	Energy Intensity [ekWh/Mega Litre]
Arnprior Public Library	21 Madawaska St	1,473.00	35.00	-	119,619.96	3,602.00	8,879.22	9.96	-
Arnprior Water Pollution Control Centre	233 Albert St.	-	168.00	2,738.78	1,139,760.00	117,706.00	242,253.71	-	872.91
Arnprior Water Filtration Plant	74 James St	-	168.00	1,907.86	967,141.14	74,198.00	157,010.35	-	920.25
Fire Hall	67 Meehan St.	895.00	42.15	-	71,845.82	13,584.20	26,925.44	22.44	-
McLean Park Ball Diamond Washrooms	143 McLean Avenue	70.00	49.00	-	194.21		3.36	0.26	-
Museum	35 Madawaska St	1,263.00	30.00	-	37,469.38	18,446.00	35,522.65	17.18	-
Nick Smith Centre	77 James St.	7,432.00	87.00	-	1,703,711.45	182,710.00	374,907.26	45.57	-
OPP Police Station	67 Meehan St.	383.00	168.00	-	30,791.06	5,821.80	11,539.48	22.48	-
Public Works Garage	73 James St.	743.00	35.00	-	58,728.31	21,608.00	41,868.55	36.06	-
Pump Station 1	50 Elgin St E	5.00	4.20	-	15,400.92		266.41	286.16	-
Pump Station 2	251 McNab St	5.00	55.30	-	49,165.13		850.46	913.52	-
Pump Station 3	68 Madawaska	150.00	114.80	-	58,274.62		1,008.03	36.09	-

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Pump Station 4	207 Riverview Drive	5.00	31.50	-	4,118.01		71.23	76.52	-
Pump Station 5	110 Wolff Cres	5.00	23.10	-	8,033.40		138.96	149.27	-
Robert Simpson Park - Concession	389 John Street N	138.00	49.00	-	9,307.56		161.00	6.27	-
Town Hall	105 Elgin St W	1,643.00	35.00	-	143,059.01	30,483.00	60,106.62	26.41	-
Water Tower	435 Hartney St.	130.00	168.00	-	21,910.36		379.01	15.66	-

## Appendix C – Cost Information

Table 4: Electricity Costs

	<b>NSC</b>	<b>Washrooms</b>	<b>RSP</b>	<b>WPCC</b>	<b>Filtration</b>	<b>Tower</b>	<b>PS1</b>	<b>PS2</b>
<b>2017</b>	\$ 287,452.39	\$ 341.28	\$ 1,960.31	\$ 209,427.34	\$ 184,532.39	\$ 4,029.17	\$ 2,184.78	\$ 7,923.52
<b>2016</b>	\$ 286,982.15	\$ 437.65	\$ 1,999.42	\$ 198,945.88	\$ 179,868.71	\$ 3,724.03	\$ 2,709.09	\$ 9,466.35
<b>2015</b>	\$ 266,110.87	\$ 490.64	\$ 2,074.61	\$ 155,249.22	\$ 170,132.43	\$ 4,002.21	\$ 2,448.39	\$ 8,615.08
<b>2014</b>	\$ 237,300.28	\$ 603.38	\$ 1,658.74	\$ 148,456.33	\$ 152,724.28	\$ 4,642.92	\$ 2,017.77	\$ 6,248.38
<b>2013</b>	\$ 207,204.59	\$ 574.23	\$ 1,686.67	\$ 139,592.00	\$ 152,743.08	\$ 4,723.01	\$ 2,252.77	\$ 9,043.00

	<b>PS3</b>	<b>PS4</b>	<b>PS5</b>	<b>Garage</b>	<b>Museum</b>	<b>Town Hall</b>	<b>Fire Hall</b>	<b>OPP</b>	<b>Library</b>
<b>2017</b>	\$ 9,862.08	\$ 997.55	\$ 1,623.03	\$ 10,130.24	\$ 6,576.98	\$ 24,556.90	\$ 12,615.97	\$ 5,406.84	\$ 17,120.31
<b>2016</b>	\$ 10,096.12	\$ 879.48	\$ 2,967.21	\$ 11,621.23	\$ 8,639.36	\$ 30,379.68	\$ 14,411.04	\$ 6,176.16	\$ 24,450.67
<b>2015</b>	\$ 8,364.45	\$ 632.81	\$ 2,420.07	\$ 11,684.49	\$ 6,867.76	\$ 24,933.73	\$ 11,497.26	\$ 4,927.40	\$ 20,496.81
<b>2014</b>	\$ 7,208.56	\$ 550.39	\$ 3,417.58	\$ 10,506.12	\$ 5,792.51	\$ 20,781.24	\$ 10,865.51	\$ 4,656.65	\$ 20,371.59
<b>2013</b>	\$ 10,203.36	\$ 572.07	\$ 2,464.10	\$ 8,237.20	\$ 4,751.98	\$ 16,902.64	\$ 9,180.86	\$ 3,934.66	\$ 28,814.55

Table 5: Natural Gas Costs

	<b>NSC</b>	<b>WPCC</b>	<b>Filtration</b>	<b>Garage</b>	<b>Museum</b>	<b>Town Hall</b>	<b>Fire Hall</b>	<b>OPP</b>	<b>Library</b>
<b>2017</b>	\$ 70,771.38	\$ 40,021.05	\$ 25,922.40	\$ 7,981.56	\$ 7,728.22	\$ 13,297.22	\$ 5,638.28	\$ 2,416.40	\$ 2,297.44
<b>2016</b>	\$ 57,742.28	\$ 39,492.26	\$ 18,132.08	\$ 8,389.93	\$ 6,093.90	\$ 12,465.05	\$ 3,961.58	\$ 1,697.82	\$ 2,217.34
<b>2015</b>	\$ 67,006.71	\$ 34,168.18	\$ 24,632.84	\$ 8,288.68	\$ 6,708.18	\$ 11,885.10	\$ 4,658.21	\$ 1,996.38	\$ 2,166.71
<b>2014</b>	\$ 57,732.01	\$ 22,167.65	\$ 29,107.39	\$ 9,344.16	\$ 8,031.06	\$ 10,758.17	\$ 4,804.03	\$ 2,058.87	\$ 3,135.08
<b>2013</b>	\$ 31,401.45	\$ 24,835.53	\$ 22,741.80	\$ 5,096.65	\$ 4,824.11	\$ 8,305.78	\$ 3,302.47	\$ 1,415.34	\$ 2,273.19