

# Township of Seguin



## **Corporate Milestone 1**

submission to:

Federation of Canadian Municipalities  
Partners for Climate Protection Program



**Version: 1**

**Date:** October, 2019

Prepared by:

Organization: Georgian Bay Biosphere  
Name: Benjamin John  
Position: Climate Change & Energy Specialist  
Contact: climate@gbbr.ca

Reviewed by:

Organization: Georgian Bay Biosphere  
Name: David Bywater  
Position: Conservation Program Manager  
Contact: conservation@gbbr.ca

Approved by:

Organization: Township of Seguin

Name: Dominique O'Brien  
Position: Director of Community Services  
Contact: dobrien@seguin.ca

Name: Daryle Moffatt  
Position: Councillor  
Contact: darylemoffatt@gmail.com



# 1. Methodology

## 1.1 Greenhouse Gas (GHG) Inventory

A greenhouse gas inventory brings together data on community and municipal sources of greenhouse gas emissions to estimate emissions for a given year. Two separate GHG inventories and forecasts have been created for Seguin Township: one for municipal corporate operations and one for community sources. As per the PCP protocol, the inventories consist of the following sources of GHG emissions.

<i>Corporate</i>	<i>Community</i>
-Buildings	-Residential
-Streetlights	-Commercial and institutional
-Water and sewage treatment	-Industrial
-Municipal fleet	-Transportation
-Solid Waste	-Solid Waste

## 1.2 Scope

This document will focus solely on corporate emissions.

## 1.3 Baseline Year

A baseline year of 2016 was selected because it is the year in which the most recent publicly available municipal greenhouse gas emissions data could be retrieved. 2016 also happens to be the most recent Statistics Canada Census year, providing the most recent data on population statistics. Additional data was gathered from other years as well, where relevant, and was referred to throughout the data analysis process. In the event that actual data could not be collected for the baseline year, assumptions were applied from prior, or successive years where relevant. Establishing a baseline is a useful tool to identify areas for improvement, inform development of a GHG reduction action plan, estimate cost savings from reductions, and serve as a reference point to track improvements.

## 1.4 Data Collection

Energy and emissions quantities were collected for Seguin Township and compiled into an internal database for analysis and calculation.

## 1.5 Data Sources

Corporate energy usage, and emissions were calculated for 2016 and reported by sector (buildings and facilities, fleet vehicles, streetlights, water and wastewater, and corporate solid waste) as well as by emissions source (electricity, natural gas, propane, fuel oil, gasoline, diesel, waste, and wastewater). In some cases, data sources varied depending on the type of expenditure required to calculate emissions. The majority of corporate data was obtained from the Government of Ontario’s open data catalogue, ‘Energy use and greenhouse gas emissions for the



Broader Public Sector<sup>1</sup>,’ as reported by each municipality under *O. Reg 397/11*<sup>2</sup>. If the data was unavailable on BPS 2016, Seguin staff provided the missing data. For a detailed summary of corporate data sources, please refer to Table 1.

Table 1:

<i>Emission Sector</i>	<i>Municipality</i>	<i>Source</i>	<i>Quality of Data</i>	<i>Notes</i>
Building/ Facilities	Seguin	BPS, 2016	High	Actual energy consumption per source, per building.
Streetlights	Seguin	BPS, 2016	High	Actual energy consumption in kWh.
Fleet	Seguin	Municipality	High	Actual billed fuel consumption for each fleet vehicle.
Water/ Wastewater	Seguin	DNE	DNE	Seguin Township does not provide water or wastewater services.
Solid Waste	Seguin	Municipality	Low	Calculation based primarily on assumptions.

Legend for data quality:

- High: Actual usage data covering the period of the inventory year, from a credible data collector/ provider
- Medium: Actual usage data provided, with some assumptions from within or around the geographic boundary, inventory year, or otherwise to fill in data gaps
- Low: Usage data provided, but mainly based on assumptions
- DNE: Does not exist

### 1.5.1 Buildings and Facilities

Actual energy consumption data by each emission source for each municipal building and facilities was obtained from the Government of Ontario’s open data catalogue, ‘Energy use and greenhouse gas emissions for the Broader Public Sector,’ as reported by each municipality under *O.Reg 397/11*.

<sup>1</sup> <https://www.ontario.ca/data/energy-use-and-greenhouse-gas-emissions-broader-public-sector>

<sup>2</sup> <https://www.ontario.ca/laws/regulation/110397>



### 1.5.2 Water and Wastewater

Seguin Township does not provide water or wastewater services. This is because the township’s expansive geographic size in relation to it’s small, spread out population makes it economically infeasible to provide these services.

### 1.5.3 Streetlights

Actual energy consumption in kWh for all streetlights in Seguin Township was obtained from the Government of Ontario’s open data catalogue, ‘Energy use and greenhouse gas emissions for the Broader Public Sector,’ as reported by each municipality under *O.Reg 397/11*.

### 1.5.4 Fleet Vehicles

Actual fuel consumption in litres by vehicle was provided by Seguin staff.

### 1.5.5 Solid Waste

GHG emissions from solid waste is a unique emission source to be quantified by local governments. As a result, this presented difficult reporting and calculation challenges. These emissions reflect the impact of methane released through the decomposition of organic matter in landfills and can be calculated based on total waste deposited in a landfill. With waste generation data pertaining solely to corporate operations being unavailable, Georgian Bay Biosphere Reserve (GBBR) estimated the quantity of solid waste generated at corporate buildings and facilities based on approximations of the size of garbage bins used, their average fullness when emptied, and the frequency of their pickup per the PCP protocol. This was used in combination with actual tonnage of waste sent to the McDougall landfill and information gathered from municipal staff on waste management practices and policies. Waste sent to the McDougall landfill from Seguin’s various transfer stations is mixed with community waste because no curbside waste collection program exists. This resulted in the tonnage reported to be an inaccurate representation of the Seguin’s waste generation.

## 2. Calculation Process

### 2.1 Buildings and Facilities

There is only one formula for calculating building emissions from municipal operations. Fortunately, these emissions have already been calculated, and the energy consumption data has been made publicly available as per *O. Reg 397/11*. For reference, a simplified version of the formula for calculating building and facility emissions as per the PCP protocol is as follows.

#### 2.1.1 Formula

$$\sum (FC * Cef) + (FC * CHef * CHwp) + (FC * Nef * Nwp)$$

Where:

FC = Amount of fuel by type consumed



Cef = Emission factor for Carbon Dioxide (CO<sub>2</sub>)

CHef = Emission factor for Methane (CH<sub>4</sub>)

Nef = Emission factor for Nitrous Oxide (N<sub>2</sub>O)

CHwp = Global warming potential of Methane

Nwp = Global warming potential of Nitrous Oxide

### 2.1.2 Assumptions

No assumptions were made in calculating GHG emissions produced by corporate buildings and facilities because actual energy consumption data was available.

### 2.1.3 Outcome

Seguin Township’s buildings and facilities produced **319** tonnes of CO<sup>2</sup>e in 2016. These emissions were produced by consuming **9,790** GJ of energy.

## 2.2 Water and Wastewater

Seguin Township does not provide water or wastewater services to its residents because of geographic and economic limitations. As a result, no GHG emissions are generated through this category and no calculation is warranted. However, for reference, a simplified version of the formula for calculating water and wastewater emissions as per the PCP protocol is as follows.

### 2.2.1 Formula

$$\sum (FC * Cef) + (FC * CHef * CHwp) + (FC * Nef * Nwp)$$

Where:

FC = Amount of fuel by type consumed

Cef = Emission factor for Carbon Dioxide (CO<sub>2</sub>)

CHef = Emission factor for Methane (CH<sub>4</sub>)

Nef = Emission factor for Nitrous Oxide (N<sub>2</sub>O)

CHwp = Global warming potential of Methane

Nwp = Global warming potential of Nitrous Oxide

### 2.3 Streetlights

There are multiple formulas that can be used to calculate the emissions produced by streetlights. However, since actual electricity consumption data was available through the Government of Ontario’s open data catalogue, ‘Energy use and greenhouse gas emissions for the Broader Public Sector’, the formula corresponding to actual consumption data as per the PCP protocol was used.



For reference, a simplified version of the formula for calculating GHG emissions produced by streetlights as per the PCP protocol is as follows.

**2.3.1 Formula**

$$\sum (FC * Cef) + (FC * CHef * CHwp) + (FC * Nef * Nwp)$$

Where:

FC = Amount of electricity consumed

Cef = Carbon Dioxide (CO<sub>2</sub>) emission factor for electricity

CHef = Methane (CH<sub>4</sub>) emission factor for electricity

Nef = Nitrous Oxide (N<sub>2</sub>O) emission factor for electricity

CHwp = Global warming potential of Methane

Nwp = Global warming potential of Nitrous Oxide

**2.3.2 Assumptions**

No assumptions were made in calculating GHG emissions produced by streetlights because actual electricity consumption data was available.

**2.4.2 Outcome**

Seguin Township’s streetlighting produced **4** tonnes of CO<sub>2</sub>e in 2016. These emissions were produced by consuming **398** GJ of energy.

**2.5 Fleet**

Actual fuel consumption data by vehicle was provided by municipal staff. With the consumption of fuel known, a standard formula for calculating the GHG emissions produced by a corporate fleet can be applied. For reference, a simplified version of this formula, as per the PCP protocol is as follows.

**2.5.1 Formula**

$$\sum (FC * VTC) + (FC * VTCHef * CHwp) + (FC * VTNef * Nwp)$$

Where:

FC = Amount of fuel by type consumed

VTC = Emission factor by vehicle type for Carbon Dioxide (CO<sub>2</sub>)

VTCHef = Emission factor by vehicle type for Methane (CH<sub>4</sub>)

VTNef = Emission factor by vehicle type for Nitrous Oxide (N<sub>2</sub>O)



CHwp = Global warming potential of Methane

Nwp = Global warming potential of Nitrous Oxide

### **2.5.2 Assumptions**

Actual fuel consumption data by vehicle was provided by municipal staff. Although municipal staff provided data on actual fuel consumption by vehicle, a portion of the reported fuel consumed went unallocated to a specific vehicle. As a result, the remaining unaccounted gasoline and diesel were allocated to heavy duty gasoline trucks and heavy duty diesel trucks respectively. This assumption and allocation was based on the observation that the majority of gasoline accounted for was consumed by vehicles classified as heavy duty gasoline trucks. Similarly, diesel that was accounted for was primarily consumed by heavy duty diesel trucks and other heavy duty equipment. Additionally, it is likely that these fuels were consumed by vehicles in the fire department, which can be classified as heavy duty gasoline and diesel trucks.

Fuel efficiency ranges between all vehicles and equipment. However, when contrasting subsectors (i.e. truck to truck, equipment to equipment, etc.) there is a relative consistency between emission technology and therefore the GHG coefficient associated with that technology. For example, the 2015 Western Star Tandem Axle Plow may have consumed more fuel than the 2013 Freightliner Tandem Axle Plow, but given that they fall under the same classification and receive the same emission factors, the GHG outcome would equate to the same amount. Therefore, despite the lack of knowledge on which vehicle consumed the unaccounted fuel, it can confidently be assumed that a similar GHG outcome would result, based on the consistency of emission coefficients.

### **2.5.3 Outcome**

Seguin Township's fleet produced **718** tonnes of CO<sub>2</sub>e in 2016. These emissions were produced by consuming **10,171** GJ of energy.

## **2.6 Solid Waste**

Since actual data on corporately generated waste is not available, local governments can estimate the quantity of solid waste generated at corporate buildings and facilities, as well as community produced waste that is diverted as part of municipal operations (i.e. parks and sidewalk garbage receptacles). This estimate is determined on the size of garbage bins used, their average fullness at pickup, and the frequency of pickup (PCP Protocol, Approach #2, p.22)<sup>3</sup>.

The type of landfill is another determinant of the formula used for estimating emissions from corporate solid waste. For reference, a simplified version of this formula, as per the PCP protocol is as follows.

---

<sup>3</sup> [https://data.fcm.ca/Documents/reports/PCP/PCP\\_Protocol\\_Canadian\\_Supplement\\_EN.pdf](https://data.fcm.ca/Documents/reports/PCP/PCP_Protocol_Canadian_Supplement_EN.pdf)





**2.6.1 Formula**

$$\sum 21 * (GBC * BF * PU * 2.136) * \left( \left( \frac{16}{12} \right) * MCF * DOC * DOCF * F \right) (1 - MR)(1 - OX)$$

Where:

GBC = garbage bin capacity (m<sup>3</sup>)

BF = Approximately how full the bin is when it is emptied (%)

PU = Frequency of pickup (times per month)

MCF = Methane correction factor

DOC = Degradable organic content

DOCF = Fraction of DOC dissimilated

F = Fraction of methane in landfill gas

MR = Methane recovery at landfill (%)

OX = Oxidation Factor

**2.6.2 Assumptions**

Data on the actual tonnage of corporate solid waste generated by Seguin Township in 2016 does not exist. Gaining an understanding of solid waste practices and policies can help to determine some of the factors and coefficients of the formula that are determinant on landfill management and operations.

Municipal staff explained that when solid waste is generated, it is sent to the various transfer stations located throughout the municipality. During the busy weekends (June-August), the transfer station waste trailers are emptied on Fridays and Mondays regardless of capacity to ensure that staff do not encounter a situation in which waste trailers breach capacity. Once the waste trailers have been emptied, solid waste is then diverted to the McDougall landfill and Walker Industries. Specifically, of the 2831 tonnes of waste generated by the entire municipality, approximately 2500 tonnes was sent to the McDougall landfill, and the remaining was sent to Walker Industries in Welland. However, this waste is mixed in with community generated waste as part of the solid waste service the transfer station provides to residents. As a result, the tonnage of solid waste reported by Seguin’s 2016 Waste and Recycling Management Year End Report can only be used as a reference to determine the accuracy of the solid waste estimate. Furthermore, given that the majority of waste was sent to the McDougall landfill, for calculation purposes, it will be assumed that all waste was sent to the McDougall landfill.

Staff from the McDougall landfill informed GBBR that no emission capture technology exists. This is because a feasibility study was undertaken, which determined that it was economically unfeasible to purchase the technology and embark on installation. While this technology does not exist, the landfill is still being actively managed. Garbage is compacted daily to reduce its



volume and then buried to allow for additional landfill space, and to deter wildlife. The landfill is also classified as engineered. The landfill is lined to capture leachate, which is then removed and sent to an offsite treatment facility for processing. These factors helped to determine assumptions on several of the values required by the formula.

Next was the process of determining the quantity of solid waste produced. It was assumed that buildings with a relatively small number of daily occupants (classified as minor buildings) had a single bin for garbage, sized at  $0.08\text{m}^3$ , and was removed weekly to eliminate any odours. While this assumption may seem to be unrepresentative,  $0.08\text{m}^3$  is equivalent to 2 large-sized garbage bags being produced per week. Additionally, this represents an average across buildings with a smaller number of daily occupants. For example, the Seguin Municipal Building may produce twice this amount in a given week, however, the Humphrey Museum and Rosseau Memorial Hall may each produce half this amount. Buildings that are heavily used by the public (Humphrey Arena and Orrville Community Centre) were assumed to have a 1-yard dumpster, or  $0.764555\text{m}^3$ , on site to facilitate the higher volume of generated waste.

Seguin Township also has 15 outdoor community recreation areas (parks and beaches), as well as 4 communities with varying capacities to collect waste along sidewalks. As a result, it was assumed that when emptying garbage bins at the various town parks and sidewalk receptacles, staff employees would transport waste from these locations to the various transfer stations via their vehicles for means of efficiency. For calculation purposes, it will be assumed that the collected waste can fit into 4, 32-gallon garbage bins. It was assumed that receptacles are continuously monitored and emptied when close to full, which would decrease in frequency as a result of Seguin's seasonal population influx. Therefore, during July and August, receptacles are emptied weekly, and during May, June, September, and October they are emptied bi-weekly before being removed for the winter months. This assumption was then used to create a monthly average which could be applied across the entire year.

### **2.6.3 Outcome**

Seguin Township's solid waste produced an estimated **28** tonnes of  $\text{CO}_2\text{e}$  in 2016.

## **2.7 Business as Usual**

In calculating the business-as-usual (BAU) forecast, the year 2030 was chosen as the forecast year.

### **2.7.1 Assumptions**

In their 2016 Population Census, Statistics Canada reported that Seguin Township experienced a 7.9% growth in population between the years 2011 and 2016. Given that the BAU forecast is determined by annual population growth, it was assumed that population grew by an even amount each year. As a result, the 7.9% growth rate was divided by the number of years over which the growth occurred (5) to estimate the annual population growth rate. After calculation, it was estimated that Seguin Township experiences 1.58% annual population growth. Following PCP protocol, this 1.58% growth rate was used to determine the forecasted emissions for the year 2030.



### **2.7.2 Outcome**

Given a 1.58% population growth rate forecasted to the year 2030, Seguin Township is expected to produce 1331 tonnes of CO<sup>2</sup>e in 2030, representing a 25% increase from baseline levels, if business is to continue as usual.