

JUNE 2024



ENERGY CONSERVATION & DEMAND MANAGEMENT PLAN

2024-2029

ENERGY CONSUMPTION & EMISSIONS
CONSERVATION & REDUCTION GOALS

Contents

Executive Summary 3

Introduction to Municipality of West Perth 4

 Ontario Regulation 25/23..... 4

 Validity Period 4

 Commitment to Greenhouse Gas Reduction 4

SECTION ONE: ANNUAL ENERGY CONSUMPTION AND EMISSIONS

Municipal Facilities 5

Facility Energy Consumption in 2023 6

Fleet vehicles 8

 Electric Vehicle Chargers 8

Streetlights and Traffic Signals 9

Water and Wastewater 9

SECTION TWO: CONSERVATION STRATEGIES

Renewable Energy Generation 11

West Perth Healthy Forests Grant & Tree Power Program 11

Municipality-wide Conservation Measures 12

Net Greenhouse Gas Emissions for 2023 13

SECTION THREE: REDUCTION STRATEGIES AND MEASURES TO IMPLEMENT

Environmental Sustainability Plan 14

Solar Array Expansion 14

Emission-free Vehicle & Handheld Machinery Acquisition..... 15

Habitat and Green Space Integration 16

2029 Greenhouse Gas Reduction Target..... 16

Appendix A: Emission Factors for Mobile Combustion..... 17

Appendix B: West Perth Fleet Emissions in 2023 17

Appendix C: Emission Factors for Electricity..... 18

Appendix D: Emission Factors for Natural Gas & Propane 19

Appendix E: Emission Factors for CH₄ from Wastewater Treatment and Discharge 19

Appendix F: Fleet Emission Reduction Exercise..... 19

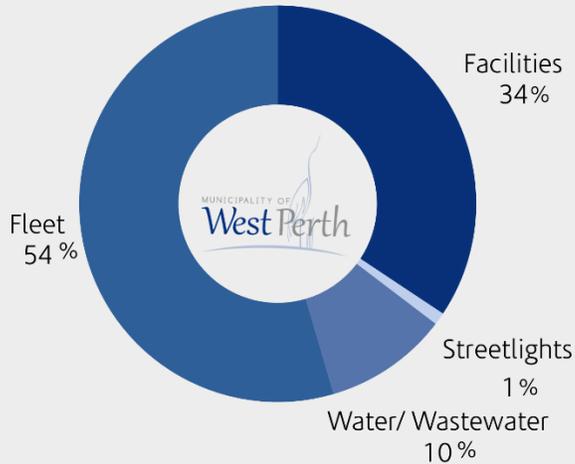
 Works Cited 20

 Glossary of Terms 20

Executive Summary

2023 GREENHOUSE GAS EMISSIONS

West Perth has reduced total GHGE by 5.2% since 2018.



FACILITY UPGRADES

The Municipal Office, Fire Hall, Keterson Pavilion, and Mitchell Operations Centre have all been rebuilt as new facilities since 2018, showing an approximate decrease of greenhouse gas emissions by:

-57,915 kg



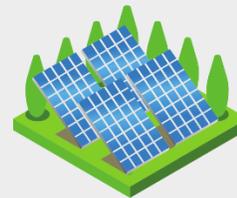
EMISSION OFFSETS

West Perth's tree planting programs have contributed 14,014 trees to the landscape since 2018, providing carbon sequestration power to offset emissions by 5.12%.



39,028 kg/yr

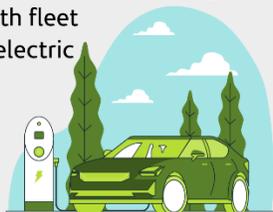
Solar panels at the Wastewater Treatment Plant generated 10,190 kWh of renewable electricity in 2023, offsetting GHGE by 306 kg/year. Three new facilities are 'solar ready' to expand solar arrays across the municipal campus in coming years.



≈ 306 kg/yr

CONSERVATION CHANGES

- LED motion activated lighting across facilities.
- Community garden spaces built and utilized.
- Parks and Trails Masterplan for green links and alternate community transportation planning.
- EV Chargers installed, with fleet transition to hybrid and electric in the future.



OPPORTUNITIES FOR 2029



Decrease operational utility costs with efficiency upgrades



Electrifying light duty fleet to reduce emissions



Use a climate-lens for decisions & investments

Introduction to Municipality of West Perth

The Municipality of West Perth was incorporated in 1998 following the amalgamation of the Townships Logan, Hibbert, Fullarton and Mitchell. West Perth is where nature, industry and culture interact harmoniously. Located within 35 minutes of London, Waterloo and Goderich, West Perth is home to 9,000 residents. Comprised of rolling farmland, quaint villages and bustling towns, West Perth is a popular destination to live, work, play and invest. A bustling small-town at its core, West Perth is a perfect location for businesses, being within a close distance to all major markets. West Perth is largely a rural municipality, with a variety of small settlement areas such as Brodhagen, Cromarty, Dublin, Fullarton, Monkton (split with North Perth), Russeldale, St. Columban (split with Huron East), Staffa, and a core urban area in Mitchell.

Ontario Regulation 25/23

Ontario Regulation 25-23 was created under the *Electricity Act, 1998*, requiring that every municipality, municipal service board, and public agency update an Energy Conservation and Demand Management Plan written July 1, 2019 every five years afterwards.

The Energy Conservation and Demand Management Plan includes three sections. The first section discusses West Perth's annual energy consumption and the emissions associated with their operations. The second section provides a description of the greenhouse gas emission offsets and energy conservation measures currently in place. The third section provides a description of previous, current and proposed ways to conserve or reduce energy consumed by the operations of the municipality. This report enables the Municipality to predict the future demand for energy, forecast the results of current and proposed measures, and meet goals to reduce greenhouse gas emissions over time.

Validity Period

This report is valid between the dates of July 1, 2024 and June 30, 2029. According to O. Reg. 25/23, the 5-year update, approved by Council will be produced before July 1, 2029.

Commitment to Greenhouse Gas Reduction

The Municipality of West Perth is driven to improve the energy efficiency of buildings and operations to reduce costs of operation, provide modern services to residents, and ensure environmental sustainability and resiliency to protect communities in the face of a changing climate. As a lower tier municipality working alongside a County and three other passionate local municipalities, West Perth strives to lead and collaborate on effective, meaningful projects and improvements across the municipality.

In the 2019 Energy Conservation and Demand Management Plan, West Perth outlined a desire to **achieve a 3% reduction in greenhouse gas emissions by 2024** using 2012 as the baseline year. The methods for meeting this objective included reducing energy consumption, investing in energy efficient and renewable projects to contribute to offsets, and seeking opportunities for technological advancement.

Section One: Annual Energy Consumption and Emissions

Municipal Facilities

The Municipality of West Perth owns twenty-one (21) facilities related to operations in roads, water/wastewater, municipal administration, recreation and leisure, and community services (Table 1).

Table 1 - Facilities Owned and Managed by the Municipality of West Perth in 2023

| FACILITY | ADDRESS | SIZE (M ²) | TYPE | USE | FUEL |
|--|-------------------------------|------------------------|---|------------|---------------------------|
| Municipal Office | 160 Wellington St. Mitchell | 1,300 | Administrative office, municipal council chambers | Daily | Electricity, Natural Gas |
| Former Municipal Office | 169 St. David St. Mitchell | 1,733 | Administrative office, municipal council chambers | Unoccupied | Electricity & Natural Gas |
| West Perth Fire Hall | 170 Wellington St. Mitchell | 1,162 | Fire Hall, offices, training room, storage space | Daily | Electricity & Natural Gas |
| West Perth Public Library | 105 St. Andrew St. Mitchell | 594 | Public Library | Daily | Electricity & Natural Gas |
| OPP/ Water Building | 132 St. George St. Mitchell | 614 | Police Station and Well Water extraction station | Daily | Electricity & Natural Gas |
| West Perth Arena, Community Centre, and Pavilion | 185 Wellington St. Mitchell | 3,850 | Community Centre, Ice rink, Administrative rooms | Daily | Electricity & Natural Gas |
| Mitchell Lions Pool Bathhouse | 19 Blenheim St. Mitchell | 367 | Indoor recreation facility | Seasonal | Electricity & Natural Gas |
| Brodhagen Community Centre | 6708 Perth Line 44, Brodhagen | 732 | Community Centre | Daily | Electricity & Propane |
| Dublin Community Centre | 7015 Helen St. Dublin | 384 | Community Centre | Daily | Electricity & Natural Gas |
| Mitchell Operations Centre | 50 Arthur St. Mitchell | 2,812 | Equipment/Vehicle storage, Administrative offices | Daily | Electricity & Natural Gas |
| Water Treatment 1,2,3 (Wells #1, #2) | 132 St. George St. Mitchell | 284 | Water Treatment Facility | Daily | Electricity |
| Well #3 | 100 St. George St. Mitchell | 16 | Water Pumping Facility | Daily | Electricity |
| Water Treatment and Well #4 | 48 Arthur St. Mitchell | 130 | Water Treatment Facility, Maintenance room | Daily | Electricity |
| Water Booster/ Standpipe Building | 87 Arthur St. Mitchell | 73 | Water Pumping Facility, Maintenance room | Daily | Electricity |
| Mitchell Wastewater Treatment Plant | 5949 Frank St. Mitchell | 366 | Sewage Treatment Facility, Maintenance room | Daily | Electricity & Natural Gas |
| Herbert St. Pumping Station | 79 Herbert St. Mitchell | 55 | Sewage Pumping Facility, Maintenance room | Daily | Electricity |
| James St. Pumping Station | 130 James St. Mitchell | 232 | Sewage Pumping Facility, Maintenance room | Daily | Electricity |
| Welcome Centre | 9 Huron Rd, Mitchell | 37 | Tourism Booth, Community Sign | Seasonal | Electricity |
| Lions Club Pavilion | 17 Blanshard St, Mitchell | 72 | Pavilion with Kitchen | Seasonal | Electricity |
| Lions Club Barn | Blenheim St, Mitchell | 65 | Zoo with Animal resources | Daily | Electricity |
| Elevated Water Tank | 125 Clarke St., Mitchell | 248 | Water Pumping Facility, Maintenance room | Daily | Electricity |

Facility Energy Consumption in 2023

In 2023, West Perth used water, electricity, propane, and natural gas in facilities. Annual energy consumption for 2023 is outlined in Table 2, with site and facility specific breakdown included in Table 3, excluding water and wastewater facilities shown in Table 4.

Table 2 - Total Fuel Consumption in Buildings and Facilities in 2023

| ENERGY SOURCE | SUPPLIER | MEASUREMENT | CONSUMED | COST |
|---------------|--------------------------|-------------------------------|---------------|----------------------|
| Water | West Perth | Cubic Meter (M ³) | 8,178.00 | \$ 16,042.68 |
| Electricity | ERTH Power; Hydro One | Kilowatt Hour (kWh) | 3,331,901.00 | \$ 433,147.13 |
| Natural Gas | Enbridge | Cubic Meter (M ³) | 124,701.00 | \$ 28,177.18 |
| Propane | | Litre (L) | 1,062.30 | undefined |
| | | | Total: | \$ 477,366.99 |

Consumption across facilities varied based on usage type. Emission Factors for electricity, natural gas, and propane were sourced from the Environment Climate Change Canada, National Inventory Report (2021) found in the Appendices.

Table 3 - Facility Energy Consumption in 2023

| Facility | ELECTRICITY | | NATURAL GAS & PROPANE | | | |
|---|-------------------|----------------------|---|----------------------|----------------------|-----------------------|
| | Consumption (kWh) | CO ₂ (kg) | Consumption (M ³) (L) | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) |
| Municipal Office | 49,093.20 | 1,472.80 | 5,668.00 | 10,888.23 | 0.21 | 0.20 |
| Former Municipal Office | 40,882.00 | 1,226.46 | 8,633.00 | 16,583.99 | 0.32 | 0.30 |
| West Perth Fire Hall | 45,316.80 | 1,359.50 | 10,259.00 | 19,707.54 | 0.38 | 0.36 |
| West Perth Public Library | 23,035.00 | 691.05 | 7,253.00 | 13,933.01 | 0.27 | 0.25 |
| OPP/ Water Building | 65,839.00 | 1,975.17 | 2,336.00 | 4,487.46 | 0.09 | 0.08 |
| West Perth Arena, Community Centre and Pavilion | 384,586.00 | 11,537.58 | 45,003.00 | 86,450.76 | 1.67 | 1.58 |
| Mitchell Lions Pool Bathhouse | 52,562.00 | 1,576.86 | 14,101.00 | 27,088.02 | 0.52 | 0.49 |
| Brodhagen Community Centre | 60,029.00 | 1,802.67 | 1,062.30 | 1,609.385 | 0.03 | 1.15 |
| Dublin Community Centre | 13,433.00 | 402.99 | 2,628.00 | 5,048.39 | 0.10 | 0.09 |
| Mitchell Operations Centre | 52,875.00 | 1,586.25 | 27,083.00 | 52,026.44 | 1.00 | 0.95 |
| Welcome Centre | 16,316.00 | 489.89 | 0 | 0 | 0 | 0 |
| Lions Pavilion | 4,320.00 | 129.60 | 0 | 0 | 0 | 0 |
| Lions Zoo | 9,843.00 | 295.29 | 0 | 0 | 0 | 0 |
| TOTALS: | 818,130.00 | 24,546.11 | 122,964 M₃ 1,062.30 L | 237,823.23 | 4.59 | 5.45 |

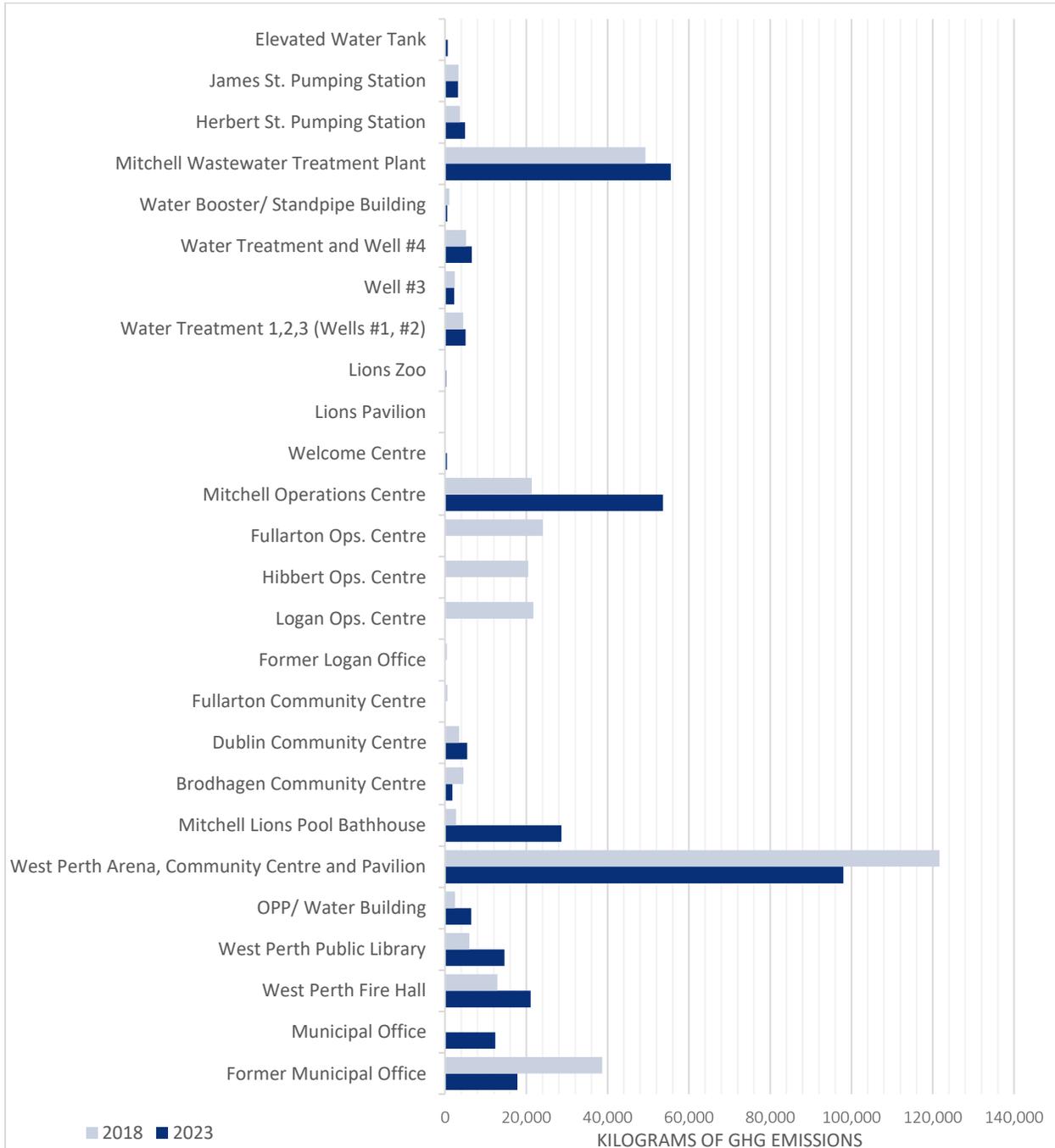
CO₂ = Carbon Dioxide (30g/kwh) (1921 g/m³) CH₄ = Methane (0.037g/m³) N₂O = Nitrous Oxide (0.035g/m³)

Total energy consumption by facility is visually represented in Figure 1 comparing 2023 to 2018's reported consumption. Five (5) facilities were sold between the last report in 2019 and 2023 (Figure 1), including the Mitchell Friendship Centre which was not reported. Four (4) other facilities were added to the analysis for 2023, either because the facility is new, or because the Municipality is now responsible for the electricity, propane, or natural gas management. The only remaining facility using and consuming propane is the Brodhagen Community Centre.

Despite all the changes to the portfolio of facilities, West Perth achieved the 2018 emissions reduction objective, decreasing facility emissions by **2.63%**. Eleven (11) facilities decreased emissions, while fifteen (15) saw an increase in emissions. The West Perth Arena, Community Centre and Pavilion experienced the

greatest decrease during the reporting period, and underwent significant efficiency improvements including new insulation, roofing, lighting, and cooling technology for the ice rink. The Mitchell Operations Centre experienced the greatest increase in emissions. However, it should be noted that the Mitchell Operations Centre replaced three rural-based operations centres in Logan, Hibbert, and Fullarton. If these rural shops and Mitchell Operations Centre in 2018 were combined, their total emissions would have equaled 87,557.28 kg; whereas in 2023 the Mitchell Operations Centre had 53,614.64 kg of emissions, meaning the total emissions from operations centres has actually decreased by **38.8%**, reiterating the positive impact centralizing operations has had on West Perth’s financial and emissions goals.

Figure 1 - Annual GHGE by Facility, 2018-2023



Fleet vehicles

Although not a requirement by the Energy Conservation Demand Management Plans of years past, ICLEI (Local Governments for Sustainability) and the Federation of Canadian Municipalities 2021 Partners for Climate Protection Protocol recommends including fleet vehicles in greenhouse gas emissions (GHGE) calculations to more accurately manage assets and reduce operational emissions over time. Going forward, West Perth will include fleet emissions in Energy Conservation and Demand Management Plans as a reference point, in order to identify opportunities for the adoption of zero-emission or low-emission vehicles where appropriate. GHGE vary depending on the vehicle type and usage. As a rural municipality, a variety of vehicle types are used seasonally and year-round across a large geographic area. In 2023, Municipality of West Perth owned a fleet of fifty-one (51) vehicles (Appendix B).



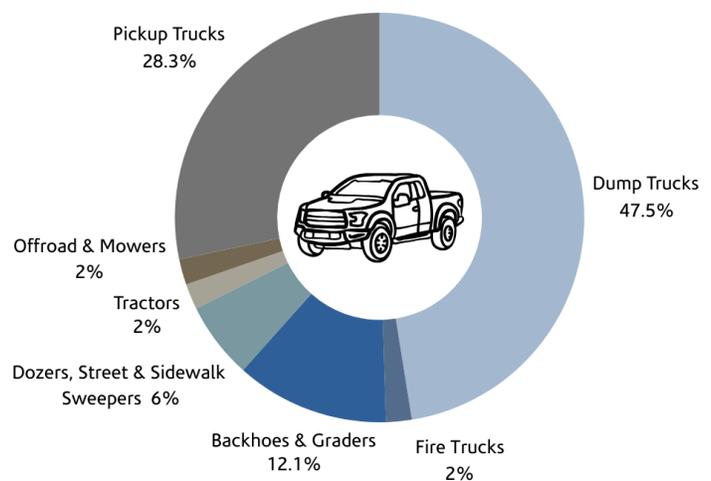
- Twenty-nine (29) vehicles use diesel. The average \$/L of diesel in 2023 was \$1.31
- Twenty-one (21) vehicles use gasoline. The average \$/L of gasoline in 2023 was \$1.44.
- One (1) vehicle is electric. This vehicle is an ice resurfacer.

The fifty-one vehicles in fleet in 2023 amassed a total of **413,960 kg** of greenhouse gas emissions. The majority of emissions were produced by dump trucks and pickup trucks. These vehicles are primarily used by the operations department focused on road maintenance and environmental services, both integral to maintaining high quality standards of community amenities. Figure 2 illustrates the composition of vehicles making up West Perth's fleet in 2023.

31% of West Perth's fleet are considered light-duty vehicles which have many options available for hybrid or electric alternatives. The remaining 69% of fleet is considered heavy-duty; there are few, if any, options available to replace with low emission alternatives. Replacing light-duty vehicles with hybrid or electric options would have a significant impact on the greenhouse gas emissions produced by West Perth's fleet.

The complete list of vehicles, fuel consumption, and greenhouse gas emissions can be found in Appendix B. Emission factors for Mobile Combustion can be found in Appendix A.

Figure 2 - Vehicle composition in 2023



Electric Vehicle Chargers

In 2023, work began to acquire a network of Electric Vehicle chargers across municipally owned facilities in West Perth. Eight (8) Level-2 AC *Chargepoint* charging ports were successfully installed in January 2024 and energized for community use in February 2024. There are four (4) ports at the West Perth Municipal Office, and four (4) ports at Keterson Pavilion, which shares a parking lot with the West Perth Community Centre and Arena. The addition of these chargers will increase electricity use at the facilities they are wired into, however, the offset they provide to community-wide emissions is important as West Perth encourages the

community to move away from internal combustion engine vehicles. One (1) Level-3 DC Fast Charger has been planned to be added to West Perth Community Centre and Arena, and is waiting funding approval in 2024 before installation can occur, in partnership with IVY Charging Networks and Rural Recharge. Chargers installed in 2024 will not be included in the analysis of this ECDMP, but will be shown in 2029’s Plan.

Streetlights and Traffic Signals

The Municipality of West Perth is primarily rural with a few small hamlets and even fewer villages and towns. Streetlights exist in the Town of Mitchell, Dublin, Brodhagen, Fullarton, Russeldale, Cromarty, Staffa, Monkton, and St. Columban. In 2015, all existing streetlights underwent conversion to LED luminaries to improve energy efficiency and reduce operational costs. In 2023, West Perth operated **822** streetlights with a total output of 49,858 Watts operating on average for 12-hours within a 24-hour period. The annual electricity consumed by streetlights amounted to **218,378.04 kWh** in 2023. The greenhouse gas emissions produced by the electricity consumed to operate the streetlight networks equates to **6,551.34 kg** per year.

Communities in West Perth are experiencing substantial growth, primarily in the form of residential neighbourhoods both in densification and sprawl. With the growth of communities also comes the necessity for more servicing and therefore more streetlights. The expectation that additional streetlights and traffic signals will cause electricity consumption to increase over the next five-year reporting period is rational. However, consideration will be made to ensure all future lighting installed complies with Energy Star standards will assist in moderating the intensity of any increase that may be experienced.



Water and Wastewater

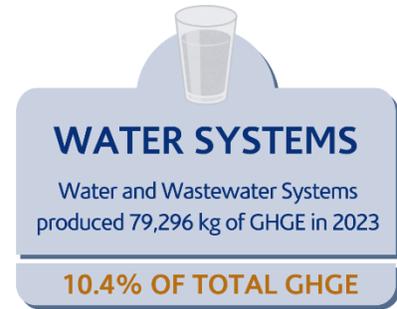
The Municipality of West Perth provides municipal water and sanitary sewer within the serviced settlement of Mitchell. Managed by the department of Environmental Services, the operation and maintenance of all municipal water and wastewater facilities including wastewater treatment, water towers, and sewage pumping stations falls under the scope of the Energy Conservation and Demand Management Plan. The consumption and emissions data for water and wastewater infrastructure is described in Table 4 in detail. Ensuring facilities related to water and wastewater are analyzed separately from other facilities allows a more strategic analysis of facility usage, vs. water infrastructure usage.

Table 4 – Water and Wastewater Facility Energy Consumption in 2023

| Facility | ELECTRICITY | | NATURAL GAS | | | |
|--------------------------------------|---------------------|----------------------|-------------------------------|----------------------|----------------------|-----------------------|
| | Consumption (kWh) | CO ₂ (kg) | Consumption (M ³) | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) |
| Water Treatment 1,2,3 (Wells #1, #2) | 167,998.00 | 5,039.94 | 0.00 | 0.00 | 0.00 | 0.00 |
| Well #3 | 74,647.00 | 2,239.41 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Treatment and Well #4 | 218,818.00 | 6,564.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| Water Booster/ Standpipe Building | 17,058.00 | 511.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mitchell Wastewater Treatment Plant | 1,740,072.00 | 52,202.16 | 1,737.00 | 3,336.78 | 0.06 | 0.06 |
| Herbert St. Pumping Station | 164,922.00 | 4,947.66 | 0.00 | 0.00 | 0.00 | 0.00 |
| James St. Pumping Station | 107,445.00 | 3,223.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| Elevated Water Tank | 22,811.00 | 684.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| TOTALS: | 2,513,771.00 | 75,413.13 | 1,737.00 | 3,336.78 | 0.06 | 0.06 |

CO₂ = Carbon Dioxide (30g/kwh) (1921 g/m³) CH₄ = Methane (0.037g/m³) N₂O = Nitrous Oxide (0.035g/m³)

A brief summary of the water processed by these facilities, and the associated GHGE are described in Table 5. A comprehensive and detailed annual report is produced and available on the West Perth website for public viewing. As shown in Figure 1, five (5) of the water and wastewater facilities experienced an increase in emissions between 2018 and 2023, while three (3) had a decrease.



In 2023, 10.4% of the total GHGE produced by Municipality of West Perth originated from the facility energy consumption and emissions produced by water and wastewater systems. Ensuring these systems are functional, exceed quality standards, and maintain efficiency are key considerations for Environmental Services staff at West Perth. Maintaining existing infrastructure through the growth seen in the Town of Mitchell has been a challenge, and investment has been made to further protect and plan for lifecycle upgrades.

Table 5- West Perth Water & Wastewater Emissions in 2023

| Facility | Input (Megalitre) | Output (Megalitre) | CH ₄ (kg) | N ₂ O (kg) |
|-------------------------------------|-------------------|--------------------|----------------------|-----------------------|
| Mitchell Wastewater Treatment Plant | 1,832.40 | 1,832.40 | 546.00 | 0.00 |
| Water Treatment 1,2,3 | 372.41 | 372.41 | 0.00 | 0.00 |
| Water Treatment & Well #4 | 744.83 | 744.83 | 0.00 | 0.00 |

In 2023, the majority of inputs to the Wastewater Treatment Plant originated from industrial sources. As the community of Mitchell continues to grow, additional usage will occur from industrial, commercial and residential sources. An analysis on drinking water and wastewater system expansions has been done to determine the costs associated with an expansion, and a timeline for when an expansion would be necessary completed. An expansion to the existing water and wastewater systems may be necessary in the next 10-years, (or two reporting cycles); Therefore, an anticipation that emissions generated by this category are probable to increase. Ensuring technology incorporated into the current system is the most efficient, and any emission offset potential capitalized on will be integral to reduce the significance of the greenhouse gas emissions generated by such an expansion.

Section Two: Conservation Strategies

Renewable Energy Generation

The Municipality of West Perth owns and operates one free-standing, 40 panel, 10-kilowatt solar photovoltaic system located at the Wastewater Treatment Centre in Mitchell (see photo below). In 2023, the system produced 10,190 kWh of energy. A solar heating system at Lions Pool in Mitchell is a rooftop heating system which exclusively warms the pool water. There is no metering on this passive solar water heater, and therefore cannot be quantified in this analysis (Table 6). The renewable energy generation produced by the solar array at 5949 Frank St. offsets West Perth’s CO₂ emissions by **305.7 kg** per year, as well as generating a meager reduction in electricity cost for the facility.

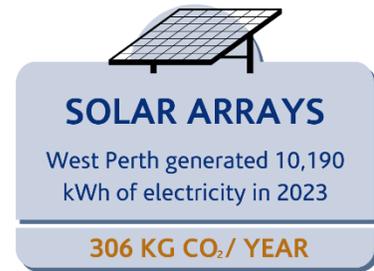


Table 6 - Renewable Energy Generation (2023)

| Energy Source | Address | Description | Annual Production |
|----------------------|--------------------------|---|-------------------|
| Solar Panel | 5949 Frank St. Mitchell | Ground mounted ‘tracker’ style (2013) | 10,190 kWh |
| Solar Heating System | 19 Blenheim St. Mitchell | Pool heater system from rooftop of pool bathhouse (2010). | unknown |

The Municipality of West Perth has built 3 new buildings within the last 5-year reporting period that have been strategically engineered with roofs that are ‘solar ready’ and electrical panel space to accommodate a solar input. The new Municipal Office, Fire Hall, and Keterson Park Pavilion are all viable rooftop solar array candidates, which would dramatically extend the Municipality’s renewable energy generation and therefore GHGE offsets.



West Perth Healthy Forests Grant & Tree Power Program

In a rural municipality, heavily dominated by agriculture and industrial land uses, forest cover has been extremely low, falling well below the recommended coverage rates by Environment and Climate Change Canada. In 2023, West Perth had the lowest forest cover out of all four local municipalities in Perth County, at **7.76%** of the municipal landcover. This equated to 44.967 square kilometers of tree cover, not specifically forests, in West Perth. In a recent study by Maitland Valley Conservation Authority, forest quality is also at an all-time low, suffering impacts by invasive species causing over 30% of trees in forests to be standing dead. In order to maintain healthy and resilient ecosystems, communities, and industries, investment in rejuvenating natural infrastructure is imperative, which includes tree cover.

In 2021, the Municipality of West Perth launched the West Perth Healthy Forests Grant, a financial incentive program for West Perth landowners to plant trees to improve ecosystem resiliency, carbon sequestration, and agricultural land preservation. The incentive offers eligible applicants a subsidy to offset the cost of trees by up to 30%. As



of 2023, 44 private landowners had participated in the program, planting a total of 6,353 trees in the Municipality. Trees improve air quality, absorb groundwater, provide thermal regulation, and sequester carbon at a rate of 2.8 kg per year in rural areas (Trees Canada, 1999). The trees planted through this program have a combined carbon sequestration value of **17,788.40 kg** per year.

Aside from tree sale programs, municipal operations have planted trees between 2019 and 2023 on public lands to improve forest cover and tree canopy in the Municipality, including:

| Year | Location or Program | # Trees |
|---------------|------------------------------|-------------------------------|
| 2018 | Plant a Tree Program | 126 |
| 2020 | Municipal Tree Planting | 150 |
| 2021 | Veterans Park | 17 trees, 20 shrubs |
| 2022 | Cooper Field | 10 |
| 2022 | Municipal Office & Fire Hall | 8 |
| 2022 | Heskey Flats | 150 (high mortality reported) |
| 2023 | Dog Park | 55 |
| 2018-2023 | General Operations | 7125 |
| Total: | | 7,661 |

These 7,661 trees planted, minus a predicted 50% mortality at the Heskey Flats in 2022, have an annual carbon sequestration value of **21,240 kg** of CO₂. Continuing to plant trees on roadsides, parks, and other public lands is an important addition to the community for all the benefits trees provide, but also as a valuable tool to sequester carbon and process other greenhouse gases in West Perth. In total, between 2018 and 2023, 14,014 trees have been planted or subsidized by the Municipality, creating a carbon sequestration power of **39,028.40 kg** per year of CO₂. This equates to a total emission offset of **5.12%**.

In 2024, West Perth initiated a Tree Power Program, a tree sale for residents of West Perth to purchase one or two native trees to be planted on urban or rural private lands. This program differs from the Healthy Forests Grant as it caters to urban residents who may only want one tree, at a subsidized price. Tree sales in 2024 amassed 150 trees. Although these trees cannot be included in the summary for the reporting year (2023), moving forward West Perth intends on continuing to invest in tree planting programs across the municipality to promote habitat resilience and ecological sustainability, as well as reap the benefits of the sequestration power.

Municipality-wide Conservation Measures

Across municipal facilities, many steps have been taken to progress operations towards the goals set out in the 2021 Greenhouse Gas Reduction Plan. Improvements include:

- LED lighting upgrades at the Arena, Library, Community Centre, Parks and Playgrounds, including baseball lighting. All lighting fixtures in new facilities, namely the Fire Hall and new Municipal Office are occupant controlled (motion detection) LED lighting.
- Community gardens established in Mitchell and operated through library and recreation community education programs to grow food and engage seniors, families, and children.
- Facility and sports field condition assessments have been completed to monitor lifecycle of assets and scope opportunities for maintenance improvements or replacement to improve efficiency and quality of assets.
- A Parks and Trails Master Plan is in progress and will highlight green-links, active transportation corridors, and opportunities for ecological integration into urban and rural communities.



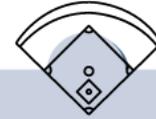
Parks & Trails Master Plan

- Active transportation links
- Natural corridors
- Parks & natural areas



Lighting Upgrades

- Motion detection LED's
- Facilities, parks, playgrounds
- Diamond lighting



Condition Assessments

- Facilities and sports fields
- Improve service efficiency
- Maintenance & lifecycle

Net Greenhouse Gas Emissions for 2023

Determining the emissions produced by The Municipality of West Perth in 2023 occurred through the analysis of four categories of emissions sources: facilities, streetlights, water/ wastewater, and fleet. Between these four categories, a total of **762,186.71 kg** of greenhouse gas emissions was produced in this reporting year (Table 7). **54%** of the total emissions were generated by fleet, with facilities generating **34%**, water/ wastewater producing **10%** of emissions, and streetlights only contributing **1%** of the total emissions.

Through this analysis, observations can be made about areas that should be prioritized for further GHGE reduction, as well as opportunities for offset contributors to meet objectives of net zero by 2050. The existing offset programs utilized by Municipality of West Perth in 2023 included a tree planting program, and solar energy generation. These two offset programs contributed to a reduction of greenhouse gas emissions by **5.2%**. Net GHG emissions produced in 2023 by the Municipality are 722,852.61 (Table 7).

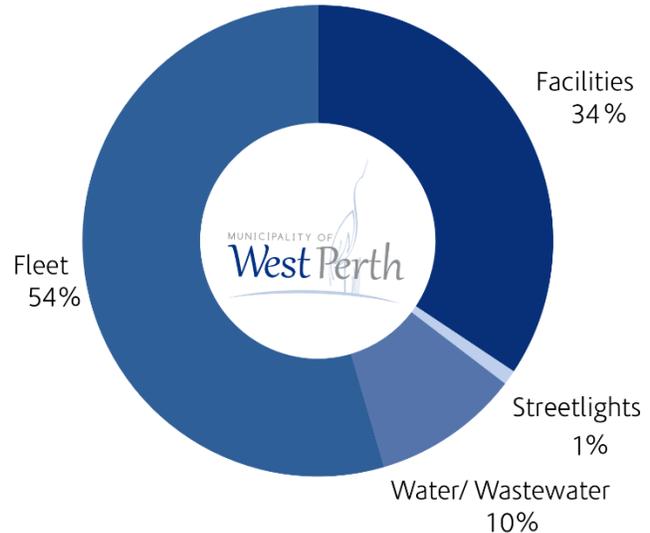


Table 7 - Municipality of West Perth's Net Emissions for 2023

| Category | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) | Emissions (kg) |
|-------------------------|----------------------|----------------------|-----------------------|-------------------|
| Facilities | 262,369.34 | 4.59 | 5.45 | 262,379.38 |
| Water/ Wastewater | 78,749.91 | 546.06 | 0.06 | 79,296.03 |
| Streetlights | 6,551.34 | - | - | 6,551.34 |
| Fleet | 413,897.61 | 39.89 | 22.46 | 413,959.96 |
| Total Emissions: | 761,568.20 | 590.54 | 27.97 | 762,186.71 |
| Tree Planting Offset | - 39,028.40 | - | - | - 39,028.40 |
| Solar Generation | - 305.70 | - | - | - 305.70 |
| Net Emissions: | 722,234.10 | 590.54 | 27.97 | 722,852.61 |

CO₂ = Carbon Dioxide CH₄ = Methane N₂O = Nitrous Oxide

Section Three: Reduction Strategies and Measures to Implement

The Municipality of West Perth is dedicated to achieving greenhouse gas emission reduction targets set by various levels of government. West Perth aims to reduce emissions using 2005 as a baseline year by **35-45% by 2030** and **80-100% by 2050**. Energy efficiency reduces emissions and offers additional advantages, including:

- Prolonging facility life through retrofits;
- Enhancing financial efficiency by avoiding long-term costs with green technology investments;
- Alleviating pressure on critical infrastructure like water treatment and waste management.

To reach energy conservation objectives, West Perth will implement the following strategies:

Environmental Sustainability Plan

The Municipality of West Perth adopted the Perth County and associated Municipalities Greenhouse Gas Reduction Plan in 2021 to address climate change by ambitiously reducing local greenhouse gas emissions. This comprehensive plan consists of 20 actions and 7 goals spanning 7 categories to decrease GHGE and enhance community resilience. West Perth is actively working towards completing these actions, such as implementing public transportation networks, installing electric vehicle (EV) charging stations at municipal facilities, and updating the recreation, parks, and trails masterplan to promote active transportation. These initiatives complement the existing goals outlined in the Greenhouse Gas Reduction Plan, which is set to be updated in 2024 as the Environmental Sustainability Plan to meet provincial and federal milestones for 2030 and 2050.

Some proposed measures under this Energy Conservation and Demand Management Plan include exploring carbon offset strategies like utilizing renewable energy sources (solar panels), transitioning to non-fossil fuel fleet vehicles where feasible (Battery Electric Vehicles), and continuing to educate and incentivize the community to be mindful of energy consumption.

Solar Array Expansion

Incorporating solar panel arrays on existing facilities presents a strategic and environmentally conscious option for West Perth. By leveraging solar energy, municipally owned facilities can markedly offset consumption of electricity and operational expenses. The existing solar array owned by Municipality of West Perth at the Wastewater Treatment Centre offset electrical consumption in facilities by **1.25%** and offset GHGE from facilities by **0.11%**. Proposed locations for additional solar arrays include the Municipal Office at 160 Wellington Street, the Fire Hall at 170 Wellington Street, and Keterson Park Pavilion at 185 Wellington Street in rooftop applications. All three of these buildings were engineered with the intention on incorporating solar arrays in capacity for added weight-load on the roof and panel/electrical capacity, understanding the commitment to net zero by 2050. Therefore, these three buildings are considered 'solar ready'. New funding through the Federation of Canadian Municipalities has been announced to help municipalities fund emissions reduction projects, which could be accessed to complete these solar array expansions.

Objective: In the next five-year reporting period, West Perth will release a request for quotes for solar systems on three (3) recently built facilities, and establish a plan in the capital budget to support the investment in solar for short and long-term installations. A five-year target of adding additional solar panel arrays to increase the emission offset to **10%**, or systems with output of **100 kW** generation is desirable.

Emission-free Vehicle & Handheld Machinery Acquisition

The advantages of electric vehicles in decreasing greenhouse gas emissions are evident. Even when considering a lifecycle analysis, electric vehicles have a notably lower environmental impact. It is crucial to establish a procurement strategy and plan that prioritizes electric vehicles when replacing fleet with the goal to reduce emissions from this category. West Perth operates nine (9) light-duty pickup trucks for various departments like building, fire, recreation, and roads. Six (6) of these vehicles are candidates to transition to hybrid or electric models before the next reporting period in 2029. The Olympia ice re-surfacer in use is currently fully electric and is due for replacement in 2028 which will be another electric model, aiming to maintain the device's efficiency.

In the side-by-side comparison provided in Appendix D, showcasing a fully electric truck, a hybrid truck, and a standard internal combustion engine (ICE) truck, the carbon emissions from a full battery/tank display a 97.5% variance between ICE and electric, and a 22% difference between ICE and hybrid. With the six (6) pick-up trucks slated for replacement within the next 5 years, an estimated emissions reduction of between **7,841 and 34,752 kg** of GHGE per year.

Installing adequate charging infrastructure at relevant facilities is crucial for ensuring the efficiency of a fleet's transition to electric vehicles. Despite the increased electrical usage associated with charging infrastructure, the environmental impact is significantly lower compared to supporting the use of internal combustion engine vehicles. A study conducted in British Columbia revealed that gasoline cars produce greenhouse gas emissions over 40 times higher than electric cars charged using hydroelectric sources (University of British Columbia, 2023). In 2024, eight (8) publicly accessible ChargePoint Level 2-AC EV chargers were installed at municipal facilities located at 160 Wellington Street and 185 Wellington Street in Mitchell. Additionally, private chargers may need to be considered for the Public Works yard as the department's vehicles switch to electric. To support this initiative, a Ministry of Transportation Ontario ChargeON grant application was submitted in January 2024. This application aims to collaborate with IVY Charging Networks to install a publicly accessible Level 3-DC Fast Charger at 185 Wellington Street.

Objective: In the next five-year reporting period, six light duty vehicles are scheduled for replacement. Hybrid or fully electric options will be preferentially considered to reduce the significant emissions produced by fleet. At least **50%** of these vehicles will be replaced with hybrid or fully electric options.

Other than the reported fleet vehicles, the Municipality of West Perth operates many hand-held gas-powered tools, including chainsaws, lawn trimmers, pressure washers, blowers, hedge trimmers, and more. All tools in this category have battery-powered alternatives readily available at similar prices. Not only are battery powered options more efficient, they are also lightweight, quiet, and simple to use and maintain. The noise factor alone is a strong benefit to surrounding landowners when work is being completed in urban areas. West Perth Operations and Parks departments commit to replacing these smaller tools with battery operated alternatives to continue to reduce fuel consumption, emissions, and storage of fuels across facilities.

Objective: Phase-out small fuel-powered hand tools and equipment with battery powered options, sourcing one brand to maintain efficient and simple operations with battery-to-device compatibility.

Encouraging employees to work from home and utilize active or shared transportation options for commuting can help decrease greenhouse gas emissions subsidiary to Municipal operations. Providing training to educate staff about the advantages of these practices and the overall impact on reducing both personal and municipally related emissions is crucial in eliciting behavioural change within our communities.

Habitat and Green Space Integration

Above and beyond the benefits of energy conservation and demand management, West Perth is committed to increasing availability of pollinator habitat and natural infrastructure in and around facilities to improve general environmental benefits. In 2022, a large pollinator field was planted adjacent to the West Perth Wetlands, with the intention to improve a vacant parcel of land into something beneficial for pollinators and migratory birds, including grassland species. This project was less than successful due to a lack of rain helping seeds propagate, and an onslaught of unintended species emerging, overtaking the planted pollinator species. Mowing of this property also occurred at a non-ideal time due to miscommunication. A replanting of grassland and pollinator species could be undertaken to revive and revitalize the project, along with the incorporation of a small trail for recreational uses. This project will be included in the scope of the new Parks and Trails Masterplan.

A rain garden was planned to be installed between the West Perth Fire Hall and the West Perth Municipal Office upon completion of both facilities in 2022. However, due to a lack of available native vegetation through the partner organization Upper Thames River Conservation Authority and municipal budget constraints on the municipal office project, this project was never realized. The potential to complete this project still exists, and would be a beautiful and beneficial use of this marginal space. Therefore, West Perth intends to complete the scope of this rain garden or pollinator garden before the next ECDMP.

Objective: Realize two pollinator habitat projects at owned lands and facilities in Mitchell in order to increase habitat capacity for at risk, vulnerable, and migratory bird and insect species.

2029 Greenhouse Gas Reduction Target

From 2018 to 2023, the Municipality of West Perth endeavored to reduce greenhouse gas emissions and conserve energy by 3 to 7%. Work completed between 2019-2023 translated to a reduction in GHG emissions in facilities by 2.63%, or 21.18% if offsets are included. During the upcoming 5-year reporting period, West Perth endeavors to achieve a reduction in greenhouse gas emissions (including offsets) of **35-45% by 2030**, dovetailing with goals set in the Perth County 2021 Greenhouse Gas Reduction Plan and Provincial and Federal reduction goals looking to achieve Net Zero by 2050.

Appendices:

Appendix A: Emission Factors for Mobile Combustion

| TYPE OF VEHICLE | CO ₂ (G/L) | CH ₄ (G/L) | N ₂ O (G/L) |
|--|-----------------------|-----------------------|------------------------|
| Light-duty Gasoline Vehicles (tier 0-3 average) | 2307.30 | 0.20 | 0.289 |
| Light-duty Gasoline Trucks (tier 0-3 average) | 2307.30 | 0.175 | 0.317 |
| Heavy-duty Gasoline Vehicles (average) | 2307.30 | 0.282 | 0.11 |
| | | | |
| Light-duty Diesel Vehicles (average) | 2680.5 | 0.073 | 0.196 |
| Light-duty Diesel Trucks (average) | 2680.5 | 0.073 | 0.196 |
| Heavy-duty Diesel Vehicles (average) | 2680.5 | 0.133 | 0.102 |
| | | | |
| Off-road Gasoline 2-stroke | 2307.3 | 10.56 | 0.013 |
| Off-road Gasoline 4-stroke | 2307.3 | 5.08 | 0.064 |
| Off-road Diesel <19kw | 2680.5 | 0.073 | 0.022 |
| Off-road Diesel >19kW Tier 1-3 | 2680.5 | 0.073 | 0.022 |
| Off-road Diesel >19kW Tier 4 | 2680.5 | 0.073 | 0.227 |
| Off-road Natural Gas | 1.9 | 0.0088 | 0.00006 |
| Off-road Propane | 1515 | 0.64 | 0.087 |
| <i>Values sourced from the Environment Climate Change Canada, National Inventory Report (2021)</i> | | | |

Appendix B: West Perth Fleet Emissions in 2023

| Vehicle Type | Fuel (\$) | Litres (L) | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) |
|----------------------|-----------|------------|----------------------|----------------------|-----------------------|
| Diesel Engine | | | | | |
| Firetruck #Ladder 95 | 890.72 | 679.94 | 1,822.58 | 0.09 | 0.07 |
| Firetruck #Pumper 92 | 890.72 | 679.94 | 1,822.58 | 0.09 | 0.07 |
| Firetruck #Rescue 98 | 890.72 | 679.94 | 1,822.58 | 0.09 | 0.07 |
| Firetruck #Tanker 93 | 890.72 | 679.94 | 1,822.58 | 0.09 | 0.07 |
| Firetruck #Tanker 96 | 890.72 | 679.94 | 1,822.58 | 0.09 | 0.07 |
| Dump Truck #71 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #78 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #85 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #88 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #91 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #96 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #99 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #102 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Dump Truck #105 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Pickup #107 | 4,098.43 | 3,128.57 | 8,386.13 | 0.42 | 0.32 |
| Dump Truck #108 | 9,563.00 | 7,300.00 | 19,567.65 | 0.97 | 0.74 |
| Backhoe #98 | 4098.43 | 3128.57 | 8,386.13 | 0.42 | 0.32 |
| Ford Tractor | 729.82 | 557.12 | 1,493.36 | 0.04 | 0.01 |
| Grader #86 | 6,830.71 | 5,214.29 | 13,976.90 | 0.38 | 1.18 |

| Vehicle Type | Fuel (\$) | Litres (L) | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) |
|---------------------------------|-----------|------------|----------------------|----------------------|-----------------------|
| Grader #103 | 6,830.71 | 5,214.29 | 13,976.90 | 0.38 | 1.18 |
| Grader #74 | 6,830.71 | 5,214.29 | 13,976.90 | 0.38 | 1.18 |
| Landfill Compactor CAT 816F #72 | 2,272.17 | 1,734.48 | 4,649.27 | 0.13 | 0.39 |
| Landfill Dozer CAT D6N LGP #95 | 2,272.18 | 1,734.49 | 4,649.30 | 0.13 | 0.39 |
| Sweeper #60 | 2,732.29 | 2,085.71 | 5,590.75 | 0.28 | 0.21 |
| Trackless MT6 #32 | 2,732.29 | 2,085.71 | 5,590.75 | 0.15 | 0.41 |
| Trackless MT6 #92 | 2,732.29 | 2,085.71 | 5,590.75 | 0.15 | 0.41 |
| Tractor #83 | 1,366.14 | 1,042.86 | 2,795.39 | 0.08 | 0.02 |
| Tractor #84 | 1,366.14 | 1,042.86 | 2,795.39 | 0.08 | 0.00 |
| Tractor #93 | 1,366.14 | 1,042.86 | 2,795.39 | 0.08 | 0.02 |
| Gasoline Engine | | | | | |
| Pickup #Building Services | 2,685.20 | 1,827.44 | 4,216.45 | 0.32 | 0.58 |
| Pickup #Support99 | 862.26 | 598.79 | 1,381.59 | 0.10 | 0.19 |
| Pickup #700 | 3,744.23 | 2,600.16 | 5,999.35 | 0.46 | 0.82 |
| Pickup #701 | 3,744.23 | 2,600.16 | 5,999.35 | 0.46 | 0.82 |
| Pickup #703 | 3,744.23 | 2,600.16 | 5,999.35 | 0.46 | 0.82 |
| Pickup #87 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #89 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #90 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #94 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #100 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #101 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #104 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #106 | 5,165.75 | 3,587.33 | 8,277.05 | 1.01 | 0.39 |
| Pickup #02 | 2,210.68 | 1,535.20 | 3,542.17 | 0.27 | 0.49 |
| Pickup #04 | 2,210.68 | 1,535.20 | 3,542.17 | 0.27 | 0.49 |
| Pickup #05 | 2,210.68 | 1,535.20 | 3,542.17 | 0.43 | 0.17 |
| Pickup #06 | 2,210.68 | 1,535.20 | 3,542.17 | 0.27 | 0.49 |
| Pickup #07 | 2,210.68 | 1,535.20 | 3,542.17 | 0.27 | 0.49 |
| 4x4 Utility Vehicle #66 | 581.81 | 404.03 | 932.22 | 2.05 | 0.03 |
| John Deere Mower Z960M | 1,872.11 | 1,300.08 | 2,999.67 | 6.60 | 0.08 |
| John Deere Mower Z960M | 1,872.11 | 1,300.08 | 2,999.67 | 6.60 | 0.08 |
| Electric Engine | | | | | |
| Olympia Ice Resurfacers | | | | | |

EF = Emission Factor CO₂ = Carbon Dioxide CH₄ = Methane N₂O = Nitrous Oxide

Appendix C: Emission Factors for Electricity

Consumption Intensity of 30 (g CO₂ eq/ kwh) in 2021 in Ontario (ECCC, 2021, p.67). “Combustion and process emissions from utility electricity generation, steam production (for sale) and transmission. Excludes utility owned cogeneration at industrial sites. Includes post-meter, unintentional leaks from natural gas consumption.” (ECCC, 2021).

Appendix D: Emission Factors for Natural Gas & Propane

| Province of Ontario | CO ₂ (g/m ³) | CH ₄ (g/m ³) | N ₂ O (g/m ³) |
|---|-------------------------------------|-------------------------------------|--------------------------------------|
| 2021 Natural Gas | 1921 | 0.037 | 0.035 |
| 2021 Propane | 1515 | 0.027 | 0.108 |
| <i>** Applies to fuel consumed by the Utility, Industry, Residential, Commercial, Institutional, Agricultural, and Transport subsectors</i> | | | |
| <i>Values sourced from the Environment Climate Change Canada, National Inventory Report (2021)</i> | | | |

Appendix E: Emission Factors for CH₄ from Wastewater Treatment and Discharge

| Treatment | CH ₄ (kg CH ₄ /kg BOD removed) | N ₂ O (kg N ₂ O-N/kg N) |
|--|--|---|
| No Treatment | 0.036 | 0 |
| Primary | 0.0036 | 0 |
| Aerobic Lagoon | 0 | 0 |
| Anaerobic Lagoon | 0.288 | 0 |
| Facultative Lagoon | 0.072 | 0 |
| Other Lagoon | 0.072 | 0 |
| Secondary Anaerobic | 0.288 | 0 |
| Secondary Activated Sludge | 0.0036 | 0.016 |
| Trickling Filter | 0.0036 | 0.016 |
| Trickling Filter – High Rate | 0.0036 | 0.016 |
| Rotating Biological Contactor | 0.0036 | 0.016 |
| Sequencing Batch Reactor | 0.018 | 0.016 |
| Secondary Biofiltration | 0.0036 | 0.016 |
| Secondary with Biological Nutrient Removal | 0.0036 | 0.016 |
| Septic | 0.18 | 0.0045 |
| Septic with Marine Outfall | 0.18 | 0 |
| Wetland | 0.0612 | 0 |
| Other/ Unknown | 0.072 | 0.016 |
| <i>Values sourced from the ICLEI & FCM 2021 Report</i> | | |

Appendix F: Fleet Emission Reduction Exercise

| Model | Tank/ Charge Capacity | Consumption (L/100km) | Range (Ford's approx.) | Emissions | | |
|---|-----------------------------|--------------------------------|------------------------------|---------------------------|---------------------------|----------------------------|
| | | | | CO ₂ (g/km) | CH ₄ (g/km) | N ₂ O (g/km) |
| 2023 Ford Lightning Lariat SuperCrew Extended Range | 131 kWh | 3.9 kWh/km | 515 km | 7.63 | 0 | 0 |
| 2023 Ford-F150 Lariat SuperCrew Powerboost Full Hybrid V6 | 116 Litres 1.5 kWh | 10.5 city/ 10.4 hwy (10.4 avg) | 1,126 km | 237.70 | 0.018 | 0.032 |
| 2023 Ford LF-150 Lariat SuperCrew 5.L Ti-VCT V8 | 98 Litres | 14.2 city/ 12.9 hwy (13.5 avg) | 742 km | 304.74 | 0.023 | 0.042 |

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Glossary of Terms

GHGE – Greenhouse Gas Emissions, for the purposes of this report, includes Carbon Dioxide, Methane, and Nitrous Oxide, as specified by Environment and Climate Change Canada.

ECDMP – Energy, Conservation and Demand Management Plan.

Energy Efficiency – Taking actions to reduce energy consumption to perform the same or similar task, reducing redundant energy use.

ICE vehicle – Internal Combustion Engine Vehicle.

Net Zero – Where the total amount of energy used is equal to the amount of renewable energy created.

Offset – A form of renewable energy generation or GHG sequestration to offset the energy consumed.

ZEVs – Zero Emission Vehicles, typically fully powered by electric battery, hydrogen, or methane.