

Tay Valley Township - Waste Management Master Plan



January 3, 2022

Prepared for:

The Corporation of Tay Valley Township



Cambium Reference: 13711-001

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Executive Summary

The waste management industry is currently undergoing significant changes that will present opportunities and challenges and will likely change how the Township will operate its waste related activities in the future. Tay Valley Township contracted Cambium Inc. (Cambium) to prepare a Waste Management Master Plan (the Plan) in anticipation of these changes and to identify efficiencies and improve services delivery.

Specifically, the goals of the Plan as identified by the Township, are to:

1. Increase diversion of waste from landfill
2. Improve service delivery
3. Minimize environmental impact.

GOALS

These goals align with the community feedback gathered through the Plans community engagement survey.

In developing the Plan, Cambium utilized research and its expertise in municipal “best practices” for waste reduction programs and planning. The project team also applied awareness of trends and anticipated future regulatory policy changes to support its recommendations.

Through the development of the Plan, the following objectives have been identified:

1. Increase the residential diversion rate to 50% by 2030
2. Increase the overall diversion rate to 35% by 2030.
3. Implement 2 options that will reduce environmental impact by 2030
4. Implement 2 options to improve services delivery by 2030

OBJECTIVES

Methodology

Cambium worked closely with the Township to outline a roadmap/methodology for the successful development of the Plan. The methodology included:

- Meetings with Township staff

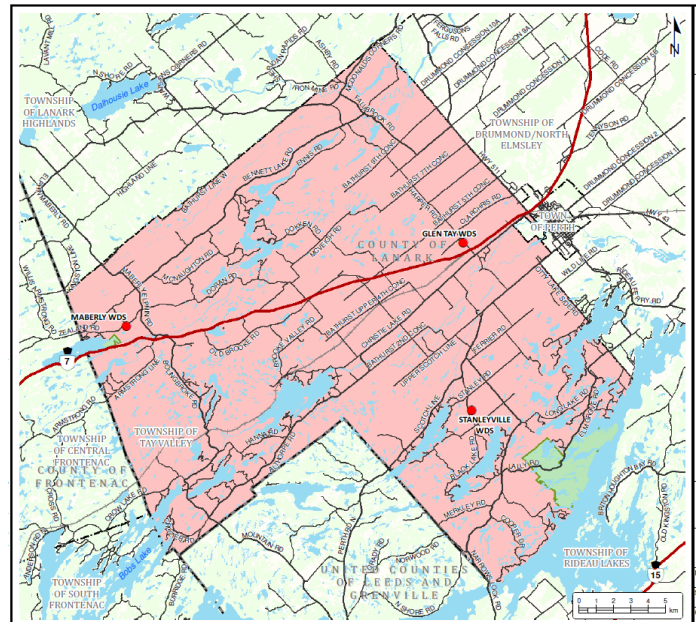
- Visits to the Townships operating Waste Disposal Sites (WDS)s
- Review of relevant waste policy and legislation
- Review of Township programs, performance, and financial statements
- Community engagement
- Development and assessment of options to achieve the desired outcomes
- Development of the Plan

Current Waste Management System

All permanent and seasonal residents in the Township are currently provided with depot drop-off services at three Waste Disposal Sites (WDS)s. No curbside garbage or recycling collection is currently offered in the municipality. The Township operates the WDSs and contracts waste hauling and processing requirements, as well as landfilling operations.

Landfill Capacity

The three WDSs in the Township all have remaining landfill capacity, however only the Glen Tay landfill is currently operated. Garbage collected at other WDSs is transferred to the Glen Tay landfill for disposal. There is over 30 years of remaining capacity in the existing Phase 1



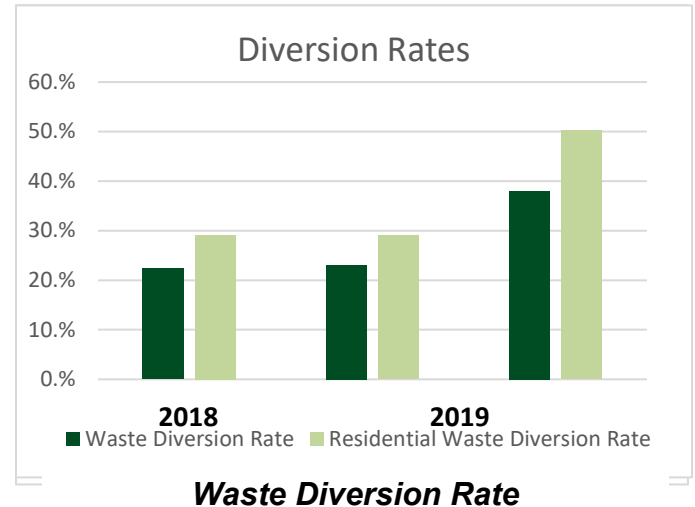
landfill area at Glen Tay WDS. Overall, the Township was estimated to have over 90 years of remaining combined capacity at the end of 2020 based on current rates of fill (4,000 m³/year). However, it is worthwhile to note that a large portion of the remaining capacity is in wetland areas and will require revaluation before it can be considered for use.

Waste Generation and Diversion

Township residents generated on average 244kg/person/year of garbage and 78kg/person/year of recycling between 2018 and 2020.

The waste diversion rate is a measure of the percentage of waste that is kept out of the landfill. It is calculated by dividing the waste diverted (recycling) by the total waste generated (garbage + recycling). Based on

the information available, the diversion rate for the Township was 22%, 23%, and 38% in 2018, 2019, and 2020, respectively. These diversion rates assume that C&D material was landfilled offsite, and thus they are lower than the AMRs reported rates which classified the C&D as recycled (diverted).



The “residential only” waste diversion rate can be calculated by excluding non-residential material from the calculation (i.e., C&D and shingles). The residential diversion rates were 29%, 29% and 50% in 2018, 2019, and 2020, respectively.

Financial Considerations

Cambium reviewed 2019 and 2020 revenue and expenses. The current waste management program operates at a net cost to the Township, meaning the expenses exceed the revenue. Overall, the review shows relatively consistent expenses and revenues year to year. The five largest costs associated with managing the WDSs are:

1. Wages, including site operations, administration, and management
2. Recyclable’s trucking, including management of contamination
3. Environmental monitoring and engineering, including open and closed sites
4. C&D trucking



5. Waste cover and compaction

These findings help to direct the approach Cambium used to develop initiatives for the Plan.

Community and Stakeholder Engagement

Feedback from residents was gathered primarily through a survey. The survey was available online and in hard copy at the WDSs. A total of 441 residents responded to the survey. Overall residents rate the Township waste services a 4 out of 5. Respondents to the survey were generally supportive of construction demolition recycling, and a mattress recycling program, and not supportive of implementing a curbside waste collection program. The responses to the surveys were considered in the development of the Plan as described further in the report.

Options, Recommendations, and Implementation

In completing our analysis of the current waste management system, several opportunities for improvement and optimization towards achieving the Plan's goals were noted.

The opportunities are organized based upon the goal that they relate to most directly, however some options can impact multiple or all goals and objectives of the Plan. A total of 41 recommendations were generated through the Plan's development. The Implementation Plan prioritized the top 16 recommendation to implement in the short-term (1-3 years) and medium term (4-6 years).

Short-term (2022-2024)

Short term recommendations were based on two main principles: firstly, that the Township should improve record keeping and performance information to support their decision-making processes, and secondly to prioritize diversion of waste from the landfill.

The short-term recommendations include:

- Implement an improved data management system
- Improve tracking of BB revenues and expenses
- Implement a mattress recycling program



- Pilot a glass recycling program
- Collect organics at Glen Tay WDS and ship to a processing facility
- Implement a User Pay system – and distribute Township specific clear bags to residents
- Eliminate the use of bag tags
- Provide additional staff training
- Reduce number of recycling bins
- Medium-term (2024-2027)

Medium term recommendations were based on improving two main principles, improving/optimizing service delivery and continuing efforts to increase diversion. Medium-term recommendations include:

- Update the layout at Glen Tay WDS
- Update hours of operation
- Add a large item reuse shelter and program at Glen Tay WDS
- Lead municipal collaboration initiatives
- Implement additional recycling program changes
- Chip Brush separate from Leaf and Yard waste and use as ground cover offsite
- Pilot a construction demolition recycling program

Based on the short-term and medium-term recommendations the total cost of all the changes suggested in this Plan is approximately \$320,000 capital investment and \$79,000 annually. Cambium recommends increasing tipping fees for C&D waste to \$80/yd³ and implementing a Township issued garbage bag program generating roughly \$100,000 to offset the costs of increasing diversion.

Implementing the recommendations above help the Township achieve its objectives by providing:



- Plans to divert an additional 250 tonnes per year of waste, increasing the waste diversion rate to over 50% and adding an additional 2 years WDS site life to Glen Tay landfill.
- Direction on improving delivery of service by changing the hours of operations and adjusting the layout at the Glen Tay WDS.
- Recommending options that would benefit the environment and result in a GHG emission reduction of 218 MTCO₂e annually or the equivalent of emissions from 47 passenger vehicles per year.

It is recommended that the Township review their Waste Management Master Plan every 5 to 10 years to measure performance. As the Blue Box program is scheduled to transition in 2026, the Township should formally review this plan following the implementation of the Individual Producer Responsibility programs in 2027 or 2028.

Respectfully submitted,

Cambium Inc.

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1.0 Introduction and Background

The Corporation of Tay Valley Township (Township) contracted Cambium Inc. (Cambium) to prepare a Waste Management Master Plan (the Plan).

The Township previously reviewed its waste management plans internally in 2017, identifying several opportunities including the option to transition to a curbside collection program for residential garbage and recycling collection. Through the 2017 Master Plan process, the Township made the decision to remain with a depot only collection system. The Township's existing waste management services and operations include many widely adopted best practices in the waste management sector such as clear garbage bag policies, bans on landfilling organic waste, partial user pay systems, and reuse opportunities.

The waste management industry is currently undergoing significant changes that will present opportunities and challenges and will likely change how the Township will operate its waste related activities in the future. Specifically, the shift towards Individual Producer Responsibility (IPR) as discussed in Section 1.4 offers a new framework for managing recyclable materials. Furthermore, the Plans development is funded by the Municipal Modernization Program and intended to identify efficiencies and modernization opportunities.

1.1 Goals and Objectives

The goals of the Plan as identified by the Township, are to:

1. Increase diversion of waste from landfill
2. Improve service delivery
3. Minimize environmental impact.

GOALS

These goals align with the community feedback gathered through the Plans community engagement survey.

The goals are also in line with the provincial *Made-in-Ontario Environment Plan* to reduce waste and increase diversion (MECP, 2018) and Township's Strategic Plan to: *"deliver local, rural services for the benefit of all taxpayers in a way that is sustainable and brings value to*

residents of the municipality” and “.. consider climate change and the environment in all decisions and operations.” (Tay Valley Township, 2017).

In developing the Plan, Cambium utilized research and its expertise in municipal “best practices” for waste reduction programs and planning. The Cambium team also applied awareness of trends and anticipated future regulatory policy changes to support its recommendations. Through the development of the Plan, the following objectives have been identified:

1. Increase the residential diversion rate to 50%
2. Increase the overall diversion rate to 35% by 2030.
3. Implement 2 options that will reduce environmental impact by 2030
4. Implement 2 options to improve services delivery by 2030

OBJECTIVES

These objectives support the Plan’s goals and will be accomplished through the implementation of strategically chosen initiatives and operational updates.

1.2 Study Area

The Township covers approximately 550 km² in the southwest corner of Lanark County, approximately 70 km north of Kingston, Ontario. The Township is adjacent to the Township of Lanark Highlands to the northwest, the Town of Perth and Township of Drummond/North Elmsley to the northeast, and Frontenac County to the south. Formerly, the Township consisted of three independent Townships: Bathurst, North Burgess, and South Sherbrooke, until their amalgamation in 1998. The Township’s location in the County is shown in Figure 1.

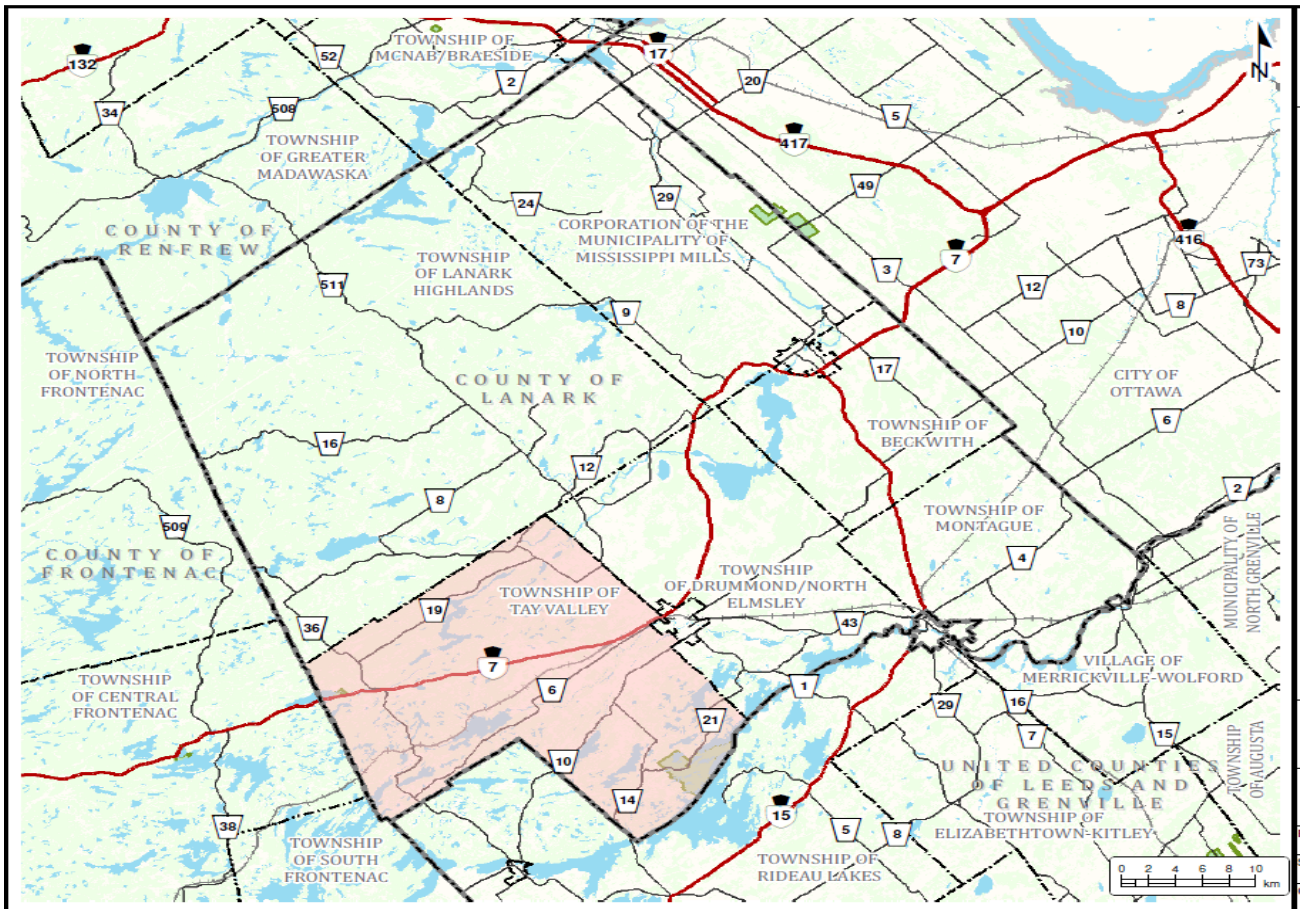


Figure 1 Regional Location of Tay Valley Township

1.3 Community Characteristics

As reported in the 2016 Census, a total of 5,665 people reside within the Township (Statistics Canada, 2021); this population increases by one third to one half during the summer months, when cottagers return to the area. Between the 2011 and 2016 Census, the population increased by 1.7%. The average population density per square km is 10.3 residents.

Generally, the Township consists of low-density rural development with higher density focused along shorelines and the centre of Glen Tay. There has been a steady increase in population over the years as seasonal residents transform their cottages into permanent homes and retirees move in from urban centres.

The largest industry in the Township is Swiss-based Omya Canada Inc., the world's biggest calcite producer. Further industry in the area has been around since early settlement and is still a large economic producer today: wood products, farming, and maple syrup. Due to a

large seasonal population, many businesses operate as seasonal support for the increased population including small contracting and haulage. Tourism is a large industry in the area due to the two Provincial Parks within the Township, as well as the many cottage rentals along shorelines of the Townships lakes and rivers (Tay Valley Township, 2016).

1.4 Waste Management Policy

In Canada, waste management is primarily regulated at the provincial level. In Ontario, the following Acts and associated regulations have been developed to ensure environmentally sound waste management practices:

- Environmental Protection Act (EPA)
- Environmental Assessment Act (EAA)
- Resource Recovery and Circular Economy Act (RRCEA)

In addition to the requirements of the legislation referenced above, the current provincial direction includes action items to reduce food waste and its related greenhouse gas (GHG) emissions (Ontario, 2018). Both the provincial and federal governments' mandates to reduce GHG emissions also have the potential to impact the food waste issue and possibly waste related transportation.

The current overall landfill life remaining in Ontario is approximately 14.5 years as of 2021; this estimate is assuming Ontario continues to export approximately 30% of waste to landfills in the United States. This lifespan is quite short given the requirements and time necessary to open new landfills (Ontario Waste Management Association, 2021).

Municipalities are directed to provide waste management services to municipal residents under the Municipal Act.

1.4.1 Environmental Protection Act (EPA)

The EPA is provincial legislation designed for the protection of the natural environment in Ontario. Regulations under this Act that relate specifically to waste management include:

- R.R.O. 1990, Regulation (Reg.) 347 - General Waste Management

- Ontario Regulation (O. Reg.) 232/98 - Landfilling Sites
- Ontario Regulation (O.Reg.) 101/94 – Recycling and Composting of Municipal Waste

1.4.2 Environmental Assessment Act (EAA)

The establishment or expansion of a waste disposal site in Ontario is governed by the Ministry of Environment Conservation and Parks (Ministry) through the Environmental Assessment Act (EAA) and Associated Ontario Regulation 101/07 Waste Management Projects (O. Reg 101/07). O. Reg 101/07 sets out the requirements for evaluating the environmental impacts of a proposed waste management project, as well as the consultation process that should be followed.

1.4.3 Resource Recovery and Circular Economy Act

In 2016, the Resource Recovery and Circular Economy Act was established to provide a provincial strategy focused on developing a circular economy and increasing resource recovery. A fundamental part of this legislation designates producers become responsible for the post consumer management of their products & packaging, which is referred to as Individual Producer Responsibility (IPR). In 2018 the provincial government released it's Made-in-Ontario Environment Plan (Ontario, 2018), which maintained the province's prior commitment to a shift towards circular economy and IPR. In 2020 and 2021, we have begun to see this shift in material management with some producers already being regulated to manage their waste (tires, batteries, electronics, and hazardous waste) and others scheduled to shift to this new system between now and 2025 (Blue Box (BB) recycling).

Under the Act the following regulations have been enacted to designate end of life management requirements for recoverable materials:

- O. Reg. 449/21 Hazardous and Special Products (HSP)
- O. Reg. 391/21 Blue Box
- O. Reg 522/20 Electrical and Electronic Equipment (EEE)
- O. Reg. 30/20 Batteries



- O. Reg. 225/18 Tires

Producers or Producer Responsibility Organizations (PRO)s will be responsible for managing each of these programs under the supervision of the Resource Productivity and Recovery Authority (RPRA). RPRA is an organization delegated by the province to oversee compliance with the regulations. A detailed summary of each of the above noted regulations is included in Appendix A and discussed further in Section 5.0 as it relates to the Plan.

1.4.4 Municipal Act

Although the province establishes the rules for managing waste and operating Waste Disposal Sites (WDS)s, municipalities are given the authority under the Municipal Act to provide waste management services to residents in their jurisdiction and enact bylaws to regulate these services. The Township has enacted the following bylaws related to waste management:

- Glen Tay Re-Use Centre – Operating Procedures (2013-070) – provides goals and rules of the Re-Use Centre
- Waste Disposal, Composting & Recycling (2015-043) – provides landfill site operation guidelines and information on acceptable materials, site security, and prohibitions
- Waste Disposal, Composting & Recycling By-Law Amendment (2019-047) – updates –the Fee Schedule and adds cylinder propane tanks to Hazardous Waste category
- Waste Disposal, Composting & Recycling By-Law Amendment (2020-053) – further updates the Fee Schedule

2.0 Methodology for Plan Development

Cambium worked closely with the Township to outline a roadmap/methodology for the successful development of the Plan. The methodology included:

- Meetings with Township staff
- Visits to the Townships operating Waste Disposal Sites (WDS)s
- Review of relevant waste policy and legislation
- Review of Township programs, performance, and financial statements
- Community engagement
- Development and assessment of options to achieve the desired outcomes
- Development of the Plan

This methodology involved a considerable amount of data gathering and research to gain a clear understanding of the Township's current waste management situation, including program operational details, waste performance and measurement, and the financial costs associated with the existing programs.

The Plan is laid out as follows (Figure 2):

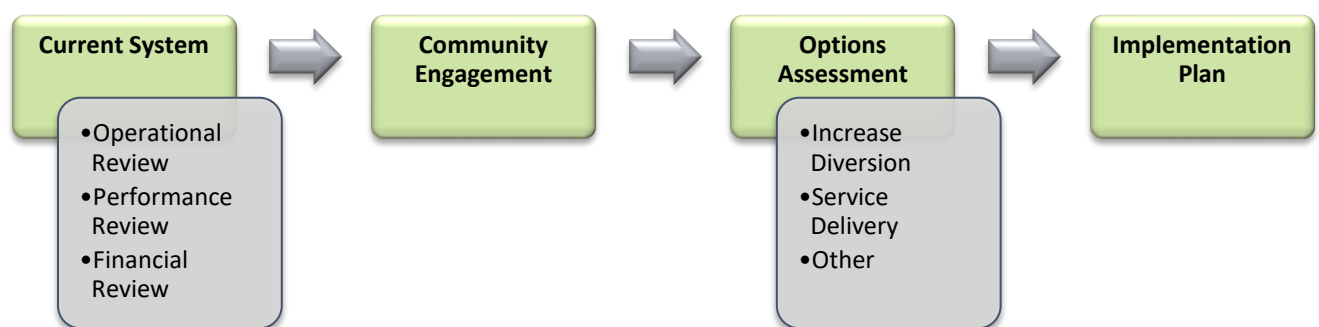


Figure 2 Report Flow

3.0 Current Waste Management System

3.1 Operational Review

Cambium reviewed waste management operations which are summarized below.

3.1.1 Waste Disposal Sites and Services

All permanent and seasonal residents in the Township are currently provided with depot drop-off services at three WDSs, as shown in Figure 3. No curbside garbage or recycling collection is currently offered in the municipality.

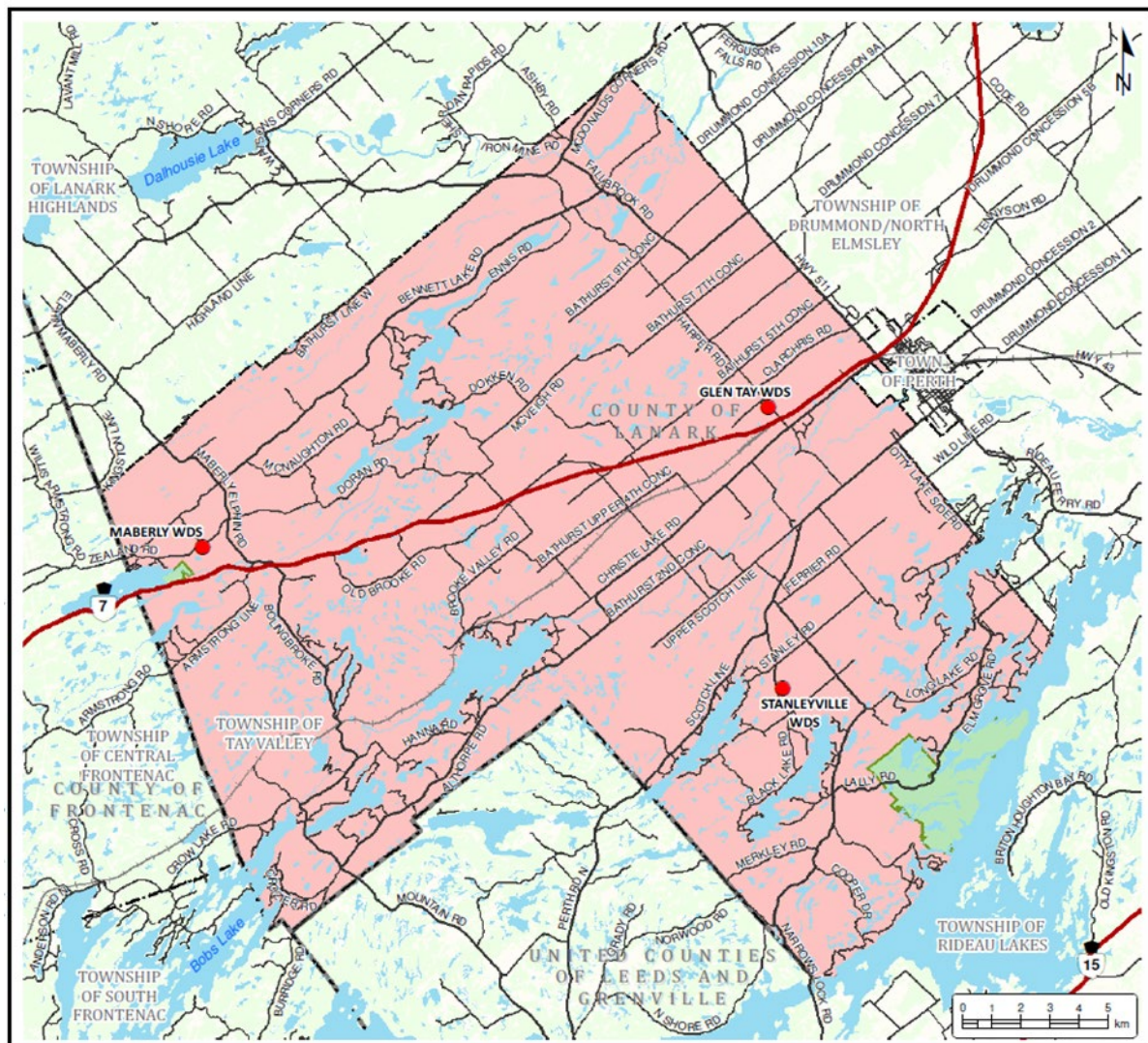


Figure 3 WDS Location Plan



The sites are located as follows:

- Glen Tay WDS Landfill and Transfer Station – 156 Muttons Road
- Maberly WDS Transfer Station – 582 Zealand Road
- Stanleyville WDS Transfer Station – 1200 Stanleyville Road

The WDSs offer a variety of services to Township residents as summarized below. Details regarding each waste management program are provided in Appendix B. Only residents of the Township are permitted to use the WDSs and are required to show a Waste Disposal Site Card (Pass) to gain access. Household waste is accepted at all WDSs, and garbage must be in clear bags. The Glen Tay WDS will also accept waste generated from businesses in the Township such as construction demolition material and commercial wastes, however large loads of commercial wastes are generally discouraged.

All WDSs:

- | | | |
|------------------|-------------|----------------------------|
| • Bagged Garbage | • Batteries | • Scrap Metal |
| • BB Recycling | • Tires | • Organics (Kitchen Waste) |

Glen Tay WDS only:

- | | | |
|-------------------------------------|---------------|--------------------------|
| • Reuse Centre | • Bulky Items | • Leaf and Yard |
| • Brush | • Textiles | • Electronic Waste (EEE) |
| • Construction/Demolition Materials | | |

3.1.2 Existing Landfill Capacity and Life

Landfill capacity refers to the volume of garbage that can be disposed of at a site, including the volume of daily and/or intermediate cover material. The approved capacity is determined through design when a site is first opened or through a theoretical landfill capacity assessment for historical sites.

All three WDSs within the Township have capacity remaining; however, only the landfill at Glen Tay WDS is currently operating. Table 1 outlines the landfill capacity information for each site.

Table 1 Summary of Site Capacities

Site	Average Annual Fill Rate (m ³ /year)	Remaining Site Capacity (m ³ , 2019)	Remaining Site Capacity (m ³ , 2020)	Years of Remaining Site Life ²
Glen Tay – Phase 1 ¹	4,000	127,932	168,972	30-40+
Glen Tay – Phase 2	0	170,000	170,000	40+
Maberly	0	5,860	5,860	1
Stanleyville	0	153,800	153,800	20+
Total			498,632	90+

Notes:

1. As included in the Operations and Development Report, Dated June 29, 2021, prepared by MacIntosh Perry
2. Calculated using an average annual fill rate of 4,000 m³

In 2021, the Township updated the final design contours for the Glen Tay WDS and submitted an Updated Operations and Design Report to the Ministry (McIntosh Perry, 2021). If approved, the updated design will add approximately 40,000 m³ additional capacity to the Phase 1 area.

Overall, the Township was estimated to have over 90 years of remaining combined capacity at the end of 2020 based on current rates of fill (4,000 m³/year). However, it is worthwhile to note that the remaining capacity for both the Glen Tay Phase 2 area and the Stanleyville WDS are at least partially located in wetland areas. Thus, they would require significant design considerations to mitigate potential environmental impacts before proceeding as originally approved and intended.

3.1.3 Waste Quantities

Waste quantities are important metrics needed to assess performance and generate meaningful waste management planning recommendations. Typically, this information is required by WDS environmental compliance approvals (ECAs), tracked by municipalities, and included in Annual Monitoring Reports (AMR)s. Cambium utilized reports and data provided by the Township to create the material summary in Table 2. It is noted that the amount of material landfilled in 2020 is less than other years. This is partly explained by reclaimed cover material reducing the annual survey volume (McIntosh Perry, 2021).

Table 2 Township Waste Generation (2018 – 2020)

³	2018 (tonnes)	2019 (tonnes)	2020 (tonnes)
Garbage	1,103	1,254	619
OCC	91	88	116
Plastic	60	68	66
Paper	89	64	67
Cans	31	28	37
Construction & Demolition	473	365	327
Rubber Tires	14	32	96
Scrap Metal	127	163	151
Batteries	2	1	1
Electronics	19	20	22
Total	2,027	2,102	1,525

**Notes:*

1. Overall tonnes of garbage disposed was based on the surveyed waste volume and using a 500 kg/m³ waste density assumption and subtracting an estimated quantity of cover (as included in the 2018-2020 AMRs).

3.1.4 Waste Composition

The Township is currently participating in a four-season depot audit of residential garbage and recycling, supported by Stewardship Ontario and the Continuous Improvement Fund. At the time of the report this information was not available, however, this information will provide valuable insight into the behaviour of residents and provide a better indication of performance as it relates to waste and recycling and the composition of the waste stream. Data obtained through the audits can be used to verify some of the assumptions made in this report (e.g., the quantity of organics being landfilled by residents) and the impacts of the recommended options.

3.1.5 Hours of Operation

The hours of operation at the WDSs are shown below in Table 3. Survey feedback on the current hours of operation was generally favourable and is discussed further in Section 3.3.3.

Table 3 Tay Valley Township WDS Hours of Operation

Summer Hours per day (Victoria Day - Thanksgiving)							
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Glen Tay	8am - 4pm		8am - 4pm			8am - 4pm	10am – 6pm
Maberly	8am - 4pm		8am - 4pm			8am - 4pm	10am – 6pm
Stanleyville	8am - 4pm		8am - 4pm			8am - 4pm	10am – 6pm
Winter Hours per day (Thanksgiving to Victoria Day)							
	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Glen Tay	8am - 4pm		8am - 4pm			8am - 4pm	
Maberly			8am - 4pm			8am - 4pm	
Stanleyville			8am - 4pm			8am - 4pm	

Note: The hours of operation offered per week in the summer was divided by the number of WDSs for each local municipality to get an estimated hours per site per week.

The hours of operation of the Township WDSs were compared to local municipalities, as shown in Table 4. In general, most municipalities offer more WDS locations within their region; however, both the Township of Central Frontenac and the Township of Mississippi Mills have 3 total WDS's. Considering the average hours presented in Table 4, the Township offers a reasonable number of operating hours when compared to other local municipalities.

Table 4 Hours of Operation – Municipal Comparison

Municipality	WDSs	Summer Hours/WDS /Week	Summer Hours/ Week	Winter Hours/Week
Tay Valley	3	32	96	56
Lanark Highland	7	8	59	55
Hastings Highlands	9	13	115	100
Central Frontenac	3	27	80	80
Minden Hills	4	34	135	87
Highlands East	5	30	148	99
Algonquin Highlands	5	33	164	81
Mississippi Mills	3	22	67	59
North Frontenac	6	19	114	56
Average	5	24	109	74

Notes: Summer Hours/WDS/Week is the average number of hours a WDS is open during the week.

The costs associated with the hours of operation are mainly labour (staffing) related costs. This is further discussed in the financial evaluation (Section 3.3).

3.1.6 Landfill Cover and Compaction

The main considerations for garbage cover and compaction are 1) the compaction rate and 2) the amount of cover material applied.

3.1.6.1 Compaction Rate

The landfilled garbage is crushed (compacted) each operating day (Thursdays) and then covered with cover material at the end of each day. Currently, a dozer is used to push and compact the garbage, as shown in



Figure 4 Garbage Compaction Equipment – Glen Tay WDS

Figure 4. There was also an excavator onsite to assist with placement of cover material and moving garbage as needed. The Township switched from using a traditional sheep's foot compactor to a dozer when bulky items were no longer landfilled onsite. The operator finds the dozer provides better results for pushing garbage and leaving an accessible area for disposal trucks.

Not enough information was available to determine the actual compaction rate at the site. The AMR assumes that the WDS is achieving a 500kg/m^3 compaction rate, which is in line with other landfills in the area (McIntosh Perry, 2021). Compaction rates noted by the US Environmental Protection Agency for a small landfill site are higher up to $700\text{--}1000\text{ kg/m}^3$ (USEPA, April 2016). To calculate the actual compaction rate would require the tonnages of garbage and cover materials received at the site and the volume of those same materials landfilled. It is recommended that this information be gathered in the future.

3.1.6.2 Cover

All landfills in Ontario are required to cover the garbage to reduce odours, vermin, litter, leachate generation, etc. Glen Tay is required to cover the garbage each day it is open, and with a minimum thickness of 0.15 m of material.

The Township has an effective way of minimizing the cover and compaction required for the site. Garbage is collected in compaction bins (Figure 5) at the WDSs and transferred to the Glen Tay landfill once per week, on Thursdays. By limiting "garbage tipping" at the landfill to one day a week and ensuring that all garbage disposed at the landfill is previously compacted, the Township reduces the amount of daily cover required, as well as associated costs of operating equipment.



Cover material is often a significant cost to landfill operations. Primarily, imported sand/soil has been used as cover material. In recent years the Township identified excess cover material placed at the site. This reclaimed cover material from historic operations and road ditching materials delivered by Township operations have been primarily used as cover. As a result, the costs

associated with purchasing cover material have been limited and the costs of landfilling have been primarily contract costs for providing labour and equipment to manage the materials.

In addition to sand, and soils the Township uses chipped brush and wood waste as alternative daily cover (ADC).

Due to the limited information available on cover material quantities used, the garbage to cover ratio could not be established. However, a small landfill should be able to achieve a 4:1 volume of garbage to cover material ratio (20%), and many municipalities implement initiatives to reduce this ratio further (McBean, 1995).

3.1.7 Bulky Item Management

As part of the background review of waste management services, Cambium reviewed the Township's AMRs and discussed operations with its 3rd party contractors. It was assumed that Construction and Demolition (C&D) waste leaving the Glen Tay WDS were being recycled. However, during the review it was determined that C&D waste is currently being sent to an alternate landfill and is not being recycled.

3.2 Performance Review

Performance was measured by evaluating the Townships waste generations and waste diversion rates as well as completing GHG emissions modelling. For clarity the term garbage is used to capture any waste materials that are sent to landfill or incinerated, while the terms recycling or diversion are used to capture waste materials that are recovered and recycled or re-used. The term waste is used to capture the combination of garbage and recycling.

3.2.1 Waste Generation Rate

Township residents generated an average of 244kg/person/year of garbage and 78kg/person/year of recycling between 2018 and 2020. This generation rate doesn't consider a portion of the waste is generated by seasonal residents. Seasonal population estimates are included in the Townships WDS AMRs. Including the seasonal population for four months of the year in the calculation, the population is closer to 6,400, and the resulting generation rates decrease to 148kg/person/year of garbage and 72kg/person/year of recycling.

The Ministers message regarding the Strategy for Waste Free Ontario, 2017, cited that the average Ontario resident produces 850 kg of waste each year (Ontario, 2017). The difference between this rate and the Townships rates can be partially attributed to materials hauled by Township residents or commercial businesses directly to non-municipal disposal locations and wastes generated from the production of goods outside of the Township.

3.2.2 Waste Diversion Rate

The waste diversion rate is a measure of the percentage of waste that is kept out of the landfill. It is calculated by dividing the waste diverted (recycling) by the total waste generated (garbage + recycling).

The Township's waste diversion rates are shown in Figure 6. The diversion rate was calculated to be 22%, 23%, and 38% in 2018, 2019, and 2020, respectively. These diversion rates assume that C&D material was landfilled (as per the previously noted finding), and thus they are lower than the AMRs reported rates which classified the C&D as recycled (diverted).

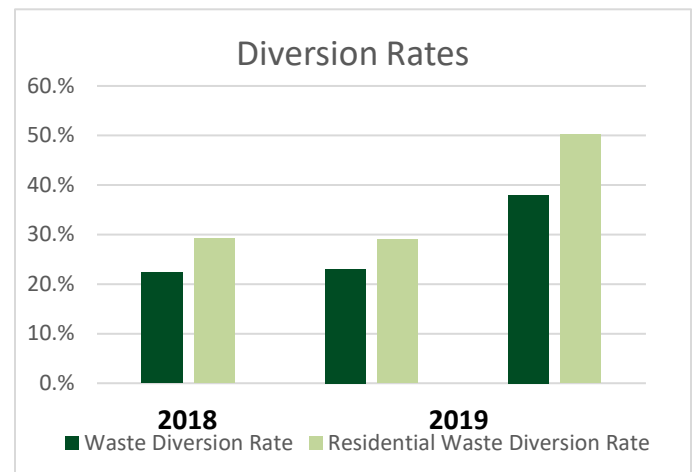


Figure 6 Waste Diversion Rate

The “residential only” waste diversion rate can be calculated by excluding non-residential material from the calculation (i.e., C&D and shingles). The residential diversion rates, as shown in Figure 6, were 29%, 29% and 50% in 2018, 2019, and 2020, respectively. In 2020, there was an increase in BB material collected. However, a greater impact on the high diversion rate was the lower fill volume (due to excavation of cover materials onsite and potentially a decrease in garbage generation). More accurate inbound garbage tonnages would assist with confirming these calculations in the future.

It should be noted that waste generation and waste diversion rates would likely be higher if all diversion program tonnages were recorded. The quantities of the following materials are not tracked and therefore were not included in the diversion estimates:

- a. Leaf and Yard waste
- b. Re use diversion
- c. Alcoholic bottle driver diversion program

With the transition to IPR it may be more difficult to obtain Township specific data as it relates to quantities of designated diversion materials. The result may be a greater focus on measuring waste generation rates and rates of landfilling. It will be important for the Township to continue capturing waste quantity and composition detail in as much detail as feasible at the WDSs as opposed to relying on end markets to provide this information. It is a requirement of the WDS ECAs to record quantities of materials managed at the sites.

Table 5 below provides a comparison of the Township's residential waste diversion rate to similar municipalities.

Table 5 Diversion Rate of Similar Municipalities

Township	2019 Diversion Rate (%)
Hastings Highlands	27.1
Central Frontenac	27.7
North Frontenac	79.0
Minden Hills	35.3
Highlands East	39.9
Algonquin Highlands	28.1

Note: Diversion rates as reported in the RPRA Datacall

3.2.3 Greenhouse Gas Modelling

Part of the Plan's development included an analysis of the Greenhouse Gas (GHG) emissions related to the Township's waste management operations. Generally, these GHG emissions come from three sources 1) decomposition of waste in landfill, 2) vehicle emissions from transporting waste, 3) emissions from processing recycling. GHG emissions can be reduced through various waste management practices including composting and recycling. The model often uses a life cycle approach, which considers sources and sinks for carbon when evaluating net GHG emissions from proposed program changes.



Cambium utilized the Waste Reduction Model (WARM) to calculate GHG emissions of alternative waste management strategies.

The tool can breakdown typical materials found in municipal solid waste into four basic categories:

- metric tons of carbon dioxide equivalent (MTCO_{2e}) which expresses the GHG emissions,
- energy units (million British thermal unit – BTU),
- labor hours,
- wages and taxes in dollars (\$).

In 2018, the Township reported that waste management operations were contributing 1,329 tCO_{2e} emissions annually (Tay Valley Township, 2020). The assessment completed by Cambium produced similar results for the quantity of tCO_{2e} produced annually from landfilling waste (1,399 MtCO_{2e} for 2018). However, the model also considers the reduction in GHG emissions from recycling materials rather than disposing them in landfill. The model works to compare the pre-existing waste management practices against proposed alternatives. The model doesn't account for emissions from historic quantities of waste. Using the 2020 waste quantities included in Table 2 as the baseline data, and assumptions regarding waste composition, the total GHG emissions from the Township's waste management operations were calculated:

- The operations currently in place in the Township are estimated to produce -824 MTCO_{2e}.

The reason for the negative emission rate is the quantity of material recycled in 2020 versus the quantity landfilled. Note that in 2020 the estimated tonnes of garbage landfilled was low. If the model is adjusted for tonnes of garbage landfilled in 2019 the result is 20 MTCO_{2e} produced. The model variability shows the impact of diverting garbage on carbon emissions. The options presented in Section 5.0 consider GHG emissions from changes in the management of the quantities of waste reported in 2020. The analysis results are included in Appendix C.



3.3 Financial Review

As part of the Plan's creation, Cambium also completed a thorough financial analysis of the current operations and on any recommendations being considered.

3.3.1 General Financial Overview

A review of the 2019 and 2020 General Ledger (GL) accounts and related invoices was completed to provide a summary of current net costs. The results are summarized in Table 6. Overall, the review shows relatively consistent expenses and revenues year to year.

Table 6 Waste Management Costs

Expenses		
	2019	2020
Wages	\$261,840	\$256,062
Monitoring	\$73,009	\$70,279
Glen Tay Cover	\$52,829	\$56,630
Garbage Trucking	\$35,197	\$35,085
Site Operations and Maintenance	\$18,067	\$16,019
C & D trucking	\$56,798	\$59,088
Other Contracted Services	\$33,000	\$13,277
Brush	\$0	\$14,500
Future Closure Costs	\$25,000	\$25,000
Recyclable Trucking	\$95,709	\$96,915
Scrap metal trucking	\$9,347	\$12,394
Other	\$7,800	\$14,912
Total	\$668,596	\$670,161
Revenue		
Recycling Sales	\$22,236	\$18,596
Waste Disposal Fees and Charges	\$73,867	\$62,704
BB - Reimbursement	\$86,338	\$99,227
Total	\$182,441	\$180,527
Net Cost	\$486,155	\$489,634

Revenues from tipping fees in 2019 and 2020 were provided by the Township for each specific waste stream (Table 7).



Table 7 Revenue from Tipping Fees

	2019	2020
Furniture, Appliance, Other	\$2,819	\$2,450
Shingles	\$27,920	\$17,255
C & D	\$30,916	\$34,933
Waste / Brush	\$830	\$935
Total Tipping Fees	\$62,485	\$55,573

The top five expenses identified during the review (Figure 7) are discussed further in Section 5.0 as they relate to specific option assessments and include:

1. Wages, including site operations, administration, and management
2. Recyclable's trucking, including management of contamination
3. Environmental monitoring and engineering, including open and closed sites
4. C&D trucking
5. Waste cover and compaction

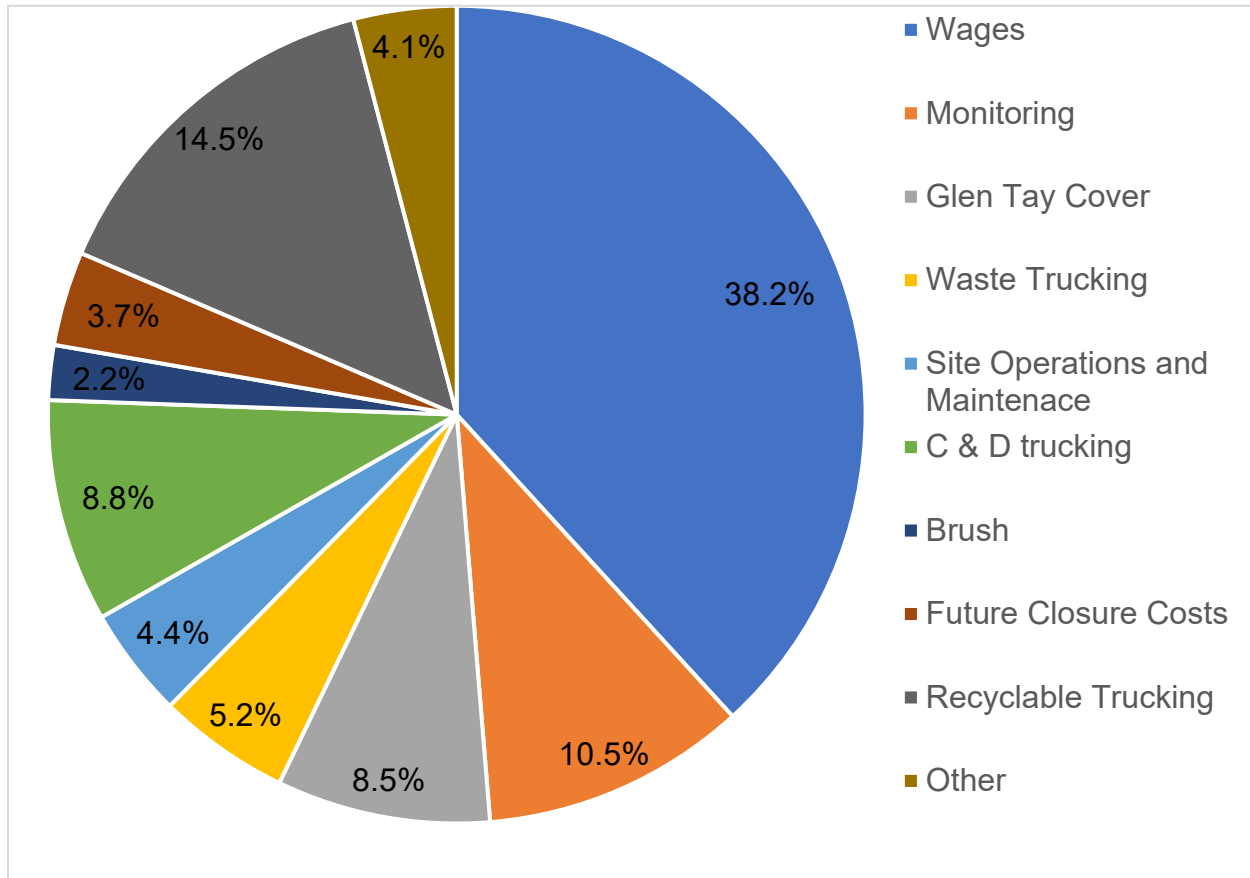


Figure 7 *Distribution of Waste Management Costs (2020)*

The financial analysis also looked at the costs to operate each individual WDS as shown in Figure 8. As expected, most costs are associated with the Glen Tay WDS, as it offers more programs and services a larger population.

In addition to the overall summary, the financial analysis looked at the individual waste streams (Figure 9).

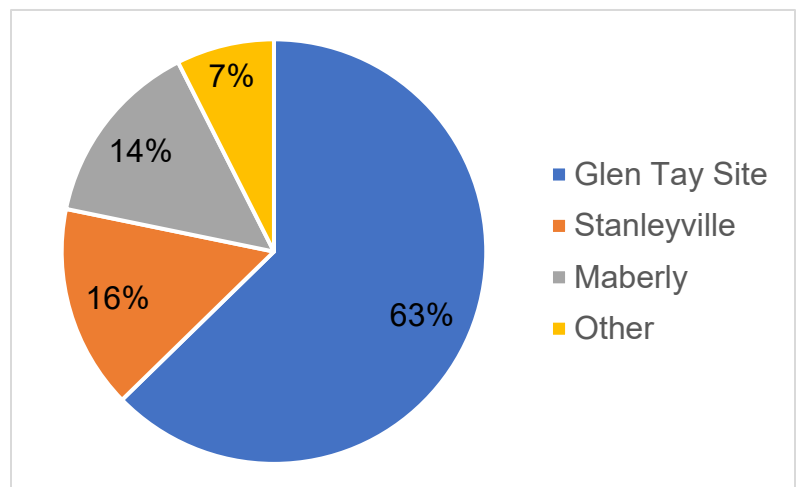


Figure 8 *Distribution of 2020 Costs per WDS*

To do so, the WDS operating wages were split between garbage, C&D, and BB recycling streams based on the tonnes managed in each program. The costs also include material hauling, handling, and processing. The revenues include tipping fees, rebates, and grant funding.

Five programs are generally a net expense to the Township: garbage, BB recycling, C&D and Bulky item management, and household hazardous waste (HHW). With the transition to individual producer responsibility (IPR) for both BB (2024) and HHW (2023), there will be an opportunity to recover costs of these programs.

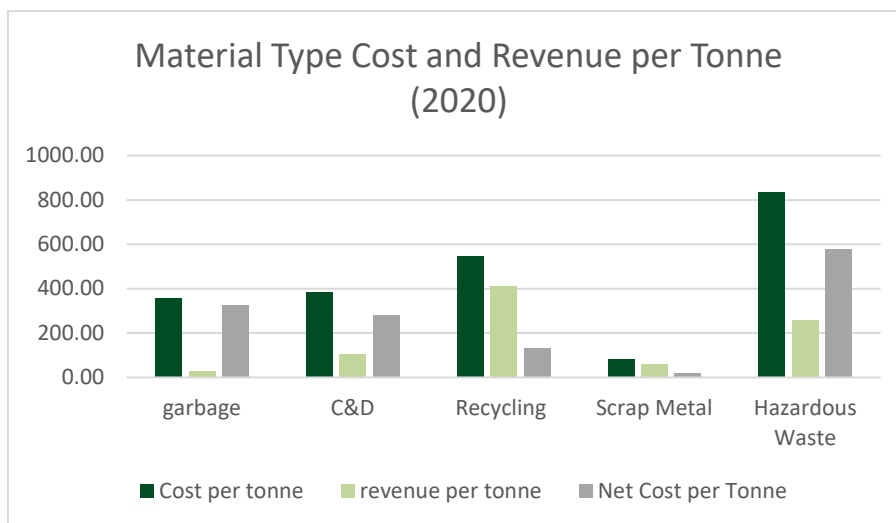


Figure 9 Material Type Cost and Revenue per Tonne (2020)

3.3.2 Blue Box (BB)

BB materials are hauled and processed at various locations by a 3rd party contractor (Stanley Sanitation Services). The Township pays 100% of the hauling costs and receives 60% of any rebate received for the sale of materials with market value.

As indicated in Section 3.1, the Township reports to RPRA annually on BB performance (tonnage and cost) to receive its proportional amount of funding for providing BB collection services. The average costs reported by the Township from 2017 to 2019 are included in Table 8.

Table 8 Blue Box Program Funding Report (Datacall)

Blue Box Program Costs	
Residential Depot Transfer	\$237,703
Promotion and Education	\$33,534
Administration	\$11,512
Revenue	-\$7,248
Total	\$275,502
RPRA Funding Allocation	\$92,821

Notes: Average costs reported through 2017-2019 datacall reports, except RPRA funding allocation for 2019 only.

It should be noted that some of the costs reported to RPRA seem to be higher than costs determined and calculated through the financial evaluation completed as part of this Plan. The method by which WDS wages and public education costs related to the BB are determined for reporting to RPRA should be reviewed.

For comparison, the reported BB program costs of other municipalities are included in Table 9.

Table 9 Blue Box Datacall – Municipal Comparison

Total Net Cost for Blue Box	
Tay Valley	\$275,502.00
Lanark Highlands	\$159,494.94
Algonquin Highlands	\$171,345.00
North Frontenac	\$218,944.00

Notes: Average costs reported through 2017-2019

3.3.3 Tipping Fees

Revenue for the Township is partially generated from tipping fees paid by residents who want to dispose of additional waste beyond the annual allocation or other materials outside of garbage and BB recycling. Table 10 provides an overview of the Township's tipping fees.



Table 10 Tipping Fees

Material	Additional Notes	Fee
Additional Bag Tag	Beyond annual allocation	\$1.00
Illegal Dumping Fee	For disposing of waste at a non-designated area or for littering or illegal dumping	Minimum charge of \$250, \$125/hr thereafter
Sorting at Site	For garbage bag containing recyclable or compostable waste	\$5.00
Brush Waste	Tree and bush clippings	\$5.00/cubic yard
C&D Waste	Discarded building material resulting from erection, repair, demolition or improvement of buildings	\$55.00/cubic yard
Shingles		\$130.00/cubic yard
Untreated Lumber Waste	Unpainted, not pressure treated	\$5.00/cubic yard
Major Appliances & Large Household Furnishings	Large non-reusable furniture (e.g., couch, upholstered chair, table, mattress)	\$20.00
	Small non-reusable furniture (e.g., bookshelf, chair)	\$15.00
	Refrigerator (freon removed)	\$5.00
	Refrigerator (with freon)	\$25.00

All other accepted materials at any of the WDSs that are not listed in the above table are allowed to be disposed of free of charges.

Table 11 shows tipping fees of other local municipalities. In general, most small municipalities use volume-based disposal fees (i.e., cubic yards). However, weight-based fees provide a better data source for evaluating waste management operations and are preferred over volume estimates, when possible.

Table 11 Local Municipalities Tipping Fees

	Lanark Highlands	Central Frontenac	Minden Hills	North Frontenac
Bag Tag	No charge	\$1.00/bag	\$2.00 after 3 bags/week	\$2.00/bag (free garbage bag per recycling bin program)
Brush Waste	No charge	No charge	\$15-\$30/cubic yard	No charge
C&D Waste	\$155.00/tonne	\$25/cubic yard	\$40/ cubic yard (sorted)	\$20/cubic yard
Shingles	\$155.00/tonne	Depends on load size	\$50/cubic yard	
Appliances and Household Items	\$155.00/tonne	\$10.00/piece	Fridge - \$50 Furniture - \$20/piece Mattress - \$30/piece	Fridge - \$30 Chair - \$10/piece Sofa- \$20/piece Mattress - \$20/piece

3.3.4 Asset Evaluation

The Township owns several capital assets used for waste operations as outlined in Table 12. To evaluate the impact of assets on the operation and effectiveness of the WDSs it is important to incorporate their capital costs as well as expected replacement schedule/value into the analysis. Due to the value and limited number of waste management assets the Township has yet to formalize their asset management plan. The age and value of the Township owned equipment requires further investigation.

Waste management related assets are both owned by the Township and supplied by various service providers. For the asset evaluation, only Township owned assets were considered. Standard amortization values and periods were applied to provide an indication of the annual cost of waste related asset. Based upon the evaluation, the estimated annual cost of capital assets management is \$38,000. It is possible that this value could change with further refinement of asset costs.

Table 12 Estimated Asset Management Costs

Landfill Site Assets	Age	Amortization period	Estimated Cost (per unit)	Total Number of Units	Annual Cost
Scale house	unknown	15	\$20,000	3	\$4,000
Reuse building	unknown	30	\$100,000	1	\$3,333
Fencing (per meter)	unknown	15	\$75	2,300	\$11,500
Site electrical (per meter)	unknown	20	\$90	50	\$225
signage (per large sign)	unknown	7	\$1,000	9	\$1,286
ECA Approvals	unknown	20	\$15,000	3	\$2,250
decking (per square meter)	unknown	15	\$100	450	\$3,000
30-yard compactor bin	unknown	10	\$40,000	3	\$12,000
Site Lighting (per light pole)	unknown	15	\$800	3	\$160
Total					\$37,754

3.3.5 Landfill Cost Model

Cambium completed an assessment of the value of the current landfill site capacity based on available information. The assessment concluded that the value of the landfill space is approximately \$156/m³ or \$312/tonne. This value considers the initial start-up costs, annual operating costs, as well as closure and post closure costs of the landfill. Start up costs were assumed to be \$22,500 based on cost of preparing the updated design report at Glen Tay WDS (referenced in Section 3.1.2) and closure costs were estimated at roughly \$250,000. The assessment is included as Appendix D.

4.0 Community and Stakeholder Engagement

Two initiatives were undertaken to obtain valuable insight into the waste management operations and services offered by the Township. Initially, staff and Council were offered the opportunity to comment on the services offered and potential areas for improvement. Then, following the initial sites visits and using the input from staff and Council, a waste management planning resident survey was prepared.

4.1 Waste Management Survey

The survey was distributed to the residents of the Township to accumulate public opinion on a variety of topics regarding current services and future management options. The survey consisted of a total of sixteen questions. Questions ranged in subject matter, including – how often residents used each service provided, what future goals/services they would like to see, opinions on implementing curbside pickup programs, when they used the WDSs, whether the hours of operation were sufficient, and backyard composting. The survey was available in hard copy and electronic format. Hard copies were handed to residents using the WDSs, and the electronic surveys were available on the Township's website. The survey was available between September 24, 2021, and October 10, 2021.

A total of 441 residents responded to the survey; 352 responded online and 89 completed a hard copy. The key findings of the survey were as follows:

- The average household that responded had 2 people and used one bin of recycling and less than one bag of garbage weekly.
- Implementing curbside pickup services were not desired by over 80% of respondents.
- All WDS were represented by survey respondents, and 75% of respondents drive 10 km or less to access one of the Sites.
- The days and hours of operation were deemed sufficient by most respondents.
- There were three potential program changes that most residents responded favorably (or indifferently) to:
 - Increase public education about waste diversion



- Implement a C&D waste diversion program
- Implement a mattress recycling program.
- 66% of respondents participate in backyard composting, and of those, approximately 40% compost both food scraps and leaf/yard waste.
- The average rating given by the respondents for the current waste management program was 4/5.

More detailed survey results are summarized in Appendix E. Any applicable results are noted in the review of options or recommendations.

5.0 Future Waste Management Program - Options and Recommendations

In completing our analysis of the current waste management system, several opportunities for improvement and optimization towards achieving the Plan's goals were noted.

The opportunities (options) presented below are organized based upon the goal that they relate to most directly, however some options can impact multiple or all goals and objectives of the Plan. The recommendations are further summarized into an implementation plan in Section 6.0.

5.1 Increase Diversion of Waste from Landfill

Cambium considered several ways to increase waste diversion from the landfill including:

- Increasing BB diversion
- Optimizing the composting program
- Implementing a C&D recycling program
- Implementing a mattress recycling program
- Implementing bag limits for garbage

5.1.1 BB Transition Planning

Under the provincial BB Regulation (Appendix A), the Township is scheduled to transition to individual producer responsibility (IPR) on January 1, 2025. On that date, producers will assume both operational and financial responsibility for the Township's BB program. The producers are required to continue the BB program but will have flexibility in how the program is delivered. The key points for the Township to consider are as follows:

- Producers will decide if they will work with the Township in any way to deliver BB Services, or do it alone
- Producers will get to decide if they will offer depot service or curbside service.
- During the transition period – January 1, 2025 – December 31, 2025 – Producers are required to continue to accept the same BB items that each individual municipality is



currently accepting. Effective January 1, 2026, producers will collect only the consistent set of BB items, as dictated by the provincial regulation.

Many of the implementation details of IPR are still to be determined, however, it is recommended that the Township begins preparing for the transition now.

It is expected the producers will initiate discussions with municipalities in the short-term to determine if they will partner with them on delivering the new BB program. It is also expected that a key discussion item will be the costs that municipalities are incurring to deliver the BB program, as producers will be looking to set a price to pay municipalities for their potential component of BB services.

Given that, it is crucial that the Township have a detailed understanding of the BB program costs.

Based on the service options in O. Reg 391, the Township should consider the following scenarios:

Scenario 1 - Producer chooses to provide depot collection service

If the producer chooses to continue providing depot services at the WDSs what are the major conditions that need to be considered and what will the Township negotiate? Specifically:

1. The Township currently provides staff to oversee proper diversion of materials and notify hauler of full bins. Is the Township willing to continue providing this service and at what cost?
2. The Township currently provides all signage and public education at the WDSs and on the website. Is the Township interested in continuing to provide these services if there is no reimbursement?
3. What is the implication if public education materials provided by the producer are inadequate or not readily accessible to residents?

Scenario 2 - Producer chooses to provide curbside collection service

Based on discussions with the Association of Municipalities Ontario (AMO), the method of recycling collection is intended to be equivalent to that of garbage collection. Therefore, should the plan to transition the entire Township to curbside BB collection be presented to the municipality by producers, then additional consultation should occur with organizations such as AMO, and the Continuous Improvement Fund (CIF), to seek direction and support on managing this transition. The Township must also consider how they will plan to manage these materials at the WDSs. Specifically:

1. Will the Township continue to accept BB materials at the WDSs at their own cost?
2. Will the Township implement bans on receiving these materials and implement stricter enforcement to encourage residents to use the services provided by the producers?
3. How will the Township deal with residents who are not able to place their recycling out on collection day due to seasonal use of their property (i.e., they are only at the residence on weekends).

Recommendations:

- Develop and maintain a detailed breakdown of any and all costs associated with the BB recycling program
- Develop an overview of the potential scenarios associated with the BB IPR transition and consider the implication of each.

These recommendations will require the following:

X	By-law Amendments (may be required post transition)
X	ECA Amendments (may be required post transition)
X	Public Education (may be required post transition)

Note: X indicates a required task

5.1.1.1 BB Materials

The new regulation defines specific eligible sources that will fall under the new BB program to be any residence or facility in the community. Therefore, the Township should ensure a clear



understanding of the quantity of BB materials which are collected from both eligible and non-eligible sources.

As noted in the previous section, effective January 1, 2026, the producers will collect only the BB items designated in the regulation. A number of those designated items that are not currently accepted in the Townships BB program include:

- a product such as straw, cutlery or plate that is supplied with a food or beverage product that facilitates the consumption of the food or beverage product and that is ordinarily disposed of after a single use, whether or not it could be reused.
- plastic film (except flexible plastic that is ordinarily used for the containment, protection, or handling of food, such as cling wrap, sandwich bags, or freezer bags)
- “Packaging-like product” includes beverage containers, glass, plastic, and cans
- “BB Packaging” packaging that is provided with a product is expected to include milk, juice, and soup cartons

In addition to providing service to residences, O.Reg.391 includes requirements for eligible Facilities (including multi residential buildings, schools, retirement homes, and long-term care homes) and a calculated number of Public Space Receptacles.

Recommendations:

- The Township should identify eligible sources in the community and ensure that Facilities in the community are aware of their eligibility for service and how to ensure that they are considered in the future program. The Township may wish to facilitate this process to increase diversion from the Townships WDSs.
- The Township will be eligible for a limited quantity of public space recycling containers. The quantity is yet to be confirmed; however, they should anticipate this service and consider potential locations to propose for these.

These recommendations will require the following:

X	Public Education
---	------------------

Note: X indicates a required task

5.1.2 Recycling Program Changes

Cambium reviewed the existing BB recycling program and considered three items related to program delivery:

1. Glass
2. Aseptic and polycoat containers
3. Number of Recycling Streams

5.1.2.1 Glass Recycling

Glass is currently being brought to the Glen Tay WDS and landfilled as daily cover. The exact quantity of glass is unknown and was estimated using values from other reports and audits (estimated to be 5% of the waste stream or 14% of the recycling stream). As mentioned in Section 5.1.1.1, glass is designated as a material to be recycled under the new BB regulation.

Implementing a glass recycling program would assist the Township in meeting the Plans objective since 69% of survey respondents prioritize increasing diversion from landfill.

Glass is commonly collected in BB programs; however, it is costly to manage as it becomes contaminated in the mixed container recycling stream and the glass often ends up in the landfill. However, there are locations that will receive source separated glass to be recycled. The material would have to be free of porcelain and ceramic materials currently collected in the glass stream. The costs associated with glass recycling are primarily hauling to the disposal facility and are included in Table 13.

Table 13 Costs Associated with Glass Recycling

Glass Recycling	
Glass (tonnes per year landfilled) ¹	40
Glass landfill per year (m ³)	80
Estimated tonnes of glass per 40 cubic yard bin	7.5
Estimated number of bins per year	5
Estimated hauling costs	\$4,800
Bin rental per year	\$1,200
Tipping fee	\$0
Total cost	\$6,000
Cost/tonne	\$150
Value of landfill space per year ²	\$12,480

Notes:

1. Tonnage was calculated assuming a 0.5tonnes/m³ density
2. Value of landfill space is an indirect cost savings

Using the EPA WARM model to look at GHG emissions related to this program, Cambium determined the emissions reduction from recycling and additional 40 tonnes of glass waste. The results show that implementing this type of program would reduce emissions by:

12 MTCO₂e, or the equivalent of emissions from 3 passenger vehicles per year.

Recommendation:

- Pilot a source separated glass recycling program

This recommendation will require the following:

X	By-law Amendments (may be required)
X	Public Education

Note: X indicates a required task

5.1.2.2 Polycoat and Aseptic Containers

Polycoat and aseptic containers are commonly found in the BB program. This category of material includes milk cartons, juice boxes, soup boxes, etc. which are currently landfilled in the Township. The cost and savings associated with adding polycoat and aseptic container

recycling are included below in Table 14. The costs do not include requirements to renegotiate contracts with the current service provider.

Table 14 Costs Associated with Polycoat and Aseptic Container Recycling

Polycoat and Aseptic Container Recycling	
Polycoat and aseptic (tonnes per year landfilled)	4.5
Hauling cost - negligible if included with another materials/container stream	\$0
Processing cost per tonne	\$160
Total Cost	\$720
Value of landfill space saved per year	\$1,404

Recommendation:

- Add polycoat and aseptic containers into the existing BB hauling and processing contract and include them as a required material in future contracts.

This recommendation will require the following:

X	Public Education
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Note: X indicates a required task

5.1.2.3 Number of Recycling Streams

Cambium completed a review of the existing 5-stream recycling system offered in the Township. The five streams include:

- Glass
- Plastic Containers
- Metal Cans
- Paper
- Cardboard

A couple of observations were noted during the site visits and background review which prompted Cambium to consider the number of recycling streams offered at the WDSs. The observations which are discussed further include:

- Many bins were either not labelled or incorrectly labelled
- There were many bins - specifically at the Glen Tay WDS (32 bins in total)
- There are some materials that are not being collected in the current streams (aseptic and polycoat containers - milk, juice, and soup cartons)



- There are line ups at the Glen Tay WDS

Despite the multiple streams, it is expected that residents are still comingling some of the materials (particularly paper with cardboard) and other non-recyclable materials. With a two-stream program (or three stream if glass is kept separate) it is expected that bins could be labelled as “container” and “fibre” and it would be easier to keep them labelled and separate. This may reduce contamination which currently costs \$5,000/year to haul back to the landfill.

Front end bins are being used to accommodate the multiple recycling streams. Fewer bins could be considered with less recycling streams. Furthermore, a compactor for cardboard could be considered at the Glen Tay WDS as a space savings opportunity if all fibres (cardboard and paper) were included in the stream. Cambium calculated the payback period for a fibres compactor to be 6 years.

As the current separate streams are market specific there are some materials that could be recycled that aren't being captured such as the polycoat and aseptic containers. Reducing source separation and sending these materials to a MRF to be sorted would allow these items to be included.

Cambium estimates it takes twice as long for residents to unload/sort their recycling with a five-stream (glass, plastics, cans, paper, cardboard) versus a three-stream program (glass, containers, fibres), which results in twice as many customers being onsite at any one time, especially during peak season. It was noted during the site visits that Glen Tay can get very busy and congested on the weekends resulting in long lineups down Muttons Road. Using Statistics Canada data and the residential survey results, Cambium estimates that, with a 5-stream recycling program, there could be as many as 20 customers onsite unloading recycling at peak times.

The financial benefit in the contract for a four-stream program (excludes glass) was estimated at \$6,000/year based on more marketable materials.

Recommendation:

- Implement a consistent 3-stream recycling program (glass, containers, fibres)

This recommendation will require the following:

X	By-law Amendments (may be required)
X	Public Education

Note: X indicates a required task

5.1.3 Household Hazardous Waste (HHW)

HHW generated by residents falls into two high level program categories for the purpose of this review, 1) Hazardous and Special Products (HSP) and 2) non-designated materials

5.1.3.1 HSP

Hazardous and Special Products (HSPs) are materials designated under O. Reg 449/21 as a material that producers are required to manage – meaning subject to IPR. For clarity, a list of materials currently accepted and managed at the Middleville HHW depot is sorted into designated and non-designated below in Table 15.

A review of the quantities of materials managed in 2019 and 2020 determined that less than half (about 47%) of the hazardous materials managed at the depot are designated (included) under the HSP or Battery regulation. This is an important consideration when deciding how to manage the existing HHW depot.

Designated HSP materials are transitioning to full producer responsibility between now and January 1, 2023. During transition the producers are required to maintain the same number of events and collection depots in each municipality for existing categories of HSP materials (O. Reg. 449/21 Section 7 (2)). Section 8 of the regulation includes minimum requirements for collection frequency.



Table 15 HSP Materials Accepted at Middleville HHW Depot

Designated Materials	Non-Designated Materials
Paint	Pharmaceuticals
Single Use Batteries	Fire Extinguishers
Propane	CFL Bulbs & Tubes
Antifreeze	Mercury
Oil Filters	Sharps
Plastic Containers	Corrosive Liquid
Pesticides	Flammables Organic
Fertilizers	Oxidizing Solids (nitrates)
Aerosols	Oil

Following transition to IPR, large producers will be required to establish a collection location for the items as summarized in Table 16.

Table 16 Hazardous Waste Collection Requirements

HSP Designated Materials	Collection Site Requirements Based on Population of Local Municipality		Tay Valley- Number of Collection Sites Required
	No requirement	500,000 or less	(Population 5,665)
Automotive Products:	Under 1,000	1 site per 1,000	5
Anti-freeze			
Oil filters			
Oil containers			
Paints and Coatings	Under 5,000	1 site per 1,000	5
Pesticides and Solvents	Under 10,000	1 site per 250,000	0
Pressurized Containers	Under 10,000	1 site per 250,000	0
non-refillable			

The Township should expect to continue receiving free collection of designated HSP materials; however, any costs associated with management of the depot will need to be negotiated through an agreement with the producers. It is expected that as the program develops new opportunities will be established with producers.

As noted in Table 16 there are a few categories of waste that are required to be collected in the Township. These materials are less risky to manage and can be managed at a small scale at one of the Township WDSs. Based on the need and costs associated with managing HHW, the Township should focus only on additional service related to designated items that would be collected at no cost and could be managed without significant infrastructure (paints, batteries, and automotive containers).

5.1.3.2 Non-designated HHW

Cambium considered the option of the Township establishing its own HHW depot.

The contract between the Township and the Township of Lanark Highlands was not provided for consideration as part of this Plan. However, it should be considered, and a plan should be

established to ensure that proportional allocation of all costs (including operation of the HHW depot) is established. In 2020, 118 users out of a total of 292 (40%) were identified as Tay Valley residents. The Townships HHW costs were identified as \$3,374 and \$3,189 in 2019 and 2020 budgets, respectively.

Hazardous waste is generally one of the most expensive waste streams to operate due to special hauling and processing costs associated with managing hazardous materials. The service is also one that is used infrequently as residents will generally wait to build up a quantity of material before driving to the HHW depot. Less than 5% of residents are using the existing depot annually. Establishing a Township owned and operated HHW depot to receive the majority of HHW would involve a significant capital investment, which could be upwards of \$300,000.

Recommendations:

- Negotiate with producers to collect less risky materials such as paint, coatings, and automotive containers at the Glen Tay WDS.
- Continue to work collaboratively with the Township of Lanark Highlands to provide the majority of HHW services for Tay Valley Township.

The recommendations will require the following:

X	By-law Amendments (may be required post transition)
X	ECA Amendments (may be required post transition)
X	Public Education (may be required post transition)

Note: X indicates a required task

5.1.4 Composting Program

Cambium assessed the option of implementing a formal composting program.

Without any recent Township waste composition studies, industry statistics were used in the assessment. On average, 30% of household garbage generation is organics (WM, 2018). However, since the Township's 2015 by-law, which requires the separation of organics from the garbage stream, it is likely this percentage could be lower. Combining this information with

the survey results and WDS visit observations, is it assumed that 21% of residential garbage disposed at the landfill still contains organics. The waste audits being completed over the next year should include composition of organics in the waste stream and will give further indication of the success of the organics ban.

The estimated quantity of residential organics waste in the Township is shown in Table 17.

Table 17 Organic Waste Quantities

Annual Organics Generation			
	2019	2020	Average
Organics diverted through existing backyard composting (tonnes)	106	51	78
Organics brought to landfill separated (tonnes)	19	9	14
Organics estimated in garbage stream (tonnes)	231	112	171
Total organics available in the residential waste stream (tonnes)	355	173	264

There are two general options for diverting municipal organic waste: 1) decentralized “at home” programs or 2) centralized collection systems at the WDSs. Often municipalities the size of Tay Valley Township choose a decentralized option for promoting composting as it can be costly and inefficient to collect and manage the quantities of organics waste generated in a centralized system. However, the Township has made the step of requiring organic waste to be separated from garbage and therefore the assessment considered both.

5.1.4.1 Centralized Organics Collection

During the WDS visits it was noted that the Township is currently managing organics by incorporating the material into Leaf and Yard piles at the WDSs. Although commonly done at home, this is not typically an approved method for managing organics waste at a Township scale and likely contributes to odour and vector issues (rodents and wasps). It has also been noted during Ministry inspections that the stockpiles of leaf and yard waste (with organics) need to be better managed to increase aeration and promote breakdown of the material.

5.1.4.2 Centralized Organics Collection & Hauling Off-Site

Cambium completed high level costing for a collection system and hauling to an offsite composting facility. One option commonly used in small municipalities is underground containers such as shown in Figure 10. These units have underground storage capacity which



Figure 10 Example of Organics Containers

keeps the organics cooler and reduces odours until collection. The containers are emptied on a regular basis using a specialized truck and hauled to a composting facility. There is an organics processing facility in Joyceville that could receive the materials. The capital and annual operating costs of implementing a 4-bin system at a single WDS are estimated at \$20,000 and \$60,000, respectively. Additional capital and operating costs would be incurred to implement the program at more than one site.

Given the Township bylaw to source separate organics and manage them separately, the next logical step would be to implement a proper composting program. Offering a proper collection program at the WDS would provide residents with additional motivation to separate the organics from the garbage stream. The Township should prepare a proper plan for management of the materials as part of the WDS operational documents and in consultation with the Ministry.

Prior to investing in a system, Cambium recommends verifying quantities of materials that are available in the garbage stream during the four-season audits currently underway. If most residents are diverting organics through their backyard program, then it may not be beneficial to implement a formal composting program.

Using the EPA WARM model Cambium determined the emissions reduction from composting an additional 85 tonnes of organic waste (70% of the organics assumed to be brought to the



WDS for landfill or compost). The results show that implementing this type of program would reduce emissions by:

at least 79 MTCO_{2e}, or the equivalent of emissions from 17 passenger vehicles per year.

5.1.4.3 Centralized Organics Collection & Composting On-Site

Cambium also considered the option of implementing on -site composting using either in-vessel or covered windrow technology. Both operations require regular addition of organic materials (feedstock) and operational oversight, and they are typically designed for more commercial applications or larger quantities of feedstock.

Recommendations:

- Confirm quantities of organics in the garbage stream during the four-season waste audit
- Implement a centralized compost collection program the Glen Tay WDS

These recommendations will require the following:

X	By-law Amendments
X	Standard Operating Procedures
X	ECA Amendments
X	Public Education

Note: X indicates a required task

5.1.4.4 Decentralized “at Home” Composting

Backyard composters and digesters are the traditional way to provide a rural composting program. Townships often order and supply backyard composters and/or digesters to residents at a reduced (subsidized) price to encourage organics waste diversion. Composters are currently sold by the Township at a subsidized cost of \$50/unit, and it sells about 10 units per year. This program can be further promoted through various public education initiatives – (i.e., giveaways).

There is also an option to participate in a pilot program using “at home” food dehydrators, which process food waste and produce a dry crumbled organic material that can be mixed into garden beds. Food Cycler has started to pilot this technology with several small municipalities. In discussions with representatives from Food Cycler, Lanark County in cooperation with Mississippi Mills and Carleton Place are looking into piloting this program. There may be opportunities for the Township to get involved in this County initiative. The retail cost of the unit is subsidized through the bulk order and program participation by Food Cycler. The County and Township would further subsidize the units for residents. While a Food Cycler retails at \$500 per unit, the subsidized units would be sold to residents for under \$200. The cost to implement this program for 150 residents is expected to be \$20,000 and would result in a similar diversion increase as the backyard composting program but cater to residents who have reasons why they choose not to compost (i.e., attracting rodents and not having enough space, etc.). Images of each unit are provided below in Figure 11.

Cambium determined the emissions reduction from composting an additional 11 tonnes of organic waste (assuming 10% increase in backyard composting) would be:

at least 10 MTCO₂e, or the equivalent of emissions from 2 passenger vehicles per year.



Figure 11 “At Home” Composting Options

Notes: left – composter, middle – digester, right – Food Cycler

Recommendations:

- Continue to promote decentralized composting through subsidized composters
- Join Food Cycler pilot program if a centralized collection system is not implemented.

These recommendations will require the following:

X	Public Education
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Note: X indicates a required task

5.1.5 Mattress Recycling Program

Cambium assessed the option of recycling mattresses rather than the current practice of hauling them offsite to another landfill.

The Glen Tay WDS currently receives mattresses and includes them in their C&D waste stream which is shipped offsite and landfilled. These low density, bulky mattresses take up

significant space in the 40-yard collection bins used, and as a result increase the number of trips when compared to overall tonnage diverted from the WDS. Mattresses also represent a difficult material to landfill as the springs in them prevent good compaction – thus they take up a relatively large amount of landfill space. Alternatively, there is currently a market for recycling these products when they are no longer usable. Recyc-Mattress is one company providing this service, recycling mattresses for many municipalities at their facilities in Toronto and Point-Claire, Quebec.

The best way to implement the program in the Township would be through mattress collection events. This program would involve the following:

- delivery of a trailer to a WDS,
- trailer left onsite to collect mattresses for seven days
- Township staff to oversee collection of mattresses
- Removal of the trailer and mattress recycling

Costs to implement a mattress recycling program is estimated at \$30 per mattress and includes collection, hauling and recycling costs. The costs are dependent on getting 100 mattresses per trailer. Trailers can hold anywhere from 80 to 130 mattresses depending on their size and how they are loaded into the trailer. In terms of cost, the program can be designed, via tipping fees, to be cost neutral by charging residents \$30 per mattress. Many municipalities recognize this and charge residents between \$10-\$30/mattress for disposal (Table 11). The Township currently charges residents a tipping fee of \$20 per mattress.

Implementing a mattress diversion program would increase diversion by an estimated 60 m³/per 100 mattresses. Based on quantities from other municipalities and Recyc-Mattress Inc. the Township produces at least 400 mattresses per year.

It would be beneficial for the Township to track the tipping fees received for mattresses separately from other tipping fees, to measure the financial viability of the program. The Township should also consider banning mattresses from the WDSs during “non-event” times to encourage residents to keep them until events.

Residents who cannot wait for Township run mattress recycling events have other disposal options including Tomlinson's Waste Recovery Centre and many retailers who will accept old mattresses when purchasing new ones. These return-to-vendor programs encourage development of the circular economy.

An estimate was used to evaluate the costs of offering mattress recycling events (Table 18).

Table 18 Cost of Pilot Mattress Recycling Event

Option - Mattress Recycling	1 event	4 events
Average size of mattress (m ³)	0.62	0.62
Number of mattresses	100	400
Total space saving (m ³)	62	248
Total tonnage	4.54	18.14
Storing and hauling costs per trailer (100/trailer)	\$1,250	\$5,000
Recycling costs per mattress	\$14	\$14
Staff costs to support program	\$240	\$960
Public education	\$250	\$1,000
Total estimated cost	\$3,090	\$12,560
Cost per mattress	\$31	\$32
Revenue (charge \$25/mattress)	\$2,500	\$10,000
Net Recycling Program Cost	\$590	\$2,560

In terms of the impact on GHG emissions, the WARM model doesn't include a mattress or textile category. So, the analysis used the most similar material type noted in the model, carpet. Using the EPA WARM model Cambium determined that implementing this program would reduce emissions by:

43.5 MTCO_{2e}, or the equivalent of emissions from 9 passenger vehicles per year.

Recommendations:

- Track and confirm the number of mattresses received annually
- Implement a mattress recycling events and ban mattresses except during an event



These recommendations will require the following:

X	By-law Amendments
X	Standard Operating Procedures
X	Public Education

Note: X indicates a required task

5.1.6 Waste Disposal Site Access and Bag Limits

During development of the Plan, Township staff identified waste sites passes as an item for review as they have not been well utilized over the last few years. Only Township residents are permitted to use the Townships WDSs, and the passes are intended to ensure that requirement is being met.

Additionally, it was noted that the bag tag program currently in place should be reviewed to consider its effectiveness and any recommended improvements/changes.

To address these requirements, Cambium evaluated 3 options:

1. Continue with existing program, use of waste site passes and bag for bag system
2. Implementation of waste site passes, and bag limits using a punch card system
3. Implementation of a “tag system” but with Township issued clear bags

5.1.6.1 Waste Disposal Site Card (Pass)

A waste pass system is commonly implemented at municipal WDSs to ensure that only waste generated within that municipality is being accepted. There may be instances when contractors working for residents, or renters requiring WDS services need to use the local WDSs but don't have a pass. Overtime, the use of the Pass in the Township has become neglected. However, a pass system is important especially at WDSs that are close to the main highway and easily accessible by residents or businesses from other jurisdictions. The Township should maintain some form of proof of residency at the WDSs.

One option would be to create & distribute a pass card (or two) to each resident, who would then be required to show it to staff in order to gain access to a WDS. To facilitate the use of passes they could be similar to a parking pass which hangs from a vehicle's rear-view mirror. This approach reduces the chances of forgetting the pass makes it easier for attendants to

confirm residency. A public education campaign could be launched advising residents of the reinforced requirements of needing a pass to access the WDSs. As well, attendants would have to be properly trained on the new system to ensure its success.

Contractors or cottage renters would require a different system to verify their origin when using a Township WDS. Municipalities like the Township of Trent Lakes have implemented a cottage kit, which can be purchased for \$3/kit to provide renters with a bag tag for disposal, garbage and recycling bags, as well as instructions on the municipal recycling program. This program is cost neutral, where the \$3/kit covers the cost of production and distribution of kits.

For managing commercial customers or contractors, typically municipalities implement a form which needs to be signed by residents and brought to the WDS confirming the origin of the materials. Passes can have numbers associated with them which could also be included on the contractor forms.

The cost to print waste site cards for residents is estimated at \$750/year. A new colour card can be issued every year or two. The cost of implementing the cottage kits covers itself.

The expected increase in diversion is unknown as it is assumed that most residents that use the WDSs are local, however there are some municipalities in the area that have higher tipping fees or accept different materials which may result in waste being transferred to the Township from these areas.

5.1.6.2 Existing Bag for Bag Program

Implementing a bag limit on garbage is considered a best practice for increasing waste reduction. The Township currently has a “bag for bag” program where every bin of recycling can be accompanied by a free bag of garbage. Residents are also provided 20 free bag tags to use at the WDSs per year. Additional bag tags are \$1 each. The Township sold 658 and 274 additional bag tags in 2019 and 2020, respectively.

Based on discussions with Township staff, the bag tags are not often used and the bag for bag is weakly enforced. Assuming an average bag weight of 12kg, approximately 90,000 bags per year or 40 bags per household per year were generated in 2018 and 2019. Data for 2020 suggest half as many bags were generated. Based on this data, residents in the Township are



generating less than a bag a week and are primarily able to dispose of garbage for free with the bag for bag program.

Cambium recommends eliminating the additional 20 free bag tags per year as it is an administrative burden that is deemed to be redundant. Additional bag tags can be purchased for waste that is generated in excess of the quantity of recycling being brought to the WDS.

The bag for bag program encourages residents to recycle, however it isn't a good strategy for waste reduction as it rewards residents generating lots of recycling with the ability to dispose of lots of garbage. Eliminating the bag for bag program is expected to decrease overall waste being generated. Eliminating the bag for bag program was not highly supported by respondents to the waste management survey, However, doing so results in greater accountability for the quantity of waste being generated.

5.1.6.3 Bag Limits/Punch Card

Cambium considered the option of implementing a bag limit.

With the Townships existing clear bag program, residents should only be putting disposable materials into the garbage stream and would be charged \$5/bag if it contained material that could be diverted (e.g., BB recycling, organics). Therefore, the next step to encourage waste reduction in the Township would be to implement a bag limit.

This option would involve implementing a system whereby each household is allocated a certain number of "free" bags of garbage for year, tracked on a punch card pass. The annual punch card would require the attendant onsite to "check off" the number of bags brought to the site. After all of the "free" bags are used, residents are required to pay a fee per additional bag requiring disposal. This system allows for residents to choose their frequency of WDS visits but still maintain some control over the number of free bags disposed. Most waste survey respondents generate one bag or less of garbage per week and the waste quantity data calculated supports this survey result.

For this system to increase waste diversion, the bag limit would have to be less than 52 bags per year (one bag per week) based on current estimated generation. The Municipality of Trent



Lakes uses this system with an annual limit of 48 bags per residence. Cambium recommends a similar limit of 48 bags. This punch card would be issued in conjunction with a Pass.

5.1.6.4 Township Issued Clear Bags

An alternate approach which Cambium considers favourable is to implement a user pay system whereby garbage is only accepted at the WDSs in Township issued clear bags (similar to Township of Central Frontenac). Clear bags labelled with Township logo would be sold at the Township office and at the WDSs for \$1.00 each, in bundles of 10 (\$10/bundle). This system could be used to easily confirm residency and limit waste generation if residency identification is required to purchase the bags. It would also serve as a solution to providing tags to cottager renters or seasonal residents as they could be supplied to the tenant by the property owner.

The Township would have a better assessment on the number of bags being brought to the WDS as it could be assumed that most bags purchased are brought to the WDS for disposal.

Not only does this system assist with managing the WDS users and reducing garbage, but it would also generate revenue to offset WDS operating costs based on use. It is estimated that a user pay system like this could generate \$90,000 based on the estimated number of bags disposed in 2018 and 2019. The WDS operating costs are either covered through taxes or directly by the site users.

This system would start to shift the cost of garbage disposal to the people who generate more waste.

If the Township were to implement this program it would require significant public education as there is little support for elimination of the bag for bag program and a user pay system.

Consideration can be given to providing exemptions for medical or other unusual circumstances.

Recommendations:

- Eliminate the 20 free bag tags and bag for bag program
- Implement a User Pay - Township issued clear bag program
- Alternately to the User Pay system – re-issue waste site passes with a stronger enforcement requirement and punch cards

These recommendations would require the following:

X	By-law Amendments
X	Public Education/Notification

Note: X indicates a required task

5.1.7 Construction Demolition Program

Cambium reviewed the existing Construction & Demolition (C&D) collection program and opportunities for improvement.

Currently, C&D and bulky items are collected separately in 40 yd bins and sent to GFL for disposal. The program keeps the materials out of the Townships landfill but is not a recycling program. Over 45% of survey respondents supported an improved C&D recycling program. The current tipping fees cover 60% of the program costs as shown in Table 19.

Table 19 Cost of Existing C&D Program

Item	Tay Valley 2019	Tay Valley 2020
C&D (Tonnes)	365	327
Total Cost of Hauling and Processing	\$56,798	\$59,088
Cost/tonne	\$156	\$181
Tipping Fees (furniture and C&D)	\$33,735	\$37,383
Revenue/tonne	\$92	\$114
Net cost/tonne	\$63	\$66

There is an opportunity to send recyclable C&D materials to a separate location where the materials would be sorted and reuse/recycled as appropriate as opposed to being landfilled.



Recyclable materials including drywall, lumber, metal, concrete and bricks, are estimated to constitute 40% of the existing C&D/Bulky item waste stream (or 106 tonnes/year).

Tomlinson is an example of one company able to accept the materials listed above for diversion. Other companies may also be able to provide C&D recycling services. The costs for recycling C&D are estimated to be \$20/tonne more than disposal. With this additional cost and based on an estimate of 40% of the existing C&D waste stream, a recycling program is estimated to cost an additional \$10,000/year. Increasing recycling of C&D waste can increase the Townships diversion rate by up to 10%.

Cambium determined the GHG emissions reduction from recycling 106 tonnes of C&D materials to be:

at least 83 MTCO_{2e}, or the equivalent of emissions from 18 passenger vehicles per year.

The existing program does conserve valuable landfill space and materials not designated as recyclable should continue to be sent to GFL and not landfilled at the Township landfill.

In order to ensure cost recovery for non-residential/household waste managed at the WDSs, the Township should adjust the tipping fee for C&D. Currently the fee is set at \$55/yd³. A cost recovery rate for C&D would be closer to \$80/yd³ (approximately \$135/tonne). The increase tipping fee would minimize the difference between the existing revenue, and C&D hauling and disposal or processing costs (approximately \$20,000/year). With the increase in fees, the Township should consider establishing a minimum tipping fee for C&D materials of \$10/load. Through public education, residents should be made aware of the difference between C&D and residential garbage. The Township should discourage weekly visits to the WDs with small quantities of C&D waste and instead encourage residents to only bring in C&D when they have accumulated enough to make the minimum fee worthwhile.

Additionally, the existing large item fee set at \$20/item should be increased to \$30/item. The current large item fee significantly under charges for items such as a couch or love seat at \$55/yd³.

Recommendations:

- Implement a diversion program for recyclable C&D materials
- Continue transferring additional bulky items offsite.
- Increase C&D tipping fees to \$80/yd³
- Increase large item fee to \$30/item

These recommendations will require the following:

X	By-law Amendments
X	Standard Operating Procedures
X	Public Education

Note: X indicates a required task

5.1.8 Reuse Programs

The Township offers a Reuse Program at the Glen Tay WDS, run by a group of volunteers and detailed further in Appendix B. In recent years the shed that provided a space for the larger items was deemed to be unsafe and acceptance of larger bulky items has been suspended.

Cambium estimates that bulky items account for 4-7% of the C&D/Bulky item waste stream that is currently shipped offsite. This is a rough estimate which could be confirmed through better waste quantity tracking or waste audits.

Based on an estimate of 7%, these materials currently cost the Township just over \$4,000 to manage annually with approximately \$2,500 in revenue to offset those expenses. Financially it doesn't make sense for the Township to invest in permanent infrastructure to support a new reuse location for these materials. However, the Township could create a covered space using a temporary infrastructure or sea container

(Figure 12) to receive and reuse some of the more desirable better condition items, which would be beneficial.



Figure 12 Temporary Shelter

Cambium included space for this reuse location in the updated layout described in Section 5.2.3 and shown in Figure 15. The cost of temporary infrastructure is estimated at \$5,500. This program would be best implemented at Glen Tay where operations will permit easy transfer and disposal of unclaimed bulky items. The operation of the bulky item reuse location will also be facilitated by a better site layout as described in Section 5.2.3.

Stanleyville and Maberly WDSs are not considered to be ideal for Reuse centres as there are no systems in place to manage undesirable bulky items that are left at the site.

Large Bulky items should not be accepted for reuse if they cannot be kept in a dry and clean location. The Township should continue to charge for disposal of bulky items but allow residents to take them at no cost due to the costs associated with managing unsold items.

Recommendations:

- Implement a reuse program for bulky items at Glen Tay WDS
- Continue charging for bulky items even if dropped off at the reuse centre

The recommendations require the following:

X	Standard Operating Procedures
X	Public Education

Note: X indicates a required task

5.1.9 Data Management System

Cambium assessed the need for a better waste quantity tracking system. Currently there are three main sources of information available:

- Information from the waste hauler who includes the total tonnes of materials hauled off site (recycling, C&D, and scrap metal) on each invoice, as well as the number of garbage bins transferred
- Bag counts from the attendants who do their best to track the number of bags received
- Quantities of any imported landfill cover material from invoices

Through the Plan's development Cambium has spent significant time reviewing data. As the Township relies on a variety of sources to evaluate their waste management performance, a



good tracking system is important. Cambium recommends the use of an electronic spreadsheet (e.g., MS Excel) to manage the various sources of information available on waste quantity and generation.

To help evaluate services in the future it would also be beneficial for the Township to gain a better idea of:

- the number of customers using each WDS and if they are residential versus commercial customers. Currently, this information is not available. Tracking can be done simply by using tally counters and recording daily or hourly number of visitors.
- The quantity of brush and leaf and yard waste managed at the WDS. This can be tracked by attendant logs sheets.
- The quantity of cover material used from alternate sources (wood chips, road ditching material etc.). This can be tracked by landfill equipment operator daily log sheets.

Although there is not a direct cost savings associated with this option, better data would be invaluable in determining the cost and effectiveness of the various waste management programs and services. The costs associated with improved data management consist primarily of administrative time and effort.

Recommendation:

- Develop a record keeping Standard Operating Procedure (SOP) and associated tracking sheets as described further in Appendix F.

This recommendation requires the following:

X	Standard Operating Procedures
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Note: X indicates a required task

5.2 Service Delivery

Cambium considered ways to improve or optimize service delivery including a review of:

- Providing curbside waste collection
- WDS hours of operation



- Site accessibility and layout

5.2.1 Curbside Waste Collection

In 2017, the Township considered whether to provide curbside waste collection to residents. The rationale for providing curbside waste collection was to increase the level of service and at the time was justified by cost savings through the structured approach to providing the services (less compactor bins required, closure of the Maberly and Stanleyville WDSs, user pay system implemented at the curb, etc.).

Based on public response in 2017, curbside collection was not implemented and depot only service was maintained. The depot-based service delivery model is not uncommon for small, rural municipalities. In 2021 survey results were similar to 2017 with over 80% of residents indicating they are not in favour of implementing a curbside collection program.

Cambium completed a high-level review of the option to implement curbside garbage collection program (no BB). For the purpose of the evaluation a every other week curbside garbage collection was estimated to cost the Township roughly \$170,000 per year. The costs of implementing the program may be offset by other operational changes as proposed in 2017. Some of the PROs and CONs to implementation of a curbside program are listed below in Table 20:

Table 20 Considerations Regarding a Curbside Program

PROs	CONs
Convenient for most residents	Not convenient for residents who are not home on collection day (seasonal)
Better tracking of waste quantities	Potential corresponding decrease to depot hours
Better control over materials collected	Potentially less participation in other diversion programs
More space available at WDSs (less bins and traffic onsite)	Uncertainty about Blue Box delivery model
Easier enforcement of policies and bag limits	Increased costs unless WDS services reduced
Provides service to residents who cannot drive	Increase the number of tipping face operating days

Recommendations:

- Based on residents' preference for depot waste management services and the additional costs associated with a curbside collection program, the Township should continue to offer waste services through the depot only.

5.2.2 Site Hours of Operation

The WDS hours of operation currently provided by the Township were discussed in Section 3.1.5. Overall, the Township provides consistent and adequate hours of operation. Compared to other municipalities the total number of hours per week that WDSs are operating is on the mid to lower end of the range depending on the season. As such, there is no reason to reduce the hours of operation if the Township continues to provide depot only waste collection services. This Section considers the distribution of those hours seasonally and by WDS to identify opportunities for optimization.

The hours of operation should be scheduled to provide adequate access to residents and at times when they will be well used. The waste management survey indicated that 87% of survey respondents thought the existing hours were sufficient, however several comments were included as to how these hours could be optimized including whether seasonal changes were sufficient and adding evening hours.

To consider seasonal hours, Cambium reviewed monthly garbage bag counts for each WDS to consider if it was worthwhile to change the hours of operation from summer hours to winter hours on Labour Day weekend instead of Thanksgiving weekend (Figure 13). Based on the garbage bag counts in 2020, there is a 1% decrease in the number of bags brought to the WDSs in October compared to September. The number of garbage bags received is notably lower between November and April compared to the rest of the year.

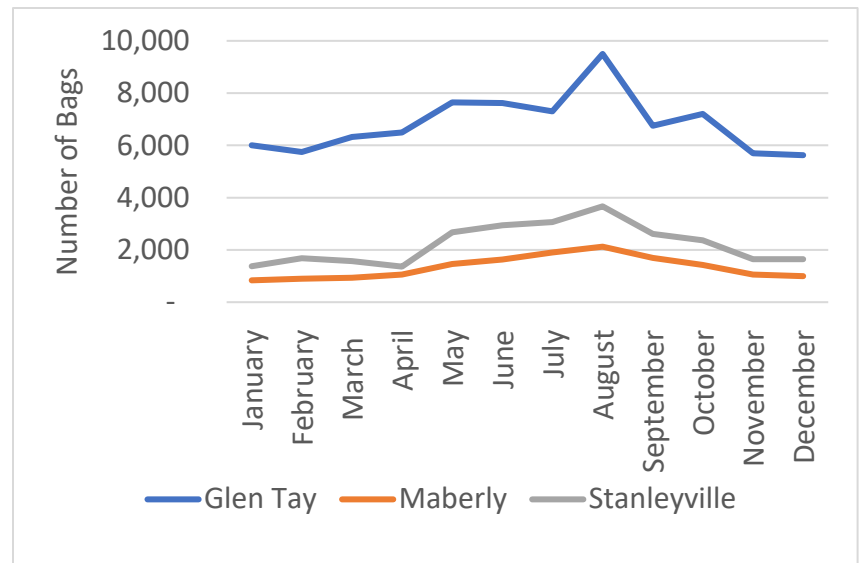


Figure 13 WDS Garbage Bag Count (2020)

To evaluate the hours of operation further, Cambium considered the current number of garbage bags received in a month, divided by the approximate number of operating hours in the month to produce an idea of how many bags (residents) each WDS receives in an hour (Figure 14). Based on this assessment, the bag count per hour was lower in September than it was in October, November, and December. Generally, the hours of operation appear to result in consistent bags/per hour for the seasonal increase in garbage, with the exception of higher bag counts in August. Based on this evaluation the duration of summer hours should stay the same.

In completing the assessment on the average number of bags per hour for each WDS it was apparent that Glen Tay receives significantly more than double the traffic per hour than the Maberly or Stanley WDSs. If each resident is only bringing in one bag of garbage to the Glen Tay Site and there are increased site visits during the weekend (71% of survey respondents indicate they visit the site on Saturday), the calculations indicate that over 100 residents could visit the site in an hour.

In order to optimize the hours based on site use and increase availability for residents who work during the day proposed revisions to the hours of operation are presented below in Table 21. The result would be longer days and one evening per week at the Glen

Tay WDS, which should reduce the number of

Saturday visitors. The Maberly and Stanleyville sites would maintain the same number of operating days but with slightly reduced hours to account for the increased hours at Glen Tay.

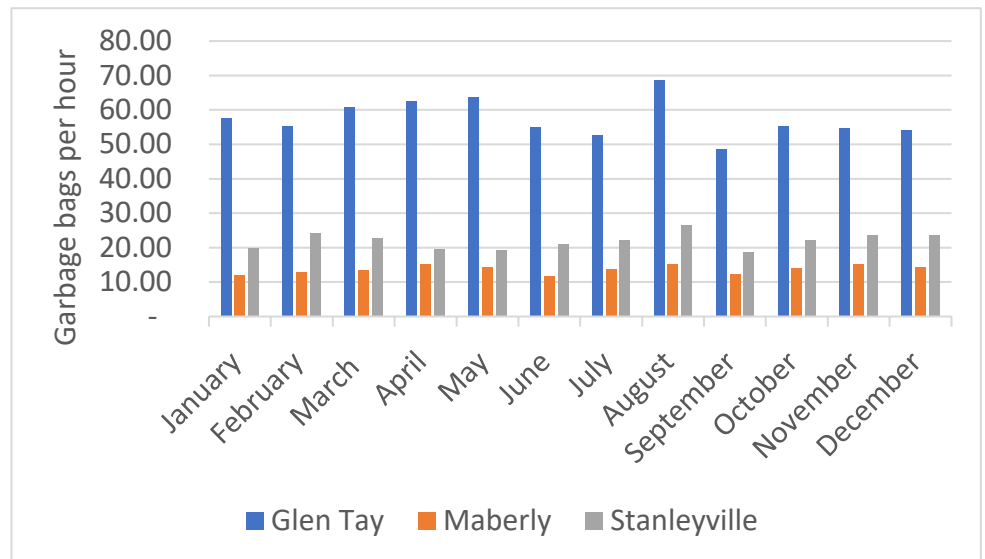


Figure 14 Average Number of Garbage Bags/Hour (2020)

Table 21 Proposed Hours of Operation

NEW PROPOSED HOURS							
Summer hours per day (Victoria Day - Thanksgiving)							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Glen Tay	8am to 6pm		8am to 4pm	3pm to 7pm		8am to 4pm	10am to 6pm
Maberly	8am to 4pm		10am to 4pm			8am to 4pm	10am to 4pm
Stanleyville	8am to 4pm		10am to 4pm			8am to 4pm	10am to 4pm
Winter hours							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Glen Tay	8am to 4pm		8am to 4pm	1pm to 5pm		8am to 4pm	10am to 4pm
Maberly			8am to 12pm			10am to 4pm	
Stanleyville			12pm to 4pm			10am to 4pm	

By implementing these changes, the average number of garbage bags received per hour would decrease at Glen Tay and increase at Maberly and Stanleyville. The result will be a more balanced use of hours for the quantity of garbage being received at each WDS.

Overall, the proposed changes to operating hours are estimated to increase cost by \$4,000/year as two attendants are required to operate the Glen Tay WDS, while only one attendant works at the other WDSs. If vehicle counts or bag counts are available per day, an assessment could be completed to determine if there are times when one attendant can manage the Glen Tay WDS (i.e., winter weekdays).

Recommendations:

- Increase the operating hours and evening availability at the Glen Tay WDS
- Maintain the same overall number of hours.

This recommendation requires the following:

X	By-law Amendments (may be required)
X	ECA Amendments (may be required)
X	Public Education

Note: X indicates a required task

5.2.3 Site Accessibility and Layout

The layout and accessibility of the WDSs was identified as an item for review in the Plan. 35% of survey respondents supported or strongly supported better waste site configuration and layout.

5.2.3.1 Stanleyville and Maberly WDSs

The Stanleyville and Maberly WDSs both have a distinct one-way traffic flow pattern at the WDS and appeared to have sufficient space to accommodate the level of traffic expected. There are 40-yard bins at these sites to accept glass and scrap metal. Ramps are available to access both of these bins. The Township should ensure that ramps and railings are maintained for safety but otherwise no major issues were noted regarding the existing layout at these WDSs.

5.2.3.2 Glen Tay WDS

Several issues regarding the layout and accessibility at the Glen Tay WDS were noted during the development of the Plan including the following:

- All Bulky Items and C&D materials must be brought to the Glen Tay WDS for disposal. Staff, members of Council, and the public have noted that the current system for dropping off these materials causes some accessibility issues as the roll off bins are high, and residents are often unable to lift items into the bins without assistance.
- There is no queuing/line up location
- There is not a separate line for items that require a fee and items that are free. Residents who wish to dispose of materials that require a tipping fee hold up the line as they determine the proper amount owed with the Waste Attendant. Residents who wish to drop

off free of charge materials do not have a way of bypassing the Waste Attendant's area and therefore the Site is prone to traffic jams and line ups down the road.

- There are space limitations as the recycling bins for collecting material are crammed into one small area resulting in lots of traffic jams while residents wait for others to unload their materials.

An updated design for the Glen Tay WDS is recommended to alleviate the above issues. The design would include a different layout and a phased approach to implementation that includes reorganization of the site in the first phase and installation of a weigh scale and tracking software in the second phase. Specifically, the scale is recommended for the following reasons:

1. improves tracking of materials coming and going from the site
2. provides a clear and transparent method for charging site fees
3. detailed weight and fee information will inform future waste planning and aid in directing more efficient operations

There was not a lot of support from survey respondents to install scales at the waste sites with over 60% responding with little or no support. However, for the reasons mentioned above the Township should strongly consider including scales in an updated site configuration.

The proposed operations centre layout is shown on Figure 15. This configuration provides for a separation between those materials that have an associated tipping fee and those that do not. Residents with "non-tipping-fee" materials will not need to cross the scale. This configuration will result in a significant decrease in resident wait times. The layout can also be implemented without the installation of scales.

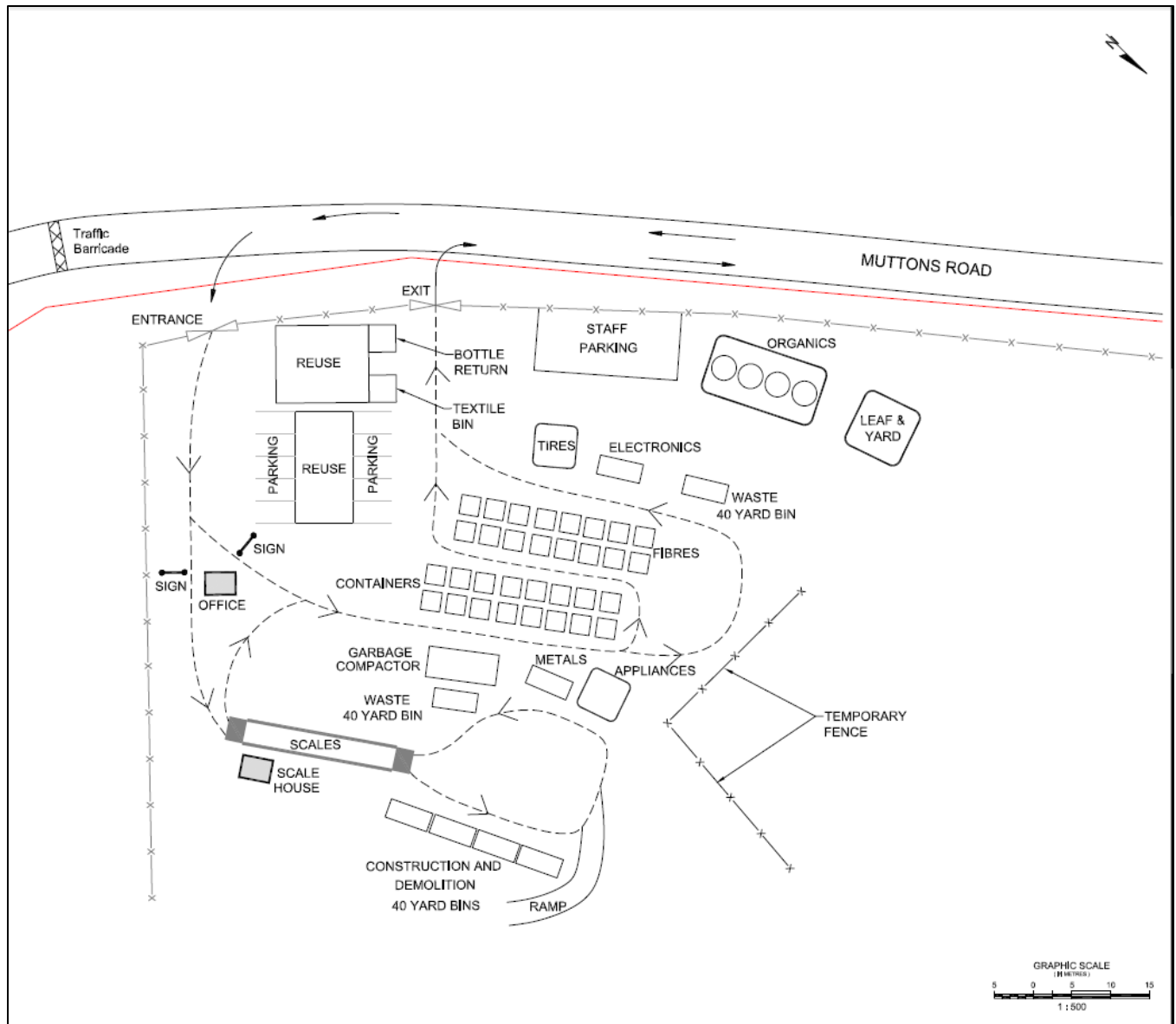


Figure 15 Glen Tay Site Layout Proposal

A ramp and bin loading area could be cut into the side of the waste mound past the scales, allowing for bins to be at ground level for easy transfer of waste. Bulky Items and C&D materials will be deposited in a designated area and not need to be lifted overhead into bins.

The site would run more smoothly with the closure of Muttons Road west of the site entrance. This road closure would reduce crossing traffic and provide a simple line up and queuing process. Barriers would be simple to install and remove, if necessary, in the future.



Bins will be placed on either side of the loop for household garbage, BB recyclables, and various divertible material. Bins can be put in (or taken out of) service as needed. This allows for flexibility to add diversion programs in the future and for expansion of waste storage capacity that should meet the Township's future needs. The traffic flow will be one direction.

Cambium estimates \$300,000 for full implementation of the new layout; however, it could be implemented in phases as noted above, with the costs being split approximately equally between the two phases.

Recommendations:

- Reconfigure the Glen Tay WDS to have a separate and more accessible disposal location for chargeable and bulky items.

This recommendation requires the following:

X	ECA Amendments
X	Public Education (may be required)

Note: X indicates a required task

5.3 Other Options

Other options that were requested or identified but didn't relate directly to one of the goals identified are included in this section.

5.3.1 Brush

Cambium assessed the current management of Leaf and Yard waste and Brush.

During the site visits stockpiles of Leaf and Yard and Brush were noted at Glen Tay WDS. There did appear to be some separation of brush from leaves but not formally (i.e., with the use of signs) and in some instances the two types of yard waste were mixed (Figure 16).



Figure 16 Load of Brush and Leaf and Yard Waste Pile at Glen Tay WDS

5.3.1.1 Leaf and Yard Waste

There was a large pile of Leaf and Yard waste at the Glen Tay WDS which did not appear to be managed other than pushing more material into the pile. Properly maintained compost piles help to reduce GHG emissions and encourage proper degradation of the material. Compost has been shown to reduce methane emissions from landfill and therefore is a good option to place over garbage in areas where landfilling is complete (Tanthachoon, Chlemchalsri, Chlemchalsri, Tudsri, & Kumar, 2008). Thus, Leaf and Yard waste which is composted separately from brush can be used as an interim or final cover once it is composted to provide some methane reduction benefits. This process would be facilitated by creating windrows of material which are more accessible to equipment for turning.

5.3.1.2 Brush

To date, management of the brush has included chipping once the piles reached a significant size. The chipped brush is used as alternative daily cover at the Glen Tay WDS or left onsite to breakdown. To ensure chipping costs are kept to a minimum, the Township should maintain

clearly defined separate areas for leaf and yard waste versus brush. Signs to delineate the two separate locations are estimated at \$750. In the past 2 years, Tay Valley spent \$14,500 on chipping brush.

Clean wood chips are not designated as waste under O.Reg. 347 and can also be used as ground cover. Clean wood chips should be made available for use in Township parks and gardens and made available to the public.

By-law No. 2015-043 indicates that Brush will only be brought by residents to the Stanleyville WDS. The Township should update the By-law.

Recommendations:

- Clearly define the separate disposal locations for Leaf and Yard and Brush
- Use wood chips as ground cover at offsite municipal parks and facilities
- Implement wood chip giveaways to residents

These recommendations require the following:

X	Standard Operating Procedures
X	Public Education

Note: X indicates a required task

5.3.2 Shingles

The Township asked Cambium to consider the option of banning shingles from the WDSs. Shingles represent a difficult to manage waste stream and one of the only commercial generated materials still being landfilled at the Glen Tay WDS. The reasons for considering a ban on shingles are to conserve landfill space and to eliminate the operational challenges associated with managing shingles at the tipping face.

Tipping fees were used to estimate the quantity of shingles being managed as shown in Table 22.

Table 22 Shingle Fees and Quantities

	tipping fees	tipping fee / yd3	yd3	m3	% landfill volume
2019	\$27,920	\$130	215	164	4%
2020	\$17,255	\$130	133	101	8%

Based on the quantity estimates, shingles constitute approximately 6% of landfill volume and would add an additional year of landfill life if banned.

Cambium determined that the disposal of asphalt shingles currently generates less than 1 MTCO_{2e} annually. As there are currently few markets for shingles, these are not likely to be recycled if banned from the Townships landfill. Therefore, implementing a ban on shingles would likely increase GHG emissions by increasing travel requirements for contractors to dispose of them.

In the survey, residents were asked to rank their support for banning materials such as shingles and mattresses from landfill. Over 50% expressed little or no support for banning shingles from the landfill.

In addition, the Township would see a loss of revenue if shingles were banned from landfill. This is the only waste stream which currently offsets costs to manage the landfill operations.

Recommendations:

- Implement a contractor sign off sheet to confirm the shingles were generated in the Township. Otherwise, maintain the existing program for shingles.

5.3.3 Bin Type and Collection Frequency

Cambium reviewed information provided by the Township to determine if improvements could be realized through optimization of the number of bins, the bin type, or collection frequency.

5.3.3.1 Recycling Bins

Cambium calculated the total volume available weekly for each recycling stream. Based on the assessment, on average recycling containers are less than full and, in some cases, only half full when collected, as shown in Table 23. There are seasonal variations that cannot be accounted for due to the nature of the data but based on this assessment it is expected that at

least seasonally some of the recycling containers can be brought out of service to increase space at the sites and reduce the number of bins that are required to be tipped. Specifically, the data shows that the number of fibre bins can be reduced at all sites and the number of plastic bins can be reduced at Maberly WDS.

If the number of bins is required to ensure residents have multiple locations for drop off when the sites are busy, then reduced frequency of collection could also be considered for some of the recycling streams.

Table 23 **Quantity of Recycling in a Bin**

	Standard (kg/m³)	Glen Tay (kg/m³)	Maberly (kg/m³)	Stanleyville (kg/m³)
Cans loose	27	19	16	12
Plastics loose	19	17	7	11
Paper loose	178	37	11	18
Carboard loose	44	21	25	18

Notes: Weights from: (USEPA, April 2016)

5.3.3.2 Garbage Bins

Based on the capacity in the garbage bins and the frequency of pick up, a total of 4,500m³ of bin space to collect garbage is available every year. The average landfilling rate per year is 4,000m³ and includes some cover materials and shingles. Therefore, the available bin sizes and frequency of pick-up seems appropriate. Without more detailed information on seasonal variations in bin fullness or weights and sites specific information the accuracy of this determination is limited.

Recommendations:

- Improve waste quantity tracking and generate data to evaluate bin size
- Evaluate recycling bin requirements with attendants and hauling contractor to determine if the number of bins or frequency of pick up can be reduced.

These recommendations require the following:

X	Standard Operating Procedures
X	Public Education

Note: X indicates a required task

5.3.4 Public Education

Public education is a key component in any strategy focused on increasing waste diversion. The waste survey suggested that over 50% of respondents are interested in increased community education and communication.

Information on the Township's WDSs and collection program are easily available for review on the Township's website. Overall, the information on the website is thorough and covers all necessary information with only a few minor updates required. The website is the most cost-effective way for the Township to share information about waste programs. Additionally, most residents visit the WDS at least every other week to deposit their household waste and recycling. The Township should consider greater use of the site staff to educate residents on upcoming changes or concerted efforts to improve a particular program (i.e., share "little known facts") (Figure 17).

It is recommended that residents receive communication and information about any new programs and major changes associated with this Plan well in advance. As part of each option assessment, Cambium has identified where public education would be beneficial.



Figure 17 Example of Waste Site Infographics



Public education costs vary depending on the level of effort provided. A summary of cost estimates for various initiatives is included in Table 24.

Table 24 Public Education Costs

Item	Cost	Notes
Website Updates	\$720	approx. 24 hours of work to update with all recommended changes
Cottage kits	\$75	for 60 kits
Educational Material Support from Cambium	\$3,500	For 2 program changes
By-law Updates	\$3,000	
Waste Site Promo Material	\$5,500	Signs approximately \$1,000 each for each WDS and handout \$500 in printing fees)
Radio Advertising	\$500	Approximate for one week of advertising
Staff Training	\$300	2 hours of training with each staff, can be worked into regular staff training - 5 staff
Total	\$13,565	

Samples of public education materials are found in the Plans Supplementary document. Through the development of the Plan, Cambium identified 10 initiatives that would require some form of public education for successful implementation.

They are as follows:

Modifications to Pass Cards or Bag Limits

Mattress recycling program

C&D program changes

Changes to hours of operations

Reuse program upgrades

Glen Tay WDS layout upgrades

HHW program changes

BB transition

Composting program initiatives

Recycling program changes

Recommendations:

- Provide residents with information about any new programs and major changes associated with this Plan well in advance
- Add updated By-laws and waste management reports (this Plan, annual monitoring reports, etc.) to the Township's website

These recommendations require the following:

X	Public Education/Notification
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Note: X indicates a required task

5.3.5 Training

The Township should implement annual training for all WDS operating staff. This training will ensure that employees working at the WDS are familiar with the requirements for the ECAs, and the Townships waste management programs. The training sessions can be an opportunity to gather information from staff about site operations, improvement initiatives, and relay important information about any upcoming changes or initiatives that the Township wants to reinforce.

Recommendation:

- Provide site operators with annual training on ECA and operational requirements for the WDSs.

This recommendation will require the following:

X	Standard Operating Procedures
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Note: X indicates a required task

5.3.6 Municipal Collaboration

There are several opportunities for the Township to collaborate with the County and other adjacent municipalities. Examples of collaborative opportunities include the following:

- Joint tendering/purchases (such as the Waste Management Master Plan) allows Townships to realize savings in the administrative process. Sometimes there are also economies of scale (e.g., composter orders).

Specifically, with Township of Lanark Highlands, the Township could consider joint tenders for chipping and grinding, scrap metal, compactor hauling, and C&D recycling.

- Public education initiatives (promotion of the HHW/HSP program or backyard composting)
- Diversion program operation (i.e., the HHW depot, a mattress collection event available to multiple municipalities, bottle drives)
- Shared equipment and/or staff (allows the municipality to have resources available without having to cover full costs associated with owning equipment). For example, if the Township of Lanark Highlands and Tay Valley Township had the same type of garbage collection bins at each WDS there would be opportunity for joint ownership of a hauling truck to collect and empty the garbage compactors. Alternately, one Township could own the equipment and the other Township rents it.

Similar circumstances would apply to the purchase of a grinder for C&D or brush. There are several municipalities in the area that use this type of equipment, thus it could be purchased and shared.

Recommendation:

- The Township should continue meeting with adjacent municipalities twice a year to share operational challenges and opportunities for collaboration.
- Establish a shared timetable of contracts and expected renewal dates to determine where collaboration on tendering is feasible.
- Consider including municipalities that have similar service models; specifically, consideration should be given to including the Township of North Frontenac, and the Township of Central Frontenac in the existing group meetings.

5.3.7 Alternate Waste Processing Technologies

During the development of the Waste Management Master Plan, several waste processing technologies were presented by members of the public and Council for consideration. Although it was outside of the scope of the project to evaluate each individual technology Cambium offers the following information and recommendations regarding alternate technologies.

1. When considering a technology, the Township should consider the waste hierarchy (reduce, reuse, recycle) and whether there are ways to encourage waste reduction or if there is a viable composting or recycling technology prior to relying on landfilling or energy from waste.
2. Before committing to a new technology, have an idea of the processing fee (cost per tonne) to assist with assessing the option compared to other alternatives.
3. A solid business and operations plan including cost benefit analysis should be in place to be considered by the Township relating to any new technologies.

5.3.8 Future Waste Disposal Operations

For planning purposes, Cambium recommends considering only the Glen Tay Phase 1 area and the Maberly site as usable landfill capacity in its current state. Therefore, an estimated 30 to 40 years of landfill life for the Township are available depending on annual fill rates.

As the Township currently has 40 years waste disposal capacity at its existing site, a detailed assessment of alternative disposal options was not considered. At this point Cambium identifies the following options that may be considered for future long-term disposal capacity:

1. Consider expansion into Phase 2 at Glen Tay WDS. This option would require a revision to the original design and operations plan to consider the wetland features around the site. It is likely that a large expansion into this area would require an engineered disposal facility with some form of leachate collection and treatment due to the location of the Phase in a wetland area.
2. Consider use of remaining capacity at Stanleyville WDS. This may require a review of the design and operations plan and revision of final contours as wetland is identified in



the permitted waste footprint and is not considered an appropriate location for waste disposal.

3. Consider establishing a permanent transfer station and exporting all waste generated in the Township.

In 10 years, the Township should re-evaluate the disposal capacity available and determine if it is a suitable time to consider these plans in more detail. Planning for future disposal capacity should occur at least 10 years in advance of the requirement if use of additional disposal capacity within the Townships WDSs is being considered.



6.0 Implementation Plan

Through the option assessments a list of 41 recommendations were generated.

The implementation plan prioritizes the options considered in Section 5.0 to meet the goals and objectives identified for the Plan. In this section priority recommendations were categorized as short-term (1-3 years), medium-term (4-6 years) and longer-term (greater than 6 years). Given the significant changes currently occurring in Ontario's waste management sector, the short-term options include greater implementation details and financial implications while longer term options are more general in nature and provide for longer term planning horizons.

The Township will need to ensure that updates to programs recommended through the Plan are reflected in the Townships Bylaws for waste management operations and fees. Cambium has outlined where this would apply in each option considered.

Short term recommendations were based on two main principles: firstly, that the Township should improve record keeping and performance information to support their decision-making processes, and secondly to prioritize diversion of waste from the landfill.

Short-Term recommendations are consolidated in Table 25.

Table 25 Short-Term Recommendations (2022, 2023, and 2024)

	Recommendation	Action	Implications	Section
1	Data Management System	Implement record keeping SOP and tracking sheets	Minimal cost (staff time), major benefit – ability to assess performance	Section 0
2	Track BB Costs	Maintain a Spreadsheet of BB Costs	Minimal cost (staff time), major benefit – increase funding through datacall, and improve for possible transition negotiations	Section 5.1.1
3	Mattress Recycling Program - Events	Ban mattresses from WDSs and implement mattress collection events Implement a mattress fee at collection events Promote mattress collection events	Minimal cost, significant impact on landfill diversion	Section 0
4	Implement Glass Recycling	Coordinate with hauler to take glass to recycler. Educate the public	Increase waste diversion, additional cost	Section 5.1.2.1
5	Compost	Following confirmation of organics quantities through waste audits – create an organics collection program at Glen Tay WDS	Potential to divert an additional 85 tonnes of organics a year. Cost anticipated at	Section 0
6	Implement a Township Issued Clear Bag program – eliminate bag tags	Eliminate the bag for bag program and implement a user pay system by providing residents with Township issued clear bags for \$1/bag	Cost of labelling bags and administering program	Section 5.1.6.4
7	Eliminate 20 free bag tags	Stop issuing the additional 20 free garbage bag tags/year	Save on administrative requirements and reduce waste produced by distributing unused bag tags	Section 0
8	Staff Training	Provide annual training to staff	Minimal cost -	Section 0



9	Bin Size and Frequency	Discuss opportunity to reduce number of recycling bins with staff and contractor	Costs savings due to reduced hauling	Section 5.3.3
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Medium term recommendations were based on improving two main principles. Improving/optimizing service delivery and continuing efforts to increase diversion. Medium-Term recommendations are consolidated in Table 26.

Table 26 Medium-Term Recommendations (2026, 2027, and 2028)

	Recommendation	Action	Implications	Section
10	Glen Tay WDS layout	Phase in upgrades to layout to improve operational efficiency and access for public	More streamlined operation, easier to charge tipping fees when needed, better access for residents Cost: \$300,000	Section 5.2.3
11	Large item reuse	Implement temporary infrastructure to accommodate diversion of larger reuse items	Increase waste diversion – cost savings from materials not sent offsite for disposal	Section 0
12	Optimize WDS hours of operation	Increase hours of operation at the Glen Tay WDS and decrease hours at the other WDSs.	Align hours of operation with site use	Section 5.2.2
13	Lead Municipal Collaboration Initiatives	Continue with collaborative group meetings. Maintain internal shared document to track contract dates for shared types of services	Potential cost savings from collaborative purchases or ideas to improve efficiencies	Section 0
14	Recycling Program Changes	Consult with producers regarding number of recycling streams	Increase diversion, improve site operations	Section 0
15	Brush Management–	Clearly define separate brush and L&Y areas. Find alternate uses for wood chips including giveaways to the public for use as ground cover or using in municipal parks/properties	Township already spends to chip brush brought to the site. Find additional beneficial uses for the material other than just ADC	Section 5.3.1
16	Pilot Construction Demolition Recycling	Separate C&D and send to Tomlinson or other facility for recycling	Some costs associated, significant impact on landfill diversion	Section 0

Longer term recommendations are considered to start guiding future planning processes and consideration for management of waste. Based on the Townships existing 30+ years of WDS capacity, longer term management options were not considered a priority at this time. The Township should continue to focus on diversion of waste with the Glen Tay WDS as the main recycling centre for the Township. It is recommended that the Township review their Waste Management Master Plans every 5 to 10 years to measure performance. As the Blue Box program is scheduled to transition in 2025, the Township should formally review this plan following the implementation of the IPR programs in 2027 or 2028.

6.1 Financing the Plan

Based on the short-term and medium-term recommendations outlined in the tables above and described in Section 5.0 the total cost of all the changes suggested in this Plan is approximately \$320,000 capital investment and \$79,000 annually. Cambium recommends increasing tipping fees for C&D waste to \$80/yd³ and implementing a Township issued garbage bag program generating roughly \$100,000 to offset the costs of increasing diversion. Table 27 outlines the cost breakdown of all the options combined below.

Table 27 Cost Summary for All Options

Option	Costs	Cost Savings	Notes
Data management system	\$750 labour	unknown	Administrative requirement
Tracking BB costs	\$750 labour	unknown	Information for transition
Mattress Recycling Program	\$500- \$2,600	reduce in C&D hauling costs	
Glass Recycling	\$6,000	\$12,00 in landfill space	Landfill space = \$312/tonne.
Implement Organics Composting	\$20,000 capital \$60,000 op	\$26,000 landfill space savings	
C&D Diversion	\$10,000/year	\$20,000/year	increase tipping fees
Eliminate 20 free bag tags		\$750	Producing and distributing tags
Staff Training		Increase diversion	
Bin Size and Frequency		Unknown but expected	



Optimize WDS hours of operation	\$4,000		Potential increase in cost due to 2 staff at Glen Tay WDS
Glen Tay WDS layout	\$300,000 capital	unknown	Potential increase revenue and efficiencies with new layout
Large item reuse	\$5,500		Storage area/container
Implement a Township Issued Clear Bag program		\$90,000	Revenue from sale of bags
Municipal Collaboration		Unknown but expected	
Recycling Program Changes		Unknown but expected	
Brush Management–	\$750		New signs
One-Time Fees	\$325,500	-	Cost savings doesn't account for landfill space saved
Yearly	\$78,850	\$110,750	

7.0 Summary and Closing

In conclusion the Township offers a well-rounded waste management program, offering many services to residents at multiple locations and times of day. Several recommendations have been made with the intent to increase waste diversion, reduce environmental impacts, and improve service delivery. The Township should consider these options and implement those which they consider to be the most in line with their priorities and needs.

Several of the options recommended will increase the operational costs compared to the costs of the current practices. In most cases, these recommendations are made as ways to increase diversion rates, save landfill space, or both. There is a potential to divert an extra 125 tonnes of waste from the Glen Tay landfill through composting and glass recycling and increase overall diversion of waste from landfill a further 125 tonnes/year through the implementation of C&D and mattress recycling. Assuming an additional 250 tonnes of waste diverted from landfill would increase the waste diversion rate to over 50%, an increase of at least 17% to the 2020 diversion rate.

The average landfill rate is currently 4,000 m³ per year, as described in Section 5.3.3.2, resulting in over 30 years of remaining landfill capacity. The initiatives outlined in this Plan could increase the lifespan of the WDSs of the Township by at least 2 years.

Landfill space saving and increasing the site life of the WDSs within the Township have an indirect cost savings for the Township. Cambium calculated the value of landfill space to be \$312/tonne. If approximately 125 tonnes of additional waste are diverted every year, then the Township is indirectly saving \$39,000/year in landfill space.

Cambium assessed GHG emissions associated with several of the options presented in this Plan. Overall, the recommendations outlined in this Plan could result in a GHG emission reduction of 218 MTCO_{2e} annually or the equivalent of emissions from 47 passenger vehicles per year.

The recommendations outlined in this Plan provide clear direction on how the Township can achieve its goals and objectives.

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9.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer, and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

Reliance on Materials and Information

The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

Facts, conditions, information and circumstances may vary with time and locations and Cambium's work is based on a review of such matters as they existed at the particular time and location indicated in its reports. No assurance is made by Cambium that the facts, conditions, information, circumstances or any underlying assumptions made by Cambium in connection with the work performed will not change after the work is completed and a report is

submitted. If any such changes occur or additional information is obtained, Cambium should be advised and requested to consider if the changes or additional information affect its findings or results.

When preparing reports, Cambium considers applicable legislation, regulations, governmental guidelines and policies to the extent they are within its knowledge, but Cambium is not qualified to advise with respect to legal matters. The presentation of information regarding applicable legislation, regulations, governmental guidelines and policies is for information only and is not intended to and should not be interpreted as constituting a legal opinion concerning the work completed or conditions outlined in a report. All legal matters should be reviewed and considered by an appropriately qualified legal practitioner.

Site Assessments

A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

Only conditions at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.



Reliance

Cambium's services, work and reports may be relied on by the client and its corporate directors and officers, employees, and professional advisors. Cambium is not responsible for the use of its work or reports by any other party, or for the reliance on, or for any decision which is made by any party using the services or work performed by or a report prepared by Cambium without Cambium's express written consent. Any party that relies on services or work performed by Cambium or a report prepared by Cambium without Cambium's express written consent, does so at its own risk. No report of Cambium may be disclosed or referred to in any public document without Cambium's express prior written consent. Cambium specifically disclaims any liability or responsibility to any such party for any loss, damage, expense, fine, penalty or other such thing which may arise or result from the use of any information, recommendation or other matter arising from the services, work or reports provided by Cambium.

Limitation of Liability

Potential liability to the client arising out of the report is limited to the amount of Cambium's professional liability insurance coverage. Cambium shall only be liable for direct damages to the extent caused by Cambium's negligence and/or breach of contract. Cambium shall not be liable for consequential damages.

Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.



Appendix A

Resource Recovery Regulation Details



Summary of Regulations under the Resource Recovery and Circular Economy Act

Hazardous and Special Products (HSP)

Ontario Regulation (O. Reg.) 449/21 (Government of Ontario, 2021a) was instated to make producers of HSP responsible for collecting, managing, and/or promoting the recycling or proper disposal of these products. An HSP includes paints, pesticides, solvents, oil filters, oil containers, antifreeze, pressurized containers, mercury-containing devices, and fertilizers.

This regulation came into force on July 1, 2021; however, producer obligations under the regulation take effect on October 1, 2021. This regulation is designed to seamlessly transition with the Municipal Hazardous or Special Waste (MHSW) program which is scheduled to end on September 30, 2021.

The transition to the new HSP regulation is to make producers environmentally accountable and financially responsible for collecting and managing HSP at end-of-life (Ontario's Regulatory Registry, 2021). The switch from the MHSW Program will transition costs away from municipalities and municipal taxpayers. The HSP regulation will require producers to:

- establish free collection networks for consumers
- manage all collected materials properly, including meeting procedures for recycling, where possible, or disposal
- provide promotion and education materials to increase awareness
- register, report, provide audited/verified sales data, keep records, and meet other requirements
- transparently reflect any related charges that are intended to be passed on to consumers

Blue Box

O. Reg. 391/21 (Government of Ontario, 2021b) was instated to make producers fully accountable and financially responsible for their products and packaging once they reach their end of life and are disposed. The regulation sets mandatory and enforceable requirements for



Blue Box collection systems and gives producers choices for resource recovery options. Blue Box materials include glass, flexible or rigid plastic, metal, paper, or a combination of these materials. There is a separate category for beverage containers within the O. Reg. 391/21. There are three types of blue box materials: product packaging, paper products, or packaging-like products.

This regulation was finalized on June 3, 2021, and implementation of the program starts on July 1, 2023. Once municipalities and First Nations communities start transitioning their blue box programs to the new framework, blue box producers will become fully accountable and financially responsible for collecting and recycling their blue box materials when consumers discard them. Producers will also have to report certified compostable products and packaging, however, there are no collection or resource recovery requirements for these products.

Upon initiation of the program, producers are required to report annually to the Authority on their performance meeting their management requirements (RPRA, 2021).

Electrical and Electronic Equipment (EEE)

O. Reg. 522/20 (Government of Ontario, 2020a) was instated to make EEE producers environmentally accountable and financially responsible for collecting and managing their products at end-of-life. This regulation was passed on September 21, 2020 and is the transition from the previous Waste Electrical and Electronic Equipment program.

This regulation is being implemented to lower costs for the people of Ontario by allowing producers to find new and innovative ways to reduce costs, manage their products and packaging more efficiently, and reduce the amount of waste sent to landfills. Producers of EEE are required to:

- establish free collection networks for consumers
- achieve management requirements through reduction, reuse, and/or recycling activities
- provide promotion and education materials to increase consumer awareness
- register, report, keep records, and undertake audits related to management activities



To facilitate an efficient delivery model and allow for economies of scale, producers would have the flexibility to meet their obligations individually, or collaboratively with other producers, by retaining service providers (Ontario's Regulatory Registry, 2019).

Batteries

O. Reg. 30/20 (Government of Ontario, 2020b) was instated to make battery producers environmentally accountable and financially responsible for collecting and managing their products at end-of-life. This regulation was put in place to replace the MSHW program. O. Reg. 30/20 was implemented with O. Reg 522/20 on September 21, 2020 and has the same requirements on producers.

Tires

O. Reg. 225/18 (Government of Ontario, 2018) was instated to make tire producers environmentally accountable and financially responsible for collecting and managing their products at end-of-life. The tire program transitioned to IPR on January 1, 2019. Tire producers that are required to collect 10,000 kg or more of product in a calendar year must satisfy the following requirements:

- in local municipalities with one or more retail locations that supplied the producer's tires or vehicles with their tires were provided to consumers in the previous calendar year, the producer shall establish and operate as many tire collection sites in the subsequent calendar year as are equal to or greater than 75 per cent of the number of retail locations in the municipality that were operating in the previous calendar year.
- in local municipalities with a population of 5,000 or more but without a retail location that supplies the producer's tires or vehicles with their tires are provided to consumers, the producer shall establish and operate at least one tire collection site.

Producers must also implement a promotion and education program by indicating the person responsible for imposing the charge and how the charge will be used to collect, reduce, reuse, and recover tires (RCO, 2018).



Appendix B

Waste Management Program Details



Garbage Service

Bags of garbage are required to have a bag tag unless they are brought in with a bin or bag of recycling. For each container of recycling residents can bring in an untagged bag of waste. Any additional bags of waste are required to have a bag tag; residents are issued 20 free bags tags per year and additional bags must be purchased at the Municipal Office for \$1/tag.

During the site visit to Glen Tay, it was noted that many customers visit the site and proceed directly to the appropriate disposal locations without being directed by the attendant. As there is no curbside collection, residents are familiar with the disposal requirements and generally follow the proper procedures (clear bag and recycling sorting) that are required. The ability of residents to proceed directly to disposal locations also eliminates unnecessary wait times. The Site layout does enable attendants to screen and charge for construction demolition and bulky items. However, the layout at the site does not enable staff to ensure that additional bags are properly tagged and that all persons entering the site have a Pass.

The Township has a clear garbage bag policy for all garbage brought to the site. The clear garbage bag policy was implemented in 2016 in order to maximize recycling efforts and minimize the disposal of recyclable and hazardous materials. There is a significant reduction in the amount of waste disposed at waste sites due to clear bags because Waste Site Attendants can identify materials like cans, plastics, used paint, newspaper, etc., and direct these materials to recycling. For privacy reasons, one small opaque bag is allowed within the clear garbage bag.

Transfer of garbage from the Transfer Stations (TS) is contracted out to Stanley Sanitation Ltd. (Stanley), who transfer one 30-yard waste compactor bin each from Stanleyville TS and Maberly TS to Glen Tay WDS on a weekly basis during summer hours and bi-weekly during winter hours. The compactor bins are emptied on the active face of the waste mound at Glen Tay WDS, as directed by the contractor retained (also Stanley) to complete the weekly cover duties. An additional 30-yard compactor bin at Glen Tay WDS is also added to the active face weekly; Glen Tay also has two additional 40-yard waste containers for overflow if needed.



Construction Demolition Materials and Bulky Items

To conserve the Townships landfill space, bulky items such as mattresses, couches, desks, large chairs, construction demolition waste and bulky plastics are kept separate, and hauled by a third party to an offsite facility (GFL Environmental Inc.'s Beckwith TS in Carleton Place) for processing and/or disposal (currently). This service is provided weekly from Glen Tay WDS (the only location in the Township that accepts these materials) or on an as needed basis by Stanley. These materials are then recycled if possible or landfilled by GFL.

Scrap Metals

Scrap metals are also kept separate and hauled offsite by Stanley to be processed in a separate facility. Stanley transfers scrap metals weekly from Glen Tay WDS, and monthly from Maberly TS and Stanleyville TS, to Cash for Trash Metal Recycling Centre in Stittsville, Ontario. 100% of the revenue from the scrap metals is rebated to the Township. It is assumed that all metal is recycled.

Blue Box Recycling

Stanley supplies recyclable containers to each WDS and TS for recyclables to be sorted at each site; residents are required to sort recycling into appropriate. Number of recyclable containers at each location is outlined below.

	Glen Tay WDS	Maberly TS	Stanleyville TS
Mixed metal recyclables	4	1	2
Fibre recyclables (OCC)	6	2	2
Plastic recyclables	4	2	2
Paper recyclables	4	1	2
Total	18	6	8

Recycling is collected from residents at WDS in the Township. Recycling is sorted into 5 streams. Styrofoam is not an accepted recyclable material and is disposed of in the garbage. Stanley is in charge of transporting full recyclable containers. For each location, OCC (fibre) and plastic recyclables are emptied twice weekly (Monday and Thursday); mixed metal cans and paper recyclables are transported weekly from Glen Tay WDS, and as needed from Maberly and Stanleyville TS (generally also weekly). Recyclables are transported back to



Stanley Sanitation for processing or directly to Emterra in Renfrew. Any recyclable materials of value are traded in for rebate with a 60/40 split, where 60% of the revenue goes to the Township, and 40% goes to Stanley.

Blue Box Recycling Streams	Accepted Materials
Clean Metal Food Cans	<ul style="list-style-type: none">• Aluminum food trays• Metal & aluminum cans• Canned meat, soft drink, energy drink, pet food, etc.• Aluminum food
Clean Plastic #1-7	<ul style="list-style-type: none">• Water/pop/juice bottles• Butter/margarine/yogurt tubs• Plastic egg cartons• Plastic bottles (shampoo, pill bottles, ketchup, etc.)
Clean Glass	<ul style="list-style-type: none">• Glass jars and bottles – metal lids removed• Porcelain• Pottery• Ceramics
Mixed Paper	<ul style="list-style-type: none">• Newspaper/flyers• Magazine/catalogues• Manila paper• Soft covered books, books with hardcover removed, phone books• Envelopes
Boxboard and Corrugated Cardboard (collapsed and bundled)	<ul style="list-style-type: none">• Boxboard boxes• Frozen juice containers – metal lids removed• Toilet paper rolls• Cardboard egg cartons• Corrugated cardboard• Brown paper, brown grocery bags

Batteries

Battery Waste is collected at all three locations, and additionally at the Municipal Office. Battery Waste includes AA, AAA, C, D and 9 volts, and batteries from items such as portable radios, flashlights, smoke alarms, pagers, cell phones, laptop computers, UPS systems, hearing aids, watches and back-up power systems. Auto batteries are not accepted. Battery Waste is hauled by Raw Materials Company Inc., and managed by producers through the



PRO Call2Recycle, who will recycle the batteries in an economical and environmentally sustainable manner.

Electrical and Electronic Equipment (EEE)

EEE waste is collected at Glen Tay WDS only. EEE waste includes amplifiers, audio and video players and recorders, cameras, cell phones, computers (desktop and laptop) and peripherals, copiers, fax machines, monitors, pagers and PDAs, printers, radios, receivers, scanners, speakers, telephones and answering machines, tuners, turntables, televisions and video projectors. Once collected, the Township is working with the EEE program (Section 1.4.3) to transfer products back to producers to recycle and/or reuse the EEE waste.

Hazardous Waste

The Township of Lanark Highlands provides Tay Valley Township residents access to the Hazardous Waste depot at the Middleville WDS. Hazardous Waste includes waste with danger, flammable, poison, toxic and/or corrosive symbols on the packaging. Residents must provide proof of residence with Tay Valley Township to be admitted. Middleville Hazardous Waste Depot is only open seasonally between Victoria Day Weekend and Thanksgiving Weekend. The Township shares a proportion of the costs associated with managing the hazardous waste depot with Lanark Highlands.

In addition to the Middleville Hazardous Waste Depot, Home Hardware's in the area accepts paint cans as long as the paint is still liquid, and cans are not rusted.

Green Waste

Brush, Leaf and Yard, and Kitchen Organics are three waste streams that are not currently designated for reuse under legislation. Provincial policy does consider future management options; however, these options do not apply to single-dwelling residential buildings in communities with a population under 20,000. Large industrial or commercial facilities regulated by O. Reg. 103/94 that generate at least 300 kg of food/organic waste a week will be required to have a 70% waste reduction and resource recovery of food and organic waste generated in the facility by 2025 (50% for large industrial and commercial facilities not regulated by O. Reg. 103/94 but do generate at least 300 kg of food/organic waste a week), and any education



institutes or hospitals that generate 150 kg of food/organic waste a week must also have a 70% waste reduction and resource recovery.

Brush

Brush is accepted at Glen Tay WDS only. Brush is chipped on a regular basis and used as alternative daily cover or composted and used as final cover on side slopes. During the site visit a significant stockpile of chipped brush was noted onsite.

As per the ECA for Glen Tay WDS, burning of clean brush is permitted under supervision and burning is subject to weather conditions in accordance with section 22 of O. Reg. 232/98. Under the current ECA it can also be used as an alternative daily cover.

Compostable Materials

While the Township encourages home composting, Glen Tay WDS, Stanleyville TS, and Maberly TS all accept compostable materials including Leaf and Yard waste and small quantities of Kitchen Organics. Compostable materials accepted are food waste, serviettes, paper towels, tissues, sawdust, shavings, wood chops, leaves, grass clippings (out of the bag), plants, and dryer lint. Meat, grease, and oil are not accepted at these sites. Compostable items are not accepted in regular garbage bags. The limited quantity of Kitchen Organics brought to the sites are mixed with Leaf and Yard waste and composted onsite.

Composted materials are used as cover at the landfill sites.

Re-Use Centre

There is a Re-Use centre at the Glen Tay WDS which is a volunteer run initiative. The Re-Use Centre accepts small items, in good shape, from Township residents. The items are sorted and put on display in the "store" where residents can take what they can use. The centre was instated to divert materials from the landfill and extend the life of articles in good condition. Materials that are accepted are: books, building materials, clothing, doors and windows, home furnishings, housewares, plumbing fixtures, tools and shop equipment, toys, and working small appliances. Materials under the "unacceptable waste" category include items that are moldy, stained, or broken and mattresses.

A textiles bin is also available at the WDSs to collect used clothing for reuse.



Appendix C

WARM Model Data

Version 15
GHG Emissions Waste Management Analysis for Township of Tay Valley (completed by Cambium Inc.)
Prepared by: C&D
Project Period for this Analysis: 01/01/20 to 12/31/20

a) For explanation of methodology, see the EPA Warm Documentation:
Documentation Chapters for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM)
 – available on the Internet at <https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-waste-reduction-model>
 b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.
 c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, users should not interpret the GHG emissions implications as occurring all in one year, but rather through time.

This is equivalent to...	
Removing annual emissions from	18 Passenger Vehicles
Conserving	9,351 Gallons of Gasoline
Conserving	3,462 Cylinders of Propane Used for Home Barbeques
0.00000% Annual CO ₂ emissions from the U.S. transportation sector	
0.00000% Annual CO ₂ emissions from the U.S. electricity sector	

Version 15

GHG Emissions Waste Management Analysis for Township of Tay Valley (completed by Cambium Inc)

GHG Emissions Waste Management

Prepared by: Glass Diversion

Project Period for this Analysis: 01/01/20 to 12/31/20

Note: If you wish to save these results, rename this file (e.g., WARM-MN1) and save it. Then the "Analysis inputs" sheet of the "WARM" file will be blank when you are ready to make another model run.

-823.86

[illegible]

Note: a negative value (i.e., a value in parentheses) indicates an emission reduction; a positive value indicates an emission increase.

- a) For explanation of methodology, see the EPA Warm Documentation: [Documentation Chapters for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model \(WARM\)](https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model) – available on the Internet at <https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model>
- b) Emission estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.
- c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, one should not interpret the GHG emissions implications as occurring all in one year, but rather through time.

-835.72

[illegible]

Total Change in GHG Emissions (MTCO₂E): (11.85)

This is equivalent to...

Removing annual emissions from

3 Passenger Vehicles

Conserving	1,334 Gallons of Gasoline
------------	---------------------------

Conserving 494 Cylinders of Propane Used for Home Barbeques

0.00000% Annual CO₂ emissions from the U.S. transportation sector

0.00000% Annual CO₂ emissions from the U.S. electricity sector

Version 15
GHG Emissions Waste Management Analysis for Township of Tay Valley (completed by Cambium Inc.)
Prepared by: Central Compost!
Project Period for this Analysis: 01/01/20 to 12/31/2f

a) For explanation of methodology, see the EPA Warm Documentation: [Documentation Chapters for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model \(WARM\)](http://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model)
– available on the Internet at <http://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model>

b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.

c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, one should not interpret the GHG emissions implications as occurring all in one year, but rather through time.

This is equivalent to...	
Removing annual emissions from	17 Passenger Vehicles
Conserving	8,896 Gallons of Gasoline
Conserving	3,294 Cylinders of Propane Used for Home Barbeques
0.00000% Annual CO ₂ emissions from the U.S. transportation sector	
0.00000% Annual CO ₂ emissions from the U.S. electricity sector	

Note: If you wish to save these results, rename this file (e.g., WARM-MN1) and save it. Then the "Analysis inputs" sheet of the "WARM" file will be blank when you are ready to make another model run.

[illegible]

- a) For explanation of methodology, see the EPA Warm Documentation: [Documentation Chapters for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model \(WARM\)](http://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model)
-- available on the Internet at <http://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-and-energy-factors-used-in-the-waste-reduction-model>
- b) Emissions estimates provided by this model are intended to support voluntary GHG measurement and reporting initiatives.
- c) The GHG emissions results estimated in WARM indicate the full life-cycle benefits waste management alternatives. Due to the timing of the GHG emissions from the waste management pathways, (e.g., avoided landfilling and increased recycling), the actual GHG implications may accrue over the long-term. Therefore, we should not interpret the GHG emissions implications as occurring all in one year, but rather through time.

[illegible]

This is equivalent to...	
Removing annual emissions from	9 Passenger Vehicles
Conserving	4,903 Gallons of Gasoline
Conserving	1,815 Cylinders of Propane Used for Home Barbeques
0.00000% Annual CO₂ emissions from the U.S. transportation sector	
0.00000% Annual CO₂ emissions from the U.S. electricity sector	



Appendix D

Landfill Cost Model



Landfill Capacity Costing Model
Continuous Improvement Fund

Municipality: Tay Valley Township

Site Name: Glen Tay Landfill

Date Completed: 22-Nov-21

Completed By: Heather Dzurko, Cambium

Total Estimated Landfill Life from Opening to Closure:

40

years

Estimated Life from November 18, 2021

Interest rate

3%

annual rate

A) STARTUP COSTS (excl HST)

		<u>Total Lump</u> <u>Sum</u>	<u>Site Life</u>	<u>Annualized Cost</u>	<u>Data Source/Explanatory Notes</u>
1)	Land	\$ -	40 yr.	\$ -	
2)	Public Consultation	\$ -	40 yr.	\$ -	
3)	Approvals and Fees	\$ -	40 yr.	\$ -	
4)	Consulting/Engineering	\$ 22,500	40 yr.	\$ 945	from council report - FBAL for Glen Tay
5)	Site Preparation/Construction	\$ -	40 yr.	\$ -	
6)	Other	\$ -	40 yr.	\$ -	
7)	Other	\$ -	40 yr.	\$ -	

Subtotal A) Annualized Startup Costs

\$ 945 per year

B) ANNUAL OPERATING COSTS (excl HST)

		<u>Typical Annual Costs</u>	<u>Data Source/Explanatory Notes</u>
1)	Staffing	\$ 157,000	
2)	Environmental Services (Monitoring & Analysis)	\$ 30,000	includes MOECC reporting
3)	Annual Reporting to MOECC		
4)	Equipment (rental or annualized cost)	\$ 54,000	cover contract (includes fuel)
5)	Equipment Fuel	\$ -	
6)	Building, Grounds, and Equipment Maintenance (Repair)	\$ 1,000	
7)	Utilities (electricity/propane/water)	\$ 4,000	toilettes and hydro
8)	Sanitary Facilities	\$ -	



9)	Safety Related Expenses	\$	1,700	
10)	Printing and General Supplies	\$	500	
11)	Purchase/Placement of Soil Cover	\$	-	
12)	Gravel/Road Building			
13)	Waste Bins/Movements	\$	25,000	other contracted services
14)	Signage/Fencing	\$	500	
15)	Animal/Bird Control	\$	-	
16)	Leases/Property Taxes			
17)	Royalties Paid	\$	-	
18)	Small Tools/Equipment	\$	500	
19)	Other	\$	1,270	cell phones
20)	Other			

Subtotal B) Annual Operating Costs \$ 275,470 per year

C) CAPITAL COSTS (excl HST)

	<u>Total Lump Sum</u>	<u>Site Life</u>	<u>Annualized Cost</u>	<u>Data Source/Explanatory Notes</u>
1) Construction Projects Not Covered Under B) (Total Site Lifetime Estimate)	\$ -	40	\$ -	
2) Other (Total Site Lifetime Estimate)		40		
3) Cell Capping and Closure	\$ 250,000	40	\$ 16,314	

Subtotal C) Annualized Capital Costs \$ 16,314 per year

D) POST CLOSURE COSTS (excl HST) O. Reg. 232/98, s. 18

(Note: Assumes post closure period equals Site Life)

	<u>Annual Costs</u>	<u>Closure period</u>	<u>Annualized Cost</u>	<u>Data Source/Explanatory Notes</u>
1) Monitoring and Reporting	\$ 9,000	25	\$ 2,590	
2) Final Capping and Closure	\$ 2,000	25	\$ 384	
2) Maintenance	\$ 1,500	25	\$ 673	



3)	Other (contingency costs)	\$	2,000	25	\$	897	
Subtotal D) Annualized Post Closure Costs					\$	4,543	per year
E)	ADMINISTRATIVE SUPPORT	5% of total of A+B+C+D			\$	14,864	
TOTAL ESTIMATED ANNUALIZED COST (A+B+C+D+E+F)					\$	312,137	
Prior 5 year Average Total Waste Tonnage Received			1,000	tonnes			
Prior 5 year Average Blue Box Tonnage Received			270	tonnes			
calculated % Blue Box of Total			27.0%				
Prior 5 year Average Volume Consumed - Total Waste			2,000	cubic metres			
Prior 5 year Average Volume Consumed - Blue Box			1,629	cubic metres			
calculated % Blue Box of Total			81.4%				
ESTIMATED ANNUAL COST PER CUBIC METRE					\$	156	per cubic metre
BLUE BOX - ESTIMATED ANNUAL ALLOCATION					\$	254,179	total cost
BLUE BOX - ESTIMATED ANNUAL COST PER TONNE					\$	941	per tonne
Garbage - ESTIMATED ANNUAL ALLOCATION					\$	312,137	total cost
Garbage - ESTIMATED ANNUAL ALLOCATION					\$	312	per tonne



Appendix E

Public Survey Analysis



Population per household and amount of waste generated per household

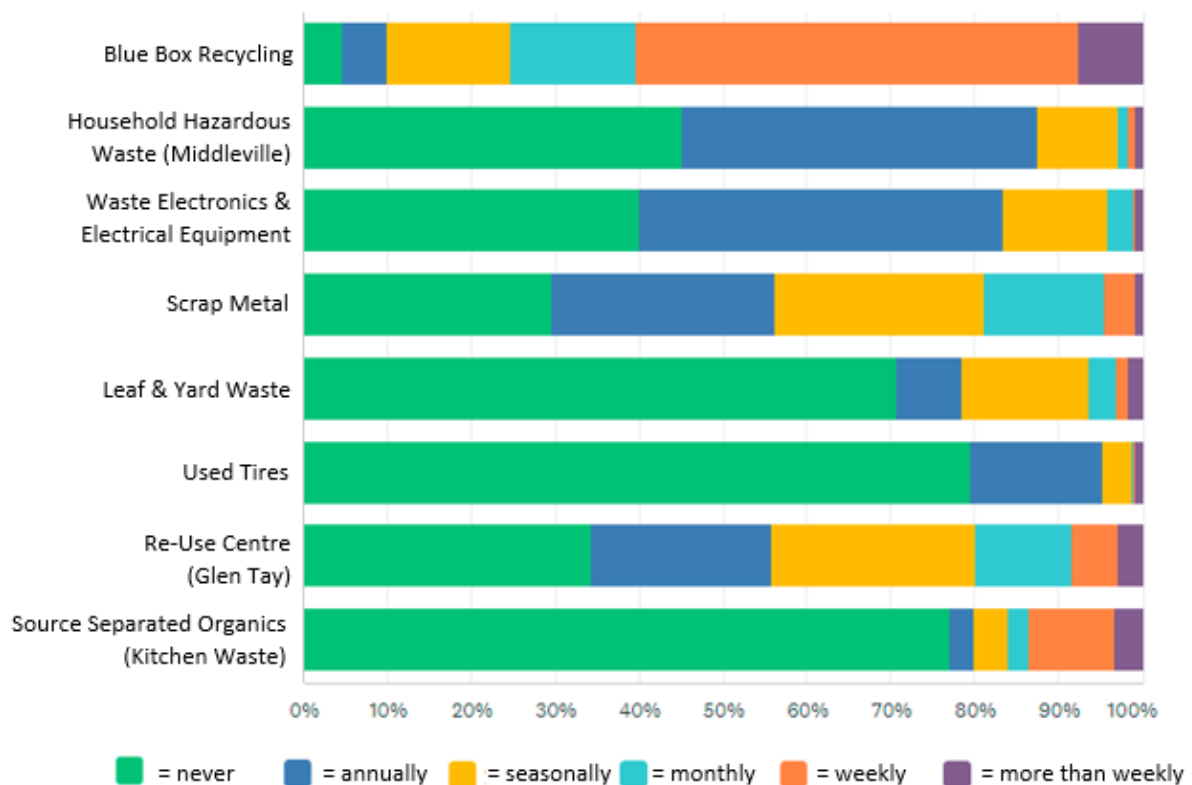
As would be expected, there is a strong correlation between the amount of people living within a household and the amount of recycling and waste that household generates per week. For households that only have one resident, 95% of the respondents said that they generate less than one to one bin of recycling per week, and 98% said that they generate less than one to one bag of garbage per week. Households with two residents (most common demographic) answered that 65% generate less than one to one bin of recycling per week and 90% generate less than one to one bag of garbage per week. Households with five or more residents responded that 71% of the households generated 2 or more bins of recycling and 57% generated one to two bags of garbage per week.

Curbside Pickup Services

82 of the 440 respondents (19%) were in favor of implementing curbside pickup services. Within this group, only 53 of those respondents were in favor of curbside pickup if it only included weekly garbage pickup and not recycling pickup as well. Of the 82 respondents, only 40 (49%) of them were willing to see an increase in taxes to facilitate curbside pickup services.

Waste Diversion Program Usage

As is shown in the figure below, the amount each service is used at the WDSs is variable. The most commonly used service is the blue box service which 53% of households use weekly, and 15% use monthly. HHW is not commonly used, with 45% of respondents saying they never use the service and 42% saying they use it once a year. E-waste is another stream not commonly used, with 40% never using it and 43% using it annually. 30% of respondents never use the scrap metal services, 27% use it annually, and 25% use it seasonally. Leaf and yard waste are not used by 71% of the respondents (more on leaf and yard waste below), but 15% of respondents use it seasonally. Used tire services are not used by 80% of the households, 16% of respondents use it seasonally. The Re-Use Centre at Glen Tay is used seasonally by 24% of respondents, annually by 21%, and never by 34%. Finally, kitchen organics is not used by 77% of the respondents, but 10% of the respondents did use this service and they used it weekly.



Days and Hours of Operation

When asked if the hours of operation were sufficient for each respondent, the general answer was yes. It was found that 86% of respondents found the hours sufficient at Glen Tay WDS, 88% found them sufficient at Stanleyville TS, and 90% found them sufficient at Maberly TS.

More detail was obtained about the hours of operation and when each Site is used the most frequently. For all three sites, Saturday is the most common day that people use most frequently. This is followed by Wednesday and Sunday for each Site. For all of the Sites, the least used day is Monday. For all of the Sites, the 8 a.m. to 12 p.m. timeslot was the most commonly used, followed by the 12 p.m. to 4 p.m. The least used timeslot for all of the sites was the Sunday 4 to 6 p.m. timeslot.

Backyard Composting Participation

213 of the respondents (49%) confirmed that yes, they do backyard compost all year round. 73 additional respondents said that they backyard compost at least seasonally throughout the year. Of those who do backyard compost, approximately 15% only composted food and waste



scraps, approximately 25% of people compost only leaf and yard waste (51% of the seasonal respondents chose this option) – the remaining 60% of the respondents said that they backyard composted both food and waste scraps and leaf and yard waste. Of the people who compost leaf and yard waste, approximately 25% mulch the leaves on their yard, and about 65% will rake leaves into a pile and compost on the property. Only approximately 5% of respondents brought their leaf and yard waste to a WDS.

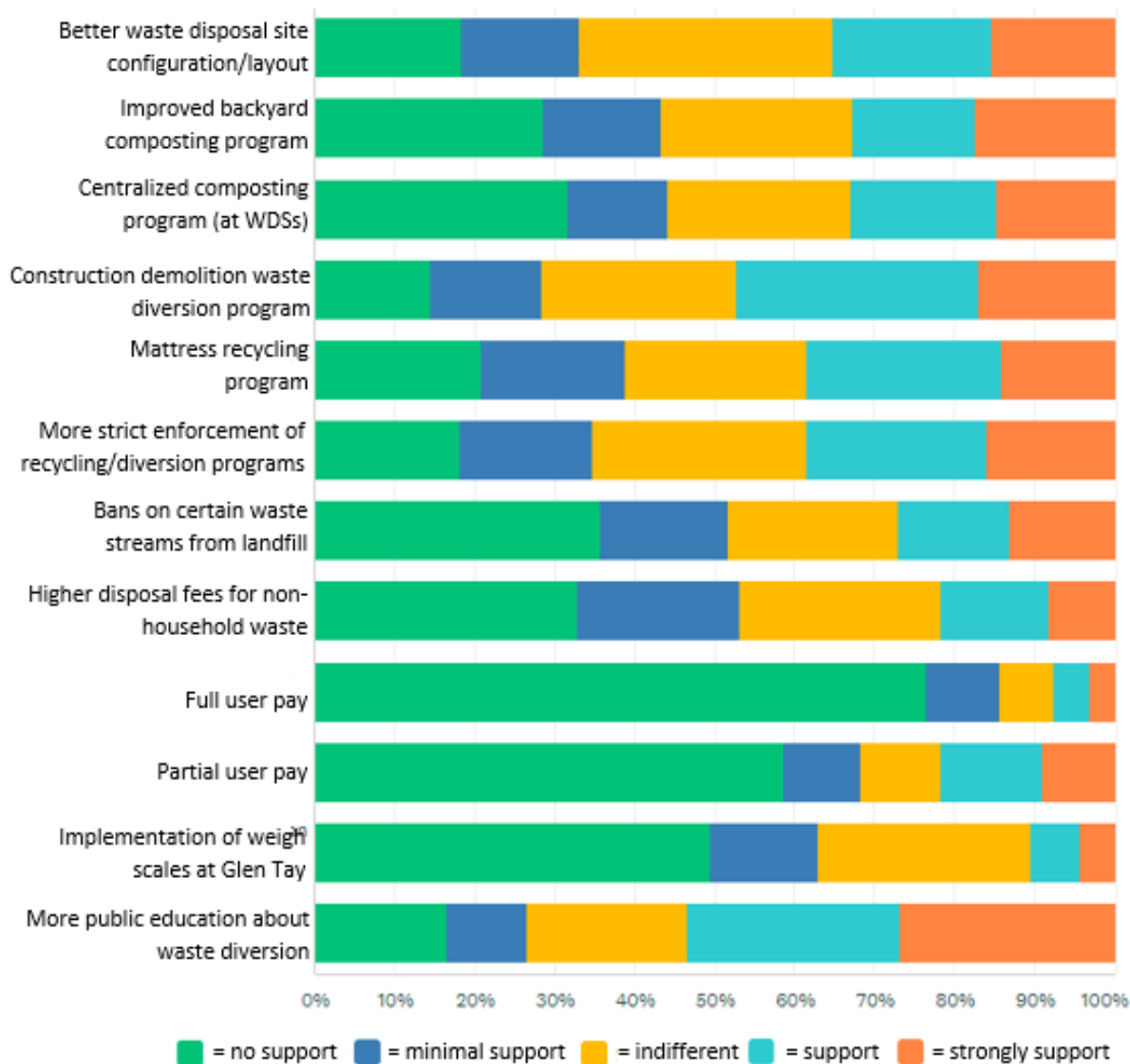
Potential Program Changes Support

Four potential program changes that the majority of residents responded favorably (or indifferently) to was increased public education about waste diversion at 55% of respondents showing support, a construction demolition waste diversion program with 47% of respondents showing support and 25% voting indifference, a mattress recycling program with 38% of respondents showing support and 23% voting indifference, and more strict enforcement of recycling/diversion programs with 38% of respondents showing support and 27% voting indifference.

Approximately 40% of respondents who identified that Glen Tay WDS was their most frequently visited Site identified that they would be indifferent to or in support of a better waste site configuration/layout. Approximately 35% of respondents were indifferent to or in support of a better waste site configuration at Stanleyville TS. There was little support for any reconfiguration at Maberly TS.

Of the respondents who identified that their most frequently visited Site was Glen Tay WDS, only approximately 8% supported a weigh scale at Glen Tay WDS. Additionally, 29% of these respondents identified being indifferent on the implementation of a weigh scale at Glen Tay WDS.

All of the responses regarding potential program changes are outlined in the figure below:



Seasonal Residents

The Township WDSs service a large number of seasonal residents – 39% of the respondents to the public survey are seasonal residents who also use the WDSs. The largest amount of the seasonal population (50%) use the Stanleyville WDS and in general, seasonal residents usually live 5-10 km away, with 80% of this demographic living within 10km of a WDS. Most seasonal resident answers were comparable to the permanent residents; the only small difference was that less seasonal residents participated in backyard composting.



Additional Changes and Services Comments

A common comment that was received in the additional changes and services textbox was that the Site's access roads are commonly in poor shape and are very muddy with lots of potholes after each rain. It was suggested for each Site that they are regraded, and additional gravel is added to fix this issue.

Another common comment was regarding the HHW facility and the lack of convenience to have to travel to Middleville WDS in Lanark Highlands. It was suggested several times that drop-off programs be instated at a minimum on one of the WDSs biannually or seasonally, and the HHW collected during these campaigns than be transported to Middleville WDS by the Township.

A final comment that was received commonly was to increase recycling options to include: Styrofoam, plastic bags, Tetra Packs, glass, and plastic foam.



Appendix F

Waste Management Master Plan Supplementary Document



Included in the development of the Plan were several supplementary materials to further define the recommendations and implementation plans. These items included:

1. Two sample public education pieces for a mattress recycling program and a glass recycling program. These can be used as templates and updated when the programs are ready to be implemented.
2. Two standard operating procedures (SOP), one for load assessments and estimating loads and one for record keeping practices. These SOPs can be used as templates for future procedures as well to outline standard requirements and ensure consistent approach to these operational requirements.
3. Record keeping forms for tracking waste material types and quantities
4. Training templates that can be used to educate staff on landfill and transfer station operations, legislative requirements and waste management programs. The training sessions include information such as:

– General Information:

1. Applicable Legislation:
 - a. Environmental Protection Act and Ontario Regulation 347
 - b. Resource Recovery and Circular Economy Act
 - c. Environmental Compliance Approval
2. Environmental Factors
 - a. Leachate
 - b. Landfill gas
 - c. Odour, pests, and litter
3. Landfill Operations
 - a. Health and safety
 - b. Site inspections and maintenance
 - c. Landfill grading, compacting, and covering



Township Specific Information:

1. Township attendant duties and bylaws
2. Load assessments - WDSs and waste streams
3. Record Keeping
4. Emergency Procedures
5. Waste Management Master Plan