December 2022 / Rev February 2023

Volume 3

Environmental Assessment of the Township of North Dundas Waste Management Plan

GOLDER
MEMBER OF WSP

TOWNSHIP OF
North Dundas

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Volume 3 – Supporting Documents

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New Landfill Site Selection Assessment

Final Report
Dec 2022 / Rev Feb 2023

GOLDER
MEMBER OF WSP

TOWNSHIP OF
North Dundas

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MEMBER OF WSP

TECHNICAL MEMORANDUM

DATE June 2020 **Project No.** 1648253

TO Township of North Dundas

ALTERNATIVE 3 – NEW LANDFILL SITE SELECTION ASSESSMENT; APPLICATION OF EXCLUSIONARY CRITERIA AND MAPPING TO IDENTIFY POTENTIAL SITES TOWNSHIP OF NORTH DUNDAS WASTE MANAGEMENT PLAN – 'ALTERNATIVES TO' EVALUATION

This memorandum provides the rationale for the development and application of exclusionary criteria for identification of a potential new landfill site to serve the future needs of the Township, which is Alternative 3 of the 'Alternatives To' the undertaking, as part of the Waste Management Environmental Assessment for the Township of North Dundas. Alternative 3 involves the closure of the Boyne Road Landfill and the establishment of a new landfill facility (a greenfield site) to serve the long term residual waste disposal needs of the Township at a new location to be determined within the geographic boundaries of the Township.

Introduction

As described in Section 4.2 of the approved Proposed Terms of Reference (ToR): "a set of general exclusionary criteria that are typically used for landfill siting will be decided for the purpose of screening out areas of the Township that are not suitable and could not be considered for a new landfill site. Published mapping sources and information from the Township's Official Plan will provide the information used in this screening exercise. Areas surviving this screening will represent potential locations for siting a new landfill. A preliminary total land area required for development of a landfill having a new airspace of 400,000 m^3 and following the requirements of O.Reg. 232/98 will be determined, and the size of the potential locations assessed to determine whether they are large enough. If there are no potential areas large enough remaining, Alternative 3 will be eliminated from the comparative evaluation".

The exclusionary criteria selected for this mapping exercise are also in line with the elements of the environment for which potential effects will be identified and described in this Environmental Assessment process. The exclusionary criteria use for the screening process consist of the following:

- Agriculture
- Atmosphere/Transportation
- Biology
- Geology and Hydrogeology

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- Socio-economic
- Land Use
- Surface Water

Agriculture

The siting of a landfill to serve the Township should avoid disrupting or adversely affecting high quality farmland, or the resources accrued by farm operations. The Township possesses an abundance of high quality or intensely used farmland and, as such, much of its land area is rural and used for agricultural purposes; siting a landfill in these farmland areas would lead to the permanent loss of usable farmland. In addition to the loss of resources for the Township, Ontario also faces a diminishing agricultural land base. With a continued loss of farmland provincially, the loss of high-quality farmland and highly productive farmland places additional strain on the depleting resources. A new landfill should be sited to minimize the loss of this high quality, intensely used, or specialized farmland.

Land use for the Township is designated in the United Counties of Stormont, Dundas and Glengarry (SDG) Official Plan (i.e. the Official Plan). Per the Official Plan, Agricultural Resource Lands are designated in their schedule for agricultural land uses. These designated lands will be excluded for landfill siting consideration. Some land in the Township (not designated as Agricultural Resource Lands) operate specialized farming operations or house livestock/poultry operations. An appropriate buffer area should be established to distance any landfill siting from these significant farming operations to ensure that these resources are not adversely impacted by future landfilling operations.

Atmosphere/Transportation

The development and operation of a landfill may result in air quality effects such as dust, odours and landfill gas in addition to operational noise. An alteration to the local ambient air quality and noise may disturb individuals who reside or work near the potential landfill site. However, a distinctly remote landfill within the Township would lead to increased transportation-related fuel consumption and exhaust emissions if located away from the main residential centres where there are the highest concentrations of population. The site selection process should consider these factors of proximity to the residential centres.

Biology

Both the development and operations of a landfill may have adverse effects on biological features of the Township (e.g. terrestrial, aquatic plant and animal species). Specific avoidance and an appropriate buffer should be allowed for specific and/or sensitive biologic features.

Within the Township are a number of environmentally significant areas identified by both the Ministry of Natural Resources and Forestry (MNRF) and South Nation Conservation (SNC), including Areas of Natural and Scientific Interest (ANSI), Provincially Significant Wetlands (PSW), Locally Significant Wetlands (LSW), and other designated conservation areas. The largest area of this category within the Township is the Mountain Provincial Wildlife Area (including the Winchester Swamp), which is both a designated PSW and ANSI. Such areas are

designated for environmental or heritage protection and are not suitable for landfill siting. Landfills should not be considered at these locations and an appropriate buffer should be provided if siting on neighbouring land to these designated features.

Geology and Hydrogeology

The current landfill servicing the Township (the Boyne Road Landfill) is a natural attenuation landfill. As described in the previously completed waste Management Alternatives Evaluation (Golder, 2015) and in Section 4.1 of the approved ToR, it is reasonable to continue to assume that the type of new landfill design would also be a natural attenuation landfill for the same reasons (affordable, feasible, technical) as the approach to and operation of the current landfill. Natural attenuation sites are those that permit the leachate to infiltrate the subsurface environment in the vicinity of the landfill and to migrate in the natural direction of subsurface flow. During this process, natural chemical and physical processes take place that attenuate or otherwise reduce the contaminants, thereby reducing their concentration in the groundwater. Considering a natural attenuation design, the selection of preferred geologic and hydrogeologic settings to mitigate the off-Site effects of leachate contaminated groundwater is of key importance. Priority of site selection should be given to areas underlain by thicker geologic materials suitable for naturally attenuating landfill leachate. Property allocated for the landfill site must also be sufficiently large to accommodate the landfill area itself and enough surrounding area for buffering and attenuation purposes to meet the Ontario Ministry of the Environment, Conservation and Parks (MECP) Reasonable Use Concept, Guideline B-7.

Published geological maps indicate that overburden in the Township consists of some areas of organic deposits comprised primarily of peat. In general, the Township is underlain by offshore marine deposits comprised of clay, silty clay, and silt; from surface or underlain by silty sand and sandy silt till (Geological Survey of Canada, 1982). In the eastern part of the Township, an elongated northeast to southwest trending ridge consisting of glacial outwash sand and gravel is present; this is locally known as the Morewood Esker, and more regionally as the Vars-Winchester esker. There is also a northeast-southwest trending area of granular soils in the western part of the Township (Hallville area) known as Hyndmans Ridge. There are several licenced aggregate operations that extract sand and gravel from these ridge features. The thickness of overburden soil overlying the bedrock is shown to generally range from about 5 to 10 metres, with some areas of both thicker and much thinner soil cover. Published geological maps indicate that bedrock in the area generally consists of limestone of the Gull River Formation (MNRF, 1985). Natural variations in geology and thickness are expected among specific parcels of land within the Township and further geological investigation would be required for a higher level of site selection/exclusion. In the absence of more detailed information that differentiates among geological sequences and overburden thickness, site selection preference should be given to larger properties of land to have a greater potential for a landfill to be able to meet MECP Guideline B-7.

Areas within the Township (such as wetlands) are known to contain deposits or organic soils. These soils do not have sufficient strength to support a structure or large embankment load (including a landfill). Additional areas in the Township (particularly in proximity to watercourses)

are known to have unstable slopes and are similarly unsuitable for any development. Site selection should be directed away from these areas and include an appropriate setback to consider both slope stability and potential leachate effects on surface water quality.

The migration and direction of potentially contaminated groundwater on a landfill property should be reasonably estimated as part of site selection. Areas of complex hydrogeological environments should be avoided if there is a low degree of confidence in predicting groundwater/leachate migration pathways. Areas where there is potential recharge into local aquifers should also be excluded from consideration for site selection. Within the Township, municipal drinking water for the village of Winchester is blended from four distinct communal water supply wells (three bedrock wells and one overburden well). The village of Chesterville is comprised of one production well and one standby well completed in overburden. Areas for the protection of these wellheads have been designated by the SNC as areas of groundwater vulnerability; portions of these areas, depending on time of travel and vulnerability rating, are to be avoided for site selection.

Surface Water

Landfill siting should consider the presence, quantity and quality of surface water at and in the vicinity of the proposed site location. A large quantity of surface water can pose operational and safety concerns for the development and operation of a landfill site. Potential effects on surface water quality can pose an additional environmental concern should the leachate contaminants escaping the landfill site not be adequately attenuated prior to reaching the receiving waterbody. The presence of surface water and drainage watershed relative to adjacent lands should be additionally considered.

SNC designates areas in the Township along the South Nation River and East Castor River as part of the regulatory floodplain. The susceptibility of this land to flooding makes these areas unsuitable for landfill siting and they should be excluded from consideration.

Socio-economic

Landfill developments may result in the displacement or disruption of residents, businesses, or community and recreation features either on-site, off-site or along haul roads. Some settings may be more prone to disruption than others regarding landfill site placement. Disruption of these settings can have an impact on the social, economic and environmental well-being of the Township and can adversely affect the growth and development of the Township in the long-term. Siting should preferentially avoid displacing residences, active businesses, and recreation features (such as parks, recreation facilities, hiking trails, golf courses, etc.). Additional economic implications arise from siting a landfill away from its main service areas (i.e., the residential core areas), leading to increased hauling and operating costs.

Land Use

The Township of North Dundas has a pre-established, policy-driven framework for permitted and prohibited land uses within the Township as set out in the United Countries of Stormont, Dundas and Glengarry (SDG) Official Plan. The plan was prepared and reviewed to be consistent with the 2014 Provincial Policy Statement and was officially adopted in 2017

(before the release of the 2020 Provincial Policy Statement). With regard to some of the site selection criteria previously discussed and additional considerations regarding social, economic and environmental growth, the Official Plan's Land Use schedule and Constraints Plan governs which lands are to be permitted for the development of a new waste management site. Per the Official Plan, only lands located in the rural district shall permit the land to be used for a waste management site. Further constraints in the plan prohibit the development of a waste management site on, or within a suitable buffer, to natural heritage features (such as significant wetlands and woodlands), resource lands (including extractive resource lands and agricultural resource lands) or within environmental protection lands (such as the regulatory floodplain).

Per the Official Plan, the MECP Guideline D-4 "Land Use on or Near Landfills and Dumps" shall be used as a guide when assessing land use near any open or closed landfill. Accordingly, the area of influence of a landfill will assume a 500 m radius of impact from the fill area perimeter and impose a holding zone on future development within this area of influence.

Screening Methodology using General Exclusionary Criteria

The general exclusionary criteria presented above were applied to the Township of North Dundas in a mapping exercise (presented as the attached Figure 1 to this memorandum). Information taken from published mapping sources and constraints from the SDG Official Plan provide the basis of the mapping exercise. The SDG Official Plan was approved by the Ministry of Municipal Affairs and Housing in February 2018. The Ministry's changes included a number of land designation and policy changes, some of which are currently under appeal by the County, local municipalities and residents. Land Use Schedules incorporating the Ministry's changes were used as part of this site selection assessment.

Some criteria (areas of groundwater vulnerability, locations of farms [regular and specialized], and recreation facilities) are not presented on Figure 1 for clarity of presentation and because the criteria did not overlap the Rural District and had no impact on the quantitative assessment of site selection.

The screening assessment of potential landfill siting will adhere to the following quantitative requirements:

- For purposes of this assessment, the new landfill is assumed to require a minimum site size of 80 ha assumed necessary to accommodate the disposal area footprint for approximately 400,000 m^3 of residual waste management and necessary lands for buffer and contaminant attenuation. This is a somewhat smaller land area than currently comprises the existing Boyne Road Landfill Site where parcels of land have been added onto the site ECA to achieve groundwater compliance with the Reasonable Use Guideline B-7. It is expected that a new natural attenuation landfill in a suitable hydrogeological centre could be designed to achieve this compliance with a somewhat smaller total site area.
- The new landfill must be sited in the Rural District as per the Township's Land Use Schedule.

- The selected site should not be sited within areas denoted on the Constraints Plan as listed in the Township's Official Plan. These areas are comprised of:
  - Extractive Resource Lands (Bedrock Overlay)
  - Significant Woodlands
  - Areas of Natural and Scientific Interest (ANSI)
  - Significant Wetlands (PSW or LSW)
  - Regulatory Floodlines
  - Crown Lands
  - Organic Soils
  - Unstable Slopes
- The selected site (and its area of influence) should not be directly adjacent to extractive resource lands. The following buffers should be maintained as dictated by the Official Plan:
  - A buffer of 300 m should be maintained from Pit and Sand Gravel Reserve
  - A buffer of 500 m should be maintained from Bedrock Reserve
- The selected site (and its area of influence) should not be directly adjacent to Natural Heritage Features and Areas. The following buffers should be maintained as dictated by the Official Plan:
  - A buffer of 120 m should be maintained from the boundary or limit of provincially significant wetlands and locally significant wetlands
  - A buffer of 120 m should be maintained from the boundary or limit of significant woodlands
  - A buffer of 120 m should be maintained from the boundary or limit of significant wildlife habitat
  - A buffer of 120 m should be maintained from the boundary or limit of significant areas of natural and scientific interest

Following this quantitative screening assessment, the remaining land areas for potential landfill siting will be scrutinized based on a general qualitative screening assessment regarding the previously established criteria (such as presence of recreational features, proximity to farmland/businesses, proximity to the residential core, and indicated geological/hydrogeological characteristics).

Site Selection Assessment Results

Six main sectors of the Township are designated as part of the Rural District and, as such, are potentially eligible for consideration for the siting of a new landfill (see Figure 1). The first sector is in the east of the Township, south of the hamlet of Morewood. The second just east of the village of Winchester, surrounding the existing Boyne Rd Landfill Site. The third is to the north of the village of Winchester, east of the Winchester Swamp. The fourth is to the west of the village of Winchester, bordering Levere Rd and the Canadian Pacific Railway. The fifth is along the western boundary of the Township, west of the Winchester Swamp. The sixth is near the southwest boundary of the Township, just north of the South Nation River.

The first, third, and fourth sectors are immediately undesirable for use as per the quantitative assessment. The first sector is entirely contained within the bedrock reserve and is in close proximity to both significant woodlands and the Morewood bog (a LSW). The third sector is problematic due to issues of proximity to the Winchester Swamp (an ANSI and PSW), to water courses that connect to the Winchester Swamp, to a nearby bedrock reserve, and to the nearby hamlet of Harmony; the remaining unencumbered portion of the third sector is largely occupied by a pre-established golf course. The fourth sector does not meet the minimum size requirement of 80 ha and the narrow size of the parcel of land would likely not enable a landfill to meet Guideline B-7.

Table 1 below presents a qualitative comparison of the remaining sectors.

Table 1: Qualitative Assessment of Site Selection

Location of Rural District	Assessment
Second (just east of the village of Winchester, surrounding the existing Boyne Road Landfill site)	Disadvantages ▪ Located within extractive resource land (bedrock reserve) ▪ Contains some significant woodlands ▪ Organic soils present in a portion of the area Advantages ▪ Located relatively near, but not adjacent, to the residential core Comment ▪ Contains existing landfill site (Boyne Road Landfill)

Location of Rural District	Assessment
Fifth (along the western boundary of the Township, west of the Winchester Swamp)	Disadvantages ▪ Is mostly covered by or is in close proximity to Winchester Swamp (ANSI and PSW), South Gower Wetland (PSW), extractive resource lands (bedrock, mineral aggregate and pit and quarry reserve), and significant woodlands ▪ Some areas of potentially insufficient soil strength (organic soils, areas of unstable slope) ▪ Parcels of land unencumbered by above constraints contain several rural residences, farms, or businesses ▪ Located at western boundary extent of the Township and distant from residential core
Sixth (near the southwest boundary of the Township, just north of the South Nation River)	Disadvantages ▪ Is located at the southwest corner of the Township boundary limits and distant from the residential core ▪ Area of negative environmental impact could spread beyond Township Boundary ▪ Proximity to regulatory floodplain and South Nation River ▪ Unstable slopes near South Nation River

Based on the results of the quantitative and qualitative screening assessments, the second sector (i.e., the rural district containing the existing Boyne Road Landfill site) is indicated to be the most desirable area for siting a new landfill. One of the principles for the Township in its ongoing development and growth is to maintain resource lands available and to focus on redevelopment or rehabilitation of existing land. This second sector already has land use designated for waste management activities and that land will not be suitable for other applications in the foreseeable future due to the potential environmental impacts associated with the existing landfill site, the Boyne Road Landfill site. Placing a new landfill for future use in a rural district sector other than the second sector will further reduce the limited other rural district areas for non-waste management development, which goes against the noted principal goals of the Township. Additionally, the social and economic impacts, and the overall environmental impacts are expected to be minimized if waste management operations are maintained in the rural district where waste management operations are currently active and on-going at the Boyne Road Landfill. The potential extent of landfill-related impacts may be further reduced by considering expansion of the existing landfill rather than trying to establish a new landfill disposal area within the same rural district. As such, although the second sector is

suitable for new landfill development and it is the overall most desirable location within the Township, development of a new landfill site is not an alternative that the Township should reasonably pursue.

Golder Associates Ltd.

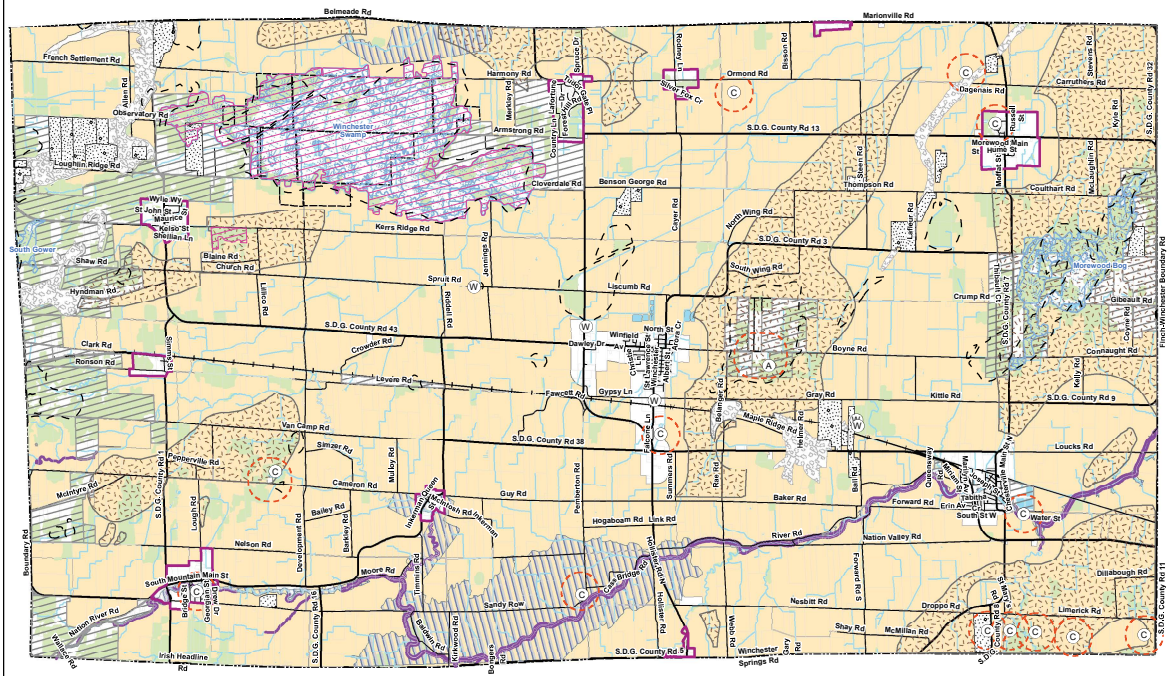
Robert McDonald, M.A.Sc., EIT
GeoEnvironmental Consultant

Trish Edmond, M.E.Sc., P.Eng.
GeoEnvironmental Engineer, Principal

RPM/PAS/PLE/sg

https://golderassociates.sharepoint.com/sites/117046/project files/6 deliverables/volume 3 supporting documents/3 final/appendix i - new landfill site selection assessment/site selection criteria b june2020 rev jan2023.docx

Attachments: Figure 1 – General Landfill Site Selection Exclusionary Criteria for the Township of North Dundas



LEGEND

- (A) ACTIVE WASTE SITE
- (C) CLOSED WASTE SITE
- (W) COMMUNAL WELL
- WATERCOURSE
- COUNTY ROAD
- ROAD
- RAILWAY
- UNSTABLE SLOPE
- WATERBODY
- ORGANIC SOILS
- EXTRACTIVE RESOURCE LANDS (BEDROCK OVERLAY)
- AREA OF NATURAL AND SCIENTIFIC INTEREST (ANSI)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- LICENSED PIT & QUARRY
- MINERAL AGGREGATE RESERVE
- RURAL SETTLEMENT AREA
- RURAL DISTRICT
- CROWN LAND
- REGULATORY FLOODLINE
- SIGNIFICANT WOODLAND
- AGRICULTURAL RESOURCE LANDS
- TOWNSHIP BOUNDARY

REFERENCE(S)

1. DATA OBTAINED ON ARCGIS ONLINE THROUGH UNITED COUNTIES OF SDG, SOUTH NATION CONSERVATION AUTHORITY AND ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY.
2. LAYERS DEPICTING UNSTABLE SLOPE, EXTRACTIVE RESOURCE LANDS (BEDROCK OVERLAY) AND REGULATORY FLOODLINE WERE DIGITIZED BY GOLDER ASSOCIATES PERSONNEL BASED ON UNITED COUNTIES OF SDG, OFFICIAL PLAN; CONSTRAINS PLAN; SCHEDULE B1; TOWNSHIP OF NORTH DUNDAS
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 1,000 2,000 4,000

1:100,000 METRES

CLIENT
TOWNSHIP OF NORTH DUNDAS

PROJECT
ENVIRONMENTAL ASSESSMENT OF THE TOWNSHIP OF NORTH DUNDAS WASTE MANAGEMENT PLAN

TITLE
GENERAL LANDFILL SITE SELECTION EXCLUSIONARY CRITERIA FOR THE TOWNSHIP OF NORTH DUNDAS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-05-28
DESIGNED	---
PREPARED	JEM
REVIEWED	RPM
APPROVED	PLE

PROJECT NO.	PHASE/TASK	REV.	FIGURE
1648253	2.0/2.1.14	0	1

APPENDIX J

Waste Diversion Study

Final Report
Dec 2022 / Rev Feb 2023

GOLDER
MEMBER OF WSP

TOWNSHIP OF
North Dundas

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REPORT

Waste Diversion Study

Waste Management Planning Environmental Assessment for the Township of North Dundas, Ontario

Submitted to:

Township of North Dundas
636 St. Lawrence Street
P.O. Box 489
Winchester, Ontario K0C 2K0

Submitted by:

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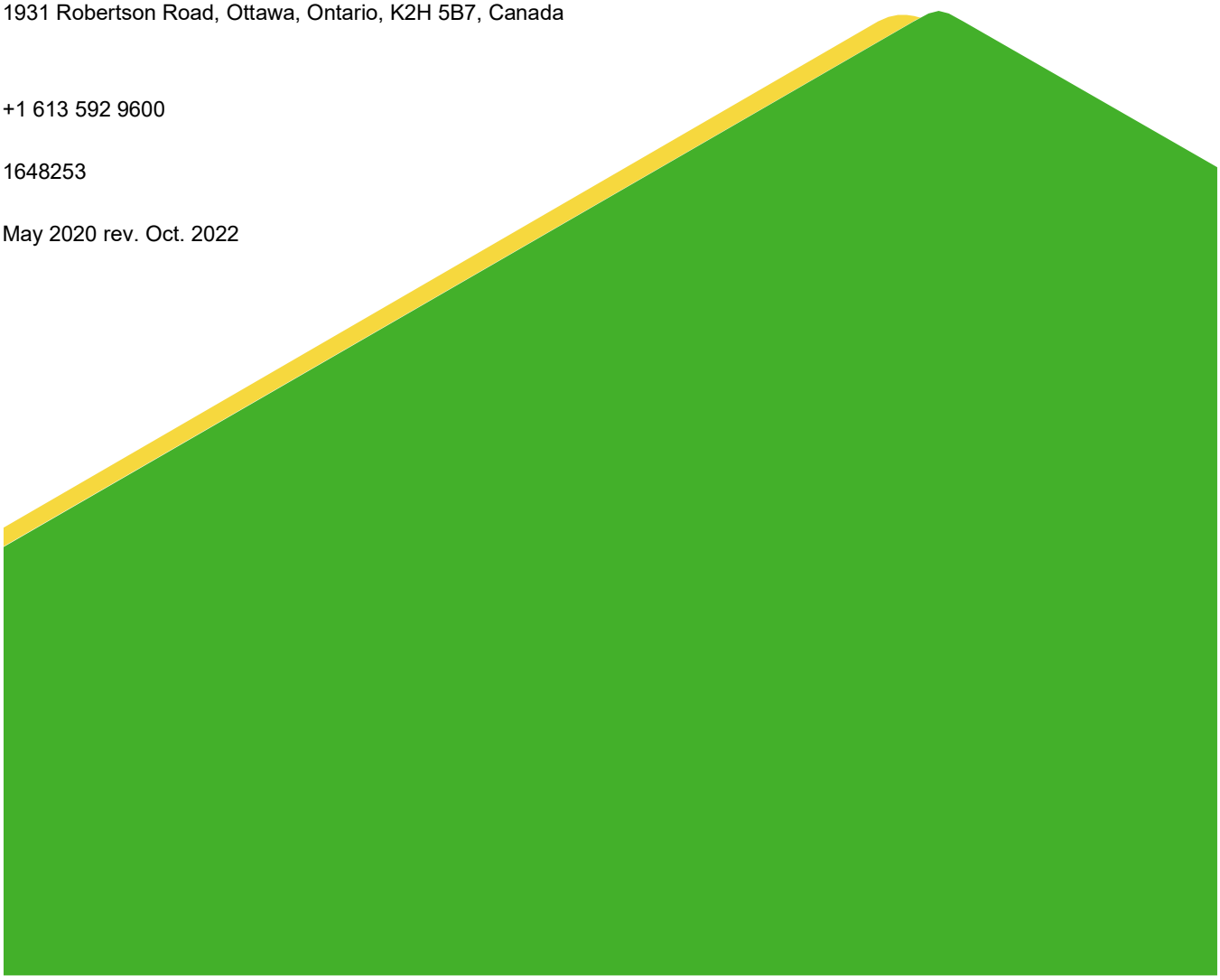
1648253

May 2020 rev. Oct. 2022



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FIGURES

APPENDICES

1.0 INTRODUCTION

The Township of North Dundas (Township) is located in Eastern Ontario, in the United Counties of Stormont, Dundas and Glengarry, approximately 40 km south of Ottawa. It was established in 1998 with the amalgamation of the former Townships of Winchester and Mountain and the Villages of Chesterville and Winchester. In 2019, the population of the Township was estimated at 11,879 by the Township's Municipal Department, based on population projections completed as part of the Township's Official Plan. The municipality is comprised of approximately 4,761 households or dwellings according to the Resource Productivity and Recovery Authority (RPRA) 2018 Datacall. Of these, 4,301 are reported as single-family households and 460 are reported as multi-family households.

An Individual Environmental Assessment (EA) for the waste management plan (EA Study) for the Township is being undertaken by the Township and requires approval under the provincial *Environmental Assessment Act* (EAA) (Ontario, 2010). As part of the EA Study, a waste diversion study is being undertaken to review the current programs and re-assess the long-term waste management diversion alternatives that are reasonable for the Township to consider within the EA process. Based on the information collected in this study, potential waste diversion options have been identified and evaluated, and the proposed waste diversion system enhancements identified.

2.0 BACKGROUND

The waste disposal service currently available within the Township for local residents and some businesses utilizes the Boyne Road Landfill (Boyne Landfill), owned and operated by the Township. The Boyne Landfill is located along Boyne Road, approximately 1.5 kilometres east of the Village of Winchester on Lot 8, Concession VI in the former Township of Winchester. The Boyne Landfill has been operating as a licensed landfill facility since 1965. The Boyne Landfill currently operates under Environmental Compliance Approval (ECA) No. A482101 issued on December 4, 1989. The ECA was amended on September 5, 1995 to allow the Boyne Landfill to accept waste from the Village of Chesterville, in addition to waste from the Village of Winchester and the Township of Winchester. Subsequent to municipal amalgamation, the Boyne Landfill was licensed to accept waste from the newly established Township (which includes the Village of Chesterville, the Village of Winchester, the former Township of Winchester, and the former Township of Mountain). The ECA was amended on October 2, 1995 to allow the Township to operate a municipal waste recycling facility on-site. The ECA was again amended on September 18, 1996 to allow the establishment and operation of a household hazardous waste transfer facility at the Boyne Landfill.

During review of the Design and Operations (D&O) Plan in late 2014 by the Ministry of the Environment and Climate Change (MOECC), now referred to as the Ministry of the Environment, Conservation and Parks (MECP), it was determined that the Boyne Landfill exceeded its approved capacity and is in an overfill situation based on the theoretical capacity based on the 1970 original application. An emergency ECA was issued by the MECP (ECA Notice No. 6 issued on July 10, 2015) to grant a temporary approval for continued landfilling at the Site lasting until January 31, 2016. At this time, it was proposed to evaluate alternatives to identify the preferred alternative for the Township's long-term waste management plan. Since 2015 the Township has applied annually for an extension to allow continued landfilling operations at the Site. Subsequently in 2019, the MECP identified that the Township was not required to seek annual ECA extensions, but rather should apply for an administrative amendment to the Site ECA to request that the expiry date for continued landfilling currently provided in Condition 2.1 (a) of the ECA be removed and instead allow continued landfilling operations until reaching the final waste contours design presented in Section 7.0 and Figure 3 of the 2013 D&O Plan while the Township pursues

an EA for its long-term waste management plan. This ECA amendment approval was received from the MECP in January 2020.

In 2015 the Township undertook an evaluation of waste management alternatives (Golder, 2015). The Township Council decided that their preferred alternative to provide long term waste management services for disposal of post-diversion waste (referred to as residual waste) was to expand the Boyne Landfill site and passed a resolution on November 10, 2015 to direct staff to commence the EA process required to obtain approval for the expansion. As a result of consultation with MECP regarding the draft Terms of Reference (ToR) (essentially the work plan component of the EA), it was concluded that the previous evaluation would not be sufficient to satisfy the requirements of the EAA to define landfill expansion as the preferred alternative for the long-term waste management plan and, as such, an evaluation of 'Alternatives To' will be required in the EA.

As part of the EA, the Township is considering the range of alternatives that are possibly available to it as a small rural municipality and has determined that the four options (waste export, landfill expansion, establish a new landfill and alternative waste management technologies) considered in the previously completed preliminary study (Golder, 2015) represent the range of the 'Alternatives To' that will be considered in the EA, along with the Do Nothing alternative and enhanced waste diversion programs. Enhanced at-source waste diversion is an alternative that will require the Township to consider and look for opportunities to increase diversion from disposal by considering public feedback, evaluating current legislation and funding mechanisms and assessing diversion opportunities in alignment with the small, rural nature of the Township. With the exception of a zero-waste solution, this alternative does not have the ability to fully address the stated problem being assessed but can reduce the amount of post-diversion waste requiring management. A zero-waste solution is not presently considered possible or available to the Township given its small size and tax base to pay for this system and no control over industrial, commercial and institutional (IC&I) waste generators (which are provincially legislated).

This Waste Diversion Study report provides an assessment of diversion options available to the Township. This study looks at the existing diversion programs including how estimates of diversion are made (without a weigh scale). Potential waste diversion options have been developed with the Township, considering the small, rural nature of the municipality as well as MECP policy and any programming or funding. Waste diversion options will be presented to the public for comment as part of the EA as well as to discuss the mechanism for their comparison and evaluation. This solid waste diversion report summarizes the work completed and provides recommendations and an implementation plan. This study fulfils the EA commitment made by the Township to complete a Waste Diversion Study to assess further opportunities for at-source residential diversion in the Township.

3.0 PROVINCIAL DIRECTION

In 2017, the Strategy for a Waste-Free Ontario: Building the Circular Economy (MECP, 2017b) was released, which provided a road map for resource recovery and waste reduction. The strategy includes the following goals:

- long-term goals of zero waste and zero greenhouse emissions from the waste sector
- interim waste diversion goals for 2020 (30%), 2030 (50%) and 2050 (80%) for combined waste streams
- lists several objectives and actions to achieve long term goals

The strategy included changes to extended producer responsibility (EPR) that involve making companies that produce or import products responsible for managing their end-of-life requirements. This is called full EPR. According to the strategy, initially EPR will be applied to products and packaging that have existing mandated recycling programs such as batteries, tires, municipal hazardous and special waste, electronics and Blue Box

recycling materials; other materials such as carpets, mattresses and furniture will be considered in the future. Another key proposed action is the development of a Food and Organics Waste Action Plan that would provide direction on reducing and diverting food and organic waste away from disposal facilities.

Currently, the net cost of the Blue Box program is split approximately 50/50 between municipalities and industry. In August 2019, the MECP issued direction to transition the management of Ontario's Blue Box program to producers of plastic and other packaging to enable the transition of materials collected under the program to individual EPR under the *Resource Recovery and Circular Economy Act* (MECP, 2016). The EPR Blue Box program aims to require producers to take full responsibility for Ontario Blue Box programs by 2025.

In November of 2018, the MECP released its Environment Plan (MECP, 2018) and a subsequent discussion paper (Reducing Litter and Waste in our Communities) was released in March 2019 (MECP, 2019) that proposes steps to implement the Environment Plan.

The Food and Organic Waste Policy Statement (MECP, 2018a) supports the province's goals to move towards zero waste and zero greenhouse gas emissions from the waste sector. The policy statement focuses on waste reduction and resource recovery through preventing and reducing food waste, efficiently collecting and processing food and organic waste, and reintegrating resources back into the economy. The statement includes the Ontario Food Hierarchy that consists of the following steps in order of importance:

1) Reduce: prevent or reduce food and organic waste at the source

2) Feed people: safely rescue and redirect surplus food before it becomes waste

3) Recover resources: recover food and organic waste to develop end-products for beneficial use

According to the statement, where collection of food and organic waste is not provided, municipalities shall provide for the resource recovery of food and organic waste through means such as home composting, community composting and local event days, should pursue regional approaches to facilitate the efficient and effective collection of food and organic waste from urban settlement areas, provide promotion and education (P&E) materials to residents that support increased participation in resource recovery efforts, and shall ensure that their official plans, zoning by-laws, plan of subdivision approvals and site plan approvals support the resource recovery of food and organic waste for residents.

4.0 CURRENT WASTE MANAGEMENT SYSTEM

The Township, through its Waste Management department and its waste hauling contractors, currently provides curbside waste collection and disposal services to its ratepayers for residential and some institutional, commercial and industrial waste. The Township provides the following waste management services:

- curbside pickup of residential and small commercial waste throughout the municipality by a private contractor (HUME Waste Services)
- curbside pickup of recyclables throughout the municipality (by municipal staff)
- sorting of recyclables at curbside during collection
- drop off for recyclables at the Boyne Landfill
- operation of a small municipal material recycling facility (MRF) at the Boyne Landfill, where collected materials are then transferred out of the Township by a recycling contractor
- drop off for a tire recycling program at the Boyne Landfill

- receipt of brush and wood at the Boyne Landfill for subsequent chipping
- operation of a Waste Electrical and Electronic Equipment (WEEE) facility for receipt, storage and transfer of WEEE at the Boyne Landfill
- operation of a Household Hazardous Waste (HHW) facility at the Boyne Landfill site to provide drop-off services of HHW for the Townships of North Dundas and South Dundas

4.1 Current Waste Diversion

The material recycling facility, the HHW and WEEE depots as well as the waste disposal facility are located at the Township's Boyne Landfill site. Recyclables (aluminum and steel cans, plastic, paper, cardboard) are collected from and pre-sorted at curbside within the Township and are taken to the recycling transfer station at the Boyne Landfill, from where they are transferred out of the Township by a recycling contractor. Materials are sorted at curbside into four streams: glass, plastic, cans, and fibres, before being brought to the recycling transfer station. Drop-off of recyclable materials is also provided at the material recycling facility. In 2019, the Township reported approximately 478 tonnes of recyclable materials were collected or dropped-off. The tonnages reported by the Township are weighed and reported by the recycling contractor who collects the material. Moving forward, the Township will be using a set of private scales available in the Township (in the village of Winchester) to provide better waste data tracking.

In 2018, the following recyclable materials were collected and diverted from the landfill: 140.31 tonnes of paper, 330.27 tonnes of cardboard, 97.96 tonnes of plastic, 10.06 tonnes of aluminum, and 30.19 tonnes of steel cans. In 2019, the following recyclable materials were collected and diverted from landfill: 127.03 tonnes of paper, 336.45 tonnes of cardboard, 31.59 tonnes of plastic, 10.22 tonnes of aluminum, and 30.07 tonnes of steel cans. The tonnages reported for paper and cardboard are derived from both residential and IC&I sources, whereas the other materials are primarily residential.

In 2017, 2018, and 2019, a total of 8.81 tonnes, 12.9 tonnes, and 13.84 tonnes respectively of WEEE materials were collected and diverted from the transfer facility at the landfill. The Township also diverts scrap metal from the landfill. Approximately 0.25 tonnes of scrap metal were diverted in 2019, with 25 tonnes stockpiled on-site for diversion. The Township's tire recycling collector (Trillium Tire) reported 51.5 tonnes of tires collected from North Dundas in 2019 and approximately 50 tonnes of tires collected in 2018.

Quantities of materials diverted through the HHW transfer station in 2019 included 9.94 tonnes of various materials (flammables), 11,556 litres of waste oil, 400 litres of acids, 1,135 litres of corrosive liquids, 160 litres of petroleum, 300 4-foot fluorescent tube lights, 102 30-pound propane tanks, and 175 various lead acid batteries.

The Township's residential diversion rate, as reported in 2018 by the RPRA, is 23.1 percent (%) (RPRA, 2018) and it is expected that a similar diversion rate occurred in 2019 based on preliminary estimates from the Township. The values reported by RPRA exclude the presence and effect of IC&I in the waste stream. Overall, the Township diverted approximately 628 tonnes of material in 2018 in the residential waste stream. Based on information provided by the Township, the residential diversion rate in 2019 should be approximately the same as 2018.

The *Waste-Free Ontario Act* is the short-form reference for two pieces of legislation: *Resource Recovery and Circular Economy Act* and the *Waste Diversion Transition Act*, 2016. While the province recognizes that additional waste disposal is needed to meet demands over the next several years, the goal of the *Waste-Free Ontario Act* and subsequent *Strategy for a Waste-Free Ontario* is to shift from waste disposal to waste diversion and make

waste management a carbon neutral industry. The Township supports these goals and is taking proactive steps, as practical and affordable for a small rural municipality, toward these goals. This study evaluates waste diversion initiatives in alignment with current Provincial policies.

The Township has and continues to look for opportunities to further increase waste diversion in this sparsely populated rural municipality. In comparison to larger urban centres where the addition of municipal-scale composting/processing of household and IC&I organics is often evaluated to progress towards achieving the province's overall interim diversion targets of 30% by 2020, 50% by 2030 and 80% by 2050 (Strategy for a Waste-Free Ontario: Building the Circular Economy, February 2017), it is noted that the majority of the Township's residents live on larger rural properties where individual composting of leaf and yard materials and food wastes is already a fairly common practice, but not documented nor counted in the Township's reported diversion rate.

4.1.1 Recycling

The Township offers a single stream recycling program (i.e., containers and paper fibre) and diverts as per the mandatory provincial requirements as outlined in Ontario Regulation 101/94. The Township accepts the mandatory recycling materials consisting of aluminum and steel food or beverage cans, glass bottles and jars for food or beverages, newsprint, polyethylene terephthalate bottles for food or beverages, and several supplementary recycling components being aluminum foil, boxboard, cardboard, fine paper, magazines, unsoiled paper cups and plates, rigid plastic containers and telephone directories. A list of recycling materials received and excluded by the Township is provided below:

Container Recycling:

- glass bottles & jars
- metal food or beverage cans (steel and aluminum)
- plastic bottle, jars & jugs (polyethylene terephthalate, types 1 through 7)
- aluminum trays & foil (clean)
- clear plastic bags to separate containers from paper, box board and cardboard

Fibre Recycling:

- box board (cereal boxes, rolls from paper towels, toilet tissue, shoe boxes, tissue boxes)
- soft cover books (telephone books)
- corrugated cardboard (flattened/bundled/tied)
- detergent boxes
- egg cartons (paper)
- kraft (brown) paper bags
- magazines, catalogues, junk mail and office paper
- newspapers and flyers (plastic bags removed)
- pizza boxes (clean)

- gable end milk and juice cartons
- juice and soup boxes (tetra-pak)

Materials not accepted in the current recycling program:

- soiled paper
- soiled paper cups and paper plates
- pizza boxes with food residue
- plastic egg cartons
- reports with plastic spines
- textiles
- waxed cardboard
- boxes still containing food residue
- film plastic (plastic grocery bags & cellophane)
- polystyrene (styrofoam trays & cups)
- electronics/cell phones (take to e-waste depot)
- batteries (take to HHW depot)
- diapers/cat litter/ dog waste
- broken glass/ceramics/light bulbs
- needles, knives or saw blades
- scrap metal
- containers that held hazardous products
- containers MIXED with paper, boxboard and cardboard

The Township's recycling program is made available to all single and semi-detached households and to multi-residential (i.e., apartment buildings and townhouse complexes) households and schools, subject to limitations.

Prior to 2013, one recycling bin was provided free of charge to single family households and multi-residential households that receive an equivalent level of curbside service. Residents are encouraged to purchase replacement and/or additional recycling boxes from local retailers.

Curbside collection service for recyclables is provided once every two weeks in the Township. Approved program recyclables are also accepted for drop-off at the Boyne Landfill.

4.1.2 Refrigerated Appliances

Refrigerated appliances (e.g., air conditioners, refrigerators, freezers, heat pumps, etc.) are accepted at the Boyne Landfill. The refrigerants are removed on-site from these appliances by a trained and MECP certified technician who then affixes a sticker to the appliance once removal is completed. A scrap metal dealer subsequently removes these items and the refrigerants from the site to be recycled.

4.1.3 Extended Producer Responsibility Materials

The Township encourages resident participation in three different provincial product stewardship programs that are cooperatively coordinated and funded by the province, the Township, and the industries that produce and distribute these designated products within the Ontario marketplace. These are described in the following sections.

4.1.3.1 Waste Electrical and Electronic Equipment (WEEE)

Televisions, computers and other electronic items contain materials such as lead, mercury and cadmium. The Township has a WEEE collection depot located at the Boyne Landfill. Acceptable material types include desktop, portable and personal hand-held computers, display devises, computer peripherals, printing and copying devices, telephones, answering machines, cell phones, pagers, image and audio devices, and other electronic devices. This program is available at no additional charge to the Township's residents and IC&I sector.

4.1.3.2 Used Tire Diversion

The Township accepts used tires at the Boyne Landfill for collection and recycling. Residents are encouraged to sell or re-purpose tires where possible, or to bring them to the collection depot at the Boyne Landfill to be recycled.

4.1.3.3 Household Hazardous Waste (HHW)

HHW material is not permitted in the garbage stream and is not collected by the Township in the curb side collection program. Residents and businesses can drop off hazardous material for safe management at the HHW depot at the Boyne Landfill and drop off is free of charge. The Boyne Landfill is licensed under the current ECA to operate an HWW depot. In addition, the Township operates HHW days several times per year at the Boyne Landfill in the spring, summer and fall. Residents are permitted to drop off such items as used oil, automotive batteries and propane tanks at any time at the HHW depot.

HHW materials accepted by the Township at the Boyne Landfill HHW depot include:

- paint products and coatings
- common household paint - latex, alkyd, melamine, anti-rust, floor
- paint thinner, stripper, solvent
- stain, varnish, sealer, finishing oil
- asphalt & roof tars, driveway sealer
- waxes, glues & cements
- fluorescent tubes and bulbs (intact bulbs and tubes only). Dispose of broken ones in the garbage stream

- automotive-type fluids such as used lubricating oil (motor, transmission, etc.), brake fluid, antifreeze/coolant, used oil filters, empty oil and antifreeze/coolant containers
- batteries such as household (AAA, AA, C, D, 9-volt), button type (hearing aid, watch, etc.), rechargeable, automotive
- medical sharps and medications, syringes
- expired or unwanted prescription and non-prescription medications
- pressurized containers, propane tanks, aerosol cans, fire extinguishers
- garden and pest control products, insecticides, pesticides, wood preservatives, ant and rodent poisons, flea powder, flea collars, herbicides, weed killers
- other hazardous materials such as smoke alarms, swimming pool/hot tub chemicals, flammable liquids, such as kerosene & lamp oil

4.1.4 Wood and Brush

Wood waste and brush currently received at the site is stored on the eastern, unfilled portion of the Boyne Landfill. Some of the wood and brush material is periodically processed using a chipper and used as cover material in the landfill and the remainder is landfilled. A pilot program for leaf and yard waste is currently providing collection services for this material to two villages in the Township, with two collection events per year.

4.1.5 Backyard Composting

The Township is aware that voluntary backyard composting by residents and farms is relatively common within the Township, especially in more rural areas. Residents and farms use small scale backyard composters that are placed on their private properties to place their organic kitchen scraps as well as some leaf and yard waste. It is not possible to estimate the amount of diversion that this practice currently achieves.

4.2 Current Residual Waste Management

Residual solid waste is the waste remaining for disposal after diversion/recycling activities. Weekly curbside collection is made available to all single and semi-detached households and to multi-residential households in the Township. Multi-residential households with seven or more units where collection vehicles can service the property unimpeded are also eligible for waste collection. All other multi-residential sites are required to contract private waste collection services. Based on data reported by the Township's contracted waste collection service provider, Hume Waste Services, approximately 90% of dwellings in the Township (all types) are currently eligible to receive curbside collection services. Curbside collection of garbage is currently subject to quantity limitations based on curbside bag limits whereby residents are entitled to two bags of waste weekly, farms are entitled to four bags of waste weekly, and businesses are entitled to six bags of waste weekly

The Township currently does not offer bulky item pick up at the curbside. While many of the bulky items received are disposed of at the Boyne Landfill, large metal goods and appliances are recycled as scrap metal.

Residual waste from the Township is currently sent to the Boyne Landfill. The site has been operating as a licenced landfill for the disposal of solid, non-hazardous waste since 1965 and the service area for the landfill is the Township of North Dundas. The Boyne Landfill is the only operational waste disposal site in the Township and receives all the residential and some of the IC&I waste from the entire Township. The waste collection vehicles haul along the municipal road network directly to disposal at the landfill site; there is no transfer station facility.

The Township is mainly rural with several small villages, with Winchester and Chesterville being the two largest villages.

Operation of the landfill site, including its diversion facilities, is carried out by the Township in accordance with the requirements of its ECA conditions. The existing landfill site is a natural attenuation landfill, without an engineered bottom liner and leachate collection system. The waste is compacted with a 2004 Caterpillar 816 F landfill compactor. In 2019 the disposal fee for uncompacted waste was $15.00 per cubic yard ($19.62 per cubic metre) and $30.00 per cubic yard ($39.24 per cubic metre) for compacted waste. A fee of $25.00 per cubic yard ($32.70 per cubic metre) was charged for shingles. For contaminated soil, the disposal fee in 2019 was $25.00 per tonne.

4.3 Industrial, Commercial and Institutional Waste

The Boyne Landfill is the only operational waste disposal site in the Township and receives all of the residential and some of the IC&I waste from the entire Township. IC&I waste diversion and disposal is governed and enforced by the Province of Ontario. However, the Township offers the following IC&I services:

- receipt and proper disposal of waste at the Boyne Landfill of waste generated by some of the Township's IC&I sector
- receipt, processing and marketing of recyclables and other recoverable materials generated by some of the Township's IC&I sector (subject to eligibility)
- the provision of information and guidance on waste reduction and diversion opportunities within the IC&I sector

The Township offers limited garbage and recycling collection services to some businesses within the Township's urban areas. IC&I establishments are required to contact the Township to confirm eligibility of service.

5.0 CURRENT WASTE COMPOSITION

It is estimated that 80% of the waste received at the Boyne Landfill is residential, while 20% is IC&I.

In 2018, the Township generated approximately 2,715 tonnes of residential waste, of which 628 tonnes were reported diverted from landfill, resulting in an overall residential waste diversion rate of approximately 23.1% (RPRA, 2018); the waste diversion rate for the Township is expected to be similar in 2019 based on preliminary estimates. The RPRA calculations account for the presence of IC&I waste and provides a factor to remove its influence on the residential waste diversion rate. As such, it is appropriate to use the RPRA waste diversion rate for assessing the residential waste stream.

A rough breakdown of Ontario's total waste composition is presented in Figure 1 below. This breakdown includes the composition of waste from both residential and non-residential sources. The waste composition for the residential waste stream for the Township of North Dundas was estimated using Waste Diversion Ontario (WDO) waste audit data from a similar rural Ontario municipality, with a comparable recycling program, and a similar waste diversion rate of 20.6%. The waste audit was from a four-season Residential Waste Composition Study prepared by AET Group Inc. (AET, 2017) for the Continuous Improvement Fund (CIF) and Stewardship Ontario (SO). The results from the rural collection south (RCS) group was used as a representative sample from this study, which is the same municipal grouping for the Township of North Dundas. To account for the presence of organics in the residential waste stream, a conservative value of 35% was selected. Environment Canada estimates that organic waste makes up about 40% of the residential waste in Canada (Environment Canada,

2013), while the overall Ontario waste composition estimate (Figure 1) reports organics as 32%. Figure 2 below presents the general composition of the Township's residential waste stream based on the RCS data.

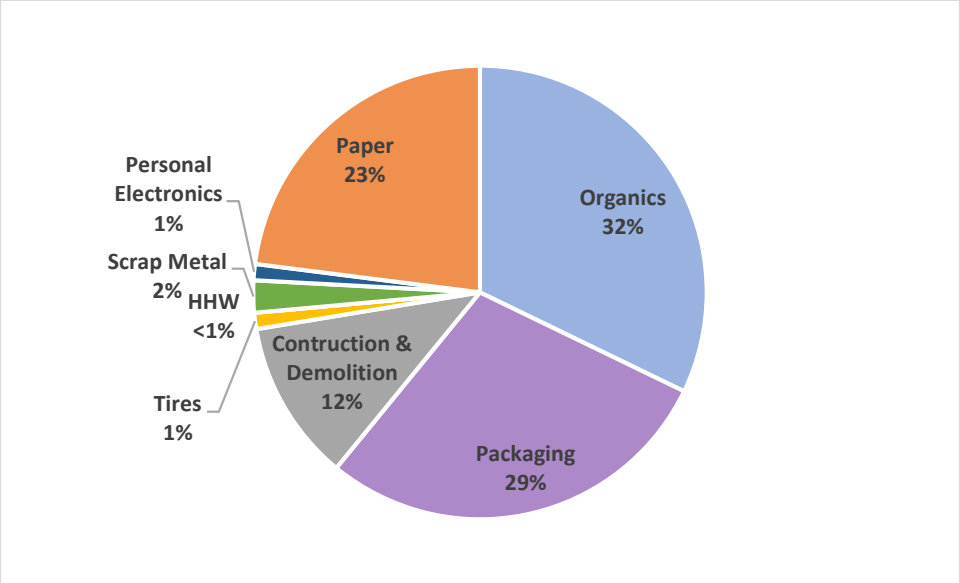

Figure 1: Approximate Breakdown of Ontario's Waste Composition. [Sourced by data from the Environmental Commissioner of Ontario's *Beyond the Blue Box Program*]

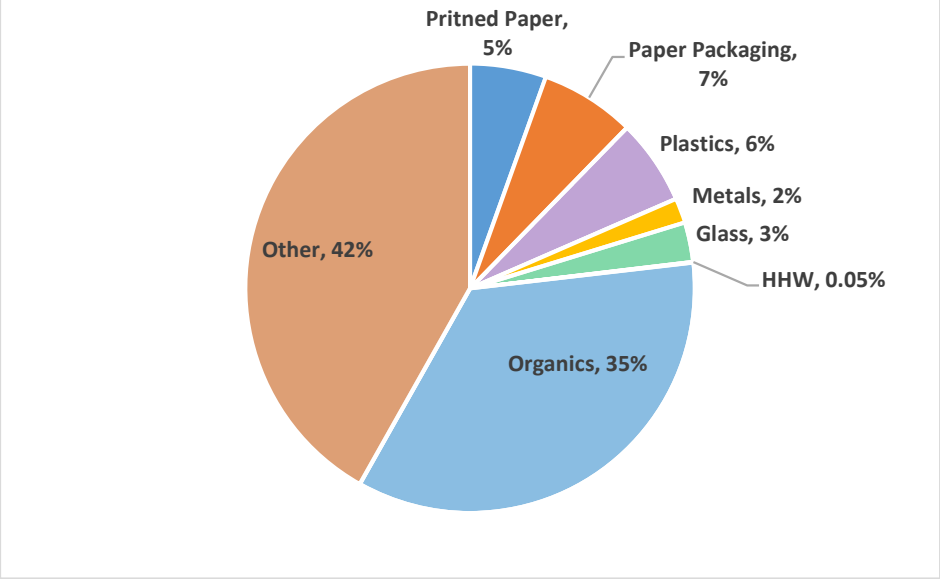

Figure 2: Rural Community South Waste Composition Estimate for the Township of North Dundas's Residential Waste Stream

Figure 2 above illustrates the estimated composition of waste in the Township's residential waste stream for a given year. The greatest proportion of the Township's waste stream is comprised of "Other" or "non-recyclable" material (material that falls outside the waste diversion program) (42%) and Organics waste (including food scraps) (35%). Materials found in the recycling program stream, including printed paper, paper packaging and plastics also represent a significant composition of the total residential waste stream (18%). Table 1 below

displays the estimated quantities of waste generated by the Township in 2018 using the total waste generated quantity reported for the residential stream, 2,715 tonnes (RPRA, 2018) and the estimated composition from RCS (AET, 2017).

Table 1: Total Generated Solid Waste Estimate (2018)

Residential Waste Stream	Tonnes Generated (before diversion)	Percent of Total Waste Stream
Printed Paper	148	5%
Paper Packaging	186	7%
Plastics	167	6%
Metals	49	2%
Glass	77	3%
Household Hazardous Waste	1.4	0.05%
Organics	950	35%
Other	1,136	42%
Total Available for Diversion	**1,520**	**56%**
Total Waste Generated	**2,715**	**100%**

5.1 Current Residential Recycling Program

Table 1 above shows that the Township has potential to divert up to 56% of the waste it currently generates. It is noted that the potential diversion could be higher than 56% but is limited by the information provided for the RCS waste composition study's category of "other" non-recyclable materials. The Township is currently capturing an estimated 23% of the recyclable material in their programs, which is about half of the estimated potential material available for diversion. It is noted that existing organics management via backyard composting and a pilot program for leaf and yard waste occurs but cannot be accounted for in the Township. This is less than the RPRA group average of 33.9% for a municipality of its designation (Rural Collection South) and the Province's projected diversion goal for 2020 (30%). Figure 3 below displays the Township's diversion rate in 2018.

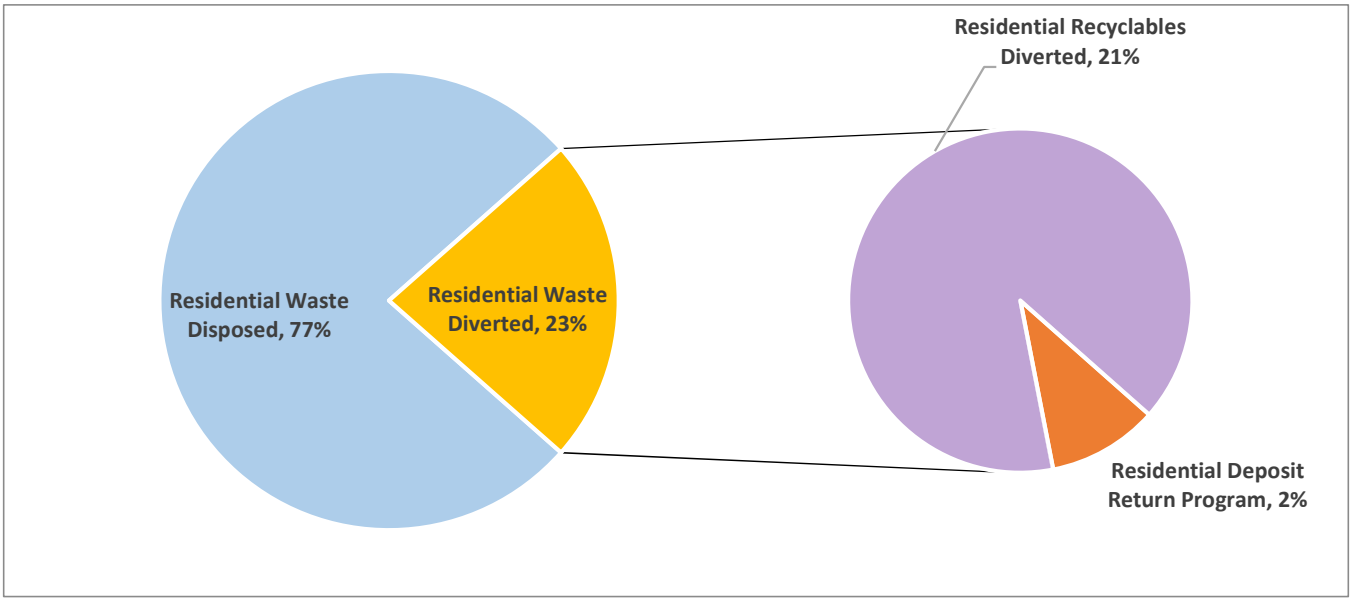

Figure 3: Township of North Dundas 2018 Residential Waste Diversion (data sourced from RPRA, 2018)

6.0 CURRENT WASTE MANAGEMENT OPERATING COSTS

The approximate net cost of the Township's solid waste management system and its system components for 2018 are presented below. Overall, the Township's solid waste management system incurs an approximate net cost of $694,700 annually. Table 2 shows the net cost of the Township's waste management services broken down to include collection, recycling and waste disposal.

The Township's recycling program has an approximate net cost of $443,400 annually that includes supply chain costs, commodity revenues, P&E, regulatory requirements and reporting, market development and program management costs. Table 3 presents this amount on a per tonne, per household and per capita basis. 444 tonnes of Blue Box recycling material were reported for residential collection in 2018 (RPRA, 2018) and has been used for calculating the cost per tonne. When compared against the average of other municipalities in its RPRA municipal grouping, the Township has a higher per tonne net annual recycling cost than the municipal group's average of approximately $580 per tonne (RPRA, 2018).

Table 2: Net Operational Cost of the Township's Waste Management Services (2018)

Service	Cost (2018)
Garbage Collection Expenditures (Curbside collection contract)	$290,000
Recycling Net Expenditure (Including wages, benefits, administration, P&E costs, and recycling program revenue)	$443,400
Landfill Site Operational Costs (Including wages, benefits, fuel, equipment repairs, landfill maintenance, administration, and tipping fee revenues)	($23,900)
Transfer Depot (including HHW, WEEE, Tires, etc.).	($14,800)
Total Waste Management Operating Cost (2018)	**$694,700**

Table 3: Recycling Program Approximate Net Costs (2018)

Item	Cost Per Tonne (Approximate, based on 444 tonnes[1])	Cost Per Capita (Approximate, based on Population Size of 11,799[2])	Cost Per Household (Approximate, based on 4,722 households[2])
Recycling Program	$998	$37.58	$93.89

Notes:
[1] Data obtained from RPRA 2018 Datacall
[2] Data obtained from United Counties of Stormont, Dundas and Glengarry (UCSDG) Official Plan and Statistics Canada

7.0 POPULATION PROJECTIONS

As an Ontario municipality responsible for providing waste services for its ratepayers, the Township's objective in undertaking the EA and this waste diversion study is to obtain approval for a long-term solution for waste disposal while concurrently evaluating diversion opportunities to reduce the amount of waste generated for disposal over the 25 year planning period. For purposes of estimating the long term waste diversion opportunities, projections were based on the population growth statistics available from the Township's Official Plan as shown in Table 4.

Table 4: Historical Total Population

	Census Year[1]				Year Projections[2]				
	1996	2001	2006	2011	2016	2017	2018	2019	2020
Total Population	11,064	11,014	11,095	11,225	11,638	11,719	11,799	11,879	11,958

Notes:
[1] From Statistics Canada
[2] From Township's Municipal Department, based on population projections completed as part of the UCSDG Official Plan

The data above indicates the population has increased by 0.68% based on a percentage change of the Township's population from 2018 to 2019. The United Counties of Stormont, Dundas and Glengarry Official Plan consolidated in 2018 suggests that the population compounded annual growth rate between 2016 and 2036 is expected to be approximately 0.6%. Based on the relatively low growth rate, it is expected that waste diversion options planned for the population at this point in time will still be of an appropriate scale for the population's needs until the end of the planning period.

8.0 WASTE DIVERSION OPTIONS

Based on the results of the previous waste management study completed in 2015 (Golder, 2015), along with the review of the current waste management services and consultation with the Township, waste diversion options have been identified for consideration in the Township's solid waste management system planning. These options and their respective sub-options were evaluated quantitively (where applicable) and qualitatively. The options identified are in addition to the Township's current waste diversion programs and are descried below.
A preliminary cost estimate for all options identified (excluding option 1) are available in Appendix A.

8.1 Option 1 – Maintain Current System

The first option being considered in this study is to maintain the current waste diversion system. This option assumes that the Township would continue to manage its waste as currently being provided, and no changes to the waste diversion (or disposal) system components are considered, as described in Section 4.0.

8.2 Option 2 – Source Separated Organics

This option considers introducing the diversion of source separated organics (SSO) from the residential waste that is currently sent to landfill for disposal. It is currently estimated that in Canada approximately 40% of waste in the residential waste stream is organics (such as food waste, soiled paper and kitchen scraps). The Township currently has no formal diversion program in place for organics (excluding the pilot leaf and yard waste program), and organic waste generated by residents is either voluntarily composted at the resident's home or is disposed of in the landfill. It is estimated that 35% of the Township's overall waste composition is organics; assuming 10% of the overall waste composition is leaf and yard waste and the remaining 25% as SSO, implementing an organics management program has the potential to divert an estimated 680 tonnes from the landfill each year. Due to the rural nature of the Township, it is likely that a meaningful amount of SSO is already being composted in residential backyard composters and not tracked in the current diversion efforts.

To achieve a higher level of waste diversion, a number of Ontario municipalities have implemented curbside SSO programs. A typical SSO program provides each household with a green bin and an indoor mini bin for the kitchen (usually provided via a one-time coupon for exchange at vendors in the municipality). Residents use the mini bin to store household organics (such as soiled napkins, bones, vegetable peelings, etc.) and, when filled, empty the contents of the mini bin into the larger green bin. The larger green bin is then serviced as part of the regular collection practices. The details of this program and the acceptable materials for the green bin are made known to residents through P&E efforts. To account for the SSO from non-residential sources or missed collection, an option to drop off approved organics at the landfill site or other transfer location may also be made available.

Option 2 considers the method of collection and end-destination of its collected organic material. It can be challenging for a smaller municipality to develop and operate its own large-scale organics management facilities, which will additionally be subject to Ministry permits and approval and operational requirements and often require a minimum tonnage of SSO material to be received to be able to affordably operate. To process SSO at the Boyne Landfill, an application to amend the Site's current waste ECA will need to be submitted to the MECP, along with a detailed explanation of the proposed organics processing facility/program and engineered design. SSO processing (differentiated from composting of leaf and yard waste) is more odorous and subject to stringent operation and design requirements. It is expected than an enclosed structure would be required for SSO processing, together with a sophisticated air handling and odour control system. Additionally, the design and approval process timeframe can be lengthy before implementation can occur. These approval and design efforts would require support from an engineering consultant.

Alternatively, the Township may consider diverting their SSO to an eastern Ontario organics processing facility, such as the Green for Life (GFL) site Lafleche Environmental Inc. (North Stormont) or Renewi Canada Ltd. (Gloucester); their licensed service areas include North Dundas. Partnering with an organics processing facility could enable compost, digestate, or biochar produced by the facility to be made available to Township farmers at a reduced rate.

Additionally, or alternatively, the Township may explore promoting further SSO diversion through a backyard composting program. Similar to what could be done with the green bins, a subsidy or one-time coupon could be provided to each household in the Township for the purchase of residential composting bins from vendors in the community. As a rural and heavy farming community, it is likely that backyard composting is already a common practice in the Township. As such, with the practice already common throughout the community, pursuing a backyard composting program may have a smaller positive effect on increasing the current waste diversion rate.

Table 5 below presents a comparative evaluation for the potential SSO programs for the Township. A preliminary cost estimate for the three SSO diversion options is presented in Appendix A.

Table 5: Source Separated Organics Options Evaluation

SSO Option	Advantages	Disadvantages
2A) Backyard Composting	▪ Minimal Costs to establish and operate ▪ Reduces operational efforts for curbside collection	▪ Backyard composting likely already in practice and this option may not result in a significant increase in diversion ▪ Relies on community engagement
2B) Curbside Collection with on-Site Organics Processing Facility	▪ SSO is self-managed ▪ Potential for a higher diversion rate for SSO	▪ Very high cost to implement ▪ Potentially long approval process ▪ Requires additional collection vehicle(s) ▪ Too small of a population size to facilitate effective organics processing business ▪ Subject to operational/design requirements
2C) Curbside Collection with Hauling to Organics Processing Facility	▪ No ECA amendments or policy issues as organics processing facility is externally managed ▪ Potential for a higher diversion rate for SSO	▪ Requires additional collection vehicle(s) ▪ Increased fuel costs and greenhouse gas emissions for hauling SSO from the Township to processing facility

Based on waste composition estimates and diversion potential, it was assumed for the purpose of cost estimating that two additional collection trucks for weekly SSO collection would be required for SSO curbside collection options. Providing backyard composters and green bins was budgeted for all households in the community, but due to the rural nature of the Township, it is likely that this entire budget would not be depleted. To reduce costs, the Township could alternate the weekly collection of SSO and either garbage or recycling, which would eliminate the requirement to purchase an additional truck; or, if new trucks are purchased for another diversion option, the old trucks could be made available for SSO collection.

The cost to provide backyard composters to the community was estimated at approximately $470,000 of capital costs; and the cost to provide green bins, collect at curbside, and haul to an organics processing facility was estimated at approximately $440,000 capital costs, with an operating budget of approximately $350,000 (for collection, hauling, and processing fees) for an estimated total of 680 tonnes of SSO waste annually. The costs for implementing an on-site organics processing facility and program at the landfill site were estimated to be well in excess of $3,000,000 for consulting, design, tender, construction, and approval processes with only a small reduction in annual operating costs versus hauling to an existing organics processing facility. These costs are also presented in Appendix A.

An SSO program has the potential to have a positive increase for waste diversion, but would be an expensive program to implement as described above, which poses challenges (especially for a smaller municipality) as the entirety of the program will be self funded by the Township. Additionally, in view of the rural agricultural nature of the Township it is known that there is already residential organics diversion taking place to a considerable

extent and so it is difficult to estimate what effect additional SSO diversion by any option might have on the residential diversion rate. Although there is an estimated potential to increase the diversion rate by as much as 25 percentage points with an SSO program, residents already manage their SSO to a degree. As a result, it is estimated that a new SSO program may only increase the Township's diversion rate by 5 to 10 percentage points, with all SSO options considered to have a relatively similar affect.

8.3 Option 3 – Enhanced Recycling

The current recycling program is a comingled single stream system that collects both fibres and containers in the same recycling bin that is collected and sorted at curbside and hauled to the small material recycling facility (MRF) at the Boyne Landfill. The current system collects recyclables once every two weeks and waste once a week, with waste being collected by a private contractor. The Township is one of few municipalities that sorts their recyclables at curbside due to the small size of their MRF, which is not large enough to incorporate a sorting line in its operation. The materials accepted in the current recycling program are presented in Section 4.1.1 of this report. The sorted recyclable material is then collected from the Boyne Landfill by a recycling contractor.

The recycling collection program is the main component of the waste diversion program. However, the current program employs equipment that is considered outdated in age and abilities, with maintenance and repair costs increasing yearly. With the introduction of Extended Producer Responsibility in Ontario, increased pressure will be placed on municipalities to increase the efficiency of their recycling programs. As recycling legislation is being updated in Ontario, and as the Township's equipment nears the end of its lifespan, an overhaul to the program's operation and equipment is imminent. It is suggested that consideration be given to optimizing the current recycling program into a dual-stream recycling program, facilitated by the purchase of two new 60/40 split collection vehicles. The new collection vehicles would be managed by municipal employees who would collect both waste and recycling weekly, with the collection of fibres and containers alternating each week. The comingled recycling material would then be hauled to an Eastern Ontario private MRF for processing, such as RARE Recycling Facility (Alexandria) or Cascades Recovery+ Recycling Center (Ottawa). The current small MRF located at the Boyne Landfill could then be repurposed into a material transfer station.

To implement the dual stream recycling program, it is proposed that the Township provides households with a subsidy or coupon for purchasing a second recycling bin. Distribution of this second bin coupon would also generate awareness for the public of the change to the recycling program. At this time, residents should be educated on which materials are to be collected on a given week. A collection calendar can be distributed with the new bins at the time of purchase.

The enhanced recycling program is expected to reduce the time for curbside collection (by eliminating manual sorting done at curbside), reduce the number of vehicles required for the collection program, and save costs by eliminating the reliance on a private contractor for waste collection. Sending the recyclables for processing at a private MRF would eliminate the small revenue generated from the recycling program but should be offset by the overall reduced operational costs. It is estimated that implementing the enhanced recycling program with dual stream recycling would cost approximately $660,000 (for provision of recycling bins, purchase of collection vehicles and promotional efforts) but would be recouped in a short amount of time because of lower operational costs over the current program and the elimination of the waste collection contract (estimated operational savings of approximately $180,000 each year). A preliminary cost estimate is available in Appendix A.

Working with a private MRF may also offer the added potential to expand the scope of accepted materials in the current recycling program and in turn increase the Township's overall diversion rate. Without expanding the scope of the program, the dual stream program is forecasted to still have a small positive effect on the residential

diversion rate, due to the extra capacity an additional recycling bin will offer residents; and by offsetting the processing efforts to a private MRF, contaminants in the recycling stream will also be reduced in the Township's residual waste management. It is estimated that the enhanced dual stream recycling program will improve the residential diversion rate by approximately 1%.

8.4 Option 4 – Leaf and Yard Waste Collection

The Township has no formal leaf and yard (L&Y) waste collection program in place. Presently, minimal curbside collection exists for only two villages in the Township and some residents/businesses drop of tree branches and brush material at the Boyne Landfill independently. The L&Y waste that is collected/received is chipped using an on-site woodchipper and the resulting woodchips are stockpiled and later used as daily cover in the landfill, particularly in winter months.

Due to the rural nature of the community, many residents already divert L&Y waste to voluntary backyard composting or otherwise manage it on their own property. A backyard composting program could be developed into a more expansive program if funded by the Township. Otherwise, the Township can consider collecting L&Y waste with a curbside collection program and explore other composting alternatives. Two possible alternatives include developing an on-site L&Y composting program at the Boyne Landfill, i.e., a windrow composting operation, or hauling collected L&Y waste to a pre-established L&Y composting or other organics processing facility. Each alternative could increase the residential diversion rate, but the efficacy of each option would depend on the status of the existing voluntary backyard composting /on property management, which is unknown.

Table 6 below displays a comparative evaluation of the options for a L&Y waste program in the Township. A preliminary cost estimate for these options is available in Appendix A.

Table 6: Leaf and Yard Waste Options Evaluation

Leaf and Yard Waste Option	Advantages	Disadvantages
4A) Backyard Composting	▪ Minimal Costs to establish and operate ▪ Reduces operations efforts for curbside collection ▪ Required by O.Reg. 101/94	▪ Backyard composting or on-property management likely already in practice and this option may not have a significant impact on diversion ▪ Relies on community engagement
4B) Curbside Collection with on-Site Composting	▪ Option to sell compost back to residents ▪ Source of daily cover material for landfill operations	▪ Requires additional collection vehicles ▪ Requires other types of organics inputs in addition to L&Y ▪ Capital costs for set up and ongoing operating costs
4C) Curbside Collection with hauling to L&Y Composting or Organics Processing Facility	▪ No changes to landfill site design or operations	▪ L&Y waste is in less demand by an organics processing facility compared to SSO material ▪ Requires additional collection vehicles ▪ High operating cost

For Option 4A, the operational efforts would be by the residents of the community but would require a capital investment by the Township to equip all households with backyard composting bins. The cost for the provision of compost bins is estimated at approximately $470,000. Options B and C incorporate curbside collection of L&Y waste and would require the purchase of an additional collection vehicle, incurring a cost of approximately $120,000. Option B involves on-site composting of the material at the Boyne Landfill by using outdoor windrow composting. Unlike SSO, a composting program for only L&Y waste is subject to fewer restrictions from provincial regulations due to the nature of the material. Ontario Regulation 101/94 provides an exception for a L&Y waste composting operation to require a waste environmental compliance approval (ECA) if certain conditions are met, making it more feasible for a smaller municipality to implement and manage. The implementation costs for a 1,000 square metre compost pad (with associated construction, approval, and design requirements), the purchase of an additional collection vehicle, and the P&E efforts total an estimated $275,000, with an estimated annual operating cost of $45,000. Option C would delegate the efforts and responsibility for processing L&Y waste to an external facility, which would result in a much higher operating cost to the Township. However, due to the low aerobic potential and higher nitrogen to carbon ratio of L&Y waste, most organics processing facilities are not as interested in receiving exclusively L&Y waste compared to SSO. Option C is estimated to require a capital cost of $130,000 and an annual operating cost of $80,500, if a location to receive this material can be identified.

Pursuant to Section 11 of Ontario Regulation 101/94, a municipality the size of the Township must establish, operate and maintain a L&Y waste system. The system must include the provision of home composters to residents (at cost or less), and the provision of information to residents regarding the L&Y waste program. The information to be provided to residents will be managed by P&E efforts. The information for residents includes publicizing the composting program, explaining the proper use and installation of home composters, the benefits of compost, and encouraging home composting.

To minimize operational costs for curbside collection of L&Y waste for Options 4B or 4C, the Township could utilize collection vehicles that are not in use for waste pick-up during a given week for L&Y waste collection. If new collection vehicles are purchased by the Township (as discussed in Section 8.3 with enhanced recycling), the older collection vehicles can be maintained for L&Y waste collection. As the estimated quantities of L&Y waste are relatively low and have a seasonal trend, it is expected that the additional operational efforts for collection would be low and seasonal.

The collection program for L&Y waste should have a seasonal operational focus, with the collection program operating once in the spring, and twice in the fall, with one early January collection date for Christmas tree disposal. The Township could also consider increasing its scope of collection beyond the two villages in the current program to the entire municipality or potentially the hamlets. The full potential of the L&Y program is estimated at approximately 270 tonnes of diverted material, or about 10% of the total waste stream. It is estimated that any alternative may only increase the residential diversion rate by 4%.

8.5 Option 5 – Policy Options

Policy Options are not a standalone waste diversion option but rather reinforce the effectiveness of other waste diversion options listed above. The Township currently has one waste diversion policy in place, which limits the number of bags that will be collected for residual waste material. The current policy states that residents are entitled to two bags of waste weekly, farms are entitled to four bags of waste weekly, and businesses are entitled to six bags of waste weekly. It is acknowledged that the current bag limit policy is not strictly enforced. Moving forward, the Township could consider the following policy options:

- **Bag Limits:** Maintain the current bag limits for residents and farms (i.e. 2 bags/week for residents, 4 bags/week for farms) but have more strict enforcement, not collecting waste that exceeds the bag limit. This will further encourage diversion efforts at residences and farms. This would be coupled with a strong P&E program to encourage participation in the recycling program, thereby reducing the amount of waste being sent for disposal.
- **IC&I Limit:** IC&I waste would have reduced acceptance at the Boyne Landfill. Multi-residential buildings and approved businesses who currently receive collection would still receive curbside collection, but other existing and new businesses would be responsible for managing their own waste moving forward through private contractors who will haul the waste and recyclables to an external waste management/disposal site.
- **Concrete Ban:** Concrete should no longer be accepted for drop-off at the landfill site.

The policies noted above would reinforce the requirements for waste diversion at the collection level and will place an emphasis on utilizing the landfill primarily for residential waste, thereby helping to extend the lifespan of the landfill capacity. The policy options can be implemented for relatively small costs, requiring mostly P&E efforts in addition to staff training and effort for Council to implement the policy requirements. Development of education materials and promotional efforts is estimated to cost approximately $5,000.

8.6 Additional Diversion Efforts

In addition to whichever diversion options above are selected, it is proposed that the Township incorporate the following into their waste management program. These diversion efforts will provide different outlets for residential waste outside of the main waste and recycling collection and management programs. These smaller diversion efforts do not require a high operating cost (if any) and will potentially reduce operating costs of other diversion programs and waste required for landfilling. These efforts compliment other diversion options but are not substantial enough to be in lieu of or offer a direct comparison. These additional diversion efforts and programs are described below.

Promotion and Education

All waste diversion options listed above will require P&E efforts in some capacity. Good communication between the Township and the residents and businesses would be expected to increase or maximize participation in the selected waste diversion programs and efforts. The primary focus of P&E is to raise awareness regarding the waste diversion program and its resources, and the benefits of diversion, while also removing barriers for participation in the waste diversion program.

Whether the current system is maintained, or one or more waste diversion options is adopted, the general public should have access to the following information:

- materials accepted in the curbside blue box collection program and the curbside waste collection program
- collection dates, route changes, and holidays for curbside collection programs
- operating hours and holidays for the Boyne Landfill
- types of HHW and WEEE and how to properly dispose of these materials
- alternative resources for waste diversion (local retailers, take-back programs, etc.)

Any newly selected waste diversion options will require additional P&E efforts so that the public is aware of the changes to the waste management system and is able to adopt the new system with ease. P&E efforts for the new waste diversion options would be done through the same channels and the associated costs reduced and shared if multiple options are selected. Following the selection of waste diversion options, the following information would also be shared with the community:

- changes to the waste management program and date of implementation
- classification of SSO (if applicable) and accepted material
- instructions for backyard composting
- policy changes and material bans
- dates for curbside L&Y waste collection
- how/where to obtain and redeem coupons for recycling bins or home composters

In addition to information regarding the new waste diversion options, residents and businesses should be regularly re-educated on the basics of waste diversion to maintain a healthy baseline participation in the program. Educational materials should be regularly distributed to remind residents which products are suitable for disposal, and through which channels they can be disposed. Educational materials for improving home practices, such as adding recycling bins in the laundry room or bathrooms for collection of common household plastic containers, can also be distributed.

Presently, information regarding the waste management practices and operations are shared to the community primarily via advertisements in the newspaper, posting on the Township's website, or through the distribution of the collection calendar. The Township also has a limited subscription to the Recycle Coach App, which allows residents to check a personalized collection calendar and receive pick up and event reminders. Through this app, the Township could also provide residents with a search tool for "what goes where?" and other information regarding collection requirements. The Township may also consider partnering with businesses or initiating awareness campaigns or promotions to raise awareness about the waste diversion program. Providing coupons for the purchase of new recycling bins or home composters are also an effective way to indirectly raise awareness of the program changes. It is estimated that a P&E budget should account for about $2 per household, with the total cost for P&E efforts during the implementation of new waste diversion efforts estimated to be between $5,000 to $10,000.

Waste Minimization

Even more important than waste diversion is waste reduction and minimization. If the volume of waste can be reduced at the source, the volume of material required for residual waste management will also be reduced. A large component of promoting waste minimization will be educating residents and businesses in the community on how they generate waste and how they can produce less. Some waste minimization practices include:

- **Home Gardening**: Growing one's own fruit, vegetables, spices or herbs can greatly reduce the reliance on purchasing the same products from a grocery store and eliminate the associated packaging, bags, and other waste that is generated from purchasing at a supermarket. Home gardening can be done by a household independently or the efforts can be shared amongst neighbours. Unused portions of fruit and vegetables from home gardening can also be used in a backyard composter, which can in turn be used again for home gardening.
- **Shopping Green**: Some goods need to be purchased in stores, but consumers should pursue goods that have minimal packaging. Avoiding disposable shopping bags by using reusable shopping bags is another way to reduce shopping waste.
- **Exchange and Resale**: Rather than buying new or disposing of used but functional items, residents can reduce the disposal of unwanted items by shopping at and donating to charities, thrift stores, community swaps and online exchange marketplaces.

Waste reduction and minimization is contingent on public engagement and awareness. The Township might consider keeping an information list on operating local charities, retailers and other businesses to provide to residents to promote minimization practices in their community and engage persons who are interested in these practices. Promoting these waste minimization practices to businesses in particular can affect their operating and purchasing practices and have an impact on the waste they generate, while simultaneously promoting the practices to employees and customers who frequent their business.

Construction and Demolition Waste Recycling

It is estimated that construction and demolition (C&D) materials are being produced in both the residential and IC&I waste streams. C&D material that could be diverted for beneficial reuse includes drywall, clean dimensional lumber (e.g., untreated lumber, manufactured wood products such as plywood, chipboard and pressboard), scrap metal, ceramic tile, porcelain products, shingles, concrete and brick. Only scrap metal is being captured and diverted in the current system. The Township may consider limiting the receipt of C&D materials at the Boyne Landfill. Accepted materials may be diverted to a waste recovery center, secondary markets, reused by the Township, or donated to the public, where possible. Drywall may be shipped to a gypsum recycler for recovery, and lumber and wood products may be chipped and used as interim cover at the Boyne Landfill.

Cooking Oil Recycling

There are several companies that purchase cooking oil and grease for reuse and resale. The Township already collects used oil as part of the HWW program at the Boyne Landfill that is collected by a contractor and hauled to an applicable recycling facility once a sufficient volume has been collected. The availability of the service at Boyne Landfill should be advertised to residents so that this material can be diverted from being sent to landfill.

Pallet Recycling

Many wooden pallets are generated through the IC&I waste stream and sent to the landfill for disposal. If pallets are diverted upon receipt at the landfill site, pallets could be given to interested public or businesses.

Textiles and Housewares

There are several community outreach missions and thrift stores throughout the Township of North Dundas, such as House of Lazarus or the Salvation Army, that work to provide household goods, clothing and services to food bank clients and other community members in need. These services accept donations from the community, such as household furniture, housewares, textiles, and old clothing, and provide it to community members in need; or these items are made available for resale with the proceeds going to funding community events, programs, and services to community members in need, such as housing, camps and social services. Donating to these services would both reduce waste being sent to the landfill and have a positive impact on the community.

9.0 EVALUATION OF WASTE DIVERSION OPTIONS

The options listed in Section 8.0 of this study have been evaluated below using five evaluation criteria. The evaluation criteria are described in Section 9.1 below and the results of the evaluation are presented in Section 10.0 of this report.

9.1 Evaluation Criteria

9.1.1 Environmental Impacts

The potential impacts that each option may have on the environment will be considered as part of this evaluation. The Environmental Impacts evaluation considers the potential positive (or negative) affects that the waste diversion option could have on the environment. Positive environmental impacts considered in this study include increased waste diversion from the landfill, waste reduction, and replacement of equipment with more sustainable technology. Negative environmental impacts include increased air emissions (for example, from increased hauling efforts and processing), and the potential for environmental spills or contaminant releases (via stormwater or otherwise).

9.1.2 Cost Effectiveness

The cost effectiveness of each option is considered as part of the evaluation. The Cost effectiveness comparison is considered quantitatively in two ways: 1) the cost required per tonne of waste material diverted; or, 2) the cost required versus the additional waste diversion percentage achieved. The information used for this comparison is summarized below in Table 7 with rounded costs. Detailed costs are presented in Appendix A. The costs for Option 1, *Maintain Current System*, have been omitted from the Table below, as the current system costs are not directly comparable to the costing of the diversion options. Similarly, the *Material Available for Diversion* and *Diversion Percentage Expected* have been omitted for Option 5, *Policy Options*, as no relevant estimates are applicable for this option.

Table 7: Cost Effectiveness Criteria Summary

Waste Diversion Option	Cost		Material Available for Diversion (tonnes)	Diversion Percentage Expected
	Capital Cost	Annual Cost		
1) Maintain Current System	N/A	N/A	625	0%
2A) SSO – Backyard Composting		$0	680	5 – 10%
2B) SSO – On-site Organics Processing Facility	$3,435,500	$305,000	680	5 – 10%
2C) SSO – Haul to Organics Processing Facility	$440,500	$352,000	680	5 – 10%
3) Enhanced Recycling – Dual Stream Recycling	$662,000	$(179,500)	630	1%
4A) L&Y – Backyard Composting	$467,000	$0	270	4%
4B) L&Y – On-site Composting	$275,000	$45,000	270	4%
4C) L&Y – Haul to Organics Processing Facility	$130,000	$80,500	270	4%
5) Policy Options	$5,000	$0	N/A	N/A

9.1.3 Economic Development / Social Acceptance

Economic Development and Social Acceptance relate to the applicability of the waste diversion option being considered for the Township residents and users of the waste management system. Consideration is given to the practicality of adopting the program, the anticipated public participation in the program, the consequences of transitioning from the existing waste diversion system to the new waste diversion option and the related effects of the transition for residents of the Township.

9.1.4 Feasibility for the Township to Implement

The Feasibility for the Township to implement the waste diversion options is evaluated with consideration given to factors directly relevant to the Township. Factors of feasibility considered in this study include affordability of the waste diversion option, long term effectiveness of the option, time required for implementation of the option, and anticipated waste management system changes (including policy updates, approval processes and contract negotiations).

9.1.5 Operational Considerations

The Operational Considerations criteria evaluates the effect of the waste diversion options on current operational requirements at the system level. Consideration is given to the amount of additional training required for waste management staff, anticipated maintenance requirements, changes in landfill site practices/operations, and other associated operational challenges anticipated.

10.0 SELECTION OF THE PREFERRED OPTION

The waste diversion options discussed above are evaluated in Table 8 below using the criteria described in Section 9.1. The evaluation criteria were used to apply a score from 1 to 5, where 1 indicates an undesirable effect, 3 is neutral, and 5 indicates a positive effect. In this scheme the higher score indicates a more preferable or beneficial option.

Table 8: Evaluation of Diversion Options

Waste Diversion Option	Criteria (score out of 5)					Total Score
	Environmental Impacts	*Cost Effectiveness*	*Economic Development/ Social Acceptance*	*Feasibility for Township to Implement*	*Operational Considerations*	
1) Maintain Current System	2	2	3	3	3	**14**
2A) SSO – Backyard Composting	4	2	4	4	4	**18**
2B) SSO – On-site Organics Processing Facility	2	1	3	1	2	**9**
2C) SSO – Haul to Organics Processing Facility	3	2	3	3	3	**14**
3) Enhanced Recycling – Dual Stream Recycling	3	5	4	4	5	**21**
4A) L&Y – Backyard Composting	3	2	4	4	4	**17**
4B) L&Y – On-site Composting	3	3	4	4	3	**17**
4C) L&Y – Haul to Organics Processing Facility	3	3	3	3	3	**15**
5) Policy Options	4	3	2	4	3	**16**

Based on the evaluation presented in Table 8 above, multiple diversion options have scored above an average score of 15, with most being preferred over maintaining the current system. A combination of waste diversion options is proposed for the preferred waste diversion system. The preferred combined waste diversion system includes:

- backyard composting for SSO
- dual Stream Recycling program
- curbside collection and on-site composting for L&Y waste
- existing and new waste management policies

The preferred combined waste diversion system consists of curbside collection of waste and dual-stream recyclables by municipal staff using new 60/40 split collection vehicles. Collection will occur weekly, with recyclables collection alternating each week between fibres and containers. Waste material will be brought to the Boyne Landfill (or alternate disposal option if the Boyne Landfill is not expanded), whereas recyclable material will be transferred at the Boyne Landfill and then hauled to a private material recycling facility outside of the

Township. According to the existing and new waste management policy options, curbside collection will only collect 2 bags of waste from residents and 4 bags of waste from farms. No waste will be collected from businesses or multi-residential buildings (following a phase out program) and receipt of concrete from IC&I sources will be limited at the landfill. L&Y waste will also be collected from specific areas of the Township at the curbside four times throughout the year: once in the spring, twice in the fall, and once in early January for collection of Christmas trees. The collection of L&Y waste will be done using the existing collection vehicles from the old waste diversion program until they have exhausted their useful lifespan; after which additional collection routes will be scheduled for L&Y waste using the new collection vehicles. Collected L&Y waste will be sent to the Boyne Landfill, where it will be chipped and used as daily cover for landfilling operations or be placed at a new composting pad for outdoor windrow composting. The Township will also promote residents to divert SSO material and excess L&Y waste from landfill using the backyard composting program introduced for SSO.

10.1 Program Implementation

To implement the new combined waste diversion program, the Township will need to take several actions to make changes to the current system. It is expected to take several months to several years to fully implement. The Township will provide residents with a coupon for the purchase of one backyard composter and one blue box recycling bin. The new 60/40 split collection vehicles will need to be purchased and a partnership with a nearby private MRF will need to be negotiated. The existing waste management contact with a private collector may then be terminated once the new collection vehicles are available and dual stream recycling has commenced. After this time, the existing MRF at the Boyne Landfill can be slowly decommissioned and transitioned into the role of a drop-off and transfer station for recyclable materials. Concurrent with these operations, the Township will need to retain a consultant to design the L&Y composting pad and program at the Boyne Landfill and receive operational approval from the MECP. Until the composting program is approved and operational, collected L&Y material can be chipped and used as daily cover, as in the current site operations. The program changes, policy updates and access to additional resources will need to be communicated to residents through a well-developed P&E program over a number of months. The P&E program should also promote waste minimization and additional waste diversion effort resources, such as the outlets for donation, recycling, or proper disposal of various products outside the regular blue box recycling stream.

The implementation of the preferred combined waste diversion system will slowly be implemented over several years as operational components are developed and organized. Beyond that, the participation in each option of the system will slowly ramp up over several more years, as the diversion practices are learned and adopted by the community until they are commonly used. As a result, it is reasonable to expect that it will take several years before the residential diversion rate sees a significant increase due to the waste diversion program changes.

11.0 CONCLUSIONS

Based on the information collected in this study, potential waste diversion options have been identified and evaluated and a preferred waste diversion program selected. The results of this study, in conjunction with other studies during the Environmental Assessment, will be used to identify the Preferred Alternative for the Township's waste management system.

The preferred waste diversion program selected as part of this study is a combination of specific waste diversion options evaluated. These consist of backyard composting for source separated organics, a dual stream recycling program with new split collection vehicles, curbside collection of leaf and yard waste, composting of leaf and yard waste at the Boyne Landfill, and specific policy requirements including bag limit policies for residents, farms and businesses. The preferred combined waste diversion system is estimated to have an increased diversion potential

between 10 to 15 percentage points, corresponding to an increased residential diversion rate of 33 to 38%. The current residential diversion rate (23%, RPRA, 2018) may actually be higher, due to the voluntary backyard composting efforts by residents that already exist but are not quantifiable within the Township. It is expected that the new waste diversion programs will require a ramp up period before meeting their diversion potential. The diversion potential is estimated based on limited information known and assumed for the waste management system for the Township. It is also noted that the Village of Winchester in the Township may experience a higher than anticipated population increase due to the potential construction of housing developments in the near future; however, this population increase is not forecasted by current population projections within this study. The potential for population increase reinforces the need to develop and establish additional waste diversion options in the Township.

For waste management planning purposes, and assuming implementation of the enhanced diversion program commences in 2021, it is considered reasonable to expect that the Township's residential diversion rate could increase to approximately 28% by 2025 and 33% by 2030 and continue at this diversion rate in the future.

12.0 LIMITATIONS

This report was prepared for the exclusive use of the Township of North Dundas. The report, which specifically includes all tables, figures and attachments, is based on data and information collected by Golder Associates Ltd. and is based solely on the conditions of the properties at the time of the work, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this report.

Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore authenticity of any electronic media versions of Golder's report should be verified.

Golder Associates Ltd. has relied in good faith on all information provided and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the report as a result of omissions, misinterpretation, or fraudulent acts of the persons contacted or errors or omissions in the reviewed documentation.

The services performed, as described in this report, were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings, or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

Signature Page

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https://golderassociates.sharepoint.com/sites/117046/project files/6 deliverables/volume 3 supporting documents/3 final/appendix j - waste diversion study/1648253 twpndundas waste diversion study 2020.docx

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APPENDIX A

Cost Estimates for Waste Diversion Options

Option 2A) SSO - Backyard Composting

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Backyard Composter Coupons for Households in Community	4,761	Household	$ 97	$ 461,817.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Capital Costs Subtotal				$ 466,817.00

Option 2B) SSO - On-site Organics Processing Facility

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Indoor and Outdoor Green Bin Coupons for Households in Community	4,761	Household	$ 40	$ 190,440.00
Construction and approval of Composting Facility (Includes engineering design, consultation, MECP approval, and approximate construction cost)	1	L.S.	$ 3,000,000	$ 3,000,000.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Purchase of Additional Collection Vehicles	2	Truck	$ 120,000	$ 240,000.00
Capital Costs Subtotal				$ 3,435,440.00

Annual Costs				
Curbside collection of SSO	1	L.S.	$ 230,000	$ 230,000.00
Staffing for composting facility	1	L.S.	$ 75,000	$ 75,000.00
Annual Costs Subtotal				$ 305,000

Option 2C) SSO - Haul to Organics Processing Facility

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Indoor and Outdoor Green Bin Coupons for Households in Community	4,761	Household	$ 40	$ 190,440.00
Contract Development with Organics Processing Facility	1	L.S.	$ 5,000	$ 5,000.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Purchase of Additional Collection Vehicles	2	Truck	$ 120,000	$ 240,000.00
Capital Costs Subtotal				$ 440,440.00

Annual Costs				
Curbside collection of SSO and Hauling to Organics Processing Facility	1	L.S.	$ 250,000	$ 250,000.00
Processing Fees at Compost Facility	680	tonne	$ 150	$ 102,000.00
Annual Costs Subtotal				$ 352,000

Total Capital Costs - 2A) Backyard Composting	**$ 466,817**
Total Capital Costs - 2B) On-site Organics Processing Facility	**$ 3,435,440**
Total Capital Costs - 2C) Haul to an Organics Processing Facility	**$ 440,440**
Total Annual Costs - 2A) Backyard Composting	**$ -**
Total Annual Costs - 2B) On-site Organics Processing Facility	**$ 305,000**
Total Annual Costs - 2C) Haul to an Organics Processing Facility	**$ 352,000**

Option 3) Enhanced Recycling - Dual Stream Recycling

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Second Recycling Bin Coupon for Households in Community	4,761	Household	$ 12	$ 57,132.00
Purchase of 60/40 Split Collection Vehicles	2	Truck	$ 300,000	$ 600,000.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Capital Costs Subtotal				$ 662,132

Annual Costs				
Additional fuel/maintenance costs over current program	1	L.S.	$ 30,000	$ 30,000.00
Recycling Processing Fees at private MRF	630	tonne	$ 25	$ 15,750.00
Eliminating Private Waste Collection Contract	1	L.S.	$ (290,000)	$ (290,000.00)
Eliminating Recycling Program Revenue	1	L.S.	$ 65,000	$ 65,000.00
Annual Costs Subtotal				$ (179,250)

Total Capital Costs - 3) Dual Stream Recycling	**$ 662,132**
Total Annual Costs - 3) Dual Stream Recycling	**$ (179,250)**

Option 4A) L&Y - Backyard Composting

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Backyard Composter Coupons for Households in Community	4,761	Household	$ 97	$ 461,817.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Capital Costs Subtotal				$ 466,817.00

Option 4B) L&Y - Onsite Composting

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Construction and approval of Composting Pad (Includes engineering design, consultation, MECP approval, and approximate construction cost)	1	L.S.	$ 150,000	$ 150,000.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Purchase of Additional Collection Vehicles	1	Truck	$ 120,000	$ 120,000.00
Capital Costs Subtotal				$ 275,000.00

Annual Costs				
Curbside collection of L&Y	1	L.S.	$ 30,000	$ 30,000.00
Processing effort at composting pad	1	L.S.	$ 15,000	$ 15,000.00
Annual Costs Subtotal				$ 45,000

Option 4C) L&Y - Haul to Organics Processing Facility

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Contract Development with Organics Processing Facility	1	L.S.	$ 5,000	$ 5,000.00
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Purchase of Additional Collection Vehicles	1	Truck	$ 120,000	$ 120,000.00
Capital Costs Subtotal				$ 130,000.00

Annual Costs				
Curbside collection of L&Y and Hauling to Organics Processing Facility	1	L.S.	$ 40,000	$ 40,000.00
Processing Fees at Compost Facility	270	tonne	$ 150	$ 40,500.00
Annual Costs Subtotal				$ 80,500

Total Capital Costs - 2A) Backyard Composting	**$ 466,817**
Total Capital Costs - 2B) Onsite Composting	**$ 275,000**
Total Capital Costs - 2C) Haul to an Organics Processing Facility	**$ 130,000**
Total Annual Costs - 2A) Backyard Composting	**$ -**
Total Annual Costs - 2B) Onsite Composting	**$ 45,000**
Total Annual Costs - 2C) Haul to an Organics Processing Facility	**$ 80,500**

Option 5) Policy Options

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL COST
Capital Costs				
Development of educational materials and promotion of program	1	L.S.	$ 5,000	$ 5,000.00
Capital Costs Subtotal				$ 5,000

Total Capital Costs - 3) Dual Stream Recycling	**$ -**
Total Annual Costs - 3) Dual Stream Recycling	**$ 5,000**

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