

November 2013

Leaf and Yard Waste and Composting Strategy





Leaf and Yard Waste and Composting Strategy

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Strategy Summary

	Objectives: The overall objective is to ensure the Region is well prepared and equipped to process and manage additional leaf and yard waste if required.	Targets: Targets for residential leaf and yard waste collection are expected to correspond with the quantity projections presented (within Strategy).
	Benefits: - Diversion of materials from landfill disposal contributing roughly 20% to York's overall diversion achievements; - Compliance with regulatory requirements; - Creation of a useful product that returns organic matter and nutrients to the earth; - Provides a tool to assist with management of the Asian Long Horned Beetle quarantine; - Builds on existing success and resident enthusiasm for the program; - Secures future success by identifying current future needs and options to fulfill those needs; and, - Suggests ideas to consider for program optimization and expansion.	

1.0 Introduction

The leaf and yard waste management strategy is a component of York Region's first Integrated Waste Management Master Plan also known as the SM4RT LIVING Plan. The Plan establishes the planning framework and strategic direction for waste management in York Region for the next 40 years; it builds on the Region's position as a waste management leader, focusing on driving waste reduction and reuse while maximizing recycling and energy recovery from the materials remaining.

The primary objective of this strategy is to ensure York Region is well prepared and equipped to process and manage additional leaf and yard waste if required.

2.0 Background and Trends

2.1 Curbside Collection and Centralized Composting

In York Region, leaf and yard waste is collected and processed to produce Compost Quality Alliance (CQA)¹ certified compost. The leaf and yard waste program is an important component of the Region's waste diversion efforts. Compost created from York Region's leaf and yard waste is a beneficial product sold to contractors and residents for use in agriculture, horticulture, landscaping and home gardening.

As one of York Region's earliest diversion initiatives, the leaf and yard waste program is well established and has been strongly embraced by residents. Leaf and yard waste materials collected and processed in York Region include:

- Leaves, branches and twigs
- Flowers and garden plants
- Shrubs, pumpkins
- Grass clippings, sod and weeds

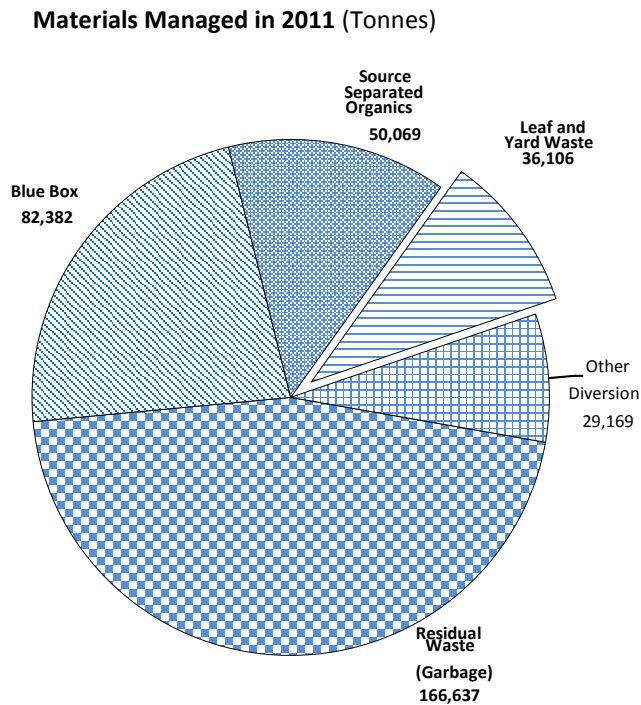
The nine local municipalities provide curbside pick-up for source separated leaf and yard waste through the growing season (April to December). Most of the nine local municipalities offer bi-weekly leaf and yard waste collection from April to December. Christmas trees are collected in January.

The leaf and yard waste diversion program is familiar to York Region residents. Their participation provides a high-quality feedstock for composting. Leaf and yard waste may only be set-out in kraft paper bags or re-usable open topped containers. Plastic bags are not accepted for use in order to avoid plastic contaminants in the finished compost. Acceptable kraft paper bags are widely available at many retailers throughout the Region.

¹ Compost Quality Alliance – a voluntary program of standardized testing and declaration of product attributes with guidelines for appropriate usage.

Collection and processing of leaf and yard waste represents a significant segment of waste materials managed by York and contributes substantially to York Region's diversion efforts, as illustrated in Figure 1.

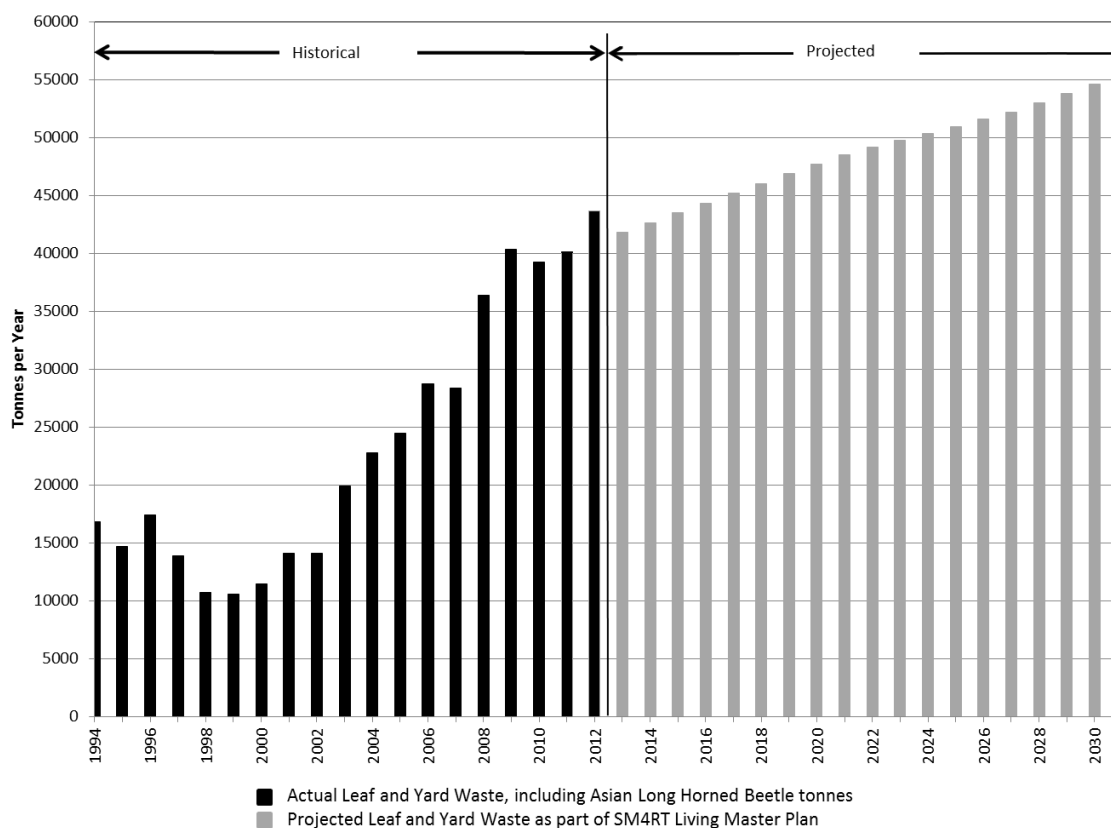
Figure 1 – Leaf and Yard Waste in York Region



Future projections of leaf and yard waste quantities are based primarily on the extension of past material generation rates into the future, reflecting growth anticipated for the Region. Figure 2 illustrates historical quantities of leaf and yard waste collected, as well as quantities projected within the time-frame of the SM4RT Living Plan. It is expected that by 2031 quantities of leaf and yard waste will increase by 53 per cent to 55,400 tonnes in 2031.

Leaf and yard waste management is a required activity governed by Ontario Regulation 101/94 made under the *Ontario Environmental Protection Act*.

Figure 2 – Leaf and Yard Waste Quantities



The Canadian Food Inspection Agency recently announced the eradication of the Asian Long-horned Beetle from Canada and repeal of the previous quarantine measures in the City of Vaughan. Consistent with these program changes, the above projections include the requirement for pre-processing of materials sourced within the Asian Long-horned Beetle quarantine area ending as of 2013.

All leaf and yard waste collected within the Region is sent to a Regionally contracted open windrow composting facility owned and operated by Miller Waste Systems Inc. (Miller). York Region municipalities have been sending leaf and yard waste to Miller's composting facility for more than 20 years. Since 1990, more than 400,000 tonnes of York Region's leaf and yard waste has been diverted from landfill and composted at the Miller facility. Miller sells the compost to contractors and residents for use as an enhancement for soil in gardening, landscaping, horticulture and agriculture.

In addition to diverting waste materials from disposal, leaf and yard waste composting produces lower emissions of greenhouse gases (GHG) in comparison to landfill gas emissions arising from decomposition of leaf and yard waste if landfilled. For example, organic waste generates methane gas as it decomposes. In landfills, the gas is lost as it escapes into the atmosphere as methane (this is 21 times more powerful than carbon dioxide – CO₂). In a study

estimating the GHG emissions of 1,000 tonnes of organic waste compared to landfilling, the CO₂ emissions were much lower for the composting option than a highly engineered landfill (Note: results are qualitative only; actual values will vary depending on local conditions.)²

2.2 Backyard Composting

Historically, one of the most cost-effective options to manage organics onsite involves backyard composters, where residents turn the compost regularly. The benefits of backyard composting include:

- Soil enrichment - compost improves soil structure to enhance plant growth
- Water conservation - compost helps soil retain moisture, reducing the need for watering
- Waste reduction - composting can reduce household waste by as much as 30 per cent
- Prevention of plant disease - compost contains natural antibiotics suppressing disease in plants

York Region and local municipalities have subsidized the cost of purchasing backyard composters. In 2010, the Region sold backyard composters for \$10, whereas most municipalities in the Region sold backyard composters (except King and Whitchurch-Stouffville) ranging in cost from free to \$44 each. The number of composters distributed, and an estimate of the amount of waste diverted through these composters and current grasscycling initiatives are shown in Table 1.

Table 1. On-site Waste Diversion Through Backyard Composters and Grasscycling.

Year	Cumulative # of backyard composters in the Region ³	Estimated Backyard Composting Diversion (tonnes) ⁴	Estimated Grass cycling Diversion (tonnes)	Total Residential On-Property Diversion (tonnes)
2007	73,230	7,323	1,247	8,570
2008	73,710	7,371	2,715	10,086
2009	74,360	7,436	7,737	15,173
2010	74,790	7,479	6,951	14,431
2011	75,011	7,501	5,891	13,409

2.3 Grasscycling

Grasscycling refers to the practice of encouraging residents to leave grass clippings on the lawn, rather than disposing of it in the leaf and yard waste collection program. Grass clippings are

² Review of Waste Technologies: Solid Waste as a Resource. (2004). Federation of Canadian Municipalities.

³ As reported to Waste Diversion Ontario

⁴ Estimated that each composter diverts 100kg/year

banned from eight of the nine local municipal residential leaf and yard waste collection programs in the Region, with only Vaughan accepting grass clippings at the curb.

According to a Citizen Panel survey completed in 2011, 75 per cent of respondents stated they grasscycle or mulch while mowing the lawn. Twenty-five per cent of respondents who did not grasscycle “did not know” why they were not implementing this practice, suggesting that further education and outreach may effectively convince this group to participate in the practice.

Knowledge barriers and misperceptions about grasscycling are common barriers to those residents not currently practicing backyard composting. Perceptions such as not wanting a messy looking lawn and weed growth are significant barriers that could be addressed through behavioral change strategies. An opportunity exists to increase uptake of these practices through behavioural change initiatives delivered in partnership with community organizations such as horticultural societies. Table 2 shows the diversion values (as a percent of the leaf and yard waste stream) which are calculated by Ontario municipalities depending on the municipal grasscycling policies in place:

Table 2. Grasscycling Diversion Rates used in Waste Diversion Ontario

Grasscycling Elements	Diversion
Promotion and education only	Two per cent of leaf and yard waste stream
Promotion and education Ban on grass clippings in leaf and yard waste pick-up	10 per cent of leaf and yard waste stream
Promotion and education Ban on grass clippings in leaf and yard waste pick-up Ban on grass clippings in residual waste	15 per cent of leaf and yard waste stream
Promotion and education Ban on grass clippings in leaf and yard waste pick-up Ban on grass clippings in residual waste Three-container limit or lower for residual waste, plus user pay	20 per cent of leaf and yard waste stream

When combined with effective public education and promotion of backyard composting benefits, harmonization of pricing for composters and grasscycling policies across the Region may contribute to adoption of backyard composting as a routine household practice by more residents.

Waste Diversion Ontario’s standard practice to account for the effects of backyard composting is to assume a diversion rate of 100 kg/composter/year. The validity of this quantity needs to

be reassessed. Recent research in western Canada has suggested the amount of material diverted in residences practicing backyard composting may be considerably greater than 100 kg/year per household. In a study of 16 households (54 residents) conducted on the North Shore of Vancouver in 2008 and 2010⁵, the quantity of organics diverted to a backyard composter was estimated at 362 kg/year per household. While this small study may not be directly applicable to a large, diverse community such as York Region, the results suggest there is a rationale for the Region to implement a similar study to better estimate the amount of organics attributed to local backyard composters.

3.0 Leaf and Yard Waste Management Strategy

Leaf and yard waste is produced from activities such as gardening, landscaping, horticulture and agriculture. Leaf and yard waste is created throughout the Region at single-family residences, multi-unit residential complexes, commercial and institutional complexes and parks.

The leaf and yard waste program is the oldest formal diversion program in York Region and annually contributes to nearly 18 per cent of York Region's total diversion achievements. This successful program is very well known and well-received by residents.

The direction for leaf and yard waste management outlined in this report is focused primarily on accommodating anticipated growth within the Region and addressing currently identified gaps and needs to continue the success of this program. In addition, options for potential optimization of the program are raised for consideration.

3.1 Strategy Components

3.1.1 Collection

Residential Source Materials

Capture of residential leaf and yard waste in York Region is accomplished primarily through curbside collection programs for single-family dwellings. The existing curbside collection program works well and meets the needs of each community. Local municipalities operate and administer the curbside collection programs with ongoing performance reviews and adjustments to meet growth needs of each local municipality.

Approximately 90 per cent of leaf and yard materials managed are collected at the curbside in York Region. In York Region, leaf and yard wastes are accepted for drop-off at the Georgina Transfer Station and at Miller's Composting facility on Bloomington Road in Richmond Hill. A

⁵ <http://www.biocycle.net/2011/10/value-and-benefits-of-backyard-composting/>

similar relative proportion of curbside versus depot capture exists in surrounding GTA municipalities.

When conducted properly, backyard or on-property composting provides an alternative to collection and processing for management of a portion of residential leaf and yard wastes. Backyard or on-property composting of leaf and yard waste provides similar diversion and environmental benefits, while avoiding costs for collection and processing.

No changes to the existing programs for capture of residential leaf and yard waste materials are deemed necessary under this strategy. The Community Environmental Centres strategy recommends consideration of adding leaf and yard waste collection as this is a best practice elsewhere in the GTA. Should that program change be made, implications to this strategy will need to be considered as well.

It is recommended that ongoing commitments to support existing residential leaf and yard waste composting programs be continued including:

- Routine collection service performance reviews
- Collection program expansions and efficiency optimizations to address growth
- Public education and promotion to encourage continued participation in the program

Industrial, Commercial & Institutional Source Materials

Leaf and yard waste materials from locations other than single family dwellings (i.e. multi-unit residential complexes, commercial and institutional complexes, parks, golf courses, sports fields and farms) are not generally captured in York Region's waste management system. Materials from these sources are handled by maintenance/landscaping contractors or other service providers and, as such, are considered as industrial, commercial and institutional (IC&I) materials. The quantities of potential IC&I source leaf and yard wastes are not known. It is important to note that leaf and yard waste is not identified as a required source separation material for the IC&I sector by Ontario Regulation 103/94 made under the *Ontario Environmental Protection Act*.

Currently in York Region, IC&I wastes are predominantly managed by private sector haulers and waste management companies outside the Regional system. For the purpose of this strategy, it is assumed that the focus will continue to be managing of residential leaf and yard waste. Should a decision be made to move toward incorporating IC&I source materials into the leaf and yard waste program, adjustment of this strategy would be required to quantify the potential additional materials to be managed and determine the preferred approach to collection and processing of IC&I-sourced leaf and yard waste.

3.1.2 Processing

A key element of success for the leaf and yard waste program relies on processing of leaf and yard waste materials received into a useful product, thereby achieving diversion from landfill. All leaf and yard waste collected within the Region is currently being sent to Miller Waste's Bloomington Road facility where it is processed into compost using an open windrow system.

Options for processing leaf and yard waste consist primarily of different composting approaches, which can be generally grouped into two categories: a) open systems and b) enclosed systems. While there are differences between these two categories in terms of the facilities, infrastructure and operational requirements; the core process (i.e. microbial degradation) and end-products (i.e. biologically stable, nutrient rich compost) are the same for both categories.

Aerated windrows (i.e. open system) are the most frequently applied approach to composting leaf and yard waste in Ontario. Aerated windrow composting of leaf and yard waste is cost-effective and is acceptable under Ontario's regulations, subject to compliance with siting, design, operation and environmental management requirements.

Common to all processing options, key factors impacting heavily on the success of leaf and yard waste composting include:

- Proper management of the site and operations to control potential odours and other environmental impacts
- Effective and correct resident participation to provide high-quality leaf and yard materials as feedstock, minimizing potential for contaminants in the final compost product and creation of processing residual waste
- Careful, expert and efficient operation of the site and processing operations to achieve the high-quality standards for the certified compost product

In November 2013, Council authorized staff to negotiate the terms of an agreement between York Region and Miller Waste Systems for long term yard waste processing at the Bloomington facility. In May 2014, staff reported back on recommendations for a ten year contract with Miller Waste.

Overlying the historic and projected leaf and yard waste quantities, it is expected that by 2031, quantities of leaf and yard waste will increase by 27 per cent from 43,500 in 2012 to 55,400 tonnes in 2031.

3.2 Recommendations to Address Future Capacity

It is recommended that York proceed in 2014 to initiate steps necessary to secure under contract, the leaf and yard waste processing capacity necessary to meet the needs identified in Figure 2 over the long term.

The following are alternatives to consider in moving forward to secure future leaf and yard waste processing capacity needed :

- i) Determine if sufficient existing leaf and yard waste processing capacity in Ontario can be made available to the Region over the long term.

- ii) Based on positive results from (i), solicit proposals from private sector contractors to provide leaf and yard waste processing and end-product marketing services for the time frames and capacities identified in Figure 2.
- iii) Based on negative results from (i), negotiate contract options with Miller Waste Systems to provide a long term direct haul and local yard waste processing option to the Region for the time frames and capacities identified on Figure 2.

Private sector contractors for leaf and yard waste processing, such as Miller and others provide an important and valuable service to many Ontario municipalities. Given the length of time required to site and build a Regional yard waste processing facility, contracting with external service providers may be the most viable option for the Region to secure additional leaf and yard waste processing serviced required for the long term. Contracting provides a method to assign risk to the contractor, however that carries with it a corresponding reduction in the ability of the customer to exert control, should the need arise. It should also be recognized that some elements of risk exposure remain, regardless of the contracting arrangements. Regardless of public or private ownership/operation, proper operation and management of a leaf and yard waste facility to control odours and other potential impacts must be a priority.

In August 2013, the Region investigated the market availability of leaf and yard waste processing capacity for a minimum of 50,000 tonnes per year. The study concluded market capacity is limited. In addition to the Miller Waste Systems facility, only five facilities in Ontario have capacity currently available to manage up to 50,000 tonnes of leaf and yard waste from York Region. These five facilities are located outside of York Region.

In November 2013, Council authorized staff to open negotiations with Miller Waste Systems for a new contract to provide increased processing tonnage at the Bloomington Road facility. In May 2014, Council authorized a ten year contract with Miller Waste Systems to provide yard waste composting services.

Opening the contract for further negotiation also allowed staff to require installation of Paradigm scale software. Having consistent software at all waste management facilities allows staff and Miller Waste Systems to consistently and accurately track yard waste tonnage over time.

3.2.1 Special Materials Management



In 2004, the Asian Long-horned Beetle infestation control area was established encompassing the City of Vaughan as well as a portion of northern Toronto. Restrictions were in place prohibiting fallen or pruned branches, any woody material or trees from being removed from this quarantine area, without first being processed to prevent the spread of the Asian Long-horned Beetle.

Over the past years, York Region has been the unfortunate host of two different types of forest infestations (Asian Long-Horned Beetle and Emerald Ash Borer) that have impacted leaf and yard waste collection and process systems.

Asian Long-horned Beetle

In February 2004, the Canadian Food Inspection Agency issued an order under the *Plant Protection Act* to control the spread of the Asian Long-horned Beetle. The control order restricted the movement of nursery stock, trees, leaves, logs, lumber, wood, wood chips or bark chips from broad-leaf deciduous trees outside of the regulated area prior to being processed to approved specifications. During the period the control order was in effect, leaf and yard waste collected within the regulated area was directed to this site for processing prior to composting.

In 2010 approximately 7,200 tonnes, or 20 per cent of York Region's total leaf and yard waste, was processed at the Region's Asian Long-horned Beetle site (8000 Dufferin Street in Vaughan). Once processed, the materials were deemed suitable for composting.

The duration of the control order requirement to process woody wastes from the quarantine area is dependent on the success of eliminating the infestation. Since there has not been a sighting of the Asian Long Horned Beetle in the defined area since 2007, the Canadian Food Inspection Agency recently declared the Asian Long Horned Beetle eradicated and has authorized lifting of the quarantine. Quarantined areas still exist in the City of Toronto, City of Brampton and City of Mississauga.

Emerald Ash Borer

Emerald Ash Borer (EAB) (*Agrilus planipennis*) is now widespread across southern Ontario, including York Region. The larvae feed on the inner bark of all species of ash trees, disrupting the tree's ability to transport water and nutrients resulting in mortality.

Although of significant impact overall to the Region, the quantity of Emerald Ash Borer waste anticipated to be managed through the Region's and local municipalities waste management programs is expected to be minimal (the majority will be managed through forestry departments and by private contractors). However, there is still an anticipated quantity that needs to be planned for management at the curb. Currently, the Region is projecting the need to manage a maximum of 1,400 tonnes of Emerald Ash Borer material in 2014. The estimated maximum expected during peak die-off period would be 4,000 tonnes/year, with all the material going curbside (which is extremely unlikely).

3.2.2 End-use and Marketing

Leaf and yard waste is better viewed as a valuable resource to be recovered and used, like many of the materials our society defines as "waste." Good quality leaf and yard waste provides an ideal feedstock for the production of compost. Compost is a nutrient rich soil enhancer used by gardeners, landscapers and farmers. Use of compost produced from leaf and yard waste returns organic matter to the earth to assist with growing flowers, vegetables, shrubs, trees and other horticultural and agricultural products.

Under the current leaf and yard waste composting arrangement, Miller sells the certified compost they produce from York Region's leaf and yard waste. The compost is certified through the Compost Quality Alliance established through the Compost Council of Canada. The Alliance ensures that all compost producers are using standardized testing methodologies and uniform operating protocols to improve customer confidence in compost selection and utilization. Currently, approximately 80 per cent of the finished compost is sold to local commercial contractors and the remaining 20 per cent is sold to residential retail customers for use in agriculture, horticulture, landscaping and home gardening. Miller Waste currently sells the compost to residents in plastic bags (1 cubic foot) for \$3.99/bag or as bulk material at \$20.00 per cubic yard.

Under the alternatives identified in Section 3.1.2 to secure additional leaf and yard waste processing capacity, marketing of the compost product is an important consideration to be incorporated into any one of the alternatives being considered and is also an important performance metric.

3.2.3 Public Engagement and Communication

The leaf and yard waste program is very well known among residents, who are very supportive, contributing to the success of this program. Continuation of the key elements supporting this success is the primary strategic focus for future public engagement and communications regarding the leaf and yard waste program.

York Region and the local municipalities all promote their diversion programs - including leaf and yard waste - using a variety of approaches, reflecting the diverse nature of the Region's communities. These investments in promotion and education have been recognized through various industry awards and are also directly reflected by the degree of resident participation driving the impressive diversion rate achievements.

A key element contributing to the success of public engagement and communication is the collaboration between the Region and the local municipalities. Collaboration allows efficient and cost effective delivery of key messages that can be tailored to suit specific needs and characteristics of each community.

Public awareness regarding backyard composting is a gap identified in earlier workshops, requiring specific attention for public engagement and communications programs by Region and the local municipalities. It is important that the public recognize curbside collection of leaf and yard waste and backyard composting are complementary programs supporting diversion. As noted previously, establishing uniform pricing and distribution for backyard composters among the Region and all local municipalities would reinforce the benefits and support for backyard composting.

The leaf and yard waste program is one of the cornerstone diversion programs in York Region. Continued support for promotion and education is fundamental to the continued success of this successful program. Ongoing communication with the public that reinforces the benefits of leaf and yard waste composting and explains the ways residents can participate effectively in the program is paramount.

Innovative engagement and communication tools are emerging regularly and should be sought out, explored and where effective, adopted to achieve continuous improvement in promotion and education. A good example is the “Online Open House,” which has been applied as one component of the SM4RT Living Plan. The success of the “Online Open House” provides a basis to make use of similar delivery mechanisms, based on concepts targeted at specific diversion initiatives, such as the leaf and yard waste program.

3.3 Backyard and Onsite Composting

Small-scale composting refers to managing food and yard waste on-site (either on the ‘countertop’ or in the backyard), typically within residential housing. The technologies in this category include backyard and ‘countertop’ composters that decompose food and yard waste into a compost product. Countertop composters are a relatively new category of composting technology that has emerged as a means to providing an on-site organics management solution for the space and time-constrained resident. The units are relatively small when compared to the space required for a kitchen container and backyard composter and require less time to manage. The technologies available for both backyard and countertop composting are discussed below.

3.3.1 Backyard Composters

A variety of products are available on the market for backyard composting. They typically employ a multi-stage process, where food and yard waste is blended to create an acceptable feedstock. Most technologies require four weeks for the initial phase of composting, followed

by a second four week phase for curing or maturing. The three-bin system discussed below allows for three stages, resulting in a 90-day composting period, with less management required during its operation.

Three-Bin Wood & Wire

The three-bin wood and wire system has been used for decades, and now pre-fabricated products are available off-the-shelf for consumers. The system requires layering of green and brown materials in the first bin, which is then rotated to the adjacent bin after a month. Manual agitation on a bi-weekly basis provides the necessary aeration to drive the process. The entire process takes roughly 90 days and is simple to build and manage, with no mechanical parts. The bins are typically lined with a wire mesh to prevent rodent entry into the system. A 530-litre (270 cm x 80 cm x 75 cm) system would have the capacity to manage roughly 3,000 kg of food and yard waste per year and can be purchased for \$900 to \$2,050.

Drum- type composting

The drum-type composters consists of two insulated chambers and must be rotated manually on a daily basis. If sourcing only food scraps as the feedstock, wood pellets must be added as a bulking agent. The first chamber is loaded over a four-week period then the system is sealed and the user begins to fill the second chamber. After a second four-week period, the material in the first chamber is ready for use. The hatch on the first chamber is released, and the end product can be unloaded into a container for use in a garden. The small-scale model (125-litre capacity) costs between \$299 and \$329 CAD⁶.

Vermicomposting

Vermicomposting uses earthworms to breakdown organic matter. Acceptable wastes that serve as feedstock are fruit and vegetables, coffee grounds, tea bags, grains, eggshells, leaves, and chemical-free grass clippings. Multiple varieties of earthworms are available for vermicomposting, including redworms and brandling worms. The end product of a vermicompost is typically more nutrient-rich than traditional compost⁷. Bedding materials for the worms can be made from scrap newspapers, straw, shredded leaves, sawdust or other composted product.

⁶ <http://eartheasy.com/jora-jk125-compost-tumbler>

⁷ Dickerson, G. W. (2001). Vermicomposting. *Cooperative Extension Service, College of Agriculture and Home Economics, New Mexico State University* , Guide H-164 1-4.

3.3.2 Countertop Composters

Countertop composters boast process times from less than 24 hours to up to two weeks. There are a variety of acceptable feedstocks, depending on the product. For example, some units cannot manage bones as they would not breakdown in the 24-hour period specified. Feedstock acceptance needs to be considered when considering technologies for a small-scale composting pilot program.

3.4 Medium Scale In-vessel Composters

Wet and dry medium scale in-vessel composters are suited to applications in the IC&I and multi-family residential sector. Dry in-vessel composters are typically batch processes, where the unit is fed a supply of material, set to run (up to 24 hours), heated to around 90° C, and slowly mixed for the duration of the cycle. The end product at the completion of the cycle is a dried food waste product that must then be hauled away and stabilized. Wet composters, on the other hand, operate at much lower temperatures (using less energy), require less residual management and the by-product of the unit is greywater that drains to the sewer. The wet composters are discussed here as they operate on a continuous feed principle and are relatively simple to operate.

A continuously fed in-vessel composter uses additional water to maintain equilibrium for microorganisms by encouraging rapid microbial growth and waste decomposition. The system uses porous “biochips” to function as an attached growth aerobic process. The system is hooked up to a sewer drain, allowing for more efficient transport (i.e., no collection and hauling) of process residuals (greywater and fine particulates). Food is generally broken down within 24 hours at an operating temperature ranging between 0° and 35° C, Anominal 27° C water demand and wastewater quality implications should be explored before this technology is recommended on a large scale in the Region. The units range in daily load capacity from 50 kg to 500 kg, and cost between \$16,000 (USD) to \$49,000 (USD).

Many commercially available medium scale composters have limitations on the feedstock that can be used. They are best suited to process food scraps, such as plate leftovers and vegetable peelings, rather all types of organic wastes. Bones (other than chicken or fish) are typically not digestible, nor are hard, fibrous produce by-products, such as avocado pits, pineapple tops, flower stems and leaves. If used in a multi-residential building, feedstocks must be monitored and users must be educated about acceptable materials in order to avoid problems.

3.5 Public Education: Backyard Composting Benefits

The following provides an overview of outreach and engagement activities (specifically targeted to on-site compost users) that is being recommended to support the implementation of the leaf and yard waste strategy. It is important to note that these activities do not need to be completed simultaneously, nor do they need to be completed in sequence. As the implementation plan is developed and finalized, the preferred sequencing of these activities will be further defined.

Establish booth at local fairs

Every community has a local fall or spring fair, and an educational booth should be developed that can be easily taken to each local fair. The benefits of on-site (countertop or backyard) organics management can be communicated by York Region staff, trained volunteers or community partners. These efforts should be co-ordinated with environmental service groups and organizations within each community to engage a broader audience.

Promotion at Local Farmer's Markets

There are a variety of materials that can be developed for distribution at the local farmer's market, including use of the booth established for the local fair. Other educational materials can be displayed and distributed from community message boards.

Establishment of an On-site Outreach Program

North Shore Recycling and Disposal (NSRD) in North Vancouver, British Columbia has established a compost coaching program, where residents can book a 20 to 50 minute appointment with a compost coach to troubleshoot issues associated with their new or existing organics management system. The NSRD estimates a two to three year payback period for the implementation of their compost coaching program, as each kilogram of organic material diverted contributes to the cost savings associated with operating the entire system. The Region could explore partnerships within the community to provide residents with technical support for their composting efforts.

3.6 Residential Pilot Programs

Countertop Composting pilot

The Region could explore the feasibility of a pilot project to test countertop composting technologies in York Region homes on a trial basis. The pilot could evaluate the diversion potential of different technologies, as well as gather user feedback about the units to decide if a larger scale program is warranted. This technology would suit residents living in apartments or homes with limited outdoor space.

Medium-scale Composting Pilot

The in-vessel composters discussed in this strategy would be suited to a multi-residential or IC&I setting. A pilot project with a community partner is recommended to assess the technology. This pilot is discussed in more detail in the Multi-Residential Strategy and the IC&I Strategy. Please see those documents for further information.

3.7 Community Shared Composting Pilot

In addition to development of on-site organics programs for individual homes, community partnerships could be established to develop additional medium-scale on-site organics projects in the Region.

Community Gardens

Community gardens present an opportunity to educate an already engaged audience about the benefits of composting. The Region could work with established community partners such as the York Region school boards and the York Region Food Network to identify pilot opportunities to develop or enhance composting practices at community or school gardens and monitor diversion potential from these activities. The Region could add value to existing projects by providing technical support, showcasing and sharing successes and lessons learned to help new projects get started.

Neighborhood Scale Associations

Neighborhood Associations or community partners with a demonstrated interest in low-impact living should be contacted regarding their desire to develop organics processing capacity in their neighborhood. The association could provide the site or sites for establishing the organics processing capacity, and work with the Region to identify an appropriate technology and work through regulatory challenges. The Region can provide support to neighbourhood or tenants' associations as appropriate to support such initiatives.

3.8 Partner with Private Developer to Establish On-site Organics Management

The above strategies for single family and multi-family composting can be deployed at new developments as well. It is recommended that the Region engage interested "green" developers about designing on-site organics management into their residential developments. Giving consideration to on-site organics management at the project planning phase provides greater opportunity for success, as the functions of the system are not deployed in an ad-hoc manner or as a retrofit. All of the concepts presented above can be more efficient if incorporated in the project design. The "countertop" composters can be built in to the kitchen in the same fashion as other common appliances, as well as incorporating food waste containers into a purpose-built space (rather than simply sitting on the counter). Backyard composters can be located in centralized landscaped areas where residents transport their materials and the landscaper or community gardener oversees the successful operation of the program. For high-density, low landscape-area developments, the medium-scale composters can be considered requisite design elements and be incorporated into common space, most likely the parking garage or other utility space. Collection chutes can be considered for ease in distribution of the material to the system.

3.9 Outreach and Engagement

As the curbside organics collection programs have been deployed, municipalities across North America have seen an increase in the quantity of organics collected at curbside. As capacity to process this material stream is limited, an outreach program that promotes the benefits of on-site management should be developed. The Region can work with local organizations (Compost Council of Canada, Landscape Ontario, Organic Landscape Alliance, or the Ontario Fruit and Vegetable Grower's Association) to promote the benefits that backyard composting can provide to gardens. Reduced inputs to the global carbon cycle should be promoted as transportation demands (i.e., collection) are reduced

as a result of managing organics on-site. Research conducted through focus groups will help to better understand barriers and messaging that resonates with residents.

4.0 Implementation

4.1 Partnerships

The following table lists partnership opportunities that would assist in implementation of the leaf and yard waste strategy.

Table 3 – Potential Implementation Partnership Opportunities

Implementation Role	Primary Partnerships
Overall program development and delivery	York Region & local municipalities
Material collection	York Region & local municipalities (including collection contractors)
Material processing	York Region, input from local municipalities regarding any program impacts and siting matters, nearby municipalities & private sector service providers and regulatory agencies
Public engagement and community composting pilots	York Region & local municipalities, media, schools, environmental/conservation themed organizations and event organizers, gardening/horticultural/agricultural organizations and local businesses

4.2 Resources and Timelines

The following provides an outline of the resources (staff and financial) required, as well as a preliminary timeline for implementation, performance targets and monitoring.

Roles and Responsibilities

The proposed arrangement for completing of this strategy is as follows:

York Region:	Processing lead
Local Municipalities:	Collections lead
Community Partner:	Participate/partner in pilots

Resources

As a well established program, the resources required for the current leaf and yard waste program are already allocated within the Region and local municipal staff complements and budgets.

As a minimum baseline, staffing resources and budgets allocated to the leaf and yard waste program should keep pace with future growth projections to maintain the diversion success of this important program. Should significant program changes be contemplated, such as the potential for incorporating IC&I source leaf and yard waste, such changes should include corresponding adjustments to staffing and budgets.

Targets

Typically, all leaf and yard wastes created by residents' gardening and landscaping activities are captured, except for the component of those materials which are put into backyard composters. Therefore, targets for residential leaf and yard waste collection are expected to correspond with the quantity projections presented herein. It has been assumed in the strategy that the proportion of leaf and yard waste generated when compared to population growth will not significantly change over time. Given housing density will increase over time which could result in a slight per capita decrease in leaf and yard waste generation, their will still be considerable growth related to single family developments. However, it is estimated that with a five per cent reduction target, York Region will only need to manage 52,114 tonnes of leaf and yard waste in 2031 resulting in more than \$200,000 in cost savings that year.

Successful implementation of the expanded composting program and pilots will provide better data on the diversion potential from emerging on-site organics management technologies. By exploring both small and medium scale technologies, estimates of diversion will be able to be derived from these demonstration projects. Regardless of technology performance, the data obtained by weighing organic waste prior to deposition into a unit in the pilot programs will serve the purpose of better estimating diversion that is achievable from these technologies. Program recommendations following pilots and data analysis will determine emphasis placed on emerging composting technologies into the future.

Performance Measurement

The primary metric to measure performance of this particular strategy is the Region successfully securing sufficient future leaf and yard waste processing capacity:

The overall leaf and yard waste management component of the system should also be measured by:

- Tonnes managed
- Tonnes diverted

- Cost/tonne
- GHG reduction
- Compost marketed
- Compost quality

5.0 Key Benefits of this Strategy

The leaf and yard waste management strategy presented herein provides the following key benefits:

- Total of five per cent reduction in leaf and yard waste material by 2031
- Regional cost savings year over year starting in 2022, resulting in a total savings of \$295,000 dollars in the year 2031
- Compliance with regulatory requirements
- Creation of a useful product that returns organic matter and nutrients to the earth
- Builds on existing success and resident enthusiasm for the program
- Secures future success by identifying current future needs and options to fulfill those needs
- Suggests ideas to consider for program optimization and expansion