REPORT TO COUNTY COUNCIL

Organics Resource Recovery Technologies Feasibility Study

To: Warden and Members of County Council

From: Director of Public Works

RECOMMENDATIONS

1. **That County Council approve, in principal, a County-owned organics processing facility utilizing Covered Aerated Static Pile Composting technology as the preferred organic waste technology concept for future implementation consideration;**

2. **And further, that County Council authorize staff to develop various source separated organics (SSO) collection options for inclusion in draft 2024 procurement documents for overall County curbside waste collection services (garbage, organics, large article, ineligible recycling sources) to be effective January 1, 2026, and present such service options for Council consideration and approval prior to market release;**

3. **And further, that County Council authorize staff to develop draft 2024 procurement documents for third party SSO processing to receive waste from the preferred County SSO collection program (derived from Recommendation 2), effective January 1, 2026, until feasibility of a County-owned organics processing facility (Covered Aerated Static Pile Composting technology) can be further evaluated and considered for County Council's final approval;**

4. **And further, that County Council authorize staff to undertake a six week public engagement campaign that will seek input on the proposed organics management program and consider the resulting feedback during the development of the proposed procurement documents noted in Recommendation 2;**

5. **And further, that County Council pre-approve one contract waste management technician as part of the County's 2024 waste management operating budget to provide operational support for SSO program development, contract procurement, education and outreach as well as prepare for the significant changes the County will experience with its municipal blue box program transition to full Extended Producer Responsibility (EPR).**

REPORT HIGHLIGHTS

- The purpose of this report is to inform County Council of the preferred organic waste diversion concept identified in the 2023 Organics Resource Recovery Technologies (ORRT) Feasibility Study.
- The preferred organic waste diversion concept entails residential curbside collection of source separated organics, also known as a green bin program, that is comingled and processed with brush, leaf and yard waste using covered aerated piles (aerobic composting). This technology can be incorporated at the Oxford County Waste Management Facility (OCWMF) composting facility for increased production and sale of quality finished compost material.
- A County-wide residential SSO curbside collection program can be included in the draft 2024 Request for Proposal (RFP) documents for procurement of contracted curbside waste (garbage, SSO, large article, ineligible recycling sources) collection services for implementation starting January 1, 2026. The draft RFP will include various collection scenarios for Council's consideration and approval before RFP documents are finalized and released to the open vendor market in Q2, 2024 and ultimately awarded in Q3, 2024.
- A potential County-wide SSO collection program may initially utilize a third party for processing of collected SSO, effective January 1, 2026, until development of a County-owned processing facility is further evaluated and considered for implementation based on organics capture rates and actual quantities collected in the first few years of the program.
- The 20 year lifecycle cost (in 2023 dollars) for implementation and operation of an SSO collection and processing system is estimated at approximately $190/tonne (in comparison to existing organics landfill costs of approximately $100/tonne) and is estimated to extend the life of the County's landfill by approximately 10 years pending organics capture rates.

IMPLEMENTATION POINTS

In 2024, staff will proceed with a six week public engagement campaign to seek input on the proposed organics management program, including the provision of curbside SSO collection.

Staff will proceed with the development of draft RFP documents for procurement of contracted residential curbside waste (garbage, SSO, large articles, ineligible recycling sources) collection services for implementation starting January 1, 2026, and will include various collection scenarios for Council's consideration and approval before RFP documents are released to the open vendor market in Q2 2024. The feedback received from the public engagement campaign will also be considered in the development of the draft RFP documents.

Residential collection scenarios include, but will not be limited to, a County-wide SSO collection program versus urban areas only as well as potential reduction in garbage collection frequency (i.e. biweekly) to promote SSO participation. Concurrent with the procurement of residential curbside collection services, procurement of a third party SSO Processor may be required for initial implementation of the SSO collection program until development of a County owned processing facility can be further evaluated and considered for implementation in 2030.

Financial Impact

A Discounted Cash Flow financial model was developed as part of the ORRT study to provide high level cost comparisons for the five short-listed organic waste diversion technology scenarios as described in the Comments section of this report.

The ORRT financial model is based on a 20 year lifecycle period with implementation of an SSO collection program starting on January 1, 2026 to align with the transition of the Blue Box program to full EPR when the County will no longer be responsible for recycling collection from eligible sources (residential, schools, long term care homes, etc.). The financial model includes capital and annual operating costs, as well as cost estimates for out of County transportation and third party tipping fees ($/tonne), and any offsetting revenue from end-product marketing.

The financial analysis for the implementation of an SSO program excludes any potential operating cost increases for collection and landfilling of garbage as a result of anticipated reduction of curbside garbage set outs and associated revenue impacts (bag tags, tipping fees).

The results of the financial analysis for each ORRT scenario (including curbside collection) are summarized in Table 1. Life cycle costs for each scenario represent the Net Present Value of the annual cash flow over the analysis period (20 years) divided by the estimated organic waste tonnage, and are discounted to account for the time value of money to represent 2023 dollars.

Table 1: Financial Analysis of ORRT Scenarios (excluding curbside collection)

	Scenario 1 **Third party wet AD [1] out of County**	**Scenario 1.1** **Direct haul third party wet AD out of County**	**Scenario 2** **Third party aerobic composting out of County**	**Scenario 3** **Co-digestion at Ingersoll WWTP [2]**	**Scenario 4** **Aerated static pile composting at OCWMF [2]**	**Baseline** **Status quo landfilling organics at OCWMF**
Upfront Capital Costs	$2.8 - $5.2	$0	$2.8 - $5.2 M	$33.9 –$62.9 M	$4.1 - $5.6 M	$0
Capital Costs over 20 years	$7.6 M	$7.6 M	$7.6 M	$7.6M	$12.9 M	$0
Annual Operating Costs	$1.7 M	$1.3 M	$1.4 M	$700 K	$830 K	$625 K
Net Present Value	- **$28.4 M**	- **$21.3 M**	- **$26.3 M**	- **$57.4 M**	- **$26.3 M**	**N/A**
Lifecycle Costs (2023 $/tonne)	**$210**	**$160**	**$190**	**$410**	**$190**	**$100**

1 Wet Anaerobic Digestion

2 Assumes utilization of third party processing for the first 4 years of the SSO collection program until construction of new County infrastructure in-service by 2030.

Additional organics (green bin) curbside collection costs would be common to all of the above ORRT Scenarios. Upfront capital costs would include the initial and annual replacement costs of curbside organic household collection carts (initial cart purchase estimated at $2.7 million, with a 10 percent annual cost of $270,000 for new carts/replacements). No annual curbside collection operating costs were factored into the organics management financial analysis as it was assumed such operating costs would be completely offset from reallocation of funds (cost savings) derived following the transition of the municipal recycling program to full EPR.

As well, the County will require one contract waste management technician as part of the County's 2024 waste management operating budget (approximately $78 K) to provide operational support for SSO program development, contract procurement, education and outreach as well as prepare for the significant changes the County will experience with its municipal blue box program transition to full EPR.

Communications

Staff from the City of Woodstock (Woodstock) and Township of South-West Oxford (SWOX), who perform contracted curbside waste collection on behalf of the County in these areas, participated as part of the ORRT Project Team with County staff and the study consultant, GHD Limited (GHD) and assisted in the development of the preferred organic waste diversion concept for processing residential SSO. The Study findings were also presented and discussed with the Zero Waste Oxford Committee on October 18, 2023.

Development of residential SSO collection scenarios and potential changes to residential garbage collection frequencies as well as other program details will involve ongoing collaboration with Woodstock and SWOX staff to inform the terms of reference as part of the draft 2024 RFP for curbside waste collection services. Such collaboration will encourage consideration of regional versus local approaches to facilitate the collection of food and organic waste from urban settlement areas as per the province's Food and Organic Waste Policy Statement.

As previously noted, staff are recommending to undertake a six-week public engagement campaign to seek input on the organics management program, including curbside SSO collection. The campaign intends to afford a virtual town hall meeting, Speak-Up Oxford and ongoing advertisements. The presentation material will also be posted on the County's website for public review and comment. Following public consultation, findings will be presented to County Council and will help to inform 2024 Request for Proposal (RFP) documents for procurement of contracted curbside waste (garbage, SSO, large article, ineligible recycling sources) collection services for implementation starting January 1, 2026.

Following potential Council approval to proceed with implementation of an SSO collection program, an extensive promotion and education campaign will also need to be undertaken to prepare residents in advance of program implementation. This will include social media, website, newspaper, and radio promotions as well as information brochures that can be included with the distribution of household carts and the annual waste management calendar.

Report No. PW 2023-42 will be circulated to Area Municipalities for information.

2023-2026 STRATEGIC PLAN

Oxford County Council approved the 2023-2026 Strategic Plan on September 13, 2023. The Plan outlines 39 goals across three strategic pillars that advance Council's vision of "Working together for a healthy, vibrant, and sustainable future." These pillars are: *(1) Promoting community vitality, (2) Enhancing environmental sustainability, and (3) Fostering progressive government*.

The recommendations in this report supports the following Strategic Plan Pillars and Goals:

		
Promoting community vitality	**Enhancing environmental sustainability**	**Fostering progressive government**
	Goal 2.2 – Preserve and enhance our natural environment	Goal 3.1 – Continuous improvement and results-driven solutions Goal 3.2 – Collaborate with our partners and communities

See: Oxford County 2023-2026 Strategic Plan

DISCUSSION

Background

The ORRT study objective and associated tasks were presented to County Council in Report No. PW 2022-33 along with findings of the 2021 residential waste characterization audit that identified 60% of the black bag (by weight) as being comprised of organic material, that potentially could be diverted from the landfill and recovered for beneficial use.

The study objective was to evaluate and identify preferred waste diversion implementation concept(s) for residential and other organic material sources that will best position the County to meet compliance with upcoming legislative requirements and policy changes, as well as provide the following long term operational, financial, and environmental benefits:

- Extend the overall operating lifespan of the OCWMF landfill by advancing the goals of the County's Zero Waste Plan;
- Reduce future landfill methane emissions through diversion of food and organic waste;
- Maximize waste resource revenues from preferred waste diversion implementation concept(s) and beneficial reuse (compost, energy/biogas); and
- Utilize proven and well-established technology concept(s) that are easily scalable.

In contrast, there are no regulations or mechanisms to enforce Industrial, Commercial and Institutional (ICI) establishments to dispose of their waste within the County, but cost could play a role in the decision of where to dispose of the waste in the future. The provision of municipal waste services to ICI establishments has not been considered a responsibility of Ontario municipalities. As a result, municipalities in Ontario and Canada have generally adopted a "hands off" waste management approach as they consider ICI waste to be adequately managed by private sector waste service providers. Further, waste generated from the ICI sector is difficult to quantify since it is generally collected by private haulers and exported out of the County.

Legislative Requirements and Policy Changes

Ontario's Food and Organic Waste Framework

The Provincial Food and Organic Waste framework under the *Resource Recovery and Circular Economy Act (2016)* currently provides a policy statement that identifies mandatory municipal organic waste diversion targets by 2025 based on population thresholds/densities by local municipality (Report No. PW 2020-56). Municipalities meeting population and density thresholds are required to provide curbside collection of SSO as a preferred diversion method, although alternatives to SSO may be used if diversion targets can be met. Of note, the service areas within Woodstock and Tillsonburg would be required to meet 50 percent organic waste diversion targets by 2025 (year end) based on their respective populations at that time.

The Provincial policy statement encourages consideration of regional approaches to facilitate the collection of food and organic waste from urban settlement areas and acknowledges a preference for curbside SSO collection; however, allows for flexibility in the type of collection program that is implemented. Currently, over ninety (90) municipalities in Ontario offer a residential curbside SSO collection and processing program (also known as a green bin program) which can divert between 30% to 60% of organics from landfill pending residential participation (capture rate) and actual (source) diversion rates.

Municipalities that do not meet the specified population/density thresholds are required to provide for resource recovery of food and organic waste at a minimum through means such as home composting, community composting and local event days. In this regard, the County currently affords a program to support backyard composting and green cone digesters.

In addition to the above Provincial framework (to which guidance materials are yet to be released to municipalities), an anticipated landfill ban of food and organic waste within Ontario may be in place by 2030.

Blue Box Program – Full Extended Producer Responsibility

Blue Box collection services in Oxford County will be transitioning to the province-wide common collection system on December 31, 2025 at which time Producers will be accountable and financially responsible for curbside collection of recyclable material from eligible sources under full EPR regulatory requirements (Report No. PW 2023-30). At that time, County-wide resources and funding previously allocated for recycling collection and processing could be alternatively considered as a means to implement a potential SSO collection program.

Federal Regulatory Framework for Landfill Methane Emissions

Development of a County organic waste diversion system that utilizes resource recovery for beneficial use aligns with the federal initiative and proposed regulatory framework under the *Canadian Environmental Protection Act, 1999* to reduce future methane emissions from municipal landfills (Report No. PW 2022-23) and the associated climate impacts from greenhouse gases.

Comments

The ORRT Feasibility Study undertaking involved a comprehensive review and evaluation of organic waste collection and processing strategies including potential integration of existing County operations (wastewater biosolids, brush, leaf and yard waste composting, backyard composting and green cone digesters) to define the preferred technology concept(s) to meet legislative requirements pertaining to organics management and further advance the County's Zero Waste Plan goals and objectives. An executive summary of the ORRT final study report is provided in Attachment 1.

Waste Generation Forecast

The assessment of organic waste quantities and evaluation of organic waste diversion concepts as part of the ORRT study was based on County-wide implementation of a weekly residential SSO curbside collection program. A sensitivity analysis was also carried out based on organic waste quantities based on implementation of a weekly residential SSO collection program in Woodstock, Tillsonburg and Ingersoll only.

The 20 year organic waste generation forecast, based on the 2021 County-wide curbside garbage waste audit, from residential sources (avoidable/unavoidable food waste, pet waste, tissue and paper towels, and leaf and yard waste) is estimated between 5,200 to 9,500 tonnes per year based on minimum and maximum capture rates of 45 and 60 percent respectively. Capture rates are dependent on program participation, which is typically lower upon initial implementation, and can be increased through promotion and education, reduced garbage collection frequency and/or garbage user fees (bag tags) adjustments.

Within these quantities of organic waste, the economic viability of various organic waste processing technologies were assessed based on specific tonnage threshold and economy of scale considerations. Organic waste from the ICI sector within the County was excluded from the waste generation forecast given it is difficult to quantify since ICI waste is managed in part by the private sector as previously noted. A potential landfill organics ban in 2030 may provide an opportunity to solicit SSO from ICI sources and generate additional revenue subject to available capacity at a County-owned processing facility; however, it is likely the County would be competing with private industry for ICI organic material.

ORRT Short Listed Scenarios

A preliminary evaluation of eight ORRT scenarios were initially identified to which five were short listed based on the most viable technologies (market availability/reliability, capital costs, organic tonnage thresholds) and the most suitable organics collection and processing site options. The five short-listed ORRT scenarios noted below were carried forward for further development and financial analysis as well as site configuration and infrastructure needs.

- Scenario 1: Third Party Wet Anaerobic Digestion (AD) – Out of County Processing
- Scenario 1.1: Third Party Wet AD (direct haul) – Out of County Processing
- Scenario 2: Third Party Aerobic Composting – Out of County Processing
- Scenario 3: Anaerobic Co-digestion at Ingersoll WWTP – In County Processing
- Scenario 4: Covered Aerated Static Pile Composting at OCWMF (direct haul) – In County Processing

Scenarios 1, 1.1, and 2 utilize third party processing and would require a transfer station at the OCWMF (except Scenario 1.1 with direct haul) for shipment to a processing facility. Whereas Scenario 3 and 4 would involve integration with existing County processes and require new County-owned infrastructure but would include offsetting revenues from marketing of end products (energy/biogas compost).

Scenario 1: Third Party Wet Anaerobic Digestion (AD) – Out of County Processing

Anaerobic (absence of oxygen) digestion (AD) is a biological process, commonly utilized in wastewater treatment facilities, that degrades organic material and generates methane or biogas. SSO for wet AD requires pre-processing to remove contaminated material (glass, plastic) and is mixed with water to create a slurry that can be pumped into sealed vessels for anaerobic digestion.

Biogas as a by-product of the AD process can be utilized as a fuel source to generate heat and electricity, and can also be used as renewable natural gas (RNG) and added directly to a natural gas distribution system if feasible. Residual material from the AD process is suitable for land application as a soil amendment.

This scenario does not require any County-owned infrastructure, with the exception of a local transfer station, but relies on a third party vendor to have available capacity to process the County generated organic tonnage and would be subject to associated processing costs (tipping fees). Collected SSO material would be transported out of County for processing without any local benefit from resource recovery.

Scenario 1.1: Third Party Wet AD (direct haul) - Out of County Processing

This scenario is the same as Scenario 1 except it would involve a direct haul to a local (In County) organics pre-processing facility (eliminating the need for a County-owned organics transfer station) prior to transportation to an out of County processing facility. Similar to Scenario 1, the County would be subject to an SSO processing unit rate tipping fee ($/tonne) without local benefit from resource recovery.

Scenario 2: Third Party Aerobic Composting – Out of County Processing

Composting is an aerobic biological process for the decomposition of SSO, leaf, yard and animal waste, and woody material to produce a nutrient rich soil amendment.

Organic materials would be collected and delivered to an in-County local transfer station, prior to transportation to an out-of-County processing facility which could employ various composting technologies such as static windrows, covered aerated piles and in-vessel/containerized systems.

In this scenario, the County would also be subject to unit rate tipping fees ($/tonne) and any revenue generated from the sale of finished compost would be retained by the third party processor.

Scenario 3: Anaerobic Co-digestion at Ingersoll WWTP

This scenario is a similar process to Scenario 1 but involves co-digestion with municipal wastewater sludge and would require significant infrastructure upgrades at the Ingersoll WWTP that generally would include process buildings and structure, mechanical equipment, odour suppression, and instrumentation and control equipment.

The addition of SSO to the wastewater treatment process would increase biogas generation for utilization as a fuel source (heat, electricity, RNG) as well as increased biosolids production that would need to be additionally managed at the County's Biosolids Centralized Storage Facility (BCSF) for ultimate land application.

Scenario 4: Covered Aerated Static Pile Composting at OCWMF (direct haul)

SSO is co-mingled with brush, leaf and yard waste that is currently processed at the County's composting facility at the OCWMF and would involve an expansion of the existing composting facility to include pre-processing and aeration systems.

The compost facility at the OCWMF currently produces beneficial soil amendment material that is sold locally and used for the production of gardening and landscaping products (e.g. triple mix, potting soil). In 2022, approximately 17,500 tonnes of finished compost derived from leaf and yard waste (only) was produced to generate $315,000 of operating revenue.

Scoring Evaluation of ORRT Scenarios

A scoring evaluation matrix was developed as part of the ORRT study based on the Future Oxford Multi Criteria Assessment (MCA) tool pertaining to the impact on local environment, economy, community and implementation. Evaluation criteria, sub criteria, weighting and scoring guidelines were developed with the ORRT project team to produce an overall evaluation score for each of the five ORRT Scenarios. The results of the MCA scoring evaluation are summarized in Figure 5.

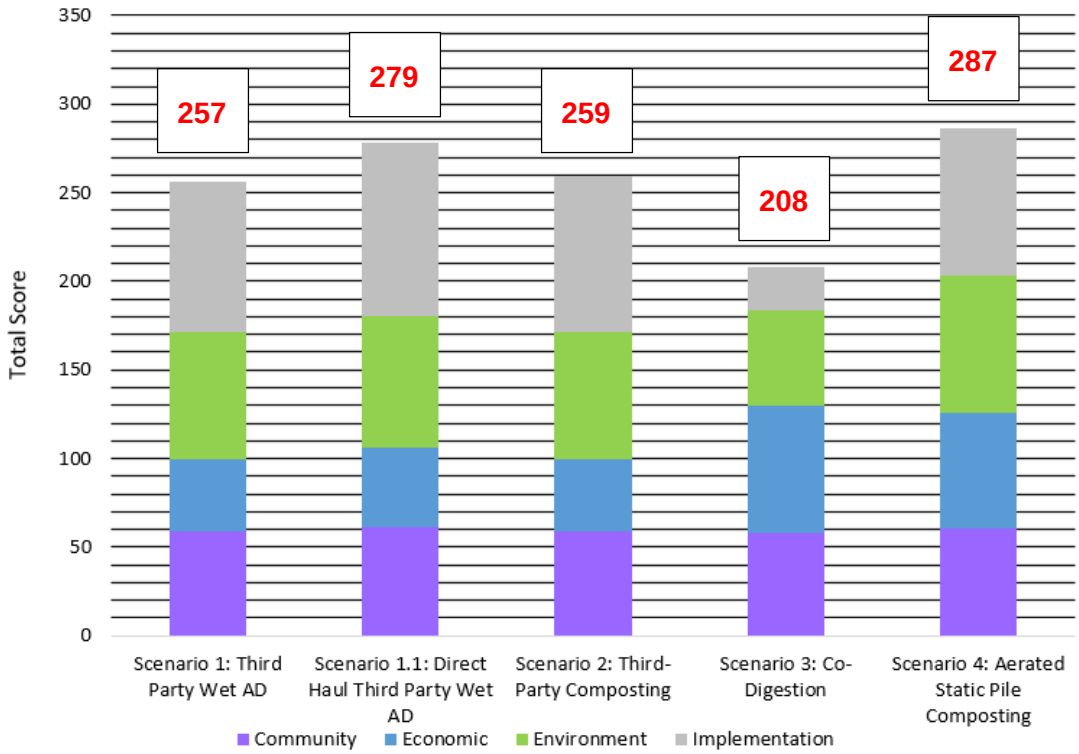

Figure 1: MCA Scoring Results for ORRT Scenarios

As shown in Table 1, the results of the financial analysis indicate that any organics management scenario will require an increase in lifecycle costs by at least 50% to 90% compared to the current landfilling costs and also require additional start up capital costs of ~ $2.7 M for green cart procurement (and annual operating costs of ~ $270 K for new/ replacement carts).

Scenario 3 had the lowest overall MCA score largely due to the high procurement risks, costs, processing challenges, and required approvals. This scenario had the highest NPV life cycle costs due to significant capital upgrades that would be required at the Ingersoll WWTP including annual operating costs and additional biosolids management, with some cost offset achieved through increased digester biogas production for beneficial reuse.

Out of County third party scenarios (Scenario 1, 1.1 and 2) had similar order of magnitude lifecycle costs requiring implementation and annual operation of a local transfer station (except Scenario 1.1) as well as out of County transportation and processing (tipping fees) costs and provide beneficial reuse of a marketable end product (biogas, compost) to the economies outside of Oxford County.

While second in overall MCA scoring, Scenario 1.1 had the lowest NPV life cycle costs largely due to the exclusion of a local transfer station that would be required for the other third party scenarios since direct haul to an in-County third party processor is possible (Scenario 1 and 2). This scenario does not require any infrastructure construction and associated approval requirements but would result in increased transportation costs and related environmental impacts and does not afford the local benefit of a reusable end product.

Scenario 4 had comparable life cycle costs to the out of county third party scenarios and would require initial infrastructure upgrades and ongoing capital and annual operating costs, partially offset from the sale of high quality finished compost material. Scenario 4 would not require a local transfer station, out of County transportation costs and third party tipping fees and had the highest MCA overall score, affording the highest environment benefit (lowest GHG emissions), highest economic value (no tipping fees, sale of high quality compost, lowest transportation costs) and greatest benefit to local community economies within Oxford.

Preferred Organic Waste Diversion Concept

The covered aerated static pile compost technology for SSO processing (Scenario 4) was recommended as the preferred organic waste diversion concept and is widely used throughout Ontario (Toronto, Waterloo, Peel, Peterborough, Simcoe, etc.) and North America with proven success. A County-wide SSO program can potentially increase the landfill diversion rate between 6 and 8 percent and extend the life of the landfill at the OCWMF by approximately 10 years based on anticipated County-wide residential organics capture over a 20 year period.

Infrastructure requirements would require expansion of the existing OCWMF compost facility with an enclosed building to receive and pre-process SSO (shredder, rotary trommel screen). Pre-processed SSO would then be mixed with brush, leaf and yard waste for final processing outdoors in concrete bunkers equipped with aeration, cover system, and leachate collection.

The potential co-mingling of SSO will expand both the quality and quantity of current finished compost material outputs for beneficial reuse and higher sales locally, with a relatively simple approval and construction process. The County currently receives $18 per tonne for finished compost whereas with advanced processing technology / co-mingled addition of SSO affords the potential to receive a $30 per tonne sale rate.

County Curbside Waste Collection Contract and Municipal Service Agreements

The County's current curbside collection contract for garbage, recycling, and large article expires on April 30, 2025 with two one-year optional extensions. It is anticipated that a contract extension with the County's current curbside collection Contractor will be negotiated to align with the County's Blue Box transition date of December 31, 2025, at which time curbside collection of recyclable material will no longer be a municipal responsibility. Such agreement re-negotiations could also potentially consider the addition of SSO collection and processing within the same service area as applicable.

As per Report No. PW 2022-33, Council directed staff to negotiate and execute amendments to the County's waste management service agreements with Woodstock and SWOX to reflect the changes associated with the transition of the municipal Blue Box Program to full EPR. Such agreement re-negotiations could also potentially consider SSO collection within their respective service areas as applicable pending cost competitiveness.

The potential inclusion of SSO as part of a new curbside waste collection contract and municipal service agreements will afford opportunities to consider changes to garbage collection frequency (i.e. biweekly) in order to promote SSO participation and program efficiencies.

CONCLUSIONS

The proposed organics waste management and processing technology approach, covered aerated static pile compost technology (Scenario 4), is commonly employed in Ontario and across North America. This organics processing technology affords sustainable benefits to the local Oxford Community and environment, although such benefits come with a notable increase in cost (90%) compared to current organics landfilling practices, which are anticipated to be federally banned by 2030.

A County-wide residential SSO curbside collection program could be included in the 2024 RFP documents for procurement of contracted curbside overall waste collection services (garbage, SSO, large article, ineligible recycling sources) for implementation starting January 1, 2026 which would formally align with the County's transition of its municipal blue box program to full EPR. Operational savings from the transition to full EPR could be reallocated to offset SSO curbside collection and start-up costs.

SIGNATURES

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ATTACHMENT

Attachment 1 – Organics Resource Recovery Technology Report Executive Summary