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Halifax Regional Council  
May 26, 2020  
June 9, 2020  
June 23, 2020

**TO:** Mayor Savage and Members of Halifax Regional Council

**SUBMITTED BY:** Original Signed  
Brad Anguish, Director, Transportation and Public Works

Original Signed by   
Jacques Dubé, Chief Administrative Officer

**DATE:** March 11, 2020

**SUBJECT:** Cart Based Garbage and Recycling Collection

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### INFORMATION REPORT

#### **ORIGIN**

On January 15, 2019, the following motion was put and passed: That Halifax Regional Council request a staff report on adopting a bin program for recycling and garbage.

#### **LEGISLATIVE AUTHORITY**

Halifax Regional Municipality Charter, Subsection 335 (b), states "The Council may make by-laws respecting solid waste, including, but not limited to, ... (b) regulating the disposal, collection and removal of solid waste;".

#### **EXECUTIVE SUMMARY**

Cart-based collection of waste is an emerging trend across Canada based on the findings of a recent jurisdictional review<sup>1</sup>. Important factors in adopting a cart-based program are typically related to health and safety considerations, modernization of collection infrastructure, citizen satisfaction (e.g., ease of use, storage) and protection from animals/birds and associated litter. Mitigation of plastic bag consumption tends to rank low as a reason for implementation of cart-based collection.

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<sup>1</sup> Attachment A – Jurisdictional Review

### **Impact on Plastic Bag Consumption**

Many residents have provided feedback that they would like the solid waste system to move to a bag free system. The reasoning is often related to an interest in overall reduction in consumption of plastics (including cost). An analysis<sup>2</sup> was completed to estimate the potential reduction in plastic consumption and cost savings should HRM move to a cart-based program.

The life-span of a cart is in the order of 10 to 15 years. It would take approximately 8.3 to 12.2 years to achieve a net reduction of plastic when comparing the weight of the plastic carts (proposed system) to the annual estimated weight of plastic bags (current system) used per household for the garbage and recycling streams. This calculation assumes bags are not used in a cart-based program (proposed system).

The expected payback to offset the purchase of a cart is in the order of 4.0 to 6.2 years by comparing the cost of the carts (proposed system) to the estimated annual cost of plastic bags (current system) per household for the garbage and recycling streams. This calculation assumes bags are not used in a cart-based program (proposed system).

Based on the jurisdictional review, it is common that bags are not used in cart-based recycling programs, however bags are typically used in cart-based garbage programs (including in instances where the program makes the use of garbage bags optional). As such, a reduction in plastic consumption and any associated cost savings is likely limited to the recycling stream only. In addition, any plastic consumption reduction realized for the recycling stream will likely not be sustained long-term due to the life-span of the cart.

### **Extended Producer Responsibility (EPR)**

EPR is a legislated program which makes brand owners and manufacturers responsible for the proper end of life management of their packaging or product. This includes the collection, processing and marketing of a designated list of recyclable materials. Should Nova Scotia Environment move forward with EPR legislation, HRM risks that any recycling carts purchased may not be compatible with an industry/producer led recycling collection program. As such, HRM should understand the Province's intention with respect to EPR prior to implementing a cart-based program for recycling.

Considering current recyclable market conditions, if EPR is not implemented, staff believe it imperative to maintain a multi-stream recycling system (paper and containers collected in separate streams). Single-stream systems have been found to have higher contamination rates than multi-stream systems, resulting in more material being landfilled. A multi-stream recycling system could be maintained by issuing two recycling carts (one for containers and one for paper) or a split cart<sup>3</sup> per household.

### **Method of Collection**

Collection of garbage and recyclables in HRM are currently provided using a manual process<sup>4</sup>. Cart-based collection can also be provided using either semi-automated or fully automated collection systems, noting that ultimately full automation typically achieves a higher rate of efficiency (e.g., less time to complete collection, less labour resources needed).

Given HRM's experience with green cart collection, consideration of a cart-based garbage collection system using semi-automated collection would be straightforward. Many vehicles in the current collection fleet are used interchangeably for garbage and green cart collection (i.e., semi-automation infrastructure is already in place). Considerations would have to be made on how to continue providing collection of bulky items (e.g., box spring/mattress, couch etc.) and home renovation waste which are included as part of HRM's

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<sup>2</sup> Attachment B – Impact on Plastic Bag Reduction

<sup>3</sup> Attachment C – Types of Carts

<sup>4</sup> Attachment D – Methods of Curbside Collection

curbside garbage collection program. A semi-automated or fully automated collection program may inhibit these services and therefore solutions and cost implications will need to be developed.

Transitioning the recycling program to a cart-based program is more challenging with consideration to maintaining the multi-stream system (use of two carts or a split cart) and transitioning the collection infrastructure to a semi-automated or fully automated system.

A full financial analysis would need to be completed that takes into consideration both capital and operating costs and provide a full analysis of different collection options for the garbage and recycling streams (e.g., split cart versus two carts for recycling, semi-automated versus automated collection, etc.).

Moving to a cart-based system may also impact inspection of curbside materials as non-conforming items can be 'hidden' within a cart. HRM implemented clear bags in 2015 and observed a 25% reduction in garbage being generated by the residential sector. It is possible that moving to cart-based program may have a negative impact on the success achieved with the clear bag program

### **Contracted Services**

The next issuance of a Request for Proposals (RFP) for curbside collection is slated for Fall 2020, with likely a five-year contract term covering July 2021 to June 2026 with an option for the Municipality to extend the contract for two years. There will not be sufficient time to transition to a cart-based collection system prior to the implementation of the next collection contract.

The operations of the Material Recycling Facility (MRF) and Otter Lake Landfill are under contract until 2024 and 2035, respectively. Moving to a cart-based program may require contract amendments that will need to be negotiated.

### **Cost Impact**

There are significant costs to transition HRM's solid waste program to a cart-based collection system. The upfront capital investment for purchase and distribution of garbage and recycling carts is in the range of \$26.34 to \$30.48 million<sup>5</sup>. There are several options available to fund this purchase, including through capital budget, a one-time fee on tax bills or a pay as you throw model<sup>6</sup>. Resident feedback on funding should be assessed through a public engagement process. The total estimated annual operating cost to maintain the cart infrastructure is approximately \$1.1 to 1.2 million, which includes \$465,000 in costs associated with managing the existing green cart program.

The cost impact of transitioning the existing program to a cart-based collection system on collection contracts cannot be estimated at this time as there are many variables for consideration such as technology (semi-automation or full automation), labour requirements, number of vehicles required, and time required to complete collection routes. It is assumed that collection contract costs will increase for a full cart-based collection system as compared to HRM's existing collection system.

Additional costs also may be incurred associated with processing loose material at the MRF and Otter Lake Landfill.

### **Next Steps**

Should Regional Council want to further evaluate transitioning HRM's solid waste system to a full cart-based program, there are number of planning tasks that will need to be completed including a full financial assessment, pilot program to evaluate the use of a split-cart for the recycling stream, engineering

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<sup>5</sup> Attachment E – Cost Impact

<sup>6</sup> Attachment A – Jurisdictional Review

assessment at the MRF and Otter Lake Landfill, public engagement, and development of a full implementation plan. It is anticipated that the planning tasks will take approximately two years to be completed and will cost approximately \$990,000 (further details are provided in the report).

Alternatively, Regional Council may want to consider transitioning HRM's solid waste system to a full cart-based program as part of a strategy review. The last solid waste system strategy review was completed in 2014. Another strategy review should be completed in fiscal year 2021/2022 or 2022/2023 given the duration since the last review and noting that the Province's intention with respect to EPR should be well known by that time.

**BACKGROUND**

**Origins of Halifax Bag Based Collection System**

HRM operates a mature waste diversion program using blue bags for recycling collection and clear/black bags for garbage collection.

Bag-based collection was established as part of the original Integrated Waste/Resource Management Strategy developed in 1995. Garbage had been collected in bags by the previous municipal units, pre-amalgamation and plastic bags had been used in the City of Halifax's first curbside recycling program which started in 1991. The organics program, including the use of green carts to collect source separated food and leaf and yard waste, was introduced in 1998 and fully implemented in 1999.

**Current Collection System Parameters**

Specifications for acceptable containers (size, weight and volume) for each waste stream are outlined in Solid Waste Resource Collection and Disposal By-Law S-600 and summarized in Table 1 with accompanying collection method.

**TABLE 1 – HRM Curbside Collection Overview**

	<b>Acceptable Container</b>	<b>Collection</b>
<b>Garbage</b>	Five clear bags. One black bag permitted for privacy.  Bags may be placed in cans for security and to better protect contents, however loose material is prohibited.  Regulation size cans (including contents) shall not exceed 34 kg, the height shall be not less than 46 and not more than 76 cm, and the diameter shall be between 38 and 51 cm.	Manual
	<b>Bulky items</b> One item or white good every garbage collection day  Items not to exceed 200 kilograms in weight	Manual
	<b>Home Renovation Waste</b> For single family dwellings - Up to 5 bundles or bags to replace bags of garbage	Manual

	<b>Acceptable Container</b>	<b>Collection</b>
<b>Recycling</b>	See through blue bag or clear bag. No bag limit for recycling.	Manual
	Bag 1 – Plastic, metal and glass containers; film plastic, aluminum foil, milk containers	Two Bag Separation Program
	Bag 2 – Paper products <sup>7</sup>	
	Bundles of corrugated cardboard	
<b>Organics</b>	240 L green cart issued by the Municipality	Semi-automated Cart tipper
	<b>Leaf &amp; Yard</b> Heavy paper leaf & yard waste bag	Manual
	Up to 20 bags of leaf & yard waste and 5 bundles of branches per organics collection day	



Figure 1: Examples of standard size garbage cans, approximately 75 litres. Images not to scale.

Bags allow flexibility in the amount of material residents can place for collection from week to week and are a relatively low-cost option (no upfront capital expenditure) in a collection system. For both recycling and garbage collection, see-through blue bags and clear bags tend to further promote proper sorting and participation in the source-separation program. For recycling, the separation of containers (plastic, glass and metal) in one bag, and paper in a separate bag minimizes contamination rates as compared to other recycling programs that commingle paper and containers together in single bag or receptacle (e.g., cart).

In the 2018 Citizen Survey conducted by HRM, garbage, recycling and organics collection were HRM's highest rated municipal service with 88% of residents satisfied or very satisfied<sup>8</sup> with the current collection services.

<sup>7</sup> Paper currently may also be placed in a retail plastic bag for collection. As a provincial ban on retail plastic bags comes into effect, residents will be asked to use separate blue or clear bags to contain paper recyclables.

<sup>8</sup> [2018 Citizen Survey, Halifax.ca](https://www.halifax.ca/citizen-survey)

### **Trends and Observations in HRM**

Based on curbside monitoring conducted by Solid Waste staff, calls received from residents and education stickers issued by collection contractors, it has been observed that some residents in HRM wish to use wheeled black and blue carts to contain waste material curbside.

Black and blue carts sized from 240<sup>9</sup> – 360 liters are available for purchase locally at some home improvement retailers. The size of these carts exceeds what is identified as acceptable for the manual garbage and recycling collection system. Collection from these types of carts requires a vehicle equipped with automation such as a hydraulic tipping mechanism. Reaching into large carts or lifting them to tip manually is an occupational health and safety hazard for the collection contractor.

Staff educate residents on acceptable manners to place materials curbside for collection and discourage the use of carts. Residents are advised to use the carts they have purchased for storage of materials between collection, while placing the bags curbside (outside of the cart) on collection day.

Despite the requirements of By-Law S-600, Halifax Solid Waste staff and collection contractors have been flexible in trying to accommodate residents and the variety of manners materials can be placed curbside. In 2019, staff directed collection contractors to collect bagged recyclables from small receptacles (preferably with no lid) that are clearly marked for recycling, such as a blue box.

### **Clear Bags for Garbage – A Model for Success**

On February 3, 2015 Council approved amendments to the Solid Waste Resource Collection and Disposal By-law S-600 which included the introduction of clear bags for curbside garbage collection. This program came into effect on August 1, 2015. Clear bags for garbage are a highly effective tool which allow for inspection of waste to ensure proper sorting and participation in source separation. Clear bags also help facilitate safety of staff through identification of potential hazards such as needles or sharp items.

The impact of the clear bag program was observed almost immediately with a 25% reduction in garbage tonnages generated by the residential sector, which has been maintained over the last four years. Other jurisdictions that have introduced a clear bag program have experienced similar declines in garbage. In the first three months of the clear bag program in Markham, Ontario there was a 28% decline in garbage tonnages. Cape Breton Regional Municipality and Valley Region also reported upwards of 25% declines in garbage tonnages.

## **DISCUSSION**

### **IMPACT ON PLASTIC BAG REDUCTION**

Residents have provided feedback that they would like solid waste collection to move to a bag free system. The reasoning is typically related to a reduction in consumption of plastics, however sometimes is also attributed to cost savings. An analysis was completed to estimate the potential reduction in plastic consumption and cost savings to residents should HRM move to a cart-based program. The analysis is included in Attachment B.

It would take approximately 8.3 to 12.2 years to achieve a net reduction of plastic when comparing the weight of the plastic carts (proposed system) to the annual estimated weight of plastic bags (current system) used per household for the garbage and recycling streams. This calculation assumes bags are not used in a cart-based program (proposed system). It is worth noting that carts typically have a warranty of 10 years,

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<sup>9</sup> 240 L is the same size as an HRM green cart.

and an assumed life-span of approximately 10 to 15 years. HRM has experienced a longer life span in the order of 15 to 20 years for some green carts purchased in 1998/1999.

The expected payback to offset the purchase of a cart is in the order of 4.0 to 6.2 years by comparing the cost of the carts (proposed system) to the estimated annual cost of plastic bags (current system) per household for the garbage and recycling streams. This calculation assumes bags are not used in a cart-based program (proposed system).

As noted in the Jurisdictional Review, many municipalities who have implemented cart-based programs allow, encourage, or require bags to be used in the garbage stream to limit litter which may escape the cart when it is emptied, and to help keep carts clean. There was no jurisdiction identified that does not allow bags to be used in the garbage stream. Therefore, moving to a cart-based program for the garbage stream likely will not significantly reduce the consumption of plastic bags.

While there is a payback to offset the purchase of carts for the recycling stream (in the order of 5.2 to 6.2 years), plastic bags will likely be continued to be used for the garbage stream. In addition, any plastic consumption reduction realized for the recycling stream will likely not be sustained long-term due to the life-span of the cart.

### **EXTENDED PRODUCER RESPONSIBILITY (EPR)**

EPR is a legislated program which makes brand owners and manufacturers responsible for the proper end of life management of their packaging or product. This includes the collection, processing and marketing of a designated list of recyclable materials.

The Province of BC legislated and implemented an EPR program in 2014, in which Recycle BC (on behalf of manufacturers of products and packaging) determined collection methods and provided recycling collection and processing services to residents in BC. This included collection frequency, collection method and what materials are accepted. While some municipalities are the contracted collection service provider, the responsibility for management of recyclables belongs to industry. In many cases, such as the City of Vancouver, the municipality only collects and manages garbage and organics.

In Ontario, curbside EPR programs for packaging materials are collectively called the 'Blue Box Program'. Stewardship Ontario (on behalf of the producers) currently reimburses municipalities for approximately 50% of the cost of curbside recycling collection. The Ontario Ministry of Environment conducted a review of the blue box program and is moving towards the BC EPR model<sup>10</sup>. This plan brings with it a timeline of six years for full implementation to ensure a smooth transition.

While no deadlines have been set, Nova Scotia Environment (NSE) is currently reviewing EPR and the efficiency of the solid waste management system in NS. The Municipal Efficiency Study<sup>11</sup> was recently presented to NSE and feedback is anticipated within the next 3-6 months. The study recommends that NS implements an EPR program. The EPR model proposed<sup>12</sup> by NS Regional Chairs is consistent with that in place in BC. Solid Waste staff have provided regular progress updates on this topic to Council through the Environment and Sustainability Standing Committee.

Any changes to the municipally operated curbside collection program could ultimately be reversed or further modified should industry be mandated to take over collection and processing of recyclable materials. Moving to a cart-based program for recycling involves significant up-front capital investment for carts (\$26.34 to 30.48 million) and potentially significant changes to collection and processing contracts. Should Nova Scotia Environment move forward with EPR legislation, HRM risks that the purchase of any new

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<sup>10</sup> [Renewing the Blue Box. Ontario Ministry of Environment, 2019](#)

<sup>11</sup> [Efficiency and Effectiveness of the Solid Waste Resource Management System. Report prepared for Divert NS on behalf of Municipal-Provincial Priorities Group. AECOM Canada Ltd, 2019.](#)

<sup>12</sup> [Proposed EPR Model for NS. NS Regional Chairs Committee. 2019.](#)



recycling carts may not be compatible with an industry/producer led recycling collection program. As such, HRM should understand the Province's intention with respect to EPR prior to implementing a cart-based program for recycling.

**COLLECTION AND PROCESSING**

Carts designed for municipal waste collection are available in a variety of sizes and styles (see Attachment C – Types of Carts) made with a combination of virgin and recycled high density polyethylene (HDPE) resin. Manufacturers will typically offer a 10-year warranty on carts. Carts are designed to be collected using a hydraulic tipping mechanism (see Figures 2 and 3). The shape and size of the lifting bar may vary depending on the type of lifting mechanism used. Messaging can be molded into the cart to identify contents or a logo.



*Figure 2: Semi-automated collection using a hydraulic tipper on the back of the truck.*



*Figure 3: Fully-automated collection. Operator does not leave the cab of the truck.*



While the collection of single-stream recycling (i.e., paper and containers collected together) is often lower cost and more time efficient than multi-stream (i.e., paper and containers collected separately), the capital and operating costs to process single-stream recycling in carts tend to be significantly higher (48.7%) with lower revenue from marketing of recyclable material (9.6% lower)<sup>13</sup>. HRM's existing MRF operates using predominantly manual sorting techniques (i.e., labour intensive). Moving to a single-stream recycling system would require a new recycling facility, with equipment designed to accommodate comingled paper and containers (i.e., more automation as compared to the existing MRF). A new facility would have to be designed, constructed and commissioned at a cost of approximately \$13.5 to 16 million<sup>14</sup>.

### **Single vs Multi-stream Recycling**

Given the current challenges in market conditions for recyclables, staff believe it imperative to maintain a multi-stream recycling system (paper and containers collected in separate streams). Single-stream systems have been found to have higher contamination rates than multi-stream systems, resulting in more material being landfilled. Source-separation of paper and containers into different streams ultimately facilitates better quality end products from the MRF. Market demand for recyclables have fluctuated in the past, with increasingly stringent requirements on the quality of the end products

The existing multi-stream recycling system could be maintained by issuing two recycling carts (one for containers and one for paper) or a split cart. A split cart can accommodate two streams and would reduce the overall number of carts needed per household. Since there are limited jurisdictions who have utilized a split-cart (only one identified in Canada), a pilot program to evaluate the merits and challenges of this system in Halifax is recommended.

Switching to a multi-stream cart-based recycling program would still require capital investments at the MRF assuming no bags will be used to store recyclables. Recyclables in bags require less tip floor space (due to ease of piling material), therefore additional bunkers and/or a larger tip floor would be required to accommodate loose material. A full engineering assessment would be required to evaluate the exact requirements and cost impact.

### **Cart-based Garbage Collection**

Cart-based collection can be provided using either semi-automated or fully automated collection system. As noted in Table 1 of Attachment D – Methods of Collection, both systems provide efficiencies and challenges when compared to manual collection, though ultimately a fully-automated system shows the highest possible benefits when investing in a cart-based system.

Given HRM's experience with green cart collection, consideration of a cart-based garbage collection system using semi-automated collection would be straightforward. Many vehicles in the current collection fleet are used interchangeably for garbage and green cart collection, therefore this change may not require as extensive planning or equipment changes. Moving to a fully automated system for all streams could have many benefits (e.g., health and safety considerations), however the cost impact is difficult to assess given the variability of many key considerations (e.g., type of collection vehicle, length of contract/amortization period, time in motion savings, labour costs, etc.).

### **Service Level Considerations**

HRM offers a high level of curbside collection service compared to many other municipalities. Examples include providing year-round collection of bulky items (e.g., box spring/mattress, washer, dryer, etc.), and home renovation waste as part of the garbage collection program; and collection of excess bagged leaf and yard waste as part of the organics collection program.

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<sup>13</sup> [Lakhan, C. A Comparison of Single and Multi-stream Recycling Systems in Ontario, Canada. 2015.](#)

<sup>14</sup> Waste Resource Strategy Update. Stantec, 2013. Adjusted for annual inflation of 2.2%

Automated collection may inhibit collection of larger items (e.g., furniture) which often require two people to lift the item into the truck (automated trucks typically only have a one-person crew). The placement of a cart tipper on a semi-automated vehicle may block full and safe access to place a larger item into the hopper. Considerations would have to be made on how to continue providing these services (e.g., separate collection vehicle, hybrid manual/automated collection) including the cost implications.

As part of the Jurisdictional Review, it was identified that several challenges with automated collection are mitigated with alternate collection services (typically manual). This includes: narrow streets, streets lined with parked cars, low tree canopies and the ability to collect excess items such as bundled branches or bulky items that do not fit into a cart. A pilot project conducted in Halifax would assist staff in identifying these key considerations prior to full implementation.

### **Contract Considerations**

Waste collection and processing services in HRM are contracted to private companies. Changes to the method of collection and the way materials are delivered to processing facilities may impact these contracts. Making substantial changes mid-contract or re-negotiating contract extensions may come at great financial risk to the municipality. The optimal time to make or propose changes to collection and processing systems is during the RFP development and procurement of these services.

The current curbside collection contract service specifications and pricing was established based on a manual collection system for garbage and recyclables and semi-automated collection for organics. The next issuance of a Request for Proposals (RFP) for collection is slated for Fall 2020, with likely a five-year contract term covering July 2021 to June 2026 and an option for the municipality to extend the contract for two years. There will not be sufficient time to transition to a cart-based collection system prior to the implementation of the next collection contract.

The cost of collection is influenced by many factors that would have to be included in the RFP as part of a transition to a cart-based system:

- Implementation date for carts
- Cart type and size
- Collection method: semi-automated or fully-automated
- Type and quantity of vehicles/equipment required
- Possible program and/or process change for collection of bulky items, construction and demolition debris (currently can be placed in a bundle curbside), bagged leaf and yard waste and tree waste (currently can be placed in a bundle curbside)
- Possible changes to the collection frequency
- Collection day boundaries: existing boundaries could change with the implementation of a cart-based collection system due to changes in the time in motion (i.e., time it takes to collect waste)
- Number of stops per route, per day

In addition to collection contracts, moving to a cart-based system will also impact the operations at the MRF. A five-year contract for operation of the MRF was issued in early 2019, and commenced April 1, 2019 expiring in 2024 (five-year contract + optional 5 years). Assuming that the multi-stream recycling program would be maintained, moving to a cart-based recycling program will result in some potential infrastructure changes related to receiving and processing loose materials (i.e., no longer contained in bags). A contract amendment may need to be negotiated to facilitate moving to a cart-based program.

Depending on the extent that loose garbage is anticipated to be received at the Otter Lake Landfill as part of a cart-based system, an evaluation of potential infrastructure changes may also need to be completed related to receiving and processing loose materials. A contract amendment may need to be negotiated to facilitate moving to a cart-based program.

## **COST IMPACT**

Attachment E provides an overview of potential cost impacts to transition HRM's solid waste system to a cart-based collection system. The upfront capital investment for purchase and distribution of garbage and recycling carts is in the range of \$26.34 to \$30.48 million. The total estimated annual operating cost to maintain the cart infrastructure is approximately \$1.1 to 1.2 million, which includes \$465,000 in costs associated with managing the existing green cart program.

The cost impact of transitioning the existing program to a cart-based collection system on collection contracts cannot be estimated at this time as there are many variables for consideration such as technology (semi-automation or full automation), labour requirements, number of vehicles required, and time required to complete collection routes. It is assumed that collection contract costs will increase for a full cart-based collection system as compared to HRM's existing collection system.

### **How to Pay for Cart Purchase**

There are several options available to fund the purchase of carts, including through capital budget, a one-time fee on tax bills or a pay as you throw model. Resident feedback on funding should be assessed through a public engagement process.

In 1998/1999, the municipality paid approximately \$8.5 million for 100,000 green carts (\$12.4 million adjusted to 2019 dollars). The cost of the carts was initially proposed to be included as a line item on individual tax bills. There was much public opposition to this at the time and the decision was made to fund the purchase of the carts through the capital budget.

Most of the jurisdictions reviewed incurred debt or had planned for purchase of carts through their capital budgets (e.g., PEI, Toronto, St John's). In some cases, funding was available through provincial stewardship programs (e.g., Winnipeg). Few municipalities directly charged residents for the purchase of carts directly on their utility billing (e.g., Edmonton and Vancouver). Many jurisdictions have employed pay as you throw utility models, as previously noted, that generally support funding solid waste programs, including the purchase of carts. A summary of utility and pay as you throw programs are listed in Attachment A.

Moving to a cart-based collection system will require a standard cart design and specifications to facilitate efficient collection. HRM will also get the best value by purchasing the carts through a competitive bid process and based on economies of scale. Allowing residents to purchase their own carts from the retail sector is not recommended. Automated lifters on collection fleet are most efficient with the use of a standard cart and are not always compatible with all cart designs with risk of damage and replacement being a potential issue. In addition, a maintenance program is much more efficient when a standard cart design is used. All municipalities using a cart-based collection system identified in the Jurisdiction Review employed a standard cart design.

## **REQUIRED TASKS TO FULLY EVALUATE CART-BASED COLLECTION**

The following tasks would need to be completed to fully assess program changes, and impact to collection and processing contracts and is estimated to take approximately two years to be completed:

- Full financial assessment of moving to a semi-automated versus fully-automated cart-based collection program for all streams.
- Pilot project to evaluate the use of a split-cart and standard cart, and to assess impacts to the program (e.g., time in motion, impacts to routes, litter, resident satisfaction). A 12-month duration is recommended to assess seasonal considerations.
- Engineering assessment of possible infrastructure and process changes for the processing of garbage and recyclables.
- Public engagement to get feedback on program changes (e.g., type and size of carts; changes to

collection of bulky items, construction and demolition and tree waste bundles, bagged leaf and yard waste; changes to collection frequency; how carts are to be paid for).

- Development of full Implementation Plan including cart procurement and distribution plan, communication strategy, and implementation schedule.

The estimated costs of these studies and pilot program are estimated to cost in the order of \$990,000 (outlined in Attachment E – Cost Impact).

### **FINANCIAL IMPLICATIONS**

There are no financial implications associated with this report.

### **COMMUNITY ENGAGEMENT**

Moving to a cart-based system is a major shift in collection that comes with cost and change in behaviour to the taxpayer. Therefore, community engagement should be an integral part in evaluating a cart-based collection model. Public input should be obtained on items such as the preference of cart type (two carts for recycling or one split cart), financing of the carts, changes to collection frequency, mobility concerns etc. In addition, a pilot program will also assist in gathering data on the impact of moving to a cart-based system, including gaining residents feedback.

### **ATTACHMENTS**

Attachment A – Jurisdictional Review  
Attachment B – Impact on Plastic Bag Reduction  
Attachment C – Types of Carts  
Attachment D – Methods of Curbside Collection  
Attachment E – Cost Impact

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A copy of this report can be obtained online at or by contacting the Office of the Municipal Clerk at 902.490.4210.

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## Attachment A - JURISDICTIONAL REVIEW

A review of eighteen municipalities across Canada was conducted to identify collection methods for both garbage and recyclables. Table A1 (on next page) provides a summary of information gathered, including the direction given to residents on whether bags should be used in the cart to contain material.

When interviewing other municipalities, it became evident that information on reduction of the use of plastic bags inside garbage carts is anecdotal as the number of bags used was not measured prior to the start of the cart-based collection program for garbage.

Given the variances in the types of programs each of these cities started with, it is difficult to compare how those models would work in HRM. For example, Ontario jurisdictions generally transitioned from blue box programs (not bags) to cart based collection. In the cities surveyed in Saskatchewan and Alberta, carts were implemented when recycling and organics collection programs were first initiated, resulting in substantial increases in diversion rates and participation.

In jurisdictions which require the use of bags in garbage carts, litter prevention and maintenance of cart cleanliness are the primary reasons provided for this direction. In general, bags are prohibited in cart-based recycling collection as the facilities receiving the material are not equipped with a bag breaker which opens the bags prior to sorting. These facilities are designed to receive the materials 'loose' (i.e., not bagged).

### Utility Models

Many municipalities operate utility models and bill residents annually for waste collection services based on the size of the cart assigned. Excess bags are sometimes permitted to be placed next to the garbage cart, provided the bag has a sticker purchased from the municipality. This allows some flexibility for occasional excess waste. These programs are often referred to as 'pay as you throw' or 'PAYT' programs and are usually designed to encourage recycling and organics diversion. A summary of rates from the jurisdictions reviewed are included in Table A2 below. For municipalities that do not have utility models, the fee is included in the general tax rate, not as a separate line item.

**Table A2 – Utility Rates and Fees for PAYT programs**

CITY	GARBAGE CART			RECYCLING CART		ORGANICS
	Size	Cost/month	Extra bag	Size	Cost/month	Cost/month
Calgary, AB	240 L	\$6.85	Rate pending	240 L	\$8.80	\$8.65
Lethbridge, AB	240/360 L	\$18.85/ \$20.50	Not permitted	240/360 L	Included in garbage fee	n/a
Vancouver, BC	5 sizes 75 – 360 L	\$6.92 - \$13.50	\$2.00 per bag	n/a	Provided by Recycle BC <sup>1</sup>	\$11.92
Winnipeg, MB	240 L/ 360 L	\$5.25/ \$8.25	\$20 for 3 bags \$10.50 per bulky item	240 L/ 360 L	Included in garbage fee <sup>2</sup>	n/a
Toronto, ON	4 sizes 75 – 360 L	\$8.30 - \$41.39	\$5.38 per bag \$15 per bulky item	4 sizes 75 – 360 L	Included in garbage fee	Included in garbage fee
Region of Peel, ON	3 sizes 120 – 360 L	Tax rate	\$1.00 per bag	3 sizes 120 – 360 L	Tax rate	Tax rate
Saskatoon, SK	240/360 L	Tax rate	Not permitted	360 L	\$5.66	\$14.00

<sup>1</sup> Curbside recycling collection in Vancouver is provided by Recycle BC under EPR legislation.

<sup>2</sup> Residents are charged a one-time fee of \$16 to change the size of the recycling cart.

**TABLE A1 – Jurisdictional Summary of Cart Based Collection Programs**

City	Population <sup>3</sup>	Organics Cart	Garbage			Recycling Program <i>Single-stream collection unless otherwise stated</i>		
			Cart or Bag Collection	Bags Permitted in Cart	Collection Method Frequency	Cart or Bag Collection	Bags Permitted in Cart	Collection Method Frequency
Calgary, AB	1,239,220	Yes Weekly	Cart	Optional	Fully-automated Bi-weekly	Cart	Prohibited	Fully-automated Weekly
Edmonton, AB	1,321,426	Yes Weekly	Cart (Pilot)	Optional	Fully-automated Weekly	Bag	n/a	Manual Weekly
Lethbridge, AB	117,394	No	Cart	Mandatory	Semi-automated/manual Bi-weekly	Cart	Prohibited	Semi-automated/manual Bi-weekly
Regional District of Central Okanagan, BC	194,882	Yes <sup>4</sup> Bi-weekly	Cart	Optional	Weekly	Cart	Prohibited	Bi-weekly
Surrey, BC	517,887	Yes Weekly	Cart	Optional	Fully-automated Bi-weekly	Cart	Prohibited	Fully-automated Bi-weekly
City of Vancouver, BC	631,486	Yes Weekly	Cart	Optional	Mix of semi/fully-automated Bi-weekly	<b>Multi-stream collection</b> Yellow reusable bag (paper) Blue box (plastic and metal) Grey box (glass)	Prohibited	Manual <sup>5</sup> Weekly
Winnipeg, MB	705,224	No	Cart	Optional	Fully-automated Weekly	Cart	Prohibited	Fully-automated Weekly
St John's, NL	205,955	No	Cart	Mandatory	Mix of semi/fully-automated/manual Weekly	Two stream Blue Bag Cardboard Bundled (voluntary participation)	n/a	Manual Bi-weekly
Guelph, ON	151,984	Yes Weekly	Cart	Optional	Fully-automated Bi-weekly	Cart	Prohibited	Fully-automated Bi-weekly
Ottawa, ON	934,243	Yes Weekly	Bags (Carts to be implemented in future for multi-unit)	n/a	Manual Bi-weekly	<b>Multi-stream collection</b> Black box (paper) Blue box (containers)	Prohibited	Manual Weekly – alternating black/blue
Region of Peel, ON	1,381,739	Yes Weekly	Cart	Preferred	Fully-automated/manual Bi-weekly	Cart	Prohibited	Fully-automated/manual Bi-weekly
Sault Ste. Marie, ON	78,159	No	Cart	Optional	Fully-automated Weekly	<b>Multi-stream collection</b> Split body cart (Containers/Paper)	Prohibited	Fully-automated Weekly
Toronto, ON	2,731,571	Yes Weekly	Cart	Optional	Mix of semi/fully-automated Bi-weekly	Cart	Optional	Mix of semi/fully-automated Bi-weekly
PEI	142,907	Yes Weekly	Cart	Optional <sup>6</sup>	Semi-automated/cart tipper Weekly	<b>Multi-stream collection</b> Bags	n/a	Manual 1 x per month
Gatineau, QC	276,245	Yes Weekly	Cart	Optional	Bi-weekly	Cart	Prohibited	Bi-weekly
Montreal, QC	1,704,694	Yes Weekly	Mainly bag-based; Carts for buildings over 9 units	n/a	Manual/semi-automated Weekly	Mix of carts and boxes	Optional	Manual/semi-automated Weekly
Regina, SK	215,106	No	Cart	Mandatory	Mix of semi/fully-automated Weekly	Cart	Prohibited	Mix of semi/fully-automated Bi-weekly
Saskatoon, SK	246,376	Yes Bi-weekly <sup>7</sup>	Cart	Mandatory	Fully-automated Bi-weekly	Cart	Prohibited	Fully-automated Bi-weekly

<sup>3</sup> Statistics Canada Census Profile, 2016 Census

<sup>4</sup> Yard waste only

<sup>5</sup> Collection of recyclables is provided by and fully funded by Recycle BC

<sup>6</sup> Residents can place 2 clear bags for excess waste next to cart

<sup>7</sup> Service provided May – October on a subscription basis

## Attachment B – Impact on Plastic Bag Reduction

Key assumptions in this analysis include:

- No bags (i.e. 'kitchen catchers') are used to line household garbage or recycling receptacles inside the home
- The multi-stream recycling system is maintained (i.e., paper stream, container stream) requiring the use of two carts or a split cart
- Standard blue bags will be used for paper collection in lieu of retail plastic bags
- Based on annual curbside monitoring conducted by Solid Waste staff since 2016, households place an average of 2.22 bags of garbage bi-weekly (57.72 per year) and 1.58 bags of recycling weekly (82.16 per year) for collection.
- The cost of bags was compiled through a scan of local retail locations and includes HST; (Tables B3 and B4 below provide a summary of the analysis).
- The weights of clear and blue bags vary depending on the thickness of the resin. Bags with a thickness between 0.75 – 2.5 mil range in weight between 14 and 40 grams depending on the size of the bag (24" x 28" - 31" x 42"). For this comparison, an average weight of 28 grams is used (1.25 mil bag, 33" x 33").
- The estimated cost of the cart is based on information gathered in the Jurisdictional Review and includes net HST (240 L cart = \$68; 360 L cart = \$88; and 360 L split-cart = \$115).
- The cart weights used for comparison were provided by IPL Plastics (240 L cart = 14 kg; 360 L cart = 16 kg; and 360 L split-cart = 19 kg).

The payback on the purchase of carts based on moving to a bag free solid waste system is shown in Table B1 by comparing the cost of the carts (proposed system) to the estimated annual cost of plastic bags (current system) per household for the garbage and recycling streams. For comparison, a range and average cost has been shown.

**TABLE B1 – Comparison of Cost of Bags Per Household to Cost of Carts**

Stream	Annual cost of bags	Payback			
		Cost of Carts			
		240 L Cart	240 L x 2 carts	360 L Cart	360 L Split-Cart
		\$68	\$136	\$88	\$115
<b>Garbage</b>	<b>Avg = \$14.68</b> (\$5.16 - \$34.42)	<b>4.6 years</b> (2.0 – 13.2 years)	n/a	<b>4.0 years</b> (2.6 – 17.0 years)	n/a
<b>Recycling</b>	<b>Avg = \$21.93</b> (\$12.98 - \$33.84)	n/a	<b>6.2 years</b> (4.0 – 10.5 years)	n/a	<b>5.2 years</b> (3.4 – 8.8 years)

The number of years it would take to see a net reduction in plastic consumption based on moving to a bag free solid waste system is shown in Table B2. The analysis is based on comparing the weight of the plastic carts (proposed system) to the annual estimated weight of plastic bags (current system) used per household for the garbage and recycling streams.



**TABLE B2 – Comparison of Plastic Consumption: Weight of Plastic Bags Per Household to Weight of Carts**

Stream	Annual weight of bags used (kg)	Number of years required to see plastic reduction/savings			
		Weight of Carts			
		240 L Cart	240 L x 2 carts	360 L Cart	360 L Split-Cart
		14 kg	28 kg	16 kg	19 kg
<b>Garbage</b>	<b>Avg 1.6 kg</b> (0.8 – 2.3 kg)	<b>8.75 years</b> (6.1 – 17.5 years)	n/a	<b>10 years</b> (8.2 – 20 years)	n/a
<b>Recycling</b>	<b>Avg 2.3 kg</b> (1.1 – 3.2 kg)	n/a	<b>12.2 years</b> (8.8 – 25.5 years)	n/a	<b>8.3 years</b> (5.9 – 17.3 years)

**Table B3 - Average Annual Household Cost of Blue Bags**

Average Annual Household Cost of Blue Bags					
Brand	Size	# per box	Price Inc HST	Per bag	
Al-Pack	Medium	80	\$12.64	\$0.16	
Kirkland	Regular	80	\$15.97	\$0.20	
Al-Pack	Medium	40	\$8.38	\$0.21	
Great Value	Regular	30	\$6.87	\$0.23	
GLAD	Tall	50	\$11.47	\$0.23	
Great Value	Large	30	\$7.13	\$0.24	
Frank	Large	30	\$8.04	\$0.27	
GLAD	Large	30	\$10.32	\$0.34	
GLAD	Large	60	\$22.97	\$0.38	
GLAD	Regular	60	\$24.71	\$0.41	<b>Annual Cost</b>
<b>Bags used per year</b>	82.16		<b>Min</b>	\$0.16	\$12.98
			<b>Avg</b>	\$0.27	\$21.93
			<b>Max</b>	\$0.41	\$33.84

**Table B4 - Average Annual Household Cost of Clear Bags**

Average Annual Household Cost of Clear Bags					
Brand	Size	# per box	Price Inc HST	Per bag	
Great Value	Regular	100	\$8.94	\$0.09	
Great Value	Large	80	\$7.21	\$0.09	
Great Value	Tall	60	\$7.21	\$0.12	
Great Value	Regular	40	\$6.41	\$0.16	
no name	Regular	40	\$7.46	\$0.19	
Al-Pack	Medium	40	\$8.38	\$0.21	
Kirkland	Regular	60	\$13.56	\$0.23	
GLAD	Tall	30	\$8.61	\$0.29	
GLAD	Large	30	\$10.32	\$0.34	
Great Value	X-Large	20	\$7.21	\$0.36	
Frank	Giant	30	\$11.49	\$0.38	
GLAD	X-Large	20	\$11.93	\$0.60	<b>Annual Cost</b>
<b>Bags used per year</b>	57.72		<b>Min</b>	\$0.09	\$5.16
			<b>Avg</b>	\$0.25	\$14.68
			<b>Max</b>	\$0.60	\$34.42

## Attachment C - Types of Carts

The size of carts offered vary between jurisdictions, with 240 L and 360 L being the most common. Estimated capacities for carts, based on a standard size bag<sup>1</sup> are:

120 L cart = 1 - 2 bags

240 L cart = 3 - 4 bags

360 L cart = 4 - 5 bags



Figure C1: Waste cart sizes from left to right: 360 L, 240 L, 180 L, 120 L, 80 L. Yellow arrow indicates the size of an HRM green cart. Photo credit: City of Surrey, BC

Radio Frequency Identification (RFID)<sup>2</sup> tags are being used more frequently as an asset management tool, to verify service<sup>3</sup> (i.e., missed collection), participation rates and truck location/routing in real time. RFID tags transmit data through radio waves to handheld devices or a reader on the truck. RFID tags can also notify the driver of a fully-automated truck if they attempt to collect the wrong bin (i.e., recycling cart into a garbage truck). Using cellular data, RFID data can also be transmitted in real time to dispatch or customer service staff.

Proper placement of carts curbside for collection is important, especially in a fully-automated collection program (Figure C2). This includes clearance for the automated arm to pick each bin up and lids facing the proper direction to allow tipping into the collection vehicle. Carts must be placed on a flat surface (i.e. not on a snowbank). Parked cars and narrow streets can also inhibit collection and require the operator to exit the vehicle and move the cart.

<sup>1</sup> [Region of Peel, Using Your Carts; bag sizes range between 45 – 90 L](#)

<sup>2</sup> HRM's initial green cart purchase included RFID tags. Since collection vehicles were not equipped with the appropriate readers, the technology was never utilized. Green carts are currently tracked using a unique serial number, recorded on delivery.

<sup>3</sup> [How RFID Technology is Evolving in the Waste and Recycling Industry. Waste 360, 2017](#)

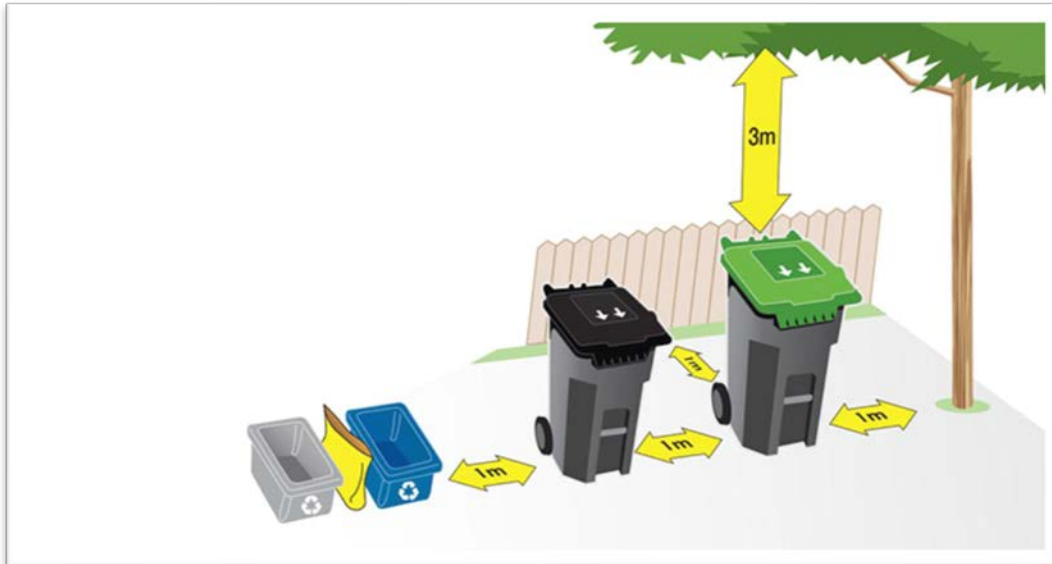


Figure C2: Required curbside set out. Photo credit: Vancouver, BC

## 1.2 Split Recycling Cart for Multi-Stream Recycling Collection

Single stream or co-mingled recycling contains a mix of plastic, metal and glass containers as well as paper products and cardboard collected together. Multi-stream systems require the resident to keep plastic, metal and glass separate from the paper and cardboard. Materials from multi-stream programs have been shown to yield higher quality recyclable products and higher value in recycling markets.

Of the jurisdictions reviewed, the City of Sault Ste. Marie, is the only multi-stream recycling program which uses a split body cart and collects using a split body truck. This is unique in Canada, and only a few municipalities in California are known to use this method of collection. The split cart has a divider down the middle and two separate lids which can be colour coded and stamped to identify appropriate materials (Figure C3). This facilitates a two-stream collection system (plastic, metal and glass containers on one side and paper/cardboard on the other side).



Figure C3: Split Body Recycling cart – 360 L total capacity. Photo credit: Sault Ste, Marie, ON

## Attachment D - Methods of Curbside Collection

Manual collection (Figure D1) is typically completed with a two-person crew (driver and helper) using a rear load packing truck. The driver stops at each collection point, and the helper collects the garbage bags. When heavier or bulky items are present, the driver will exit the truck to assist.



Figure D1: Manual collection of garbage in HRM. Two-person crew consists of a driver and 'helper'.

Semi-automated collection (Figure D2) can accommodate tipping of a cart by use of a hydraulic tipper. Crews must exit the vehicle to wheel the cart to the tipper, engage it and return it to the curb.



Figure D2: Semi-automated collection. Helper moves cart from the curb to a hydraulic tipper on the back of the truck. Cart is then returned to the curb.

Both manual (bags) and semi-automated (cart) collection can be completed by one worker per vehicle. Usually this is facilitated using collection vehicles that have side loading compartments (see Figure D3). For recycling collection in HRM, some collection vehicles are configured with the two compartments on the side of the truck such that one worker is utilized for collection. These trucks can be driven from the right side of the vehicle.





*Figure D3: Side-loading recycling collection vehicle for manual collection. Compartments keep blue bags and paper recycling separate in the body of the truck.*

Fully automated collection (Figure D4) utilizes trucks fitted with a hydraulic arm that is operated from the cab of the truck. The operator moves the arm using a joystick controller to pick up the waste cart, empty it, and put it back in place. This type of collection is the least labour intensive, only requiring one operator.



*Figure D4: Fully-automated collection. Operator does not leave the cab of the truck. Controls an arm which picks the cart up and tips into the truck.*

During the jurisdictional scan and review of literature<sup>1</sup>, further insight was gathered on the benefits and challenges with the various collection methods used across the country. These are summarized below (Table D1).

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<sup>1</sup> [Thinking "Beyond the Box". York University, 2018](#)

**TABLE D1 – Curbside Collection Methods Table of Benefits and Challenges**

<b>METHOD</b>	<b>DESCRIPTION</b>	<b>BENEFITS</b>	<b>CHALLENGES</b>
<b>Manual</b>	<p>Bags, cans or boxes are used to contain material</p> <p>Manually lifted by collection staff and tossed/emptied into the hopper or compartment of a vehicle</p> <p>Typically requires two-person crew per collection vehicle: driver and helper</p>	<p>Quickest and overall least expensive method of collection – lowest equipment costs</p> <p>Allows for inspection of contents to ensure proper sorting</p> <p>Bags offer flexibility in capacity and facilitates multi-stream recycling</p> <p>Bags contain material to prevent litter from blowing</p> <p>Allows for collection of bulky items and bundles of renovation debris in the same vehicle</p> <p>Lowest equipment costs (rear-pack vehicle)<sup>2</sup></p>	<p>Higher rates of worker injury</p> <p>Open boxes (recycling) can contribute to windblown litter</p> <p>Bags may be broken open by birds/animals</p> <p>Not conducive to collecting material from large bins/carts</p>
<b>Semi-Automated</b>	<p>Material is contained in a high capacity, wheeled-cart which is designed to latch on to the lifting system</p> <p>Collection staff leave the vehicle and wheel the cart to the vehicle where it is tipped using a hydraulic mechanism</p> <p>Requires one or two-person crew per collection vehicle</p>	<p>Uniform volume/set out at each home</p> <p>Reduction in worker injury</p> <p>Rear loading trucks are more adaptable to narrow streets</p> <p>Rear-pack vehicles can be modified through addition of a lifting mechanism</p>	<p>Carts limit the ability to view material to determine it is acceptable for collection and proper sorting</p> <p>May limit ability to collect bulky items or bundled material in the same truck</p>
<b>Fully-Automated</b>	<p>Wheeled carts are picked up using an automated arm, controlled by a joystick from the cab of the truck</p> <p>Requires one-person crew per collection vehicle</p>	<p>Safest method of curbside collection for workers</p> <p>More time efficient than semi-automated collection (time in motion)</p> <p>Requires fewer staff – least labour intensive</p> <p>Allows for Radio Frequency Identification (RFID) tracking to monitor participation rates; may allow video camera for material inspection</p>	<p>Impediments include tree canopy, low wires, parking or other objects at or near the curb that can impact collection</p> <p>Specific cart placement at the curb is required for collection to be successful – resident education and uniformity is key</p> <p>Operator still must get out of the truck to move improperly placed carts (lower efficiency of automation if exceptions are high)</p> <p>Limits the ability to pick-up bulky items or bundled materials in the same truck</p> <p>Storage of multiple carts on residential properties and their placement at curb frontage on narrow lots can be a concern</p> <p>Not suited for narrow streets or areas with on-street parking</p> <p>Estimated 20% higher vehicle costs vs manual collection vehicle.</p>

<sup>2</sup> HRM's collection contracts currently stipulate that no collection fleet shall exceed ten (10) years of age during the term of the contracts.



## Attachment E – Cost Impact

There are significant costs to transition HRM's solid waste program to a cart-based collection system. The following sections summarize costs and associated considerations with respect to:

- Studies/Pilot Program
- Delivery and Maintenance of Carts
- Collection Systems
- Waste Processing

All costs presented are order of magnitude and are inclusive of net HST.

### Studies/Pilot Program

As previously noted, further study is needed to fully assess program changes and impact to collection and processing contracts. Costs are estimated in the below table and are for services provided by external parties (e.g., consultants, contractors).

**Table E1: Estimated Cost of Studies/Pilot Program**

<b>Task</b>	<b>Cost Estimate</b>
Financial Evaluation of Collection Methods	\$100,000
Pilot Program <sup>1</sup>	\$750,000
Engineering Assessment	\$40,000
Public Engagement <sup>2</sup>	\$100,000
<b>Total</b>	<b>\$990,000</b>

### Delivery and Maintenance of Carts

Should HRM proceed with a cart-based collection system, the following tables below provide a cost estimate with respect to delivery and maintenance of garbage and recycling carts. The total estimated capital cost to purchase and distribute garbage and recycling carts is \$26.34 to \$30.48 million (including net HST). The total estimated annual operating cost is \$1.1 to 1.2 million (including net HST), which includes \$465,000 in costs associated with managing the existing green cart program.

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<sup>1</sup>12-month pilot project conducted at 1,500 households. Includes estimates for lease of specialized collection vehicle (split-cart collection), contracted labour costs, education and evaluation.

<sup>2</sup>Estimate includes hiring of outside firm to conduct surveys, development of communications collateral, Shape Your City portal, in-person engagement at public events.

**TABLE E2: Initial Cart Purchase – Estimated Capital Costs**

Item	Garbage Carts (240 – 360 L)	Recycling Split Carts (360 L)	Total Costs
Cart purchase <sup>3</sup>	\$9.4 - \$12.1 million	\$15.9 million	\$25.3 – \$28.0 million
Distribution <sup>4</sup>	\$555,000 - \$693,000	\$555,000 - \$692,000	\$555,000 – \$1.38 million
Communications	\$485,079 - \$624,000	\$485,079 - \$624,000	\$485,079 – \$1.24 million <sup>5</sup>
<b>Total Initial Implementation</b>	<b>\$10.4 - \$13.5 million</b>	<b>\$16.9 – \$17.3 million</b>	<b>\$26.34 - \$30.48 million</b>

**TABLE E3: Annual Costs: Estimated Annual Operation and Maintenance Costs Carts**

Item	Organic Carts (Existing Budget)	Garbage Carts (240 – 360 L)	Recycling Split Carts (360 L)	Total Costs
<b>Annual replenishment</b> - New homes - Replacements	\$305,000	\$183,600 - \$237,600	\$310,500	\$799,100 - \$853,100
<b>Annual Operational</b> - Deliveries/repairs - Parts	\$160,000	\$85,000	\$85,000	\$330,000
<b>Annual Replenishment and Operating Cost</b>	<b>\$465,000</b>	<b>\$268,600 - \$322,600</b>	<b>\$395,500</b>	<b>\$1.1 - \$1.2 million</b>

### Collection Systems

Changes in collection contract costs are dependent on many factors. Currently, HRM's garbage and recycling programs are based on manual collection. Manual collection is the most cost-effective method to collect waste materials, however has limitations as noted in this report (e.g., higher rates of workplace injury). At this time, Solid Waste staff cannot estimate the cost impact of transitioning the existing program to a cart-based collection system as there are many variables for consideration such as:

- Collection method: semi-automated or fully-automated
- Labour requirements
- Type and quantity of vehicles/equipment required
- Collection frequency
- Number of stops per route, per day (time in motion)

It is assumed that collection contract costs will increase as compared to HRM's existing collection system. A financial assessment needs to be completed to evaluate the impact of moving to a cart-based collection system with either semi-automated or fully-automated collection. For reference, the below table shows collection contract costs for HRMs collection program for garbage, recycling, and organics over the last three years.

<sup>3</sup>Based on current count of 138,594 units serviced; New homes/replacements = 2,700 per year; Cost of carts = \$68/\$88 for garbage, \$115 split recycling

<sup>4</sup> Distribution and Communication estimates derived from: [Automated Cart Recycling: A Study of Municipal Collection and Operations in Ontario. CIF, 2016](#)

<sup>5</sup> Economies of scale could be achieved if garbage and recycling carts are deployed simultaneously, avoiding duplicate communications costs.

**Table E4: Existing Collection Contract Costs**

<b>Year</b>	<b>2017/18</b>	<b>2018/2019</b>	<b>2019/20</b>
<b>Cost (incl. net HST)</b>	\$16,023,975	\$16,328,350	\$16,852,000 (budgeted – on track)

**Waste Processing**

Solid Waste staff cannot estimate at this time the cost impact to the MRF or possibly at the Otter Lake Landfill should HRM transition to a cart-based collection program for the garbage and recycling streams. An engineering assessment needs to be completed to assess the possible infrastructure requirements and process changes for the acceptance of loose garbage and recyclables (i.e., not bagged).