



Optimization of Grey Highlands' Recycling Depots

Continuous Improvement Fund

Project 629.8

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Project provided funding to support the Municipality towards the conversion of roll-off bin services to Front End Load service to increase efficiencies

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1. Executive Summary

The Continuous Improvement Fund is intended to support municipal Blue Box recycling projects in Ontario. The Municipality of Grey Highlands successfully applied for funding to optimize its recycling depot operations.

Grey Highlands is a rural municipality settled within Grey County. It has a population of 9,804 (2016 Census) and is made up for three former townships that amalgamated in 2001. There are two urban centers (Flesherton and Markdale) as well as a number of small hamlets in this predominantly rural agricultural community. The Municipality owns and operates three waste disposal sites (WDS). In the summer of 2016, the WDS transitioned from an un-compacted 40-yard roll-off bin collection system to 8-yard front-end loading bins (FEL) in an effort to achieve cost savings for recycling. The Municipality received financial and technical support from the Continuous Improvement Fund (CIF) in completing this transition.

The objective of this project was to reduce the hauling frequency of materials from the WDS from three hauls per week to one, achieving anticipated cost savings of approximately \$60,000 per year. Recycling collection at the WDS was previously conducted using roll-off bins. Each site had one open top for cardboard (OCC) and one cabin-style for comingled materials. Overflow bins were occasionally required for peak times to accommodate volumes. As part of the collections contract, the six rented bins and the material collected was hauled away weekly requiring three weekly trips by the contractor. In July, 2016 thirty FEL bins were purchased and installed in the three sites. Materials from all three sites are now collected in single weekly trip by the contractor's FEL truck.

The focus of this project was to reduce depot collection and hauling costs therefore these costs were isolated as best as possible from curbside collections.

This project was completed in February of 2017 after collecting 6 months of data to show a comparison for the same 6 month period one year prior. The two time periods compared are July through December 2015 and 2016. From this analysis, staff have determined the impacts of this project are:

- Actual yearly cost savings of \$56,395
- Payback period on project costs of 0.5 years

Other benefits of the new program are: bins are more user friendly, lower to the ground for ease of use and have locking lids to reduce litter, vermin and possible weather issues. OCC bins have slots to encourage flattening of boxes to increase the density and capacity of cardboard materials which further enhances hauling efficiency.

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2. Background

Grey Highlands provides curbside collection service and depot drop off service for waste and recycling. The bulk of the total recycling is collected through the curbside program, approximately 60%. The remainder is collected at the WDS. Users may choose to use the WDS over the curbside program for various reasons, including:

- Excess materials per holidays, special occasions, moving etc.
- They missed their curbside collection
- They choose not to use the curbside program

In 2011 the Mandatory Recycling by-law was enacted.

<http://www.greyhighlands.ca/downloads/635.pdf>

The recycling contractor (Mid Ontario Disposal) enforces relevant portions of the By-Law by not collecting items that aren't properly sorted, overweight etc. The contractor also works with residents to educate when non-compliance occurs.

In 2013, the Municipality applied for funding and technical assistance from the CIF in preparing a tender for a new solid waste management collection and processing contract. This RFP scope included collection service to the WDS. During the process the CIF suggested the Municipality complete a financial analysis to determine if cost savings could be achieved by transitioning to a different collection bin system.

The financial analysis identified significant savings could be achieved by transitioning the un-compacted bin system to a compacted bin system as the densified loads would reduce hauling frequency and related costs. An FEL bin system was selected as it requires very little capital investment and an FEL collection vehicle service was available from the contractor.

This project report presents highlights from the transition to the FEL bin system at the Municipality’s WDS.

3. Community Profile

Grey Highlands is a predominantly rural community (882.4 km²) located in southwestern Ontario approximately 200 km north of Toronto and 40 km south of Owen Sound. According to 2016 census data the Municipality has a population of 9,802 and 5,200 households. Grey Highlands is one of nine partner jurisdictions within Grey County.



Figure 1. Location of the Municipality of Grey Highlands

The Municipality consists of two urban centers (Markdale & Flesherton), a number of hamlets, the scenic Beaver Valley, the Bruce Trail, Lake Eugenia and a vast agricultural community.

There are a few sizeable industries; Chapman’s Ice Cream, Ice River Springs and ski resorts. The area experiences significant seasonal tourism (summer and winter) influxes for skiing, hiking, canoeing, snowmobiling, hunting, fishing, lake activities, and other recreation. Geographic diversity combined with seasonal flux creates a unique challenge for service provision.

4. Waste Management System

The Municipality provides curbside waste and recycling collection as well as three WDS where ratepayers have the opportunity to dispose of curbside recycling items, additional diversion items as well as waste. The WDS are operated by municipal staff and open as per the following schedule.

Waste Disposal Site Hours and Locations		
Osprey	Saturday 9am – 5pm	493926 Road 49, Maxwell
Markdale	Monday 9am – 5pm Saturday 9am – 2pm	775557 Hwy 10, Markdale
Artemesia	Monday 9am - 5pm (year round) Saturday 9am -1pm (Winter Nov 1 – April 1) Saturday 9am – 5pm (Summer April 2 – Oct 31)	113524 Grey Rd 14, Priceville

Figure 2. Grey Highlands Waste Disposal Sites Hours and Locations

Since January 2014, the Osprey site has operated as a transfer station for waste and diversion activities; the remaining landfill capacity is being held in reserve. Markdale and Artemesia WDS are actively landfilling and receiving diversion materials. Curbside waste collection is contracted to a local hauler and buried at Markdale and Artemesia sites.

Curbside and depot recycling collection is contracted to Mid Ontario Disposal, taken to their facility in Orillia and then shipped to the Canada Fibers Materials Recovery Facility in Peel for processing. The Municipality is currently in year one of a three-year contract with Mid Ontario Disposal. This contract expires in June of 2019.

Waste is collected every week and recycling is collected every other week on the regular collection day. There is a three-bag limit on waste collection; two of the three bags must be tagged. Bag tags cost \$2 each.

The recycling program is defined as a modified single-stream whereas OCC is required to be flattened and bundled separate from the blue box/bag of containers and paper items. Accepted items are as follows:

- Newspaper, paper bags, magazines & catalogues, flyers, phone books, office & school paper, paperback books, paper egg cartons, baked goods trays, clean pizza boxes, box board (cereal & cracker boxes). Hardcover books with covers removed.
- Rinsed food & beverage cans, empty metal aerosol cans.
- Aluminum beverage cans, pie plates & clean aluminum foil.
- Clean glass food & drink bottles and jars only. Rinse & remove lids.
- Plastic containers #1 through #7. Rinse & Remove lids. (No Styrofoam, foam, polystyrene or vinyl).
- Large plastic pails up to (5) gallon in size. Clean & remove metal handles.
- Plastic bags: grocery, sandwich, bread, milk bags, fruit & vegetable. Place all bags in one bag & tie closed.
- Dark and clear plastic trays (from plants or food) and cell packs. Rinsed of all debris.

In addition to traditional blue-box recycling the following diversion programs are also available at all the WDS unless otherwise noted.

- Electronics (Ontario Electronics Stewardship)
- Tires (Ontario Tire Stewardship)
- Scrap metal
- Styrofoam (Grace Canada)
- Drywall (Artemesia WDS only trial period)
- Household batteries (RAW Materials)
- Christmas lights and electrical cords
- Textiles (Canadian Diabetes Association)
- Fluorescent light bulbs and tubes (only at Ideal Supply store in Flesherton)

Safe disposal of Household Hazardous Waste (HHW) / Municipal Special Household Waste (MHSW) are available to residents through an agreement with the City of Owen Sound. There are eight events per year April through October.

The Municipality continues to investigate additional opportunities to provide the best possible diversion options for its residents.

5. Program Challenges

Hauling / trucking costs are typically the largest factors impacting waste management programs particularly for rural municipalities. By reducing hauling from three roll-off trains per week to one FEL haul per week the carbon foot print of the operation is significantly reduced. The purchase of FEL bins as a capital investment has offset the roll-off bin rental reducing long-term costs. The actual hauling costs for depot bin servicing cannot be isolated per the flat rate all inclusive contract that was in effect in 2015.

Recently, there is uncertainty surrounding the release of the new Waste-Free Ontario Bill 151 legislation responsibility requirements. It is unknown if Ontario municipalities will be required to invest in programs for additional diversion obligations. The Grey Highlands is actively involved in commenting on the evolving process via Association of Municipalities of Ontario and CIF facilitated events and continues to monitor the legislation as it develops and will plan for any required changes.

6. Approach

With the assistance of CIF, staff explored options that would be most feasible to improve depot collections efficiencies. Staff worked together with the collections contractor to optimize the collections methods.

The volume capacity of the previously employed roll-off bins was converted to the appropriate number of FEL bins with room for overflow if necessary. FEL bins also have the flexibility of being reassigned to a different material type (OCC or comingle) if material volumes fluctuate. The bins can also be relocated to either WDS as necessary pending the monitoring of incoming material flow. This can be completed by Municipal staff if necessary as no special equipment is required to move the FEL bins.

Quotes were obtained from local FEL manufacturing companies. Specifications were compared and the lowest bidder was chosen. A one year warranty was included. There were a few follow-up items such as touching up paint and replacing some bent pins. Service from the manufacturer has been very good.

a. Scope

This project did not require any site preparation. Roll-off bins were removed by the contractor and thirty new bins were set in place by staff and the manufacturer. Ten FEL bins were placed at each WDS. The contractor employed a FEL truck as part of the current contract service.

Signage was ordered to accompany the FEL bins. Signage includes simple text and relevant images of acceptable items including preparation instructions to flatten OCC. Signage was attached to bins and/or mounted on moveable posts.

WDS staff has taken extra time to engage with customers regarding the new bins and their purpose. Information was also placed in outreach media.

The change in operations from a staff and customer perspective was relatively seamless and well-received.



Figure 3. FEL bin and signage at Markdale WDS



Figure 4. Comingle FEL bins at Artemesia WDS



Figure 5. OCC FEL bins at Artemesia WDS



Figure 6. Comingle and OCC FEL bins at Markdale WDS

b. Monitoring and Methodology

WDS staff continue to monitor depot collections per reporting from the collections contractor. Two time periods were selected to compare tonnage and costs: July to December of 2015 and July to December 2016. WDS attendants monitored bins for fullness at the end of each open to the public day; bins were recorded as full or half full. Starting in July 2016, the collections contractor provided one weight for all bins collected at all 3 sites. Beginning in November 2016, weights for OCC and comingled recyclables were reported for each site.

7. Results and Analysis

This section of the report includes an analysis of the weight of materials collected and transferred from the depot sites, assessment of the adequacy of the current number of FEL bins at each site using bin fullness, and a financial analysis to determine cost savings and return on investment.

a. Materials Collected and Transferred

Table 1 presents a comparison between the previous roll-off system and the new FEL system. The tonnage of recyclable materials collected from the WDS did not vary significantly (less than 1 tonne) between reporting periods.

Table 1: Pre vs Post FEL Material collection at WDS

Depot Tonnage Comparison	July – Dec 2015 (Roll-Off)		July – Dec 2016 (FEL)	
	Comingle	OCC	Comingle	OCC
Osprey	17.1	11.2	30.0	19.4
Markdale	32.3	15.0	32.0	15.5
Artemesia	18.3	31.8	18.8	10.5
TOTALS	67.7	58.0	80.8	45.4
Combined Totals	125.7 tonnes		126.2 tonnes	

Comingle materials weights are generally heavier than OCC due to the higher density of the uncompacted materials as per the “Residential GAP manual on Generally Accepted Principles for Calculating Municipal Solid Waste Flow in Appendix C”. Uncompacted OCC ranges from 45-60 kg/m³ compared to mixed food and beverage containers (equivalent Grey Highlands comingle stream) at 104 kg/m³. These materials are not compacted at WDS.

b. Financial Analysis

Hauling costs for the periods July to December 2015 and 2016 decreased by 62% (\$30,613) from \$49,725 to \$19,112. The 2015 contract did not detail the specific cost associated with hauling from the depots so a hauling cost estimate was calculated based on known hauls per year and estimated cost per haul. The depot hauling costs decreased significantly as a result of the change in hauling method as well as eliminating the cost of renting depot collection bins.

This provides an estimated annual savings of \$58,666 on hauling material from the WDS to the MRF in Orillia. The implementation of the new bin collection system did not impact any of the other costs related to operating the WDS for Blue Box recycling collection (staffing, maintenance, etc.).

Table 2: Financial Analysis of FEL Bin System Implementation

Costing Elements	2016 estimated ¹	2016 actual (26 wks) ²	2015 actual (26 wks)
Collection bin type	8yd FEL	8yd FEL	40yd roll-off
Hauling	\$ 38,224	\$ 19,112	\$ 49,725
Depot staffing	\$ 60,809	\$ 30,404	\$ 31,315
Maintenance (snow, gravel, grass, repairs)	\$ 828	\$ 414	\$ 414
Capital amortization	\$2,939	\$ 2,750	-
Monitoring & measurement	\$ 1,200	\$ 600	\$ 300
total depot operating cost	\$104,560	\$ 57,280	\$ 81,754
# of lifts per year	52 lifts	26 lifts	160 lifts
capital costs (bins & signs)	\$ 29,395		
Annual depot savings	\$ 58,666		
Payback period (years)	0.5 yr.		

c. Assessment of Bin Capacity

WDS attendants track fullness of bins either full or half-full. There were 5 to 6 FEL bins full per operating day per site. This indicates the number of bins per site is sufficient to service the needs of the community. This measurement is recorded to monitor that sufficient storage for recyclables is available at each site. Bins can be moved from site to site if the need arises to reflect the change in volume at one site compared to another.

d. Lessons learned

Monitoring customers using FEL bins and explaining the system’s how’s and whys is important for their understanding and diversion program success. Signage is important but some customers will not read it regardless of how clear the signage is. There is an expectation that the Municipality is responsible for the rate payers waste and recycling.

At the start of each day a few bins are opened by staff for customer use. Opening the bin lids provides a bit of a challenge as the pivot point is just less than two metres in height. Comingle bins must stay open for customers to easily place their materials into the bins. Once a bin is filled, another is opened. This allows WDS to easily monitor what is placed in the bins and to avoid having multiple bins only partially filled.

Staff use specially designed tools to assist in the opening and closing of bins safely. During a snow event the lids can be heavy from snow and ice and must be cleaned off with a rake or broom before opening.

8. Promotion and Education

WDS staff were trained to explain the purpose and benefits of the new FEL bins to customers on-site and carefully monitor bin use. Information about the new bins was also published on the Municipal website and printed media (a bi-weekly news paper ad). The FEL bins did not require much follow up P&E as the colour and placement of the bins in the usual place for recycling translated easily for site users. Previous roll-off bins were brown, new FEL bins are the same colour as a blue box. This consistency in bin colour reinforces the messaging for recyclable items separation. There have been no negative concerns from site users regarding the FEL bin implementation.

9. Project Budget

The cost of roll-off bin rentals vs the FEL bin purchase translates to a 6 month payback period.

Table 3: Project Budget vs Actual Costs Incurred

Item	Actual	Budgeted	Reason for variance
8 yd FEL bins	\$ 21,480	\$ 21,864	Lowest quote selected
8 yd FEL bins with OCC slot	\$ 5,550	\$ 5,640	Lowest quote selected
Monitoring, measurement, and final reporting	\$ 2,000	\$ 2,000	
Signage	\$ 618	\$ 1,200	Budgetary restrictions
Site preparation	-	\$ 1,000	No site prep required
total	\$29,648	\$ 31,704	

During the period in which 40 yd roll-off bins were in service depot service costs were calculated to be \$99,450 based on number of trips per year and estimated costs per trip. The current FEL bins are serviced for a known cost of \$38,224.

10. Conclusions

The FEL bins have been well-received at the sites by customers. Attendants report some challenges with opening and closing the lids due to their height and weight if there is snow or ice accumulation. Staff are working with WDS attendants to overcome this challenge.

Slotted bins for OCC have been successful at encouraging customers to flatten boxes. Some bins for OCC have experienced difficulty with lid pins bending or breaking during FEL truck collection of bins. Staff surmise this is due to non-flattened OCC stuck in the peak of the bin. When the FEL truck tips the bin the OCC can become stuck and cause damage to the pin and or lid. Consultation with contractor to take some care in the collection process will result in reduced risk of damaging bins/lids.

The decrease in tonnes of recyclable materials may be attributed to the following factors:

- Open top roll-off bins inadvertently collected snow, ice and rain making the OCC materials slightly heavier due to moisture retention.
- The consistent light weighting of recyclable materials. Despite the light weighting the materials still bear a cost to process which does not reflect the same trend/curve as tonnes – the volume still exists.

Processing still has a cost and moreover, recycling processors must adapt to the constantly evolving packaging appearing on the market. Markets for the end materials must also be continuously refined to adapt to the ever changing packaging. “The Evolving Tonne of Recyclables” article by Maria Kelleher in February 2016 describes this phenomenon.

On the whole, the FEL bins have been successful from the perspective of reducing trucking and improving the user experience. The elimination of bin rental fees has a significantly short payback period creating a considerable prompt financial benefit to the program.

The Municipality of Grey Highlands would like to thank the CIF for its funding and assistance for making this transition and savings possible.