

# **County of Peterborough**



## **CIF Project # 275**

### **Final Report**

**December 2011**

**The Corporation of the County of Peterborough  
470 Water Street,  
Peterborough, ON  
K9H 3M3**

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## **Executive Summary**

The County of Peterborough is committed to continually trying to improve the Blue Box recycling program whether it is at curbside or the transfer stations. The project was to pilot 2 solar powered fibre compactors at 2 different locations with a high volume of fibre material, seasonal residents and at least a half hour away from the recycling facility.

The sites selected met these criteria however it became clear early on after installation that the compactors required more time by depot attendants than originally anticipated. This was due to the hopper area of the compactor filling up and residents being unable to access the compactor while it cycled. The compaction process takes 1 to 3 minutes depending on the fullness of the compacted bin, hopper fullness and how cold it is.

Overall, the project was over budget (with staff time and travel time included) by \$6,058.00. This was mainly due to the health and safety and public safety concerns raised by one of the host townships. One of the 2 compactors was decommissioned in January 2011 and removed from the site in March 2011.

The haulage savings by number of trips was significant at 56 trips saved. From a cost savings standpoint with the comparison of per tonne versus per hour there was a savings of \$3622.00. It is anticipated there will be greater savings achieved for the balance of 2011 since it is a straight per tonne rate for both front end collections and the compacted roll off. If there were no front end collections done at the Buckhorn Transfer Station, the savings would be approximately \$6000.00 in 2011.

The County of Peterborough will now focus on the success of the compactor at Buckhorn and the continued co-operation of township staff.

### **1.0 Introduction**

The County of Peterborough (County) was approached by Continuous Improvement Fund (CIF) representatives following the presentation of E & E Report #326: "Recycling Depot Optimization Project" to provide a funding opportunity for implementation of on-site compaction. This report provides an overview of this Project including: a description, the installation and implementation and lessons learned. Information was gathered by County staff, from the Materials Recycling Facility (MRF) processing contractor (HGC Management Inc.), depot attendants, and from site evaluations. The Project data spans 8 months from September 2010 to April 2011.

### **2.0 Program Background**

The County has a total population of 58,000 people representing 34,279 households (22,200 permanent and 12,079 seasonal). The County is located

along the Trent-Severn Waterway, directly north of Northumberland County, east of the City of Kawartha Lakes, west of the County of Hastings and south of Haliburton County (as seen in Figure 1). The County is a large geographic area of 3,805 km<sup>2</sup> in a predominantly rural and cottage environment with some small urban pockets.

Processing services for Blue Box materials are contracted to HGC Management Inc. and collection services are provided by BFI Inc. The MRF is located in the City of Peterborough (City), and is owned and managed by the City. The County has a contract with the City for use of the facility.

Materials collected in the County Blue Box program include the following items:

**Mixed Fibres:**

- All household papers, newspapers, inserts, glossy magazines, office paper, telephone books, soft covered books;
- All corrugated cardboard, boxboard, Bristol board, construction paper, brown paper, egg cartons;
- Bagged plastic film.

**Mixed Containers:**

- All plastic bottles and jugs, tubs and lids;
- All clear and coloured glass;
- All metal food and beverage containers and foil;
- All polycoat paper, coffee cups, milk containers.

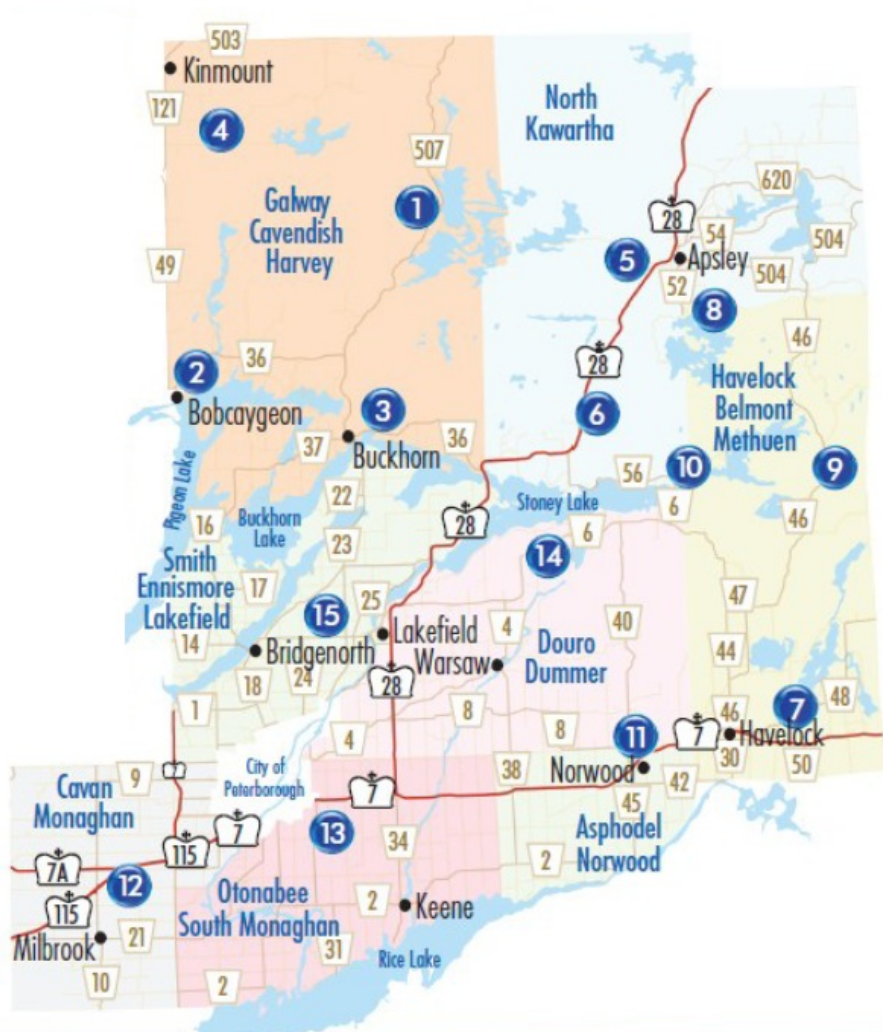
**Figure 1 Location of County of Peterborough in South Eastern Ontario**



The County is comprised of 8 Townships and operates under a 2 tier government system. The County is responsible for administering waste diversion programs including curbside blue box and depot recycling services, Municipal Hazardous or Special Waste (MHSW) depots, Waste Electronic and Electrical Equipment (WEEE) and pilot organics services. The Townships within the County own and operate the landfills and transfer stations and are responsible for the garbage collection services. As a result, each Township has their own level of waste service (bag limits, bag tags and depot hours) and each Township manages the depot attendants at the various depot sites.

The 15 rural depot sites (Figure 2 and Table 1) throughout the County serve both permanent and seasonal residents. Curbside collection and access to the depot system is offered to approximately 24,540 households. The remaining 9,740 permanent and seasonal households are within Townships which only provide depot service. As noted above the County has a high seasonal population, causing an increase in demand on the depot sites from May until October.

### Figure 2 County of Peterborough Recycling Depot Locations



### Table 1 Legend of Depot Names in County

# on Map	Depot Name	# on Map	Depot Name
1	Cavendish Transfer Station	7	6 <sup>th</sup> Line Belmont Transfer Station
2	Bobcaygeon Transfer Station	8	Jack's Lake Transfer Station
3	Buckhorn Transfer Station	9	Oak Lake Transfer Station
4	Crystal Lake Transfer Station	10	West Kosh Transfer Station
5	Anstruther Lake Transfer Station	11	Norwood Landfill
6	Haultain Transfer Station	12	Cavan Transfer Station

13	Drummond Line Transfer Station	15	Smith Landfill
14	Hall's Glen Transfer Station		

As part of E & E Project #326, the County replaced the previous bins (30 yard roll-off bins for mixed containers and 8 yard rear load bins for mixed fibres) and replaced them with 8 yard front end bins with dual sliding doors. Photos 1 and 2 show the 'Container' and 'Fibre' front end bins.

**Photo 1 Front End Bin for Containers**



**Photo 2 Front End Bins for Mixed Fibres**



Table 2 describes the level of service to residents:

**Table 2 Recycling Service Provided to Residents**

<b>Township</b>	<b># of Depots</b>	<b>Curbside Recycling Collection</b>
Asphodel-Norwood	1	Yes
Cavan Monaghan	1	Yes
Douro Dummer	1	Yes
Galway-Cavendish & Harvey	4	No
Havelock-Belmont-Methuen	4	Village of Havelock only
Otonabee-South Monaghan	1	Yes
North Kawartha	2	Yes
Smith-Ennismore-Lakefield	1	Yes

The 2 sites selected for the fibre compaction project do not have full access to curbside recycling collection and have a high seasonal resident component.

### **3.0 Project Description and Objectives**

#### **Description**

To further increase efficiency, further compaction of the fibre materials was identified as a next step in E&E Project #326.

Benefits of choosing a solar powered fibre compactor were identified as:

- Reducing the number of hauls of fibre materials to the MRF resulting in less fuel, and emissions of greenhouse gases;
- Remote monitoring of bin fullness by County staff and collection contractor would ensure timely collection;
- Reduction in hauling cost in relation to the number of hauls required especially during the peak season of May to October;
- Reduction of the number of heavy trucks on County and Township roads; and
- Reduction in the reliance of the electrical grid and/or fossil fuels by using the green energy of the solar panels.

Public participation in diversion at the depots is important to the County particularly during the peak season months. By implementing a solar powered fibre compactor the County was hoping to show residents a new and improved method for collecting fibre materials at 2 depots that have a high volume of fibre materials and experience capacity issues in the peak summer months.

The County opted for solar power with electrical back up due to the varying electrical capacities at the transfer stations. This would allow expansion to other

transfer stations in the future. It was decided the compactor would be used for fibre materials as the costs for fibre hauling was greater than for containers.

## **Objectives**

The objectives of the Project were to:

- Determine the cost savings;
- Efficiencies in operation; and,
- Ability to apply this infrastructure to other sites in the County.

The County estimated the total project cost at \$99,743.00 and CIF was able to award a 75% funding level with a total grant of \$74,807.00. This amount included:

- The estimated cost to supply and install 2 fibre compactors with solar option;
- 3 - 40 yard roll off boxes;
- Concrete pads for both sites and installation of electrical;
- Remote monitoring costs for the 8 month pilot period; and,
- Estimated staff time for implementation, monitoring and final reporting.

The equipment purchase was awarded to Efficient Waste Management Services Inc (EWM). Installation of the concrete pads and electrical was awarded to Stoney Shores General Contracting.

The intent of the Project was to reduce overall hauling costs associated with the 2 depot sites for fibre materials while maintaining low levels of contamination, and increasing public participation and acceptance and therefore increasing the amount of materials collected.

This Project will measure the impact of the objective using:

- Hauling cost of the compacted materials compared to front end;
- Staff and/or labour associated with the compactor;
- Equipment performance and maintenance; and,
- Tonnage increase due to increased visibility.

## **4.0 Pre-Fibre Compactor System and Costs**

This section will outline the rationale in choosing the 2 pilot sites including:

- Distance from the MRF;
- Volume received; and,
- Transportation costs in relation to the above.

Table 4.1 shows the distance and volume factors of the depot sites in the County.

**Table 4.1 Depot Site Distance from MRF and Fibre Tonnes Collected**

Depot Site	Distance from MRF (km) return	Fibre Collected in Tonnes (2009)
Crystal Lake Transfer Station	152	53.45
Jack's Lake Transfer Station	140	13.55
Anstruther Lake Transfer Station	130	50.80
Oak Lake Transfer Station	126	11.42
West Kosh Lake Landfill	124	9.58
Bobcaygeon Transfer Station	114	102.51
Cavendish Transfer Station	110	48.81
Haultain Transfer Station	96	27.84
6 <sup>th</sup> Line Belmont Transfer Station	90	142.56
Hall's Glen Transfer Station	84	38.01
Buckhorn Transfer Station	74	150.48
Norwood Landfill	64	40.71
Smith Landfill	40	130.54
Cavan Transfer Station	32	246.71
Drummond Line Transfer Station	22	58.05

The collection of the front end bins was done by Waste Services (CA) Inc. (WSI), now BFI, at a per hour rate. In conjunction with the start of this project, a recycling collection Request for Proposals (RFP) was also being written. Since the new collection contract pricing would be requested on a per tonne basis, it was anticipated the compactor would be collected at a per tonne rate.

The original cost analysis for the project was completed using per hour rate data for comparison between the front end collection and the compacted roll off collection. The cost analysis for 6<sup>th</sup> Line Belmont and Buckhorn Transfer Stations are below.

**Table 4.2 Initial Cost Analysis for 6<sup>th</sup> Line Belmont and Buckhorn Transfer Stations**

6 <sup>th</sup> Line Belmont Transfer Station			Buckhorn Transfer Station		
Collection Type	# Fibre Collections per year	Cost per Year	Collection Type	# Fibre Collections per year	Cost per year
Front End	52	\$11,544.00	Front End	88	\$15,840.00
Compacted Roll Off	22	\$ 3,100.00	Compacted Roll off	17	\$2,800.00
6 <sup>th</sup> Line Belmont Estimated Savings		\$ 8,444.00	Buckhorn Estimated Savings		\$13,040.00
Estimated Total County Savings			\$21,484.00		

The data for Tables 4.1 and 4.2 are based on the 2009 fibre collection year for both sites. The Front End collection was based on a rate of \$120.00 per hour. The compacted roll off collection cost above is based on a rate of \$80.00 per hour. After the CIF funding was approved, the recycling collection RFP (in production at the same time), determined the rate to be per tonne to maintain consistency with the other recycling collection rates.

## **5.0 Preparation for Installation at Buckhorn and 6<sup>th</sup> Line Belmont**

County staff worked with Township staff on the placement of the solar powered fibre compactor units at the 2 transfer stations. The transfer stations are owned and operated by the Townships and therefore the depot attendants are not staff of the County. Township staff were willing to try something new with the potential to save time and money.

The photograph below shows the configuration of the front end bins at the 6<sup>th</sup> Line Belmont Transfer Station. The site had 14 fibre bins (on the right in the photo) and 11 container bins (to the left in the photo) with collection of both materials once per week year round.

Photo 3 depicts the 6<sup>th</sup> Line Belmont Transfer Station prior to the compactor.

**Photo 3 6<sup>th</sup> Line Belmont Transfer Station**



The 6<sup>th</sup> Line Transfer Station as shown above has ample space for the solar powered fibre compactor and roll off box. The compactor would not impede traffic flow and would remove 14 front end bins from the site.

The Buckhorn Transfer Station has less space as it recently went from an active Landfill to a Transfer. Buckhorn had 10 fibre bins and 10 container bins with once

a week pick up from November to March and twice a week pick up from April to October to accommodate the increase in material from seasonal residents.

Photo 4 shows a sample of the fibre bins located at the Buckhorn Transfer Station.

**Photo 4 Fibre Bins at Buckhorn Transfer Station**



## **6.0 Installation of Concrete Pads and Electrical**

EWM provided specifications for the concrete pads of a minimum of 6 inches deep by 10 feet wide by 35 feet long. Both pads were within 50 feet of the depot attendants' building to hook up the electrical components. This was for the electrical back up system and the heating system for the hydraulic fluid in the winter. The concrete pads and electrical were installed and ready by the end of June 2010.

Both concrete pads were installed above ground and therefore created a step up of 6 inches for residents and attendants alike. Yellow paint was purchased and a line around the concrete pad was done for health and safety (as seen in Photo 7).

### **Mixed Fibre Audits June 22, 2010 and June 30, 2010**

The mixed fibre audits at 6<sup>th</sup> Line and Buckhorn were to determine a number of factors:

- Current level of contamination in the front end fibre bins;
- Amount of flattened cardboard; and
- Composition and comparison of the 2 sites.

The calculated average front end fibre bin weight in 2009 was 258.41 kg for 6<sup>th</sup> Line and 241.68 kg for Buckhorn. The 2 bins selected for auditing in 2010 totaled 341.98 kg and 308.74 kg respectively. The bin at 6<sup>th</sup> Line Belmont did have a bit of moisture due to rain storms prior to auditing.

The photographs below show the diversity of materials in the front end bins.

**Photo 5 Fibre Material for Audit at 6<sup>th</sup> Line Belmont June 29, 2010**

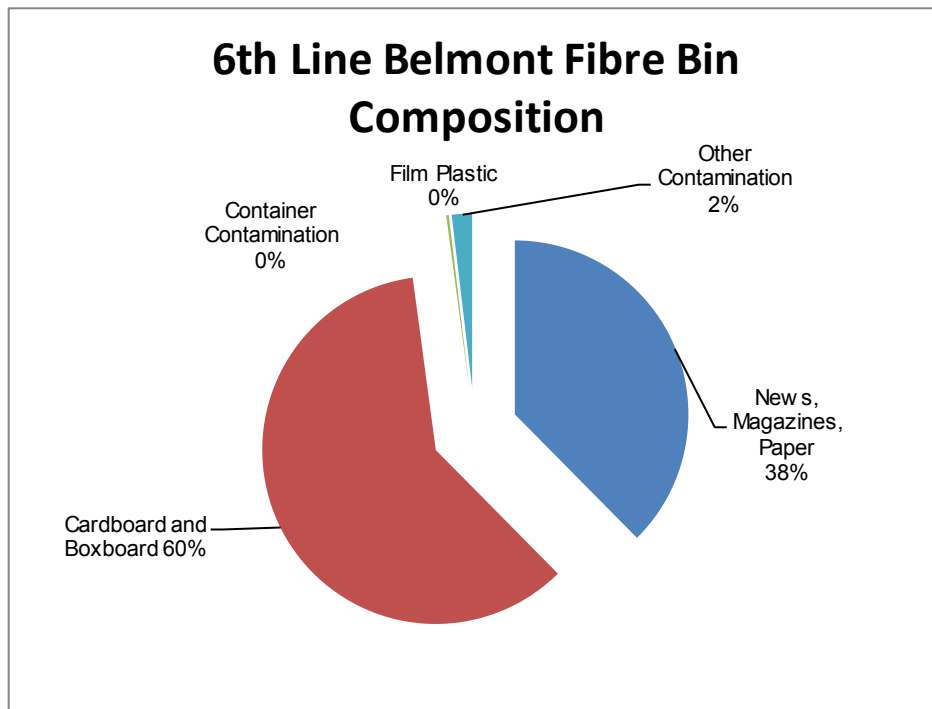


**Photo 6 Fibre Material for Audit at Buckhorn June 22, 2010**

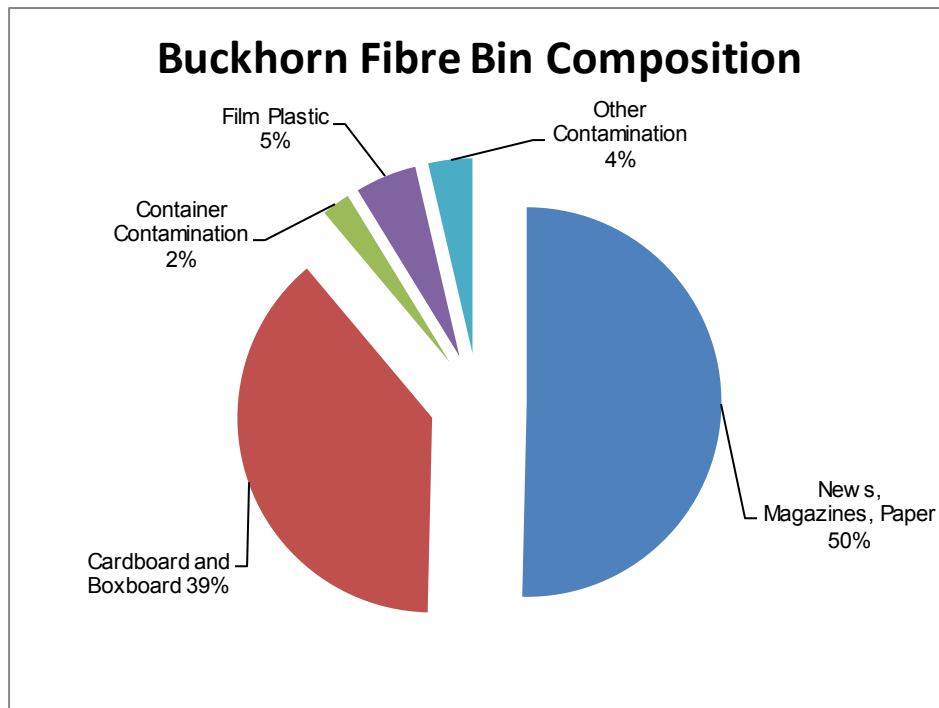


The Tables below describe the composition of the fibre bins from the 2 sites.

**Table 6.1 Composition of 6<sup>th</sup> Line Belmont Fibre Bin**



**Table 6.2 Composition of Buckhorn Fibre Bin**



As shown in Tables 6.1 and 6.2 the amount of contamination at both sites was 2% and 6% (total) respectively. The fibre composition did vary between the sites

most noticeably in the cardboard/boxboard (60% vs 39%) and news/magazines/paper categories (38% vs 50%).

As shown in Photos 5 and 6, there were a significant portion of boxes that were not flattened prior to being put in the bins. At 6<sup>th</sup> Line non-flattened cardboard accounted for 12% by weight of the cardboard/boxboard category.

## **7.0 Delivery, Installation and Initial Operation**

The units were received and installed at the 6<sup>th</sup> Line Transfer Station on September 2<sup>nd</sup>, 2010 and the Buckhorn Transfer Station on August 24<sup>th</sup>, 2010.

Staff from EWM and Metro Compactor were very helpful in training depot attendant staff and County staff in the operation of the compactors. However, very early in operations it was apparent that the solar to electrical switch was not operating correctly and therefore the compactor was running strictly from electrical. EWM corrected the issue by replacing the electrical panels in October 2010. Both sites required the electrical to be upgraded as the capacity initially installed was incorrect.

### **Equipment Performance and Maintenance**

The tables below describe the compactor operations over the pilot period. Both the 6<sup>th</sup> Line Belmont and Buckhorn Transfer Stations operate on different days and schedules with operating days and hours changing from winter to summer and vice versa. It is important to note the number of operating days as opposed to the time between collection dates when making comparisons.

The percent of the bin full is from the remote monitoring system. When the ram is operating, the psi is measured and given a percentage of the 40 yard closed roll off that is full. This information is then emailed to County staff and the contractor on a twice daily basis for monitoring when the bin is to be picked up. A value of 70% full was chosen as the 'pick up' email to go to staff and the contractor. Depending on the operating day and time, there could be a couple of days between this email and pick up.

The weight in kilograms (kg) is an actual weight from the scale house software at the MRF.

**Table 7.1 6<sup>th</sup> Line Compactor Operation Analysis September 2010 to December 2010**

Collection Date	Operating Days	% bin full	Weight (kg)	# Compactor Cycles	Operating Time (minutes)
17-Sep-10	11.75	105%	6980	2926	547
04-Oct-10	13.5	96%	6810	2388	624
19-Oct-10	11.25	96%	6180	230	494
08-Nov-10	14	100%	6620	409	470
25-Nov-10	12	82%	6380	165	422
13-Dec-10	14	97%	6490	169	451
29-Dec-10	8.5	71%	5590	159	414
Average	12	92%	6436	226	489

The number of compactor cycles relates to the number of times the button to compact the materials was pushed by a depot attendant. Coinciding with this information is the operating time. The operating time is the number of minutes the compactor ram was pushing the fibre materials.

It had been established prior to the compactors being installed that there would be 4 front end bins left on each site in case of overflow or compactor malfunction during the pilot period. These bins were utilized at both sites. At the 6<sup>th</sup> Line Belmont site they were used when there were electrical issues. They were used at Buckhorn as overflow during the holiday season.

As shown in Table 7.1, the 6<sup>th</sup> Line Belmont Transfer Station's fibre compactor was only in operation from September 2010 through to mid-January 2011. Once the initial electrical issues were dealt with the compactor was operating well with an average weight of over 6000 kg.

As shown in Table 7.2, the Buckhorn Transfer Station's fibre compactor is operating well with a consistent weight of over 6000 kg. The collections made on December 29<sup>th</sup>, 2010 were to mitigate any overflow issues the sites may have experienced over the New Year's holiday. County staff, the collection contractor and Township staff agreed it would be better to have the compactor bin switched early than to run into capacity issues on a busy day.

The Buckhorn Transfer Station continues to operate the solar powered fibre compactor however as part of an agreement with this township, more front end bins were provided for overflow during the busy summer cottage season.

**Table 7.2 Buckhorn Compactor Operation Analysis September 2010 to April 2011**

Collection Date	Operating Days	% bin full	Weight (kg)	# Compactor Cycles	Operating Time (minutes)
5-Sep-10	7	67%	5590	500	429
18-Sep-10	8	84%	6550	270	520
5-Oct-10	9	90%	6810	408	483
20-Oct-10	7	74%	6360	250	471
6-Nov-10	7	89%	6390	161	412
25-Nov-10	9	112%	6920	224	571
14-Dec-10	9	74%	5430	153	378
29-Dec-10	4.25	41%	4090	135	315
18-Jan-11	8	78%	6100	204	532
15-Feb-11	12	100%	6610	215	557
17-Mar-11	13	96%	6960	95	266
8-Apr-11	9	72%	6080	219	540
29-Apr-11	9	68%	5810	213	514
<b>Average</b>	<b>9</b>	<b>80%</b>	<b>6131</b>	<b>234</b>	<b>461</b>

Maintenance of the compactor is performed by Environmental Services Operations staff on a monthly basis. The inspection and maintenance takes approximately 2 hours (including travel time) to perform and is generally done when other maintenance or health and safety inspections are being completed.

In speaking with HGC Management, the current MRF operator, there has been no change in the quality or value of materials coming from the County's compactor units.

### **Health and Safety and Public Safety Concerns**

#### **Photo 7 Solar Powered Fibre Compactor at 6<sup>th</sup> Line Belmont**



Photo 7 above shows the raised cement pad with yellow 'caution' paint.

#### 6<sup>th</sup> Line Belmont Transfer Station Concerns

1. Raised concrete pad deemed to create a trip hazard.  
Township staff required a recycled asphalt 'ramp' to be installed on both sides of the concrete pad as shown in Photo 8 below. The installation of the ramp was completed in October 2010 by County Public Works staff at no charge and the asphalt material was \$585.58. The Township requested railings or fencing to surround the compactor and have the solar unit blocked off.

#### **Photo 8 Asphalt ramping installed at 6<sup>th</sup> Line Belmont**



2. Location of key lock out for compactor operation.  
Township staff requested the key lock out be moved. County staff moved the key lock and installed a hooking mechanism for the hopper door.
3. Location of solar panel a hazard (potential for residents to walk into it).  
Township staff were concerned regarding public safety relating to the location of the solar panel. The signs and ramps were already installed.
4. Fibre materials left while compactor cycling creating a trip hazard.  
County staff suggested a small cart for fibre materials if the depot attendant was not available to let residents know the cycle would only take a couple of minutes. Township staff did not want the material to be double handled.

**Photo 9 Solar Powered Fibre Compactor at Buckhorn Transfer Station**



The photograph above of the solar powered fibre compactor at the Buckhorn site shows the difference in layout between the 6<sup>th</sup> Line Belmont and Buckhorn sites.

The Buckhorn Transfer Station opted to surround the fibre compactor with the front end container bins. This would help to expedite residents through the site as they would not have to walk as far to drop off their materials. As well, if the compactor is cycling, residents may drop off their container materials and then their fibre materials.

#### **Buckhorn Transfer Station Concerns**

1. The raised concrete pad at Buckhorn was also an issue.  
As seen in Photo 9 gravel was used to make a gradual grade all around the compactor. This was done by the Township at no cost to the County.

### **8.0 Operating Costs and Savings**

As previously mentioned, during the application phase of this CIF funded project, the County also had an RFP out for recycling collection services. The cost benefit analysis was done based on an hourly collection rate for both front end and roll off. However, the new recycling collection contract is based on a per tonne rate.

For the period of September 2010 to March 31<sup>st</sup>, 2011, ABA had the haulage contract for the compacted roll off at a price of \$34.28 per tonne. As of April 1<sup>st</sup>, 2011 (start of new recycling collection contract County wide), BFI took over the collection at a price of \$35.00 per tonne with the acknowledgement that the average bin weight would be over 6 tonnes. The original RFP price was \$78.13 per tonne for the compacted roll off. However, the County was able to provide weights to BFI to negotiate a better price. The front end bin collection is done at \$86.23 per tonne.

Table 8.1 shows the savings in haulage for the 6<sup>th</sup> Line Belmont Transfer Station.

**Table 8.1 6<sup>th</sup> Line Belmont Compactor Haulage Costs and Savings**

Collection Date	Collected Weight (kg)	Cost of Haulage for Compactor	# of Front End Trips Saved	Front End Cost (Based on Trips Saved)	Compactor Savings
17-Sep-10	6980	\$ 239.27	2	\$ 276.76	\$ 37.49
04-Oct-10	6810	\$ 233.45	2	\$ 276.76	\$ 43.31
19-Oct-10	6180	\$ 211.85	2.5	\$ 345.95	\$ 134.10
08-Nov-10	6620	\$ 226.93	2	\$ 276.76	\$ 49.83
25-Nov-10	6380	\$ 218.71	3	\$ 415.14	\$ 196.43
13-Dec-10	6490	\$ 222.48	3	\$ 415.14	\$ 192.66
29-Dec-10	5590	\$ 191.63	2	\$ 276.76	\$ 85.13
<b>Total</b>	<b>45050</b>	<b>\$1,544.31</b>	<b>16.5</b>	<b>\$ 2,283.27</b>	<b>\$ 738.96</b>

As Table 8.1 above describes, the initial cost savings for the 6<sup>th</sup> Line site was minimal however there were 16 front end truck trips saved. Unfortunately due to vandalism and ongoing Township staff and public safety concerns this compactor unit was decommissioned in January and moved to the County Public Works Yard in Douro in March. With more time, more efficiencies may have been gained and therefore more dollar savings. A more detailed project cost analysis is available in Appendix A.

The Buckhorn site, as shown in Table 8.2 below, has an initial pilot haulage savings of \$2,883.00. From September 2010 to March 31, 2011, the haulage savings is the calculated hours at \$120.00 per hour multiplied by the number of times the front end bins would have been collected according to historical collection schedules. For Buckhorn, the fibre bins were collected twice per week from April to October and once per week the balance of the year. The exception being the Christmas and New Year's holidays which for December and the first week of January would revert to a twice per week collection for fibre.

Due to the large seasonal volume of recycling materials in general, it was deemed necessary and appropriate for the Buckhorn site to have both the

compactor and front end bins available for residents. The number of Front End trips saved has been adjusted to reflect the actual number of front end trips saved since Buckhorn did use the overflow bins on a regular basis from December to present.

**Table 8.2 Buckhorn Transfer Station Cost Analysis for 8 Month Pilot Period**

Collection Date	Collected Weight (kg)	Cost of Haulage for compactor	# of Front End trips saved	Front End Cost Based on Trips Saved	Savings using Compactor
5-Sep-10	5590	\$ 191.63	3	\$ 431.10	\$ 239.47
18-Sep-10	6550	\$ 224.53	4	\$ 574.80	\$ 350.27
5-Oct-10	6810	\$ 233.45	4	\$ 574.80	\$ 341.35
20-Oct-10	6360	\$ 218.02	2	\$ 287.40	\$ 69.38
6-Nov-10	6390	\$ 219.05	3	\$ 431.10	\$ 212.05
25-Nov-10	6920	\$ 237.22	3	\$ 431.10	\$ 193.88
14-Dec-10	5430	\$ 186.14	2	\$ 287.40	\$ 101.26
29-Dec-10	4090	\$ 140.21	2	\$ 287.40	\$ 147.19
18-Jan-11	6100	\$ 209.11	2	\$ 287.40	\$ 78.29
15-Feb-11	6610	\$ 226.59	3	\$ 431.10	\$ 204.51
17-Mar-11	6960	\$ 238.59	4	\$ 574.80	\$ 336.21
8-Apr-11	6080	\$ 208.42	4	\$ 601.89	\$ 311.48
29-Apr-11	5810	\$ 199.17	4	\$ 578.60	\$ 297.65
	<b>Total</b>	<b>\$ 2,732.12</b>	<b>40</b>	<b>\$ 5,778.89</b>	<b>\$ 2,883.00</b>

There is the opportunity at the Buckhorn Transfer Station for more savings if the compactor is used rather than the Front End bins.

## 9.0 Lessons Learned

- For health and safety and public safety it is recommended to have the concrete pads dug out and installed at ground level rather than grading after the fact.
- Ensure there is enough electrical capacity to power all necessary equipment including the compactor requirements.
- Increase the size of the hopper area and encourage residents to break down the oversize cardboard prior to depositing into the hopper.
- The solar option, although environmentally friendly, has a longer cycle time especially during the cold winter months. It is recommended to go with electrical or gas generator depending on the location.
- Haulage of the unit at the 70% to 80% full range to minimize the amount of spillage back into the hopper and thus necessitating another cycle to clear the hopper area.
- Remote monitoring is very beneficial to staff and the hauler in minimizing the guesswork and extra time involved for township staff to further monitor pressures and call in the bin.

- It is very important given the experience of County staff, to ensure that all staff, whether it be at the Township or County level, are fully informed and aware of the benefits and drawbacks of projects.
- County staff must prepare Depot attendant staff with information to give to residents regarding the importance of new technology, including fewer trucks on site, fewer bins on site, and therefore fewer greenhouse gas emissions, less stress on Township and County roads, less contamination in the recycling and the potential for everyone to save money.

## **Conclusion**

This project was an opportunity to work together with the townships to help to optimize operations. Although it did not work out entirely as planned with the loss of the 6<sup>th</sup> Line Belmont compactor, the County did achieve its goals of:

- Reducing the number of hauls required and therefore reducing emissions and fuel costs;
- Successfully piloting the remote monitoring so the hauler and staff may monitor the compactor operation;
- Reducing the cost of haulage;
- Reducing the number of heavy trucks on County and Township roads; and
- Reducing reliance on electrical grid and fossil fuels to run the compactor.

Surveys of residents using the Buckhorn compactor in summer 2011 by summer staff indicated 62% of residents are using the compactor; 32% are using the Front End Bins; and 6% are using both. Comments received included:

- “Just great, good for the environment”
- “Easy, great idea”
- “saves energy and space”
- “too little space in compactor”
- “good, but a little annoying when waiting”

The solar powered fibre compactor could be an option at any rural depot location however depending on the amount of vehicles, there could be additional staff time required. It is very effective in reducing the number of hauls required to the MRF and therefore reduces greenhouse gas emissions, fuel costs, and wear and tear on the road infrastructure.

## Appendix A – Cost and Timeline by Site

Preparation, Installation, Operation Costs and Timelines for Fibre Compactors by Site				
Buckhorn Transfer Station	Date	Cost	Item	Explanation
site visits	spring 2010	\$ 120.00	determine location of compactor	Staff time
Pre-Audit	Jun-21	\$ 75.00	tip bin	
Pre-Audit	Jun-21	\$ 337.50	staff and travel time	3 staff to sort & weigh & refill bin
concrete	Jun-30	\$ 2,950.00	concrete & electrical	
electrical	Jun-30			
concrete & electrical	Jun-30	\$ 280.00	staff and travel time	
Paint	Jul-22	\$ 37.05	yellow hazard paint	paint yellow hazard line around edge of concrete pad
Delivery	Aug-24	\$ 320.00	staff and travel time	1 staff member on site to monitor installation
compactor	Aug-24	\$ 29,340.00	compactor unit	
roll off boxes	Aug-24	\$ 8,845.00	2 roll off boxes	
compactor operation	Aug-24	\$ 80.00	staff and travel time	show attendants how to operate compactor
remove bins	Aug-23	\$ 292.00	remove 6 front end bins	this will leave 4 as back up/overflow
remove bins	Aug-23	\$ 100.00	staff and travel time	
label compactor	September	\$ 80.00	staff and travel time	put fibre label on compactor
Re-do electrical	October	\$ 240.00	staff and travel time	electrician re-did electrical
install safety lock	October	\$ 80.00	staff and travel time	install safety lock on electrical panel
Latches & screws	November	\$ 24.15	hopper door has no latch	install latch to keep door open
Latches & screws	November	\$ 80.00	staff & travel time	install latch to keep door open
repair electrical wire	January	\$ 60.00	staff & travel time	snow plow gouged electrical wire; staff repair
replace paddle latch	Feb-11	\$ 35.50	paddle latch	paddle latch broke; replace
replace paddle latch	Feb-11	\$ 80.00	staff and travel time	replace paddle latch
install bins	May-11	\$ 210.00	move 3 bins	extra overflow front end bins for Seasonal influx
regular maintenance	ongoing	\$ 600.00	staff time and materials	maintenance of compactor
remote monitoring	ongoing	\$ 352.00	September to April	remote monitoring of compactor operation
<b>Total Expense - Buckhorn Transfer Station</b>		<b>\$ 44,146.20</b>		
swing bin		\$ 8,845.00	roll off box swing bin	improve efficiency with fewer trips when switching out roll offs
monitoring weights/loads, data compilation, report	Sept to April	\$ 2,700.00	monitor remote monitoring; weights; loads	Compile data; write report
6th Line Belmont Transfer Station	Date	cost	Item	Explanation
site visits	spring 2010	\$ 120.00	determine location of compactor	Staff time
concrete	Jun-29	\$ 2,950.00	concrete & electrical	
electrical				
concrete & electrical	Jun-29	\$ 280.00	staff and travel time	
Pre-Audit	Jun-29	\$ 150.00	tip bin	
Pre-Audit	Jun-29	\$ 300.00	staff and travel time	3 staff to sort, weigh & refill bin
Paint	Jul-22	\$ 37.05	yellow hazard paint	paint yellow hazard line around edge of concrete pad
Delivery	Sep-02	\$ 320.00	staff and travel time	1 staff member on site to monitor installation
compactor	Sep-02	\$ 29,340.00	compactor unit	
roll off boxes	Sep-02	\$ 8,845.00	1 roll off box	
compactor operation	Sep-02	\$ 80.00	staff and travel time	show attendants how to operate compactor
remove bins	Sep-01	\$ 438.00	remove 8 front end bins	this will leave 4 as backup/overflow
remove bins	Sep-01	\$ 100.00	staff and travel time	
label compactor	September	\$ 80.00	staff and travel time	put fibre label on compactor
electrical issue	October	\$ 120.00	staff and travel time	repair loose wires in electrical panel
install bins	Oct-22	\$ 189.80	take 3 front end bins	electrical issue; required bins for the weekend
compactor running slow	October	\$ 80.00	staff and travel time	
Re-do electrical	October	\$ 240.00	staff and travel time	electrician re-did electrical
meet with Township staff	October	\$ 435.00	staff (3) and travel time	discuss Health and Safety issues and public safety concerns
install safety lock	October	\$ 80.00	staff and travel time	install safety lock on electrical panel
meet with County & Township staff	October	\$ 360.00	determine location of asphalt ramping	
install asphalt ramp	October	\$ 585.58	install asphalt ramp	Public safety concerns; asphalt charge
install asphalt ramp	October	\$ 1,350.00	staff and equipment	
Latches & screws	November	\$ 24.15	hopper door has no latch	install latch to keep door open; move electrical switch
Latches & screws	November	\$ 320.00	staff & travel time	install latch to keep door open
replace hopper door lock	November	\$ 105.00	lock, staff and travel time	key broke inside lock; replaced lock
bury electrical wire	December	\$ 160.00	staff and travel time	cut concrete pad to bury electrical wire
HBM Council Meeting	January	\$ 260.00	staff and travel time	resolution to remove compactor by April 2011
no power to compactor	January	\$ 80.00	staff and travel time	vandals cut power to depot attendant building; no power to compactor
meet electrician at site	January	\$ 80.00	staff and travel time	determine if compactor could run exclusively on solar; no;
Compactor cease operation	Jan-17			
remove compactor	March	\$ 200.00	staff and travel time	staff oversee the removal operations
remove compactor	Mar-11	\$ 600.00	remove compactor to Douro Yard	EWM disconnected electrical and solar for movement to Douro Yard
transport compactor	March	\$ 420.00	move compactor to Douro Yard	ABA transport compactor and roll off box to Douro Yard
install bins	March	\$ 661.00	move front end bins	move front end bins back to Havelock
install bins	March	\$ 320.00	staff and travel time	staff oversee movement and placement of front end bins
remote monitoring		\$ 220.00	September to January	remote monitoring of compactor operation
regular maintenance		\$ 300.00	staff time and materials	maintenance of compactor
<b>Total Expense - 6th Line Belmont</b>		<b>\$ 50,110.58</b>		
<b>Total</b>		<b>\$105,801.78</b>		
<b>CIF Budget</b>		<b>\$ 99,743.00</b>		
<b>Over Budget</b>		<b>\$ 6,058.78</b>		