



FINAL REPORT AND PROJECT EVALUATION

FOR

**SOLAR POWERED COMPACTORS FOR
RECYCLABLE MATERIAL CONTAINERS**

AT

**EVELEIGH (PORT CARLING), McLEAN
(BAYSVILLE) AND FRANKLIN (DWIGHT)
WASTE TRANSFER STATIONS IN
THE DISTRICT MUNICIPALITY OF MUSKOKA,
CIF #303**

Friday November 4, 2011

**THE DISTRICT MUNICIPALITY OF MUSKOKA
70 PINE STREET
BRACEBRIDGE, ONTARIO P1L 1N3**

1. Executive Summary

1.1. Communities in the cottage country region of Ontario, specifically the District Municipality of Muskoka (Muskoka) are confronted with unique waste management issues such as seasonally fluctuating populations, large rural road networks and long distances to recycling material processing facilities and markets. These obstacles present operational and economic challenges for the Muskoka recycling program. Muskoka in association with Waste Diversion Ontario (WDO), The Continuous Improvement Fund (CIF) and Stewardship Ontario entered into an agreement to install equipment to improve efficiency and reduce transportation costs at three of Muskoka's seven Transfer Stations. The three selected Transfer Stations were McLean and Franklin, both of which are located in the Township of Lake of Bays, and Eveleigh, which is located in the Township of Muskoka Lakes.

1.2. The following equipment was installed at the selected Transfer Stations:

- 4 model RJ 225 Ramjet Stationary Solar Compactors (two each at Eveleigh and McLean)
- 2 model TC 220T Trash Commander Tank Stationary Solar Compactors at Franklin
- 9 Forty cubic yard roll-off containers – three for each site

The addition of this equipment has dramatically increased the efficiency of Muskoka's recycling operations. Regardless of seasonal fluctuations in quantities the key area of improvement is the reduction of transportation costs. A related benefit is the reduction of Green House Gases.

Two 5 month periods – one before and one after the installation of the compactors – have been analyzed to demonstrate the benefits of the new equipment. When the two periods are compared, it is clear that the reduction in transportation costs justify the installation of the compaction equipment. For transportation of recyclables without the compactors, Muskoka's invoices for the three selected transfer stations would total \$65, 936.40 in 2011. With

compaction the total cost is projected to be \$25, 438.94 for the year, a net saving of \$40, 497.46.

2. Background

2.1. The District Municipality of Muskoka was created in 1971. Muskoka is an upper tier municipality with responsibility for solid waste management. Muskoka contains six lower tier municipalities which are predominately rural with urban centres within each of the municipalities. The six lower tier municipalities are The Towns of Huntsville, Bracebridge and Gravenhurst and the Townships of Georgian Bay, Lake of Bays and Muskoka Lakes. Muskoka's year-round population is roughly 57, 000 with an additional 76, 000 residents in the summer bringing the total population closer to 133,000. The land area of Muskoka is 4, 761 square kilometres containing over 600 lakes.

2.2. Solid waste management in Muskoka is a blend of curbside garbage and recycling pickup, staffed waste transfer stations where residents drop-off garbage and recyclable materials, and un-staffed small bin sites for both garbage and recyclables. The focus of this project was the recyclable streams at staffed waste transfer stations. Muskoka has seven such facilities with at least one in each Township. The three transfer stations chosen for this project were Eveleigh in the Township of Muskoka Lakes, and Franklin and McLean both located in the Township of Lake of Bays. All three of the facilities offer seven day a week service to residents in the summer with reduced hours/days of operation in the winter season. Recyclables at all three of the selected locations are handled in the same manner and are diverted into three streams. There is an open top bin for cardboard and a side loading depot style bin for containers and mixed paper. Prior to the installation of the compactors, un-compacted recyclables were hauled by BFI Canada to the Materials Recovery Facility (MRF) located in Bracebridge. The current recycling operation with the compactors in place remains similar, with three streams. However, the side loading depot bins have been replaced with dedicated compactor bins for mixed paper and container streams. Cardboard is still collected in an un-compacted open top bin.

2.3. Muskoka was incurring expensive transportation costs prior to the installation of the compactors due to the frequent lifts of recyclable materials. The loose fill depot bins only held an average of 1.28 metric tonnes of containers and 1.35 metric tonnes of mixed papers. The low capacity of the loose fill containers in conjunction with the high number of monthly trips to the recycling facility, an average of 17 trips/month for containers and 18 trips/month for mixed paper caused recycling costs at the Transfer Station to come under scrutiny. As a result, economical and environmentally friendly solutions that would reduce transportation costs and increase the efficiency of the transfer stations were explored.

3. Monitoring & Reporting

3.1. Budget

3.1.1. Upon review of the transportation costs associated with Muskoka's recycling program a plan was developed to increase the efficiency of the program and an application was made to the Continuous Improvement Fund (CIF) administered by Waste Diversion Ontario (WDO). The District Municipality of Muskoka in association with WDO, CIF and Stewardship Ontario entered into an agreement to install six solar powered compactors and nine forty cubic yard roll-off bins at the three selected Transfer Stations. A detailed budget was prepared and a synopsis of budgeted versus actual costs is as follows:

CIF #303 Transfer Stations Recycle Compactors Project Costs		
Expenses	Budget	Actual
Project Administration and Approvals (3 sites)	\$9,000	\$26,718
Site Works & power supply	\$63,867	\$76,369
9 Forty Yard Bins	\$79,605	\$78,870
2 Franklin Site Compactors, incl training & delivery	\$70,400	\$78,870
2 McLean Site Compactors, incl training & delivery	\$70,400	\$70,270
2 Eveleigh Site Compactors, incl training & delivery	\$70,400	\$70,270
Contingency Allowance	\$54,552	\$23,823
Total	\$418,224	\$425,190

3.1.2. Upon installation and commissioning of the compactors, the actual costs of the project were within 2% of the budget. The slight departure from budgeted costs was due primarily to costs for site works and a change order for the Franklin compactors to cross cylinder models. The date of Substantial Performance for the project was January 31, 2011.

3.2. Maintenance

3.2.1. Upon completion of the installation of the solar powered compactors and forty cubic yard roll off bins a few trouble shooting initiatives took place. Solar power inverter issues were resolved under warranty. Otherwise, there were no deficiencies and the compactors have operated well since their installation.

3.3. Labour

3.3.1. The compactors do not directly reduce labour time. In fact, there is a requirement for the site attendant to go to the compactor bin and initiate a compaction sequence when a light in the Transfer Station scale house illuminates. The light is activated by a level sensor in the compactor chamber. Site attendants have been able to successfully fit this extra duty into their routine. At the Muskoka Lakes Transfer Station it was necessary to supplement staffing with a student on summer weekend afternoons because the full-time site attendant could not keep up with the demand for service.

3.4. Transportation Savings

3.4.1. The installation of the solar powered compactors and forty cubic yard roll off bins have provided immediate positive results and savings. To properly quantify the transportation savings, environmental value and the increase in efficiency at the Transfer Stations, the actual lifts for the Spring and Summer seasons of 2010, without the equipment have been compared to

the actual lifts for the Spring and Summer seasons for 2011 with the equipment, as follows:

Pre CIF #303 Recycle Bin May-Sep 2010 Activity					
	Containers Lifts	Tonnes	Mixed Paper Lifts	Tonnes	Total Tonnes
May-10	17	21.11	6	8.05	29.16
Jun-10	20	25.01	9	12.97	37.98
Jul-10	34	47.39	16	24.35	71.74
Aug-10	33	51.17	18	23.15	74.32
Sep-10	18	26.86	12	20.15	47.01
Total	122	171.54	62	88.68	260.22
Post CIF#303 Recycle Compactor Bins May-Sep 2011 Activity					
	Containers Lifts	Tonnes	Mixed Paper Lifts	Tonnes	Total Tonnes
May-11	4	12.76	3	13.65	26.41
Jun-11	4	15.2	4	20.23	35.43
Jul-11	10	41.47	7	33.27	74.74
Aug-11	11	46.26	7	34.2	80.46
Sep-11	6	21.89	3	21.21	43.1
Total	35	137.58	24	122.56	260.14

3.4.2. Since the installation of the compactors and roll-off bins, Muskoka has handled a similar tonnage of recycling material while requiring fewer lifts from BFI Canada. Examination of the table above demonstrates that in the five month period in which compactors were in place, approximately the same amount of material was transported in 68% fewer lifts than in a similar period without the compactors. Another way of looking at this is to calculate the number of lifts that would have been required in 2011 had the compactors not been in place. This can be done by dividing the total weights of materials collected in 2011 by the “tonnes per lift” calculated for 2010. Based on 1.28 and 1.35 tonnes per lift for containers and mixed paper respectively, in 2011, without the compactors, 107 lifts and 90 lifts would have been required for containers and mixed paper respectively, for a total of 197 lifts. As noted in the table above, with the compactors, only 35 lifts and 24 lifts were required for containers and mixed papers respectively for a total of 59 lifts – a 70% reduction. These financial benefits are in addition to the reduction of green house gases.

4. Conclusion

4.1. The completion of CIF #303 has increased efficiency at three of Muskoka's waste transfer stations. As was anticipated during the project application, the solar powered compactors and forty cubic yard roll off bins have reduced the number of lifts of recycling materials to the MRF. When 2011 projected recycling totals for mixed paper and container streams are assessed by converting to un-compacted lifts required for the transportation of the 2011 projected tonnage, the amounts saved post CIF#303 are as follows:

Compacted vs. Un-compacted Recycle Bins at McLean, Franklin & Eveleigh

	Lifts	BFI Lift Fees
2011 Un-Compacted (annualized)	345	\$65, 936.40
2011 Compacted (annualized)	103	\$25, 438.94
Projected Annualized Savings	242	\$40, 497.46

4.2. The annualized recycling lift activity demonstrates a significant reduction in costs. Theoretically, with the compactors installed Muskoka saves over \$40,000 over the course of the year. Based on this saving, the project payback period will be 10.5 years with the CIF portion of funding comprising 4.9 years of that total. Furthermore, anecdotal evidence suggests that the quality of the recyclables in the compacted forty cubic yard roll off bins is higher, with less contamination than is found in the un-compacted recycle depot bins.