

Conducting a Waste Audit in the Killam Library at Dalhousie University to Establish Waste Habits and Locate Problem Areas

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Abstract

This report analyzed the need for increases in waste diversion rates in order to reduce the amount of waste entering landfill sites. As municipalities move towards reducing and diverting their waste, universities are also trying to improve their waste practices as part of the Greening the Campus movement. This project focused on a waste reduction pilot project at the Killam Library at Dalhousie University in Halifax, Nova Scotia. The pilot replaced individual refuse bins with a four-bin waste system consisting of compost, paper, recycle, and waste bins. Interviews and surveys were also conducted throughout the Killam Library to establish waste habits. The results of the project indicated that the four-bin system is a useful method to increase waste diversion rates. Although the majority of individuals agreed with changes to improve diversion rates the main barrier to successful implementation is a lack of knowledge of proper recycling methods. This report recommends an education campaign to provide students, staff and faculty with the necessary information to properly recycle.

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1. Introduction

Halifax Regional Municipality (HRM) strives to stabilize and process an overwhelming amount of waste every day. Waste can diminish water, soil, and air quality; and is estically unpleasant (Withgott *et al.*, 2010). Several programs have been initiated by HRM to reduce the impact to the environment and maximize resource recovery, which includes collection of refuse, recycling, and composting (Naturally Green, 2009). In 2008, 50% of Halifax's garbage was directed away from the landfill due to waste diversion (Naturally Green, 2009). Waste diversion is the redirection of garbage from landfills through reuse, recycling, or composting and this plays an important role in effective and sustainable waste management (Federation of Canadian Municipalities, 2009).

Universities across North America have made efforts to promote sustainable campuses. The University of Prince Edward Island (UPEI) continuously strives to combine education and campus operations to achieve sustainability. Through a waste audit UPEI discovered that although it had a comprehensive paper recycling program, the it lacked other waste disposal methods. The cafeteria used mostly styrofoam and non-recyclable plastics which led to changes in food purchasing (Beringer, 2005). The University of Western Ontario assessed waste from five buildings on campus and found that the majority of the waste was organics, non-recyclable plastics, and coffee cups (Frederick *et al.*, 2008). The students conducting the audit suggested that the university promote a Tupperware Campaign and a waste free day (Frederick *et al.*, 2008). They also recommended that the university only provide recyclable food packaging and advertise the use of personal mugs (Frederick *et al.*, 2008).

Dalhousie recently conducted a waste audit on the Henry Hicks Academic Administration Building and the Sir Charles Tupper Medical Building (R. Owen, personal communication, January 27, 2010). The audits measured the efficiency of the waste diversion system and found that the waste most frequently placed in the incorrect bins was coffee cups, soiled napkins, facial tissue, and cardboard (R. Owen, personal communication, January 27, 2010). The researchers also found that the recycling bins had the least contamination (R. Owen, personal communication, January 27, 2010).

A waste audit in 2008 was conducted at the Killam Library and the Student Union Building (SUB) (Carty *et al.*, 2008). The results indicated that the Dalhousie recycling program was operating inefficiently and required improvements to meet Dalhousie's sustainability goal (Carty *et al.*, 2008). The report suggested that Dalhousie improve student awareness surrounding recycling, provide more recycling bins on campus, and improve signage to specify where recyclables can be disposed of properly (Carty *et al.*, 2008).

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Dalhousie has committed itself to creating a sustainable atmosphere for the students, faculty, staff and surrounding community. The creation of the Office of Sustainability in 2008 and the Sustainability Policy in 2009 are steps towards the greening the campus movement (Traves, 2009). However, as a large public institution Dalhousie University contributes significantly to the waste stream of the HRM so has implemented a 75% goal of waste diversion (Dalhousie Waste Management Guide, 2009). To reach this goal the university should analyze barriers to waste reduction in order to determine priorities for campus environmental policy formation and implementation (Bardati, 2005).

This report will address the issue of waste diversion at the Killam Library (Killam) located on the Dalhousie University in Halifax, Nova Scotia. In the past decade, Dalhousie has made significant improvements in this area with the implementation of the four-bin system. The system consists of four bins for recyclables, compost, paper, and refuse providing the option for waste diversion. This report will refer to refuse as the remaining waste left for disposal once reusable, recyclable, and compostable materials have been removed (Sustainability Assessment Tool, 2009). The Killam was chosen for the subject of this report because it is a highly frequented building, providing an accurate representation of the Dalhousie community. Also, the initiation of a pilot study by the Killam Green Team, an environmentally conscious group of staff, and their desire to improve waste reduction made it a perfect candidate for the assessment of waste disposal. The pilot study removed all individual refuse bins on the second floor atrium and increased the four bin systems from two to four. In order to assess the success of the pilot project a comprehensive waste audit was necessary.

Audits are effective strategies to evaluate community waste habits and to improve waste management (Halifax Regional Municipality, 2008). A waste audit can raise awareness on campus about the effects of improper waste disposal and the strategies available to improve waste diversion rates. They can also save the university money in waste disposal and decrease the amount of waste custodial staff have to sort through before sending it to the HRM waste services (Halifax Regional Municipality, 2008). By determining the efficiency of the waste management practices at the Killam and by providing tangible solutions for custodial staff, this waste audit will help to implement changes that will bring the University closer towards its goal of a 75% diversion rate.

The objectives of this report were to:

- 1) Determine the success of the pilot project initiative on the second floor atrium of the Killam Library.
- 2) Determine the recycling habits of the individuals who frequent the Killam Library and their willingness to accept changes to infrastructure to encourage waste diversion.

2. Methods

2.1 Study Design

As nothing was known prior to the audit regarding the contents of the waste bins or waste habits of individuals frequenting the Killam, an inductive approach was required to go from observation to theory to determine trends in waste contamination and waste habits (Palys *et al.*, 2008). Data collection included direct measurement,

interviews, and surveys. A quantitative approach was used to collect data concerning the contents of the individual refuse bins and the four-bin systems, while a qualitative approach was used to gather data on the waste habits of those going to the Killam. Purposive non-probabilistic sampling techniques were used to gather qualitative data. Topology of the quantitative and qualitative approaches included exploratory, descriptive, and explanatory objectives. These approaches allowed group members to become familiar with waste contamination and attitudes; to explain trends related to waste; and to determine possible theories to aid in increasing waste diversion rates. An ethics proposal was approved to ensure the confidentiality and safety of those individuals involved in the interviews and surveys (Appendix 6).

2.2 Quantitative Sampling Procedures

Waste audits were conducted on the first floor (atrium area), second floor (atrium and common areas), and third floor (atrium area) of the Killam to determine the amounts and sources of waste contamination. The focus of the waste audits were the pre and post pilot project on the second floor atrium; the waste audits conducted on the first and third floors were conducted to confirm trends in waste contamination on the second floor and to provide further support for the need of the four-bin system to increase waste diversion rates. The waste audits were conducted from March 1st to March 15th, 2010. All group members participated in the audits; however, the group was divided in two smaller groups to conduct the audits efficiently. Sandra Dwyer, a member of the Killam Green Team, helped organize the audits. She also obtained permission for the audits from Bill Maes, the University Librarian. The audits were carried out at the back of the Killam

behind the Circulation Desk. Group members wore appropriate attire, provided by Facilities Management, including Tyvek suits, safety glasses, gloves, and face masks to ensure safe handling of waste. During the pre-pilot the waste was collected by custodial staff who combined the individual refuse bins with the refuse container in the four bin system, but during all other audits the group members collected the waste. Each bag of waste was sorted individually according to the Dalhousie Waste Management Guide (2009). The proportion of each type of waste in each bag was estimated as a percent and recorded in an accountability chart (Appendix 1). Pictures were taken at various points during the audits to visually document contamination and waste practices. At the end of each audit, all waste was placed in its proper bag and disposed of outside in the Killam garbage removal area.

2.3 Qualitative Sampling Procedures

Interviews and surveys were used to gather data regarding waste habits and attitudes about the use and removal of individual refuse bins. The interviews and surveys were purposive because it is the proper sampling technique to use with exploratory objectives and guarantees at least some discrepancy within a small sample (Palys *et al.*, 2008).

Only one interview (Appendix 3) was conducted to collect information from the Killam custodial staff. The interview was arranged by Carla Hill, one of the Custodial Supervisors of the Killam, and eight members of the Killam custodial staff participated in the interview. The interview was conducted to confirm the findings of the waste audits, to outline other problem areas, and to indicate the success of the pilot project.

The surveys (Appendix 4) were conducted on a voluntary basis throughout the Killam. Group members randomly distributed the surveys to 187 individuals, with each group member conducting approximately 31 surveys. The sample size was calculated from the total number of individuals who frequented the Killam in 2009 divided by the number of days the Killam was open in 2009. This sample size allowed for a confidence interval of 95% (+/-7). The surveys were conducted from Thursday to Tuesday, March 18th to March 23rd, including mornings, afternoons, and evenings.

2.4 Data Analysis

There was no statistical analysis of the quantitative data. All data recorded in the accountability charts was summarized in Excel spreadsheets (Appendix 2). All survey data was also summarized in Excel spreadsheets. The spreadsheets were used to construct graphs for visual representation of individuals' recycling habits and waste contamination. For all audits the waste data from each of the four-bin systems was averaged according to type to give one value for each compost, recyclables, paper and refuse. This was done to prevent an overwhelming amount of graphs from being created.

2.5 Reliability and Validity Issues

In order for methods to be reliable, sufficient details must be given so that subsequent researchers can understand and implement the procedures while obtaining consistent results (Palys *et al.*, 2008). Though all of the methods used to collect and measure the data are clearly outlined in this section and provided in appendices, future

researchers may not obtain the same results. Reliability issues may include changes in the members of the Killam Green Team or changes in administrators, such as Rochelle Owens, who provided support for this project. These changes could lead to a change in attitudes preventing future success of similar projects. If the same people are interviewed or surveyed in future waste audit projects, the results could prove to be false.

Validity refers to how well research techniques measure the variables of the research (Palys *et al.*, 2008). There are several validity issues related to this project: differences among group members in estimating the proportions of contamination; the definition of variables; and the possibility that not all variables were defined and measured. These issues may have lead to slight errors in quantitative and qualitative measurements.

2.6 Limitations and Delimitations

The limitations included time, cooperation and honesty of participants in surveys and interviews, the removal of garbage before the designated pick-up time, and dangerous materials that may be found during the waste audits. The delimitations included performing waste audits on only the first three floors of the Killam library and not auditing waste from the Second Cup, the Killam Bistro, or the washroom waste bins.

3. Results

3.1 Waste Audit

The amount of waste and the level of contamination were estimated within the four-bin systems and the individual refuse bins prior to the implementation of the pilot project on the second floor (figure 1). The compost bin contained no contamination (100% paper) while the refuse bin contained the greatest amount of contamination (60%). The majority of which was compost, and equal parts of paper and recyclables. Both recyclables and paper contained approximately the same amount of contamination (32% and 29 % respectively). Refuse was the main source of contamination in the recyclable bin while both waste and compost were contributors to contamination in the paper bin.

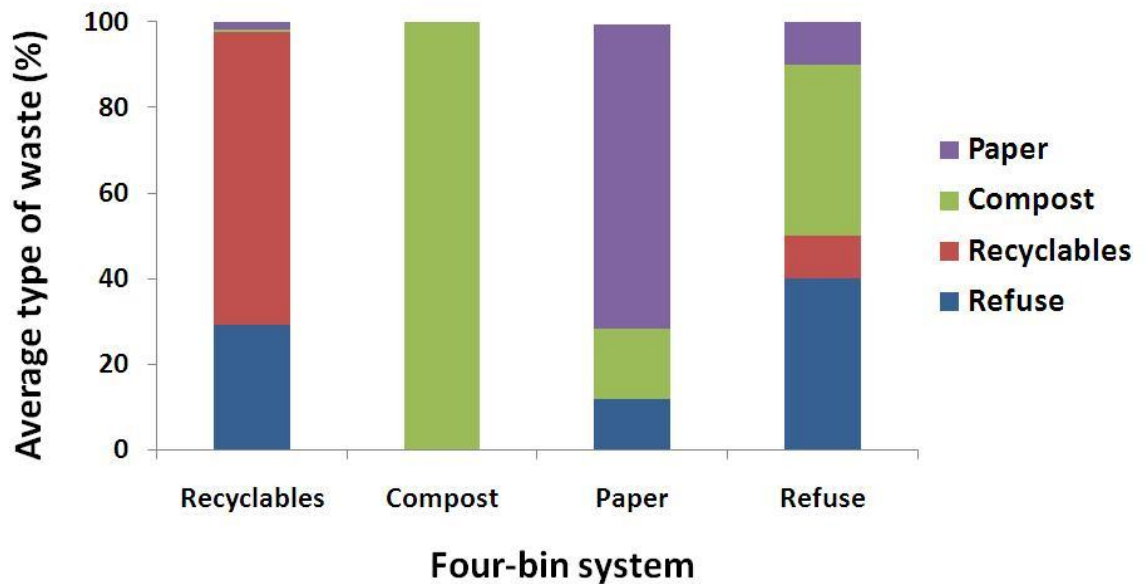


Figure 1. Average percent of contamination within the four-bin systems and refuse bins on the 2nd floor atrium prior to the implementation of the pilot project.

The results from the post-pilot waste audit of the second floor (figure 2) showed a noticeable improvement in the amount of contamination in the refuse bins and

recyclable bins. Contamination decreased 39% in the refuse bins, 28% in the recyclable bins and 5% in the paper bins. A slight (3%) increase was found in the compost bins. Refuse was the sole contamination in recyclable and compost bins, while the major contributor of contamination was compost in the paper bins. Compost was the sole contaminant in the refuse bin.

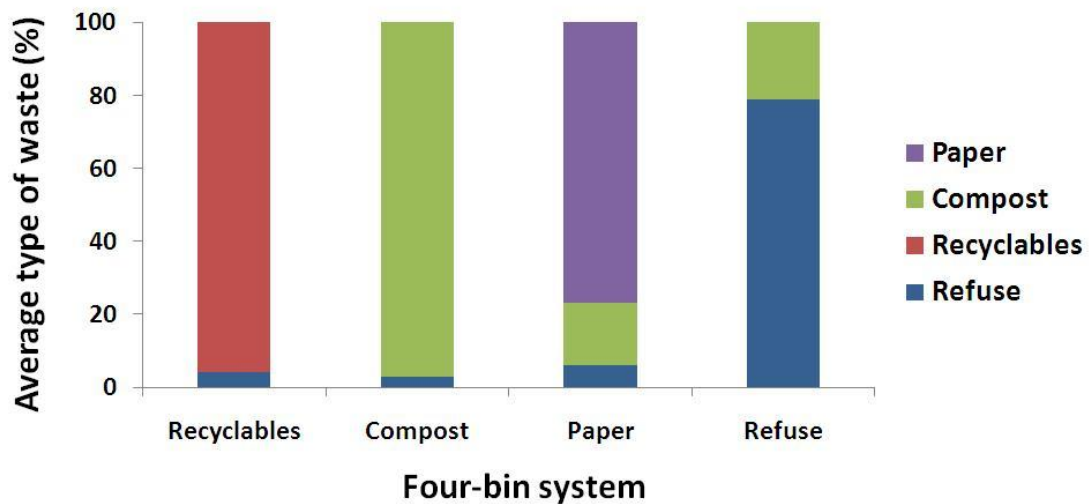


Figure 2. Average percent of contamination within the four-bin systems on the 2nd floor atrium after the implementation of the pilot project.

Supplementary audits were carried out on the first and third floor atriums, as well as the second floor Learning Commons. Similar levels of contamination were found in the compost on the first floor atrium (figure 3). Contamination within the refuse bins was 40%, the majority of which was from compost sources. Paper showed little contamination while contamination within recyclable bins was approximately 40% and was mostly refuse.

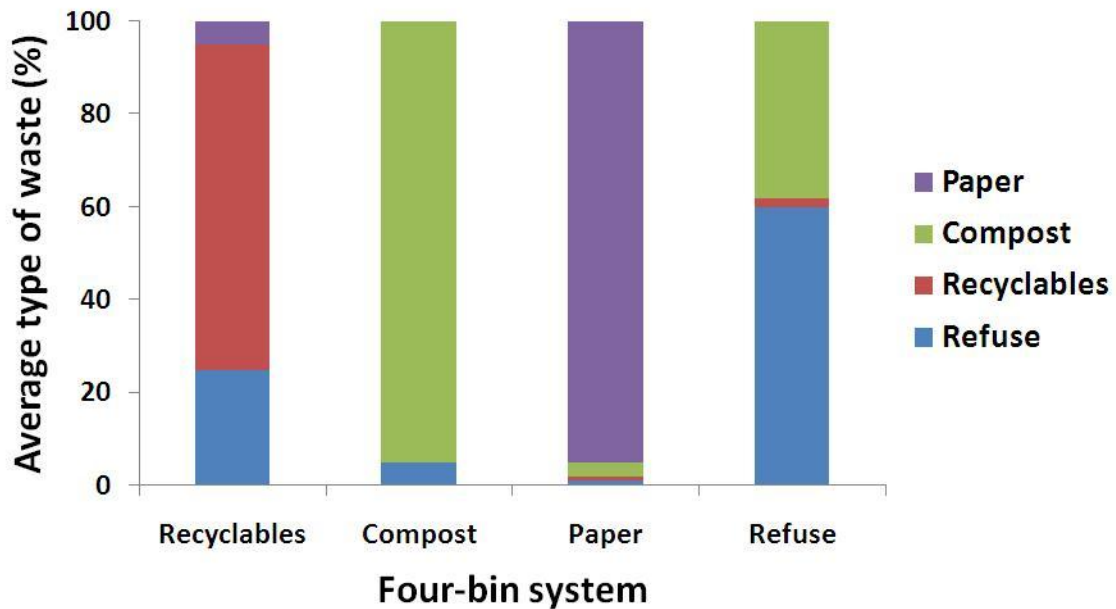


Figure 3. Average type of waste collected from the four-bin systems located on the 1st floor Killam Library.

Contamination in the compost, refuse and paper bins on the third floor (figure 4) was similar to all other audits previously conducted. The amount and type of contamination in the recyclable bins was less than other audits had typically recorded. Contamination was less than 20% in these bins.

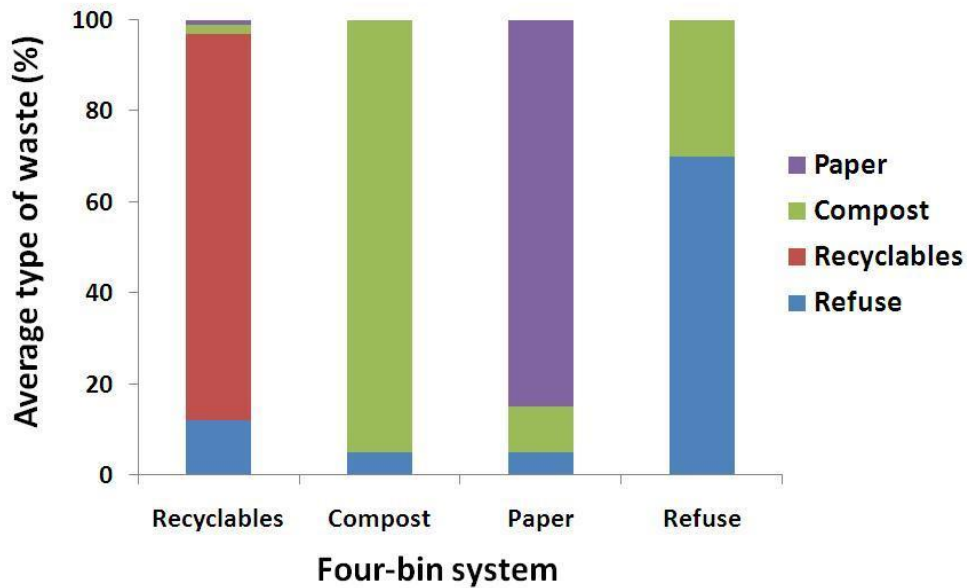


Figure 4. Average type of waste collected from the four bin waste systems located on the 3rd floor atrium at the Killam Library.

A separate audit was carried out for the individual black refuse bins on the first and third atrium floors and the second floor Learning Commons (figure 5). All three floors had similar levels of contamination at around 50-60%, of which compost was the highest contaminant. Paper was the second largest contributor to contamination on the second floor Learning Commons. On the first floor, recyclables were the second largest source of contamination while on the third floor paper and recyclables shared equal parts of contamination.

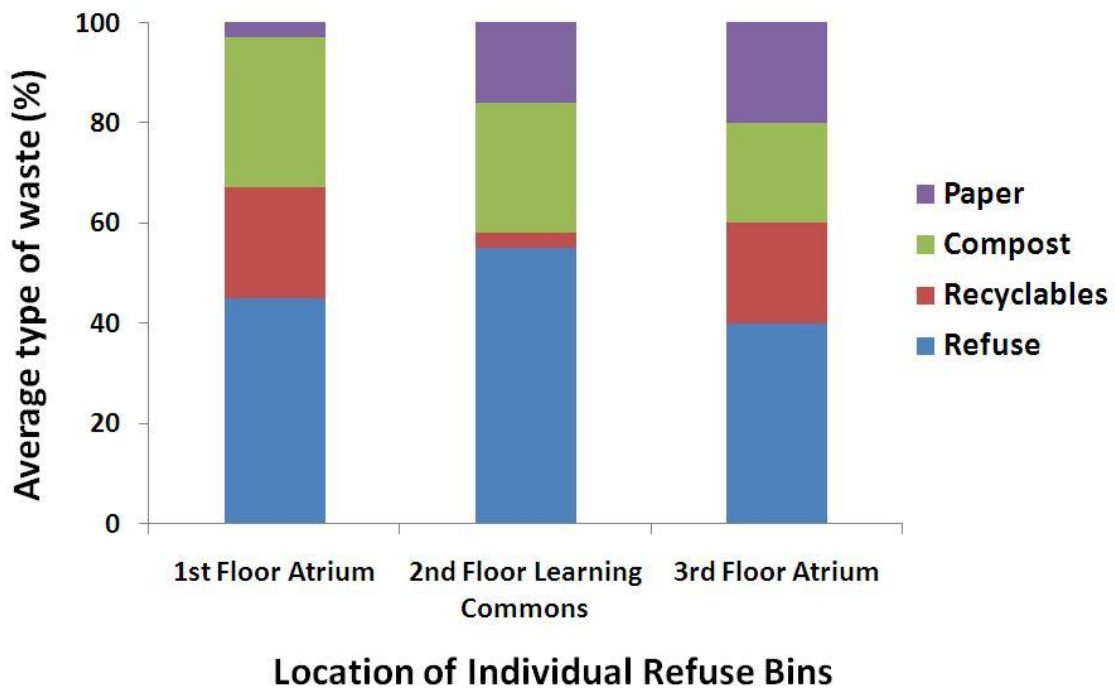


Figure 5. Average type of waste for the contents of the refuse black bins located on the 1st, 2nd, and 3rd floor of Killam Library.

3.2 Custodial Staff Interview and Surveys

Only two of the eight members of the custodial staff interviewed were comfortable speaking about waste diversion at the Killam. As custodial staff are not required to sort waste, they do not take note of any contamination unless it is obvious (i.e. pizza boxes). The custodial staff stated that they had noticed an increase in the use of the four-bin system during the pilot project and that the project was running smoothly. Individuals frequenting the Killam disposed of their waste and did not leave it on the desks and study tables during the pilot project. Staff mentioned the areas of heaviest waste were the 1st and 2nd Learning Commons.

The surveys conducted on the random sample population of the Killam Library (Appendix 5) indicated that the Killam's population were mainly students (94%).

Females were twice as abundant as males. The majority of the population was relatively young within the age range of 18-25 at 91%, followed by 26-35 at 6%, 36-55 at 2%, and 56+ at 1%. It was also observed that the majority of the Killam Library population visits the library 4 to 5 times per week.

To determine recycling habits the survey asked how frequently the individuals recycled and how far they were willing to travel in order to recycle properly (figure 6). Overall 83% of the population claims to recycle over half the time and while only 17% recycle less than half the time. With regards to the willingness to travel, 65% of the population said they would travel up to 25m in order to properly recycle, while 35% said they would travel 26-101+ m to recycle properly. It was expected that those who recycle more often, would travel further distances in order to recycle. However, the opposite was found; those who recycled more often were not willing to travel as far as those who recycled less often.

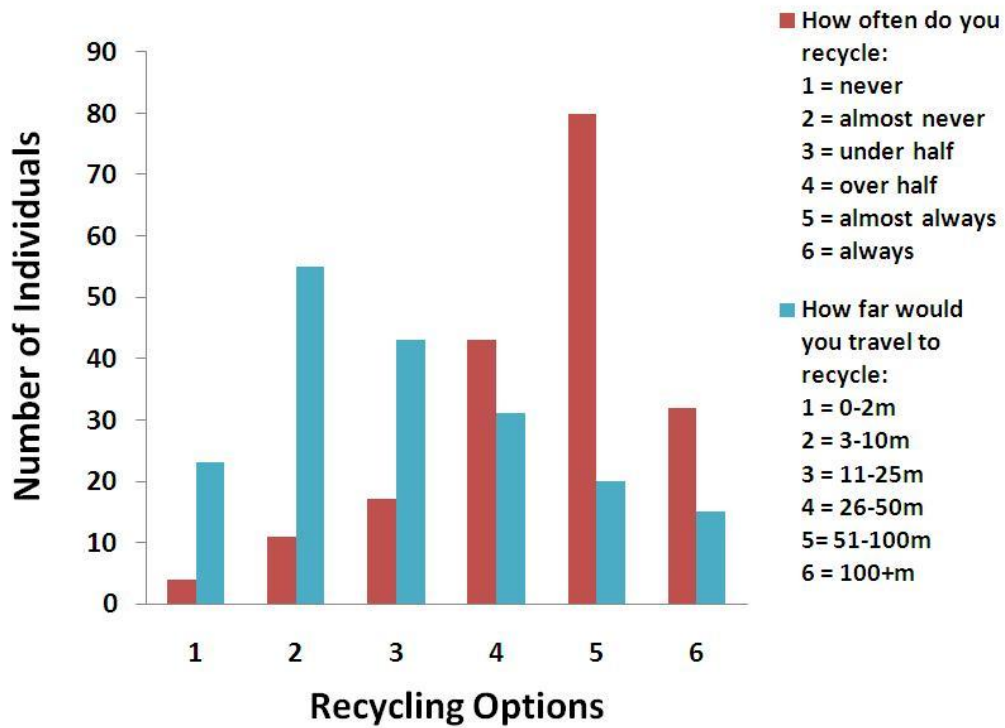


Figure 6. Survey response data for the level of recycling and the willing travel distance to recycle in the Killam Library.

The surveys asked if black refuse bins deter the individual from properly recycling (figure 7). One fifth of the population (22%) felt that individual refuse bins deterred them from recycling, while two fifths of the population (38%) felt that the black refuse bins did not deter them from properly recycling. The remaining two fifths of the population (40%) felt that the black refuse bins sometimes deterred them from properly recycling.

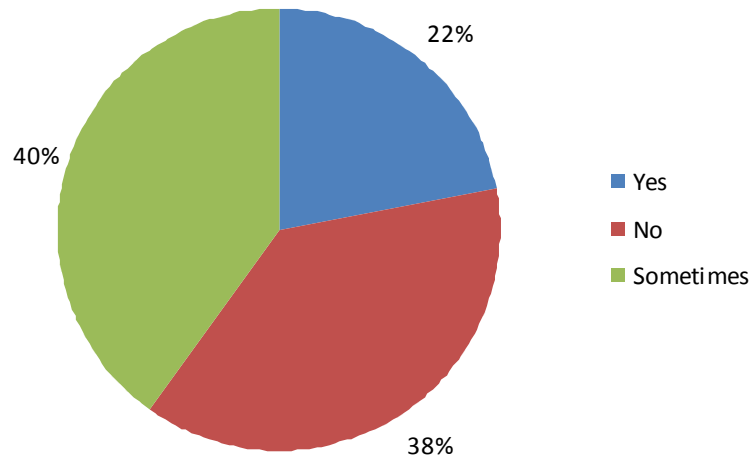


Figure 7. Survey response data for the deterrence of recycling by the presence of refuse black bins in the Killam Library.

To determine the level of agreement with the removal of the individual refuse bins the surveys asked how individuals felt about the removal of the refuse bins. 41% of the population believed that the removal of the refuse bins was a good idea, 21% strongly agree and 13% strongly disagree. Overall almost two thirds (62%) of the population agreed with the removal, compared to one third (39%) who disagreed with the removal of the black refuse bins.

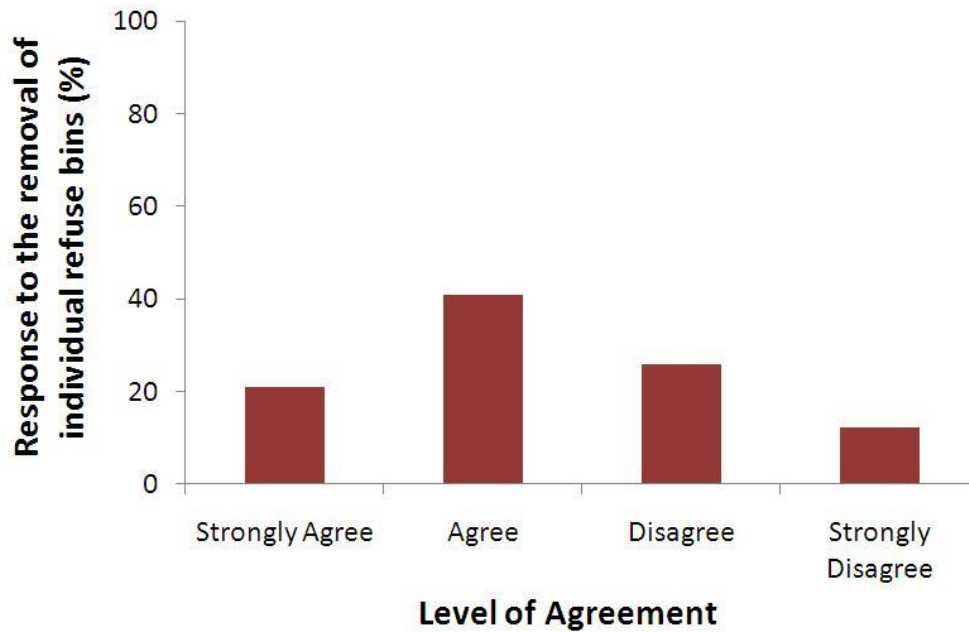


Figure 8. Survey response data for the removal of individual refuse black bins in the Killam Library.

To measure the level of understanding of proper recycling methods the survey listed several materials and asked which could be recycled properly according to the Dalhousie Guide to Waste Management (figure 9). Greater than 80% of individuals surveyed correctly believed that paper, plastic and glass could be properly recycled. Only 60-75% believed compost and batteries could be properly recycled, and even fewer (approx. 35%) believed tinfoil could be. 24% of individuals incorrectly believed that styrofoam could be recycled.

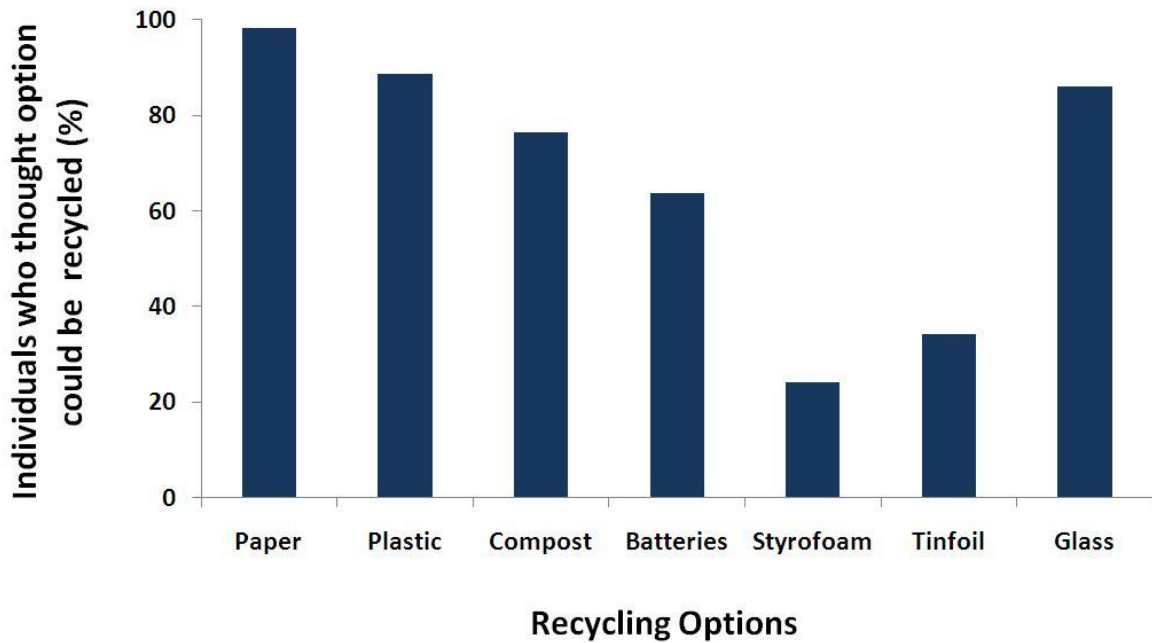


Figure 9. Survey response data of the individuals who thought option could be recycled in the Killam Library.

4. Discussion

The main objectives of this report were to determine the success of the pilot project on the second floor atrium in the Killam Library, the recycling habits of those who frequented the building and their willingness to accept changes to infrastructure to promote waste diversion.

4.1 Waste Audit

Before the pilot project began on March 1, 2010, the Killam Library showed considerable contamination in the recyclable and refuse bins of the four-bin system on the second floor. An audit of the first and third floor atrium provided supplementary data of the “pre-pilot” state of the atrium floors. These results supported those found on the second floor audit; refuse was the main source of contamination in recyclable bins,

while compost was the main source of contamination in the refuse bins. A previous audit of the Killam and the Student Union Building found similar results, where compost was most often disposed of improperly (Carty *et al.*, 2008).

Two weeks after the pilot project had been introduced, a second waste audit re-evaluated the contamination on the 2nd floor. Substantial improvements in the amount of contamination in all of the bins indicated that the pilot project had been a success. The removal of the individual refuse bins did appear to result in reduced the levels of contamination in the four-bin system and greater waste diversion.

During the audits on each the first and third atrium floors and the second floor Learning Commons, the contents of the individual black refuse bins were collected. Extremely high levels of contamination, greater than those found in the four-bin system, may indicate that contamination is more likely to occur when individual refuse bins are provided. It was found that coffee cups were significant contributors to the total amount of refuse and the contamination in compost bins. Other universities, such as the University of Western Ontario and Dalhousie University, had also indicated this problem after waste audits were conducted on campus (Frederick *et al.*, 2008; R. Owen, personal communication, January 27th, 2010).

The overall success of the pilot project was greater than expected and the Green Team is planning to implement it permanently throughout the remaining floors (S. Dwyer, personal communication, April 2010).

4.2 Custodial Staff Interview and Surveys

The interview with the custodial staff identified the need for the implementation of education programs at the Killam and other areas on the Dalhousie campus to increase awareness regarding waste diversion.

The majority of the people surveyed at the Killam Library were students between the ages of 18 and 25. The results of the surveys can be used as an indicator of the recycling habits of this age bracket of students at Dalhousie University.

The survey results indicated that the majority of the population did recycle over half of the time; however, less than half were willing to travel over 26 m to recycle properly. Those individuals that were not willing to travel far are perhaps more likely to be deterred by numerous individual refuse bins. However, only a small portion of the population admitted to being deterred from recycling by numerous refuse bins. Equal parts of the population were either not deterred or sometimes deterred by the presence of these bins. A study conducted by Dalhousie found that half of the population surveyed were confused as to what type of waste belonged in the refuse and what type could be recycled (Carty *et al.*, 2008). Regardless, it appears that the individual refuse bins may be used more often than not because of convenience or laziness. This is supported by the higher levels of contamination in the individual refuse bins versus the four-bin system.

Though the majority of students agreed with the pilot project, a better understanding of proper waste disposal is needed. Results from the survey indicated a lack of knowledge of proper waste disposal within all four-bins. As mentioned earlier, coffee cups were often thought to belong in the compost, but due to their plastic lining

Dalhousie and the city of Halifax will not accept them as compostable material (Dalhousie's Guide to Waste Management, 2009). Surprisingly, a considerable portion of individuals believed that styrofoam could be properly recycled. Dalhousie and HRM do not accept styrofoam as a compostable or recyclable material.

5. Conclusion

The waste audit of the Killam was successful in outlining problem areas regarding waste diversion. However, for Dalhousie to reach its goal of 75% diversion, there needs to be further research regarding waste disposal practices. Future research projects could investigate the success of Muggy Mondays, an initiative of local student environmental group SustainDal, to promote the use of reusable coffee mugs in place of disposable ones. The university would benefit from a feasibility assessment of HRM establishing a facility to compost biodegradable coffee cups or Dalhousie implementing policy changes needed for biodegradable coffee cups at all coffee vendors on campus. Creating work-study programs that focus on waste diversion at Dalhousie could also prove to be a valuable tool for future research. Increased student involvement and pressure from students for positive changes regarding waste diversion will also help reach this diversion goal. Student volunteers could aid in sorting refuse to help lower the costs of waste removal. It is recommended that the Killam Library initiate a second pilot project, removing the individual refuse bins on the first and second floor Learning Commons since these areas were highlighted as significant contributors to high abundances of waste and waste contamination. This report also recommends developing an education campaign about waste management on the Dalhousie campuses. This could

be done through the establishment of programs about how to compost and recycle properly, and providing the Dalhousie Waste Management Guide in various languages could help to change attitudes and increase knowledge regarding waste diversion (Keniry, 1995).

Acknowledgements

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Appendix 1. Waste Audit Accountability Chart

Killam library Waste Audit

Name of Data Collector

Date:

Floor #:

Area:

Start Time:

End Time:

Type of Waste	Bag Number	Proportion of total waste (%)				Additional Comments
		Refuse	Recyclables	Compost	Paper	

Appendix 2. Waste Audit Raw Data

Table 2. Pre-pilot percent of waste within the four bin systems and individual black refuse bins from the second floor atrium Killam Library.

Waste Bin	Percent (%)			
	Recyclables	Paper	Organics	Refuse
Refuse	10	10	40	40
Organics	0	0	100	0
Paper	0	71	17	12
Recyclables	68	2	1	29

Table 3. Post-pilot percent of waste within the four bin systems from the second floor atrium Killam Library.

Waste Bin	Percent (%)			
	Recyclables	Paper	Organics	Refuse
Refuse	0	0	21	79
Organics	0	0	97	3
Paper	0	77	17	6
Recyclables	96	0	0	4

Table 4. Percent of each type of waste within the four bin systems from the first floor atrium Killam Library.

Waste Bin	Percent (%)			
	Recyclables	Paper	Organics	Refuse
Refuse	2	0	38	60
Organics	0	0	95	5
Paper	1	95	3	1
Recyclables	70	5	0	25

Table 5. Percent of each type of waste within the four bin systems from the third floor atrium Killam Library.

Waste Bin	Percent (%)			
	Recyclables	Paper	Organics	Refuse
Refuse			30	70
Organics			95	5
Paper		85	10	5
Recyclables	85	0.5	2.5	12

Table 6. Percent of each type of waste within the individual black refuse bins from the 1st, 2nd, and 3rd floor Killam Library.

	Percent (%)			
	Recyclables	Paper	Organics	Refuse
1st Floor Atrium	22	3	30	45
2nd Floor Commons	2.5	16.5	26	55
3rd Floor Atrium	20	20	20	40

Appendix 3. Killam Custodial Staff Interview

1) How often are the garbage bags in the bins emptied?

The garbage bags are removed once a day generally in the mornings when the custodial staff start their shifts.

2) How full are the bins before they are emptied?

The bins are usually quite full and need to be emptied by the time the custodial staff remove them.

3) Is there any additional sorting of recyclables/garbage done by the custodian staff?

Additional sorting only takes place if large items such as pizza boxes need to be removed from either the individual refuse bins or four-bin systems.

4) What are the areas of heaviest garbage?

Areas of heaviest garbage include the first and second floor learning commons. The custodial staff stated that there are noticeable increases in contamination in the individual refuse bins and an increase in the total amount of garbage in the first floor common since the implementation of the extended hours.

5) How many bags are removed per day?

All garbage bags are changed everyday, unless they contain no garbage.

6) Did you notice an increase in the use of the four-bin systems during the pilot project?

The custodial staff stated that they had noticed an increase in the use of the four-bin system and that the pilot project was running smoothly. Individuals frequenting the Killam were disposing of their garbage and not leaving it on the desks and study tables.

7) Have you noticed any contamination of the four-bin systems?

As custodial staff are not required to sort garbage, they do not take note of any contamination unless it is obvious. One custodial staff member stated that there has been some organic contamination in the paper bins located in the first floor commons area.

Appendix 4. Killam Library Survey

- 1) What is your occupation?
Student Staff Visitor/ Contractor Other
- 2) What is your sex?
Male Female
- 3) What is your age?
18-25 26-35 36-55 56+
- 4) How many days per week are you in the Killam Library (on average)?
0-1 2-3 4-5 6-7
- 5) Is the removal of black garbage bins in the Killam Library a good idea?
Strongly Agree Agree Disagree Strongly Disagree
- 6) How often do you recycle?
Never Almost never Less than half the time
More than half the time Almost always Always
- 7) How far would you travel in order to properly recycle?
0-2m 3-10m 11-25m 26-50m 51-100m 101m+
- 8) Do numerous garbage bins in the Life Science Centre detour you from properly recycling?
Yes No Sometimes
- 9) What do think can be properly recycled (check all that apply)?
Paper Plastic Organics Batteries
Styrofoam Tinfoil Glass

Appendix 5. Killam Library Survey Population

Table 1. Survey response data identifying characteristics of the Killam Library population.

Population Characteristics		Count	Percentage (%)
Occupation	student	176	94
	staff	3	2
	visitor	0	0
	other	8	4
Sex	male	62	33
	female	125	67
Age	18-25	169	91
	26-35	12	6
	36-55	4	2
	56+	1	1
Visits to the Killam Library Per week	0-1	25	13
	2-3	52	28
	4-5	78	42
	6-7	31	17

Appendix 6. Ethics Proposal

ENVIRONMENTAL PROGRAMMES FACULTY OF SCIENCE DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

GENERAL INFORMATION

1. **Title of Project:** Conducting a Waste Audit on Dalhousie University Campus to Establish Waste Habits and Locate Problem Areas

2. **Faculty Supervisor(s):** Tarah Wright **Department:** Environmental Science **Ext:** 3683
e-mail: Tarah.Wright@dal.ca

3.

Student Investigator(s)	Department	e-mail:
Tamara Wilson	Biology	t.wilson@dal.ca
Jillian Woods	Environmental Science	jillian.woods@hotmail.com
Alex Heathcote	Biology	aheathcote@dal.ca
Kit Milnews		CH821946@Dal.Ca
Jennifer Thompson		jn296202@dal.ca
Dayna Zipursky		dayna_zipursky@hotmail.com

4. **Level of Project:**
Non-thesis Course Project [x] Undergraduate [] Graduate

Specify course and number: ENVS 3502: Environmental Problem Solving II

5.
 - a. **Indicate the anticipated commencement date for this project:** March 1st, 2010

 - b. **Indicate the anticipated completion date for this project:** April 13th, 2010

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research

Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

Our project will address the issue of solid waste on campus at Dalhousie University in Halifax, Nova Scotia by recording and measuring waste from the Life Sciences Centre (LSC); and the second floor atrium and second floor common area in the Killam Library.

Rational:

1-The LSC is undergoing a major overhaul to improve its efficiency and this audit is an inexpensive step in this process.

2-Identify problem areas and notify facilities management of improper waste disposal.

3- To possibly save the university money in waste disposal and prevent custodial staff from having to re-sort garbage before its removal by HRM waste services.

4-Complete a database of waste disposal habits for the LSC. A former group of students completed a database of waste (November, 2009) describing the contents of the four bin waste systems throughout the LSC. Future waste audits of the LSC could be compared to this baseline data to indicate any improvements in waste habits.

5-The Killam Green Team is trying to implement changes in the library in order to reduce the amount of solid waste and promote awareness about waste habits.

Research Questions:

1-Are students aware of their waste habits?

2-How can Dalhousie promote the three R's-reduce, reuse, recycle?

3-What roles do custodial staff play in waste management at Dalhousie?

Methodology/Procedures

a. Which of the following procedures will be used? Provide a copy of all materials to be used in this study..

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations

Other, specify Photographs of waste and the group sorting through the waste

- b. Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.**

Please see attachments for the flow charts that indicate procedures to be used in this study.

3. Participants Involved in the Study

- a. Indicate who will be recruited as potential participants in this study.**

Dalhousie Participants: Undergraduate students
 Graduate students
 Faculty and/or staff
Non-Dal Participants: Children
 Adolescents
 Adults
 Seniors
 Persons in Institutional Settings (e.g. Nursing Homes,
 Correctional Facilities)

Other (specify) _____

- b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.**

Male and female students will be randomly selected in the LSC for surveys. Please see attached questionnaire. Male and female members of the custodial staff of the LSC will be interviewed. Please see attached interview and survey questions.

- c. How many participants are expected to be involved in this study?**

We plan to interview 50 students for the survey who are willing to participate in the study. Only custodial staff that are willing to be interviewed will be included in the study. At this time, we are unsure of how many custodial staff will take part in the study.

4. Recruitment Process and Study Location

- a. From what source(s) will the potential participants be recruited?**

Dalhousie University undergraduate and/or graduate classes
 Other Dalhousie sources (specify): Life Sciences Centre
 Local School Boards
 Halifax Community
 Agencies
 Businesses, Industries, Professions
 Health care settings, nursing homes, correctional facilities, etc.

[] Other, specify (e.g. mailing lists)

b. Identify who will recruit potential participants and describe the recruitment process.

Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

All group members will recruit potential participants. One group member will contact Michael Murphy to obtain permission to interview custodial staff and determine the best procedure for group members to interview potential custodial staff members. Potential student volunteers will be randomly selected from the hallways of LSC.

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation?

Yes [] No [x]

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used. Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

Feedback, in the form of a report, will be available to participants through the group until May 13th, 2010, and at anytime through Rochelle Owen of the Dalhousie University Sustainability Office, or participants can attend an oral presentation at The Company House on April 6th, 2010.

Please see attachments for a copy of the feedback letter.

POTENTIAL BENEFITS FROM THE STUDY

1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.

Participants may be made aware of their waste habits, the consequences of their waste habits, and how they can change their waste habits. Participants may be made aware of locations of recycling, composting, and paper bins throughout the LSC.

2. Identify and describe any known or anticipated benefits to society from this study.

There may be a potential for Dalhousie University to contribute less waste to landfills. Also,

there may be a potential for Dalhousie to minimize its ecological footprint in the surrounding community. Opportunities may arise for the surrounding community and Dalhousie to work together with respect to waste issues.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

- 1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors**

No known or anticipated risks

Explain why no risks are anticipated: Potential participants will only take part in the surveys or interviews if they wish to volunteer their time. They will be informed that their personal information, for example sex, age, will be grouped together with the participants' information. They will be individually identified by a respondent number only.

Minimal risk
Description of risks:

Greater than minimal risk
Description of risks:

- 2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.**

All interview and survey questions have been drafted without bias. All participation in the study is voluntary.

INFORMED CONSENT PROCESS

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>

- 1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?**

- Information letter with written consent form; provide a copy
 - Information letter with verbal consent; provide a copy
 - Information/cover letter; provide a copy
 - Other (specify)
-

- 2. If written consent cannot be obtained from the potential participants, provide a justification.**

The group understands the importance of written consent; however, potential participants can review the questionnaire before deciding to participate in the study. As well, potential participants will be shown a copy of the feedback letter and the information/cover before deciding to participate.

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

1. **Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.**

All data collected from participants will be grouped according sex and/or age. Participants will only be identified by a respondent number.

2. **Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.**

All data collected from the participants will be given to Rochelle for future research. A copy of the final report will be given to Tarah Wright.

3. **Indicate how long the data will be securely stored, the storage location, and the method to be used for final disposition of the data.**

Paper Records
 Confidential shredding after 4 weeks
 Data will be retained indefinitely in a secure location
 Data will be retained until completion of specific course.

Audio/Video Recordings
 Erasing of audio/video tapes after _____ years
 Data will be retained indefinitely in a secure location
 Data will be retained until completion of specific course.

Electronic Data
 Erasing of electronic data after _____ years
 Data will be retained indefinitely in a secure location
 Data will be retained until completion of specific course.

Other

(Provide details on type, retention period and final disposition, if applicable)

Specify storage location:

ATTACHMENTS

Please **check** below all appendices that are attached as part of your application package:

- Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
 Information Letter and Consent Form(s). Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
 Information/Cover Letter(s). Used in studies involving surveys or questionnaires.
 Parent Information Letter and Permission Form for studies involving minors.

[x] **Materials:** A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS	
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date

FOR ENVIRONMENTAL PROGRAMMES USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

Signature

Date

Feedback Letter:

To Whom It May Concern:

All of the information that is to be collected from our study will be available from several sources. You can contact us directly until the May 13th, 2010 for a copy of the final report. After this date, Rochelle Owen of the Dalhousie Office of Sustainability can be contacted for a copy of the final report. Also, the group members will present the findings of the study in the form of a Pecha Kucha at The Company House on April 6, 2010 from 5:30-8:30 p.m.

Regards,

Jillian Woods
Kit Milnews
Alex Heathcote
Jennifer Thompson
Tamara Wilson
Dayna Zipursky

Information/Cover Letter:

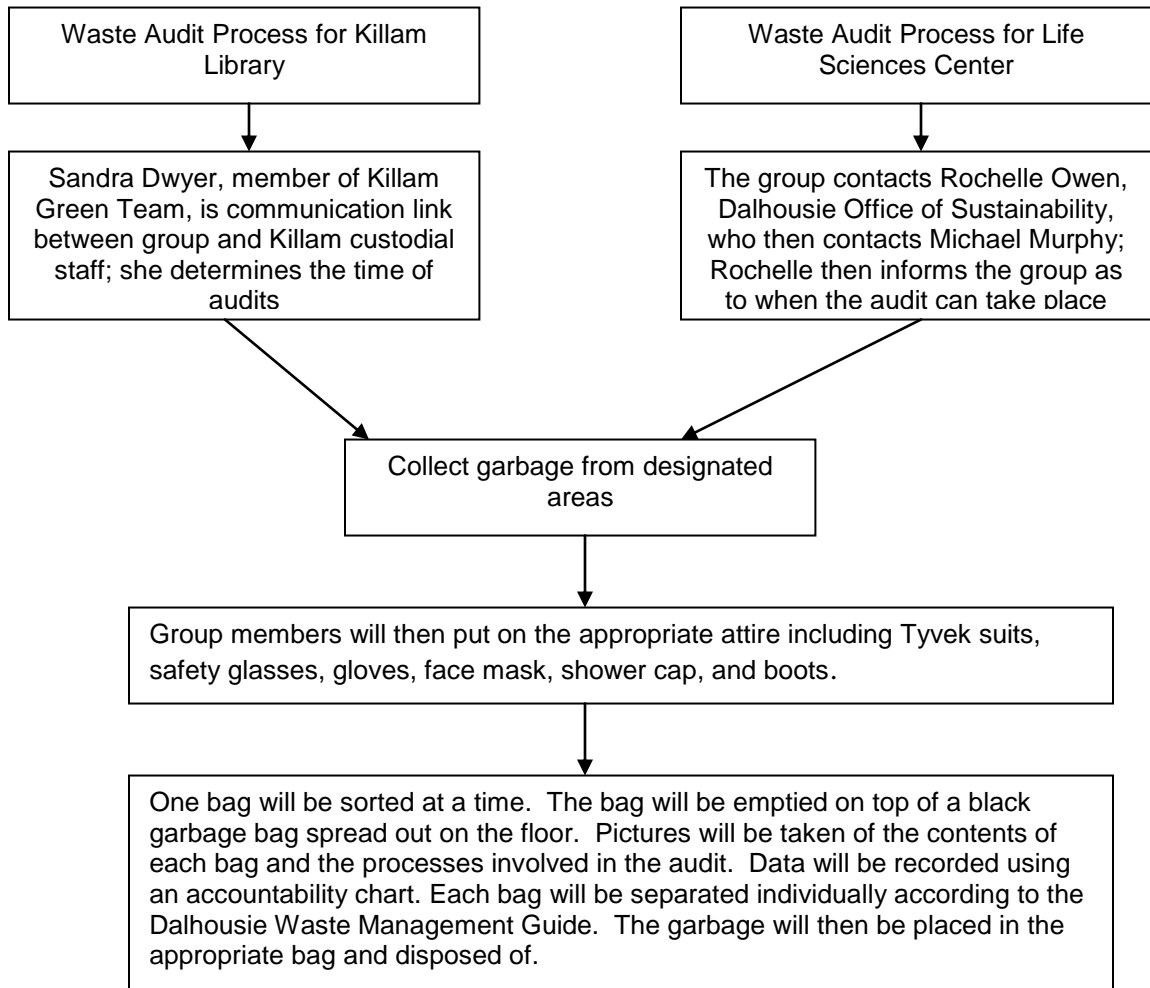
To Whom It May Concern:

The following waste audit is being conducted to determine waste habits in the Life Sciences Centre on the Dalhousie University campus, to outline any problem areas, and to indicate if there is a need for further education regarding waste practices on campus. No participant will be identified in the study with respect to their name, but only by a respondent number. All data collected will be kept with Rochelle Owen of the Dalhousie University Sustainability Office.

Regards,

Jillian Woods
Kit Milnews
Alex Heathcote
Jennifer Thompson
Tamara Wilson
Dayna Zipursky

Flow Charts for Waste Audits:



Flow Charts for Interviews and Surveys:

