

Waste Assessment

2018 Report

Date prepared: August 2018

Prepared for:

QuadReal Property Group

Jamieson Place

Prepared by:

Green Calgary



Since 1978, Green Calgary has been a leading urban environmental charity empowering Calgarians to green the way they live, work and play

Wednesday, August 15, 2018

Sharlene Quian
Property Manager
QuadReal Property Group
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Calgary, Alberta T2P 4H4

Dear Sharlene,

Green Calgary's Green Workplace team is pleased to present a completed copy of our detailed report from the August 1st 2018 waste assessment that took place at Jamieson Place.

The report provides a breakdown of composition and detailed analysis of the findings from the waste assessment. From this analysis, our visits to the site and conversations with you, we have put forth a series of recommendations for your facility. These recommendations are considered to be the best next step for your organization in your building's waste and recycling initiatives.

We are confident that these recommendations will continue to guide the building's diversion programs in the right direction. If you require any help in implementing these plans, Green Calgary would be happy to assist you.

If you have any questions or concerns, please do not hesitate to contact me.

Kind regards,



Reka Vasarhelyi

Team Lead Green Workplace

Green Calgary

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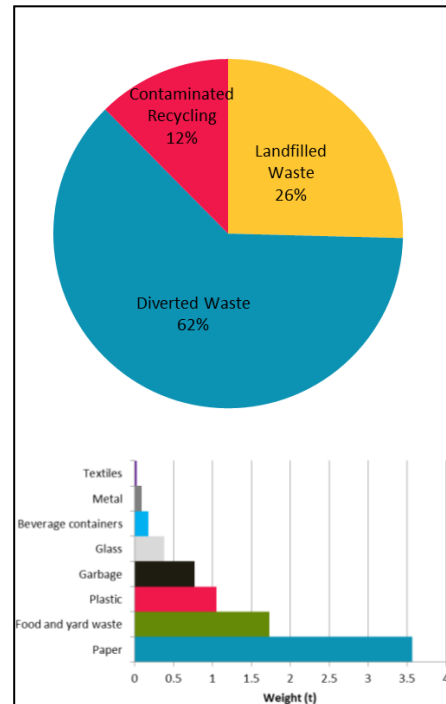
1.0 – Executive Summary

Green Calgary performed a waste assessment for Jamieson Place on August 1st 2018. This report outlines Green Calgary’s findings and provides recommendations on how to further divert waste from the landfill.

The assessment visually analyzed 24 hours of waste created between July 31st and August 1st. This assessment acts under the assumption that this 24 hour period is representative of an average day of waste. Using this information, Green Calgary found that Jamieson Place had a diversion rate of 62%.

The largest contributors to Jamieson Place’s waste were paper waste, food and yard waste, and plastic waste. Paper waste contributed to 47.5% of all material going to the landfill, whereas food and yard waste and plastic contributed 22.2% and 13.5% respectively.

Green Calgary estimates that Jamieson Place could reach a potential diversion rate of 85% at the building with higher participation in the current programs. Notably, the building could witness drastic increases in its diversion rate with higher compliance with the paper recycling program.



Jamieson Place Quick Facts

Diversion Rate 62%

Waste and recycling per business day 121 kg

Staff and tenant education is vital for the effectiveness of current programs and - perhaps most importantly – the reduction of waste generated. Initiatives, such as reusable water bottles and coffee mugs, reduced printing, paper hand towel recycling, and informing guests of recycling programs could help to reduce the waste generated at Jamieson Place.

2.0 – Overview

Green Calgary conducts waste assessments to measure the overall diversion rate, as well as the composition of the waste stream. Measurement is necessary to understand the current state of waste generated within a facility and the relative impact of existing diversion programs. Waste assessments help clients strategically implement waste reduction and recycling programs that reduce the overall environmental impact associated with their waste generation.

This is the eighth Green Calgary waste assessment that has been conducted at Jamieson Place. To continue the building's waste management measurement and diversion plans, Green Calgary completed a waste assessment on August 1st 2018.

This report highlights findings in a series of figures and tables, and includes a discussion of the results plus recommendations to further improve the diversion rate.

Appendix A provides a detailed material breakdown of the waste stream, and Appendix B provides a summary of the raw data used in the report.

It is important to note that the results and information are based on a snapshot that is taken from a 24 hour sample. If operations are normal, the results are typical over a year even though there may be daily variances. The purpose of the report is to identify the composition of the material that is leaving the building, determine the effectiveness of existing recycling programs, and determine the need for additional programs or steps to further improve waste reduction and diversion.

This report has been prepared for the specific purpose(s) contained herein. To the extent that statements and information provided by the client, its representatives, or partners have been used in the preparation of this report, Green Calgary consultants relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. Green Calgary makes no certification and gives no assurances except as explicitly set forth in this report. This report and the information contained herein, is produced for the expressed use of the organization whose name is on the title page of this document. Green Calgary specifically prohibits redistribution of this report and the material contained herein in whole or part without expressed written permission of Green Calgary.

3.0 – Methodology

The waste assessment analyzes a 24-hour sample of waste generated. Through visual estimation, the composition of the waste is categorized into paper, plastic, metal, food and yard waste, beverage containers, electronics, etc. This data is converted to weight, which is the standard measurement of waste and is then extrapolated to reflect annual waste generation. Specifically, values in this assessment are expressed in metric tonnes (t). The sample of waste analyzed should be representative of the annual waste generated, provided that day reflects typical operations. The amount of waste collected for the assessment is utilized in order to determine annual waste generated, along with provided waste disposal data and waste bin size and frequency of pickup.

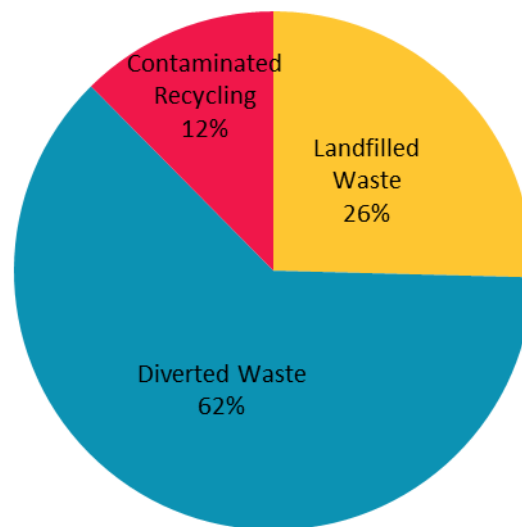
The success of a waste assessment requires the cooperation and participation from property managers, tenants and custodial staff. The custodial staff was required to use clear garbage bags during the 24-hours of waste collection. The garbage bags were staged in a pre-determined area so Green Calgary staff could analyze the waste. Green Calgary did not receive any recycling information from the tenants at Jamieson Place, as the majority of recycling programs were captured in the assessed waste.

4.0 – Waste Assessment Results

4.1 – Diversion Rate

The building’s annual diversion rate is 62% as seen in Figure 1. The diversion rate is calculated by dividing the total amount of material diverted from the landfill over the total waste and recycling output from the building. The total annual waste that left the building was 30.7 t, of which, 19.1 t were diverted from the landfill.

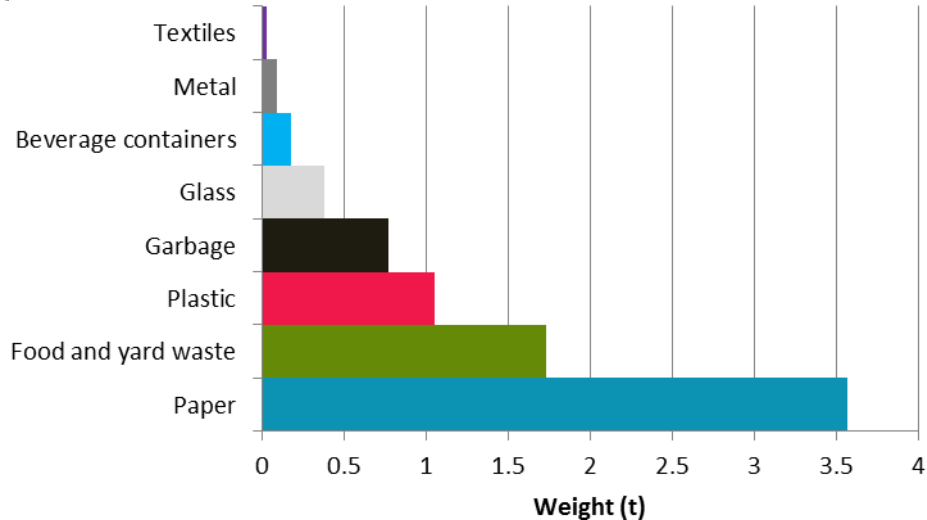
Figure 1: Diversion Rate for Jamieson Place in 2018



4.2 – Waste Results

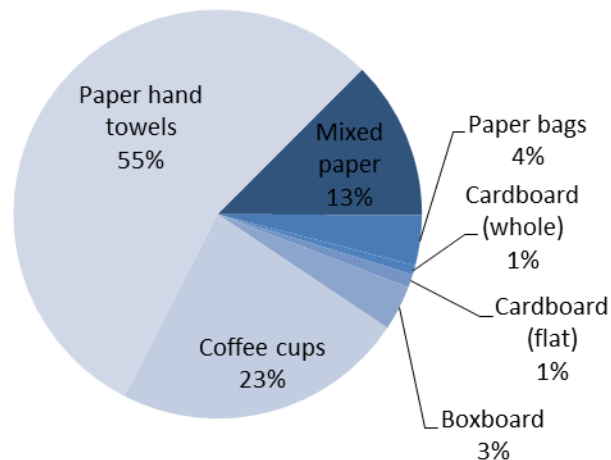
Figure 2 displays the waste material breakdown based on the 24 hour sample of landfilled waste collected from the building. The industry standard for comparing waste output is by weight; in Canada, this is in metric tonnes annually. The largest categories by weight were paper waste, food and yard waste, and plastic waste.

Figure 2: Annual Waste Material Breakdown for Jamieson Place in 2018



Paper waste was the most landfilled material from Jamieson Place at 3.5 t annually (45.7%). This category encompasses all materials produced from wood pulp and fiber. The most common paper products in this category were paper towels (55% of paper waste), coffee cups (23% of paper waste), and mixed paper (13% of paper waste). A complete breakdown of the paper waste is shown in Figure 3.

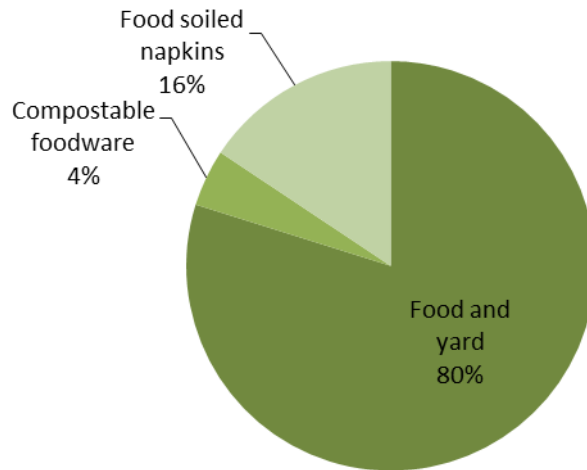
Figure 3: Paper Waste Breakdown



The second most abundant material found at Jamieson Place was food and yard waste, totaling 22.2% of the landfill waste stream, 1.73 t annually. This category includes all organic matter in

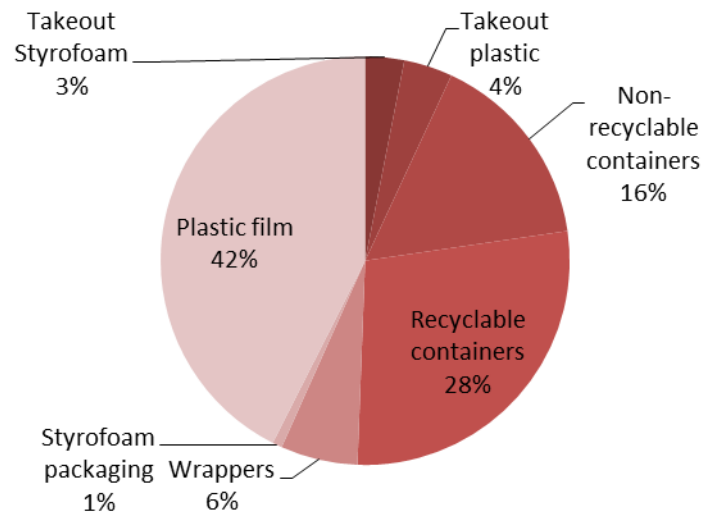
the waste stream. The most common materials observed in the assessment were food products (80%), soiled napkins (16%), and compostable foodware (4%). A complete breakdown of the food and yard waste is shown in Figure 4.

Figure 4: Food and Yard Waste Breakdown



The third most common material was plastic, totaling 13.5% of the landfilled waste stream, (1.1 t) annually. Plastics are materials synthesized from petrochemicals. The most common plastic wastes found in the assessment were plastic film and wrapping (42%), which was followed closely by recyclable containers (28%), and non-recyclable containers (16%). A complete breakdown of the plastic waste is shown in Figure 5.

Figure 5: Plastic Waste Material Breakdown



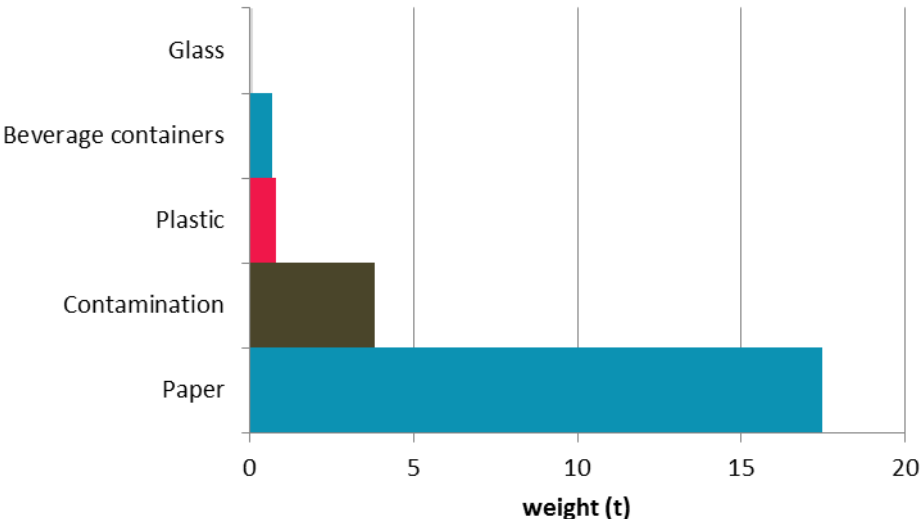
Note that not all items above are recyclable. Appendix A provides a detailed breakdown of the materials found in the waste stream and each material’s diversion potential. This information is

useful to determine the success of current recycling programs and indicate potential next steps to increase the diversion rate for the building. It was found that 78.6% of the total waste was composed of divertible materials.

Figure 6 below shows the breakdown of recycled material which is diverted from the landfill throughout the year. A total of 22.9 t of waste was diverted from the landfill through Jamieson Place’s current programs. Paper recycling accounted for the majority of the diversion at 76.4%. The remaining recycling was made up of plastic (3.5%) and beverage containers (3.0%).

The contamination rate of the recycling was quite high (16.6%). Most recycling facilities have a contamination threshold of 5%, which, when exceeded, results in all collected materials being sent to landfill. In this case however, the contamination was almost solely due to binders placed in the recycling. Unfortunately, binders are non recyclable items due to their mixed material natures. To promote reuse, binders can be donated to accepting charities. For end of life, binders are best disposed of by removing the cardboard from the covers to place in the recycling with the remaining binder materials to be placed in the landfill stream.

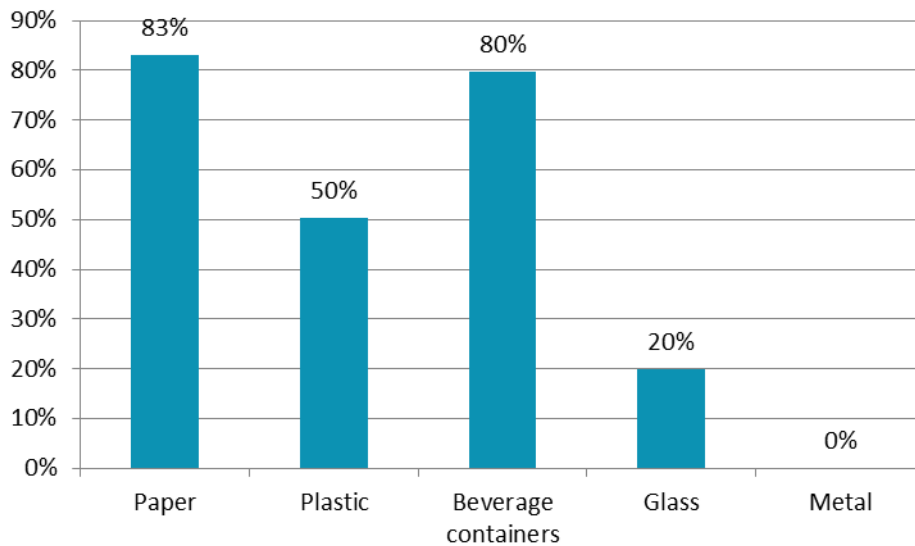
Figure 6: Annual Recycled Material Breakdown for Jamieson Place in 2018



4.3 – Capture Rates

The capture rate is the proportion of divertible waste, expressed as a percentage, which is successfully diverted from the landfill stream through the building’s recycling programs. Capture rates provide a snapshot look at how successful each recycling program is. Jamieson Place’s most successful program is paper recycling with an 83% capture rate. Figure 7 show the capture rates for Jamieson Place.

Figure 7: Capture Rates for Recycling Programs at Jamieson Place



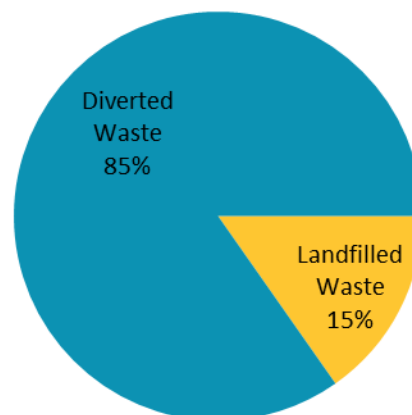
4.4 –Recycling Potential

Figure 8 illustrates the diversion rate potential of 85%. This value represents the amount of material that could be diverted from the landfill, if all materials were captured in their respective diversion programs.

The recycling potential is calculated by taking the weight of recyclable material which was found in the waste stream (indicated in Appendix A), adding it to the weight of the materials which are currently being recycled and dividing by the total waste output.

The assessment found that 78.6% of all materials found in the building’s waste stream were divertible and could be diverted either through a recycling stream or a composting stream as opposed to the waste stream.

Figure 8: Potential Diversion Rate for Jamieson Place



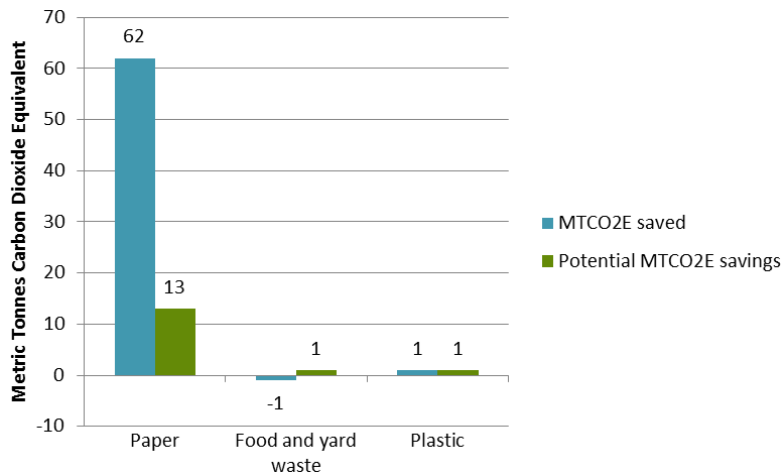
4.5 – Environmental Benefits

Jamieson Place’s largest contribution to waste generation was from paper, a total of 21 tonnes in one year. Green Calgary calculated that by recycling 17.5 t of paper, Jamieson Place saved approximately 295 trees from being harvested.

In addition, waste diversion efforts resulted in 62 metric tonnes of CO₂E (carbon dioxide equivalent) being prevented from release this year. An average car emits about one metric tonne every 5,000 km. The amount of CO₂E saved equates to driving an average vehicle for 310,000 km. That’s equal to driving around the Earth 7.7 times.

Figure 9 depicts the total MTCO₂E emitted by Jamieson Place by its top three waste categories as well as the potential additional savings if the diversion rate were to approach the 85% target. If the diversion rate could approach the target, an additional 15 metric tonnes of CO₂E would be saved, equivalent to driving to Toronto and back about 11 times.

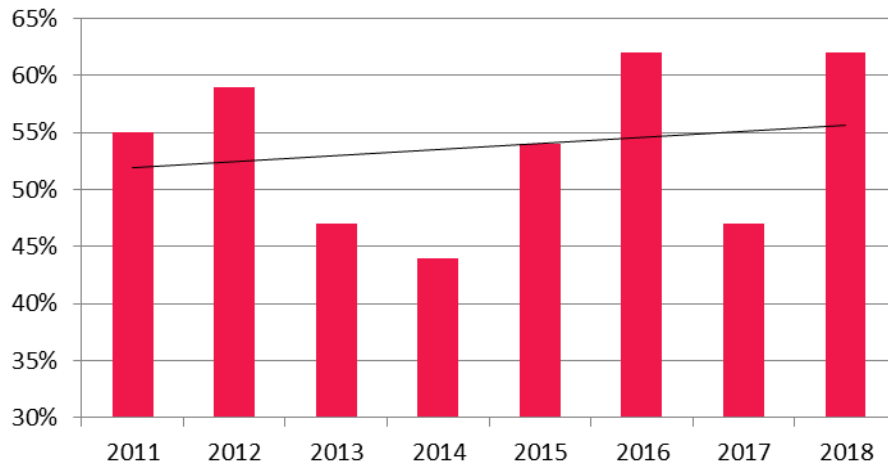
Figure 9: Current and Potential savings of MTCO₂E at Jamieson Place



4.6 – Historic Trends

The waste assessment performed on August 1st 2018 was the eighth assessment performed at Jamieson Place. Figure 10 illustrates the changes in diversion rate over the past eight years. The trend shows a fair amount of variance in diversion rate from year to year, however the data indicates that the diversion rate is trending to continue increasing over the years.

Figure 10: Historic Diversion Rate Trends at Jamieson Place



It is important to note that while the diversion rate is not significantly greater than previous years, the amount of waste generated in 2018 is almost half of what was generated in 2017 (30.6 t < 56.0 t). This indicates that while the building tenants may not be changing their diversion habits too much year over year, they are reducing the amount of waste they generate, which is something to celebrate.

5.0 – Recommendations

Based on this assessment, it is estimated that the diversion rate could be increased from 62% to 85%, with an additional 6.1 t of waste being diverted to the various recycling streams.

Below is a list of recommendations that are a combination of building occupant and staff education and operational suggestions. These recommendations consider the 3Rs (reduce, reuse, recycle) and are meant to be seen as a hierarchy, with reduction as the first priority, followed by reuse and finally recycling. The main problems identified are:

- Paper hand towels in the landfill stream
- Food and yard waste in the landfill stream
- Recyclable plastic in the landfill stream

The recycling programs at Jamieson Place are well established, and the programs implemented to reduce waste generation are showing success. For example, the 2017 waste assessment had a large amount of single use coffee pods, which were not observed this year. Additionally, a large amount of office and mixed paper was observed in the waste stream last year, which was not the case in 2018. This indicates that the efforts to reduce waste generation in the building are very successful and Jamieson Place is well on its way to a high diversion rate.

5.1 – Paper

Paper waste contributed to 35.2% of the landfilled waste from the main office. The highest contributing item were paper hand towels. Clean paper hand towels (such as those used to dry hands in washrooms) are accepted in the recycling program. The second and third largest items were coffee cups and mixed paper, which are accepted in the recycling program. With education on the existing program, the waste to landfill could be further reduced. With full compliance, Jamieson Place could see an 11.2% increase in diversion from paper alone.

In order to reduce the production of paper waste, a focus in the buildings can be made to:

- Recycle clean paper hand towels from bathrooms. Signs can be placed above the waste bins in bathrooms with “clean paper hand towels only.” Custodial staff could then be directed to place collected paper towels in the recycling stream
- Continue education on recycling coffee cups and encouraging the use of reusable coffee mugs
- Continue encouraging paper recycling

It is important to note that the City of Calgary will fully ban paper materials from the landfill by Q3 2018. This means that the monetary costs to landfill paper and cardboard materials will increase for haulers, and by default, the companies employing them to manage their waste.

5.2 – Food and Yard Waste

Food and yard waste accounted for 22.2% of Jamieson Place’s landfill waste, and can therefore have a great impact on future diversion. Increasing participation in the current food and yard waste program could result in a diversion rate increase of 5.8%. The most significant materials in this stream were food materials, food soiled napkins and compostable foodware. To reduce food and yard waste disposed of in the waste stream, increasing education on composting may prove beneficial. For example, many people may not be aware that napkins and food soiled paper products are compostable. Similarly, compostable foodware are relatively new products at many restaurants and consumers may not be aware that they can be placed in the food and yard waste stream. Tenant engagement can be as simple as reminders in newsletters or providing a lunch and learn on recycling and composting in the workplace.

Educating tenants on why food waste should be kept out of landfills may also be effective. Food and yard waste in the landfill does not decompose the way it will in a composting facility. Due to the nature of a landfill, an anaerobic environment is created where the waste will not break down. An example of this can be seen in Figure 11, showing a 1974 newspaper pulled from a Calgary landfill in 2016 in near perfect condition.

Figure 11: Example of how waste is preserved in landfills



The result of anaerobic environments inside landfills is increased production of methane gas – a greenhouse gas 25 times more potent than carbon dioxide, and a major driver of climate change. Composting not only helps to mitigate the formation of methane from landfills, but also turns food and yard waste into a new and useful product, diversifying the local economy and returning nutrients to the soil.

In addition to the environmental benefits of diverting food and yard waste, The City of Calgary will be increasing landfill rates for food and yard waste in Q3 2018 and completely banning food and yard waste from the landfill by Q3 2019.

5.3 – Plastic

Plastics accounted for 13.5% of Jamieson Place's landfill waste. Plastics are any material synthesized from petrochemicals. Many plastics are recyclable and should be placed in the recycling stream, including items with a recycling symbol, beverage containers, and plastic film or bags that can be stretched. Unfortunately, styrofoam, wrappers, crinkly plastic film and small or light plastics such as plastic cutlery and coffee lids are not accepted by most haulers in Calgary. Providing education to tenants on what plastic materials are recyclable may reduce recyclable plastics being placed in the garbage.

Reduction is the first priority of the 3 R's. The generation of plastic waste by tenants can be decreased by encouraging tenants and staff to avoid buying single use products and individually wrapped food items. A few simple changes can go a long way, such as:

- Encouraging reusable travel coffee mugs when visiting coffee shops to avoid non-recyclable plastic lids
- Replacing zip lock bags with reusable containers
- Encouraging compostable foodware or paper plates at catered events to replace styrofoam plates

Waste reduction can be encouraged by engaging tenants in eco challenges. Green giveaways could be a part of this – green lunch kits can be a great way to help tenants to avoid food packaging. In addition, friendly competition can help building occupants participate in green initiatives.

5.4 – Waste Diversion

5.4.1 – Bin Labelling and Signage

Green Calgary recommends clearly labelling the collection bins with depictions of the allowable materials. Labelling with only words, without colour or visual cues, is often not a strong enough approach to encouraging diversion. The best management practices for signage are: clear, consistent terminology; image based, and colour coded. Good signage is needed on all waste containers as it helps to inform the users to place their materials into the correct streams.

It should be noted that changes to the bylaw in November 2017 included a requirement for all businesses to have proper signage for their bins.

5.4.2 – Tenant Engagement

The tenants at Jamieson Place are demonstrating an effort to reduce waste generation which is the number one goal of the 3 R's hierarchy. To continue encouraging waste reduction and to help facilitate a higher diversion rate, it is recommended to provide environmental messages and reminders in newsletters to tenants. Giving feedback on how a program is going can help employees see that their efforts are making a difference (or where their efforts can be improved). Also, sharing goals with employees can help encourage them to participate in order to reach a shared goal.

Additionally, it may prove beneficial to provide Green Calgary's Recycling at Work lunch and learn, or Waste at Work workshop to tenants to help address knowledge gaps and positively shift behaviours.

Green Calgary would be pleased to assist in the implementation of these recommendations. If further direction is required, an action plan could be compiled to outline steps and tasks required for successful implementation of the recommendations. Additionally, Green Calgary is available to consult on each step required to complete any of these actions. Green Calgary can also assist in identifying potential barriers to behavior change and develop strategies to eliminate these barriers, which may result in more sustainable behaviour.

5.5 - Potential Cost Savings

Often inaccurately considered a barrier to recycling, cost is an important factor to consider with these findings. As mentioned above, the standard unit for measuring waste is weight in metric tonnes (t). Likewise, waste is charged to haulers based off the weight of their hauler – that is, the landfill charges based on a dollar value per tonne. In Calgary in 2018, that charge (known as a tipping fee) is \$113 per tonne for basic sanitary waste (garbage), and will be increasing to \$180 per tonne for waste containing paper, food and yard waste, and metal. The charges to the

consumer from the hauler are often a combination of hauling costs (number of trips) and tipping fees. Quite commonly, the heaviest materials in our waste stream are also very easily divertible. Notably, paper and food and yard waste are almost completely divertible, and in this assessment made up 67.9% of all the main office's landfilled waste. If successfully diverted, the charges to haulers for the same volume will likely be reduced (as the total weight will be less). In this sense, there are two major opportunities to reduce the cost of waste significantly with added or improved recycling programs:

1. It is possible to negotiate a reduced rate per cubic yard, noting that your waste is now lighter than it was previously.
2. It is possible to reduce the number of pick ups of your garbage bin, as more of your staff begins to use your recycling programs.

**Note: the above cost savings are not guaranteed and we recommend discussing options with your hauler.*

Memberships, Donations and Volunteering

As a local environmental charity we are fueled by the support we receive from Calgarians—indeed, we exist because of them. When you make a contribution to Green Calgary you enable us to deliver hands on environmental programming to green the way Calgarians live, work and play by making healthier and greener choices. You know that when you are giving to Green Calgary you are investing in your community and in the future of your community.

Here are some examples of how you can support our environmental work:

Become a Member

Join a community of environmentally conscious individuals and business who, like you, support positive environmental action in Calgary. As a Corporate Member you get access to:

- Discounts in our EcoStore
- Discounts on Green Workplace workshops, waste audits & special offerings
- A Facebook post, Tweet, & announcement in our newsletter
- Eligibility to buy ads in our newsletter
- Membership to our Little Green Library for all your staff

Become a Volunteer

We offer a variety of volunteer opportunities through our Corporate Volunteer Program. We work with you to find the best fit for your team's availability and skills. Take advantage of this opportunity to engage with the community while learning how to work as a team.

Volunteering Grant

In recognition of employees and retirees who volunteer in the community, many companies award grants to local nonprofit organizations to support their work. If your company offers compensation for your invaluable volunteer hours please let us know and we'll assist you through the application process.

Donate

Please make a gift to further our environmental work in Calgary and empower your fellow Calgarians to live more sustainable lives.

Monetary Donation

When you make a monetary contribution to Green Calgary you are enabling us to deliver hands on environmental programming to green the way Calgarians live, work and play.

You become a hero at Green Calgary. You are the one making positive environmental change happen!

Electronics Donation

Donate your old or unwanted electronics (Cell phones, computers, screens, printer cartridges, etc.) to us and you'll be helping fund environmental education programs throughout Calgary.

We make sure the items you donate are properly recycled by our Canadian recycling partner: Think Recycle.

Contact us to arrange a pick up or keep us in mind for your next hardware overhaul!

Appendix A – Waste Material Breakdown

Paper - Recyclable	
Books	
Boxboard	
Cardboard	
Coffee cups	
Mixed paper	
Newspaper	
Office paper	
Paper bags, packaging paper	
Percent of Landfilled Waste	45.7%
Plastic - Recyclable	
Mixed containers	
Plastic film & wrapping	
Percent of Landfilled Waste	10%
Plastic - Non-Recyclable	
TO container - plastic (non-recyclable)	
TO container - Styrofoam	
Wrappers (i.e. chip , creamers, candy bars)	
Percent of Landfilled Waste	3.5%
Organic - Recyclable	
Coffee grounds	
Edible organics	
Food soiled napkins	
Inedible organics	
Percent of Landfilled Waste	22.2%
Metal - Recyclable	
Ferrous; i.e tin can	
Non-ferrous; i.e. foil	
Percent of Landfilled Waste	1.2%
Refundable - Recyclable	
BC-aluminum	
BC-carton, juice tetra, pouches	
BC-glass	
BC-plastic	
Percent of Landfilled Waste	2.3%
Residuals - Non-Recyclable	
Undefinables	
Disposable coffee pods	
Bathroom waste	
Binders	
Percent of Landfilled Waste	9.9%
Miscellaneous - Recyclable	
Textiles	
Percent of Landfilled Waste	0.3%

Appendix B – Raw Data Tables

Actual Diversion Rate			Potential Diversion Rate		
	Weight (t)	Percent (%)		Weight (t)	Percent (%)
Waste	7.8	25.4	Waste	4.7	15.3
Recycled	19.1	62.2	Recycled	26	84.7
Contamination	3.8	12.4	Total	30.7	100%
Total	30.7	100%			

Material Composition of Waste Stream		
Material	Weight (t)	Percent (%)
Paper	3.56	45.7
Plastics	1.05	13.5
Food and yard	1.73	22.2
Metals	0.09	1.2
Glass	0.38	4.9
Beverage Containers	0.18	2.3
Residuals	0.77	9.9
Textiles	0.03	0.3
Total	7.79	100%

Material Composition of Recycling Stream		
Material	Weight (t)	Percent (%)
Paper	17.47	76.4
Plastic	0.79	3.5
Beverage Containers	0.70	3.0
Glass	0.10	0.4
Contamination	3.80	16.6
Total	22.86	100%