

Waste Assessment

2016 Report

Date prepared: October 2016

Prepared for:

**Jamieson Place
Bentall Kennedy LP.**

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

Tuesday, November 01, 2016

Sharlene Quain
Property Manager
Bentall Kennedy
308 - 4th Avenue SW

Dear Sharlene,

Green Calgary's Green Workplace team is pleased to present a completed copy of our detailed report from the October 5, 2016 waste assessment that took place at Bentall Kennedy.

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,



Alex Berthin
Team Lead Green Workplace

Green Calgary

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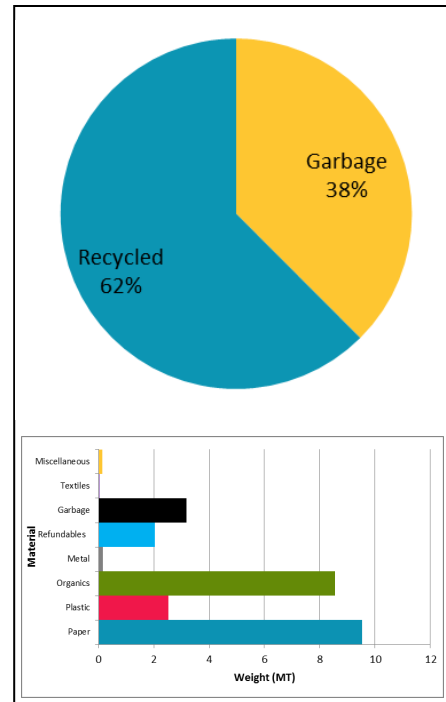
1.0 – Executive Summary

Green Calgary performed a waste assessment for Bentall Kennedy on October 5, 2016. 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 October 4, 2016 and October 5, 2016. This assessment acts under the assumption that this 24 hour period is representative of an average day of waste. Using this information, as well as recycling data provided by facilities staff, Green Calgary found Bentall Kennedy had a diversion rate of 35%.

The largest contributors to Bentall Kennedy’s waste were paper, organic and garbage waste. Paper waste contributed to 36.4% of all material going to the landfill, whereas organic waste and garbage waste contributed to 32.6% and 12.1% respectively. Despite paper waste being the largest contributor to landfilled waste, Jamieson Place did divert 35.5 MT of the 45.0 MT annually generated paper waste.

Green Calgary estimates that Bentall Kennedy could reach a potential diversion rate of 96% with higher participation in the current programs. Notably, the organics program is only capturing 25% of the material, which is likely the product of a lack of education. Further, the commingled recycling program had a lot of organic waste in it, which counts as contamination. This shows that staff is interested in diverting organic waste, but reinforces that apparent lack of awareness and education in the program. Another notable material in the assessment was disposable coffee pods. This item did not account for a large amount of the waste; there was a fair amount of it found in the recycling. This is also not accepted in a commingled program, and contributed to 2.3 MT of contamination in the commingled program. These items could be removed by replacing with reusable coffee pods, changing the coffee stations to a drip or French press, or by using a compostable coffee pod.



Jamieson Place Quick Facts

Diversion Rate	62%
Waste and recycling per business day	277kg

Staff and tenant education is vital for the introduction of new programs, effectiveness of current programs and - perhaps most importantly – the reduction of waste generated. Encouraging staff to bring reusable mugs could help reduce waste by up to 2100 kg per year. Other initiatives, such as bringing a reusable water bottle, adding signage, assessing bin placement and informing guests could drastically reduce the garbage generated at the Bentall Kennedy.

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 sixth Green Calgary waste assessment that has been conducted at Bentall Kennedy. To continue the building's waste management measurement and diversion plans, Green Calgary completed a waste assessment on October 5, 2016.

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.

Photos taken during the assessment are included in Appendix B of 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, organics, 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. 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. Bentall Kennedy provided recycling data for the Jamieson Place by sharing specifics regarding programs in place and their frequency of pickup.

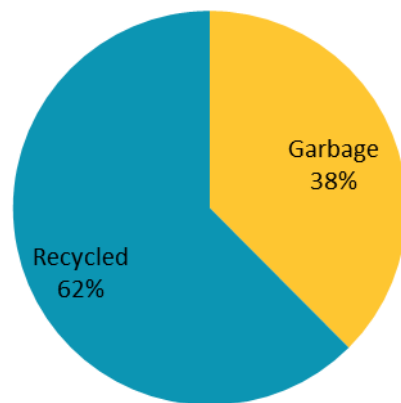
4.0 – Waste Assessment Results

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 69.8 MT, of which, 43.6 MT were diverted from the landfill.

“The total annual waste that left the building was 69.8 MT, of which, 43.6 MT were diverted from the landfill”

Figure 1: Diversion Rate for Jamieson Place in 2016



4.2 – Waste Results

Figure 2 displays the waste material breakdown based on the 24 hour sample of garbage collected from the building. The industry standard for comparing waste output is by weight or in this case metric tonnes annually. The largest categories by weight were paper, organic and garbage waste.

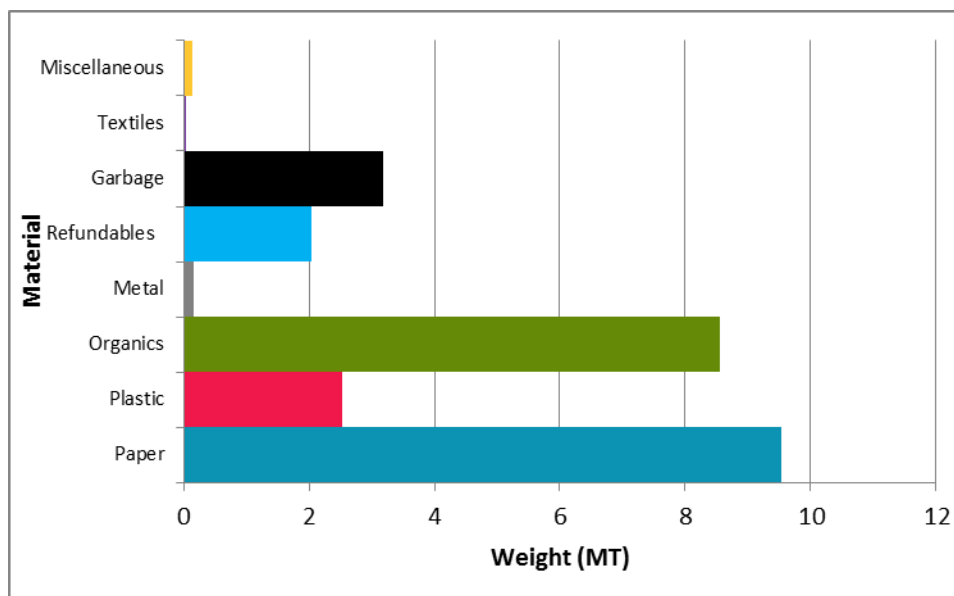
Paper waste accounted for 36% (9.5 MT) of all the landfilled waste from Jamieson Place. Paper waste was made up of the following items: newspaper (2.9 MT, 30%), coffee cups (2.0 MT, 21%), mixed paper (1.9 MT, 20%), cardboard-whole (0.9 MT, 9%), magazines (0.4 MT, 5%), paper hand towels (0.4 MT, 4%), office paper (0.3 MT, 3%), boxboard (0.3 MT, 3%), take-out contaminated boxboard (0.2 MT, 2%), paper bags & packaging paper (0.2 MT, 2%), fountain & Dixie cups (0.1 MT, 1%) and pulp board (less than 0.1 MT, < 1%).

“Paper waste accounted for 36% of all the landfilled waste”

Organic waste accounted for 33% (8.5 MT) of all the landfilled waste from Jamieson Place. Organic waste was made up of the following items: edible organics (3.7 MT, 44%), liquids (3.2 MT, 37%), food soiled napkins (1.0 MT, 12%), coffee grounds (0.5 MT, 5%), and compostable cups (0.1 MT, 2%).

Garbage waste accounted for 12% (3.2 MT) of all the landfilled waste from Jamieson Place. Garbage waste was made up of the following items: unidentifiable waste in black bags (1.7 MT, 55%), binders (1.4 MT, 44%), washroom waste (less than 0.1 MT, 1%), rubber gloves (less than 0.1 MT, 1%) and disposable wipes (less than 0.1 MT, <1%).

Figure 2: Annual Waste Material Breakdown for Jamieson Place in 2016



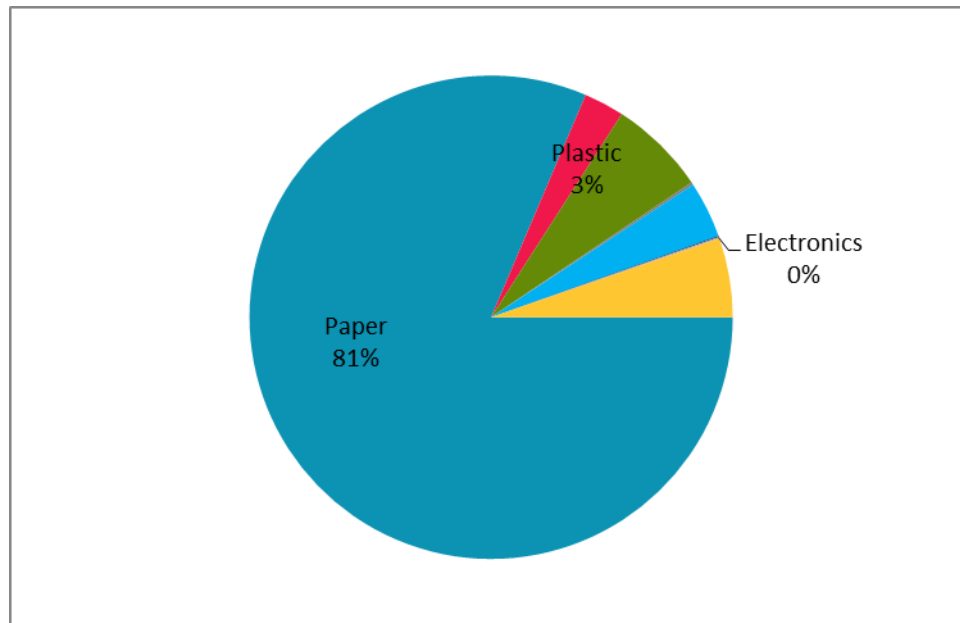
Note that not all items above are recyclable. Appendix A provides a detailed breakdown of the materials found in the waste stream and each material's diversion potential. This information is useful to determine the success of current recycling programs and indicate potential next steps to increase the diversion rate for the building. It was found that 35.5% of the total waste was recyclable paper and 6.2% of the total waste was recyclable plastic. Conversely, 0.9% was non-recyclable paper and 3.5% was non-recyclable plastic.

“A total of 43.6 MT of waste was diverted from the landfill through Jamieson Place’s current programs.”

Figure 3 below shows the breakdown of recycled material which is diverted from the landfill throughout the year. A total of 43.6 MT of waste was diverted from the landfill through Bentall Kennedy’s current programs. Paper products represent 81.4% of this value. Organics account for 6.5%. The remaining 12.1% of materials are made up of plastics, refundable beverage containers, electronics and single use coffee packet recycling.

There was a significant amount of contamination (12.6%) found in the recycling program. Anything about 5% is generally a cause for concern, as bags will often be directed to the landfill by the recycling company. In the commingled program the largest contaminants were single use coffee packets (2.31 MT), liquids (2.38 MT), edible organics (0.35 MT) and take-out plastic containers (0.23 MT).

Figure 3: Annual Recycled Material Breakdown for Bentall Kennedy in 2016



4.3 – Recycling Potential

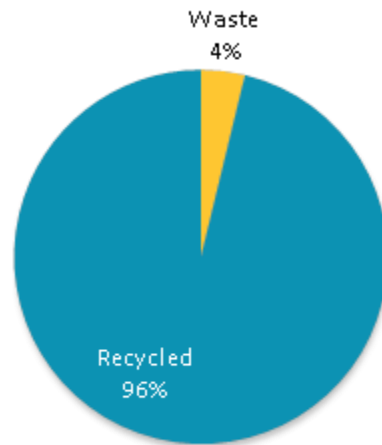
Figure 4 illustrates the diversion rate potential. This value represents the amount of material that could be diverted from the landfill, if all materials were captured in their respective diversion programs.

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 material which is currently being recycled and dividing by the total waste output.

The assessment also found that, 89% of all material found in Jamieson Place’s waste stream was divertible and could be diverted either through a recycling stream or a composting stream as opposed to the waste stream.

“89% of all material found in the Jamieson Place’s waste stream is divertible”

Figure 4: Potential Diversion Rate for Jamieson Place



5.0 – Recommendations

Based on this assessment, it is estimated that the diversion rate could be increased from 62% to 96% with an additional 23 MT 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.

As was previously mentioned, reduction of waste is more beneficial than diversion for many economic, social, and ecological reasons. Therefore, reducing the total amount of waste produced in the workplace should be a top priority. To this end, behavioral changes may assist in reducing total waste generated.

For example, it was found that Jamieson Place's staff disposes 2100 kg of coffee cups per year. Coffee cups have been traditionally considered to be non-recyclable. However, these products have recently been accepted into recycling programs, including the program at Jamieson Place. Educating staff on the recycling program could help reduce or eliminate this waste from the landfill. Further, building staff and tenants should be encouraged to use reusable mugs in order to completely halt generation of needless waste from disposable cups, plastic lids, and cardboard insulation sleeves.

Organic materials accounted for 32.6% of all Jamieson Place's waste, and can therefore have one of the greatest impacts on future diversion. Full compliance in the current organics program could result in a diversion rate of 75%. However, full compliance is an anomaly and should be a target, but not an expectation. Despite having an organics program, the results show that 8545 Kg (75%) of organic materials were disposed of in the garbage, and only 2825 Kg (25%) in the organic waste bin. The most significant material in this stream was edible organics, which accounted for 14.3% of all the waste-to-landfill from the assessment. Food waste is easy to divert from the landfill with commitment to an effective organics program. Garbage bags assessed that organic waste also included other non-compostable and non-recyclable waste; such as, take-out containers, wrappers, and single use coffee pods.

Organic 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. This results in 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 organic 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 organic waste, The City of Calgary is in the process of passing a by-law to keep organic waste out of the landfill. The plan presented is a multi-year strategy to add organic waste to the designated materials list, increase tipping fees and ultimately ban the material from the landfill. For Jamieson Place, this could mean much higher costs from the waste hauler for loads that have organic waste. It is expected that organics will be added to the designated material list in Q3 2017, with increased rates in Q3 2018 and a complete ban of organics from the landfill by Q3 2019.

Paper waste contributed the bulk of the waste from Jamieson Place at 36.4%. The highest contributing item was newspaper, which can be easily accepted in the current recycling program. The second largest item was coffee cups, which can be reduced or diverted as noted above. Other items are common paper products which are easily recyclable: mixed paper, cardboard, magazines and office paper. With education on the existing program, the waste to landfill could be drastically reduced. With full compliance, Jamieson Place could see a jump from 62% to 76%.

It is important to note that the City of Calgary has also added paper and cardboard to the designated materials list in Q1 of 2016, has implemented increased rates for these items in Q1 2016 and will fully ban the 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 the manage their waste.

Contamination was a concern at Jamieson Place with a rate of over 12%. Anything exceeding 5% is often sent by the recycler to the landfill. Staff at Jamieson Place was placing organic waste in the commingled program. This suggests that with The City of Calgary's cultural shift to divert organic waste, staff is interested in taking part; however, they lack the education to understand the programs completely. Another notable contamination concern found in the waste assessment is the presence of disposable coffee pods. This individual item accounted for the 5% of the total waste (2.4 MT annually), with 2.3 MT of the waste entering the commingled recycling program. There are several alternatives which could drastically reduce this number. Examples include:

- Disposable coffee pods could be replaced with compostable coffee pods.
- A re-usable coffee pod can be purchased with either a re-usable filter or disposable filter
- Replace the single use coffee maker with a drip coffee maker
- Replace the single use coffee maker with a kettle and French press

Green Calgary also recommends adopting donation as a method of disposing of unwanted office supplies and furniture. At Jamieson Place, it was observed that a large number of binders (5.3% of total waste) were thrown away. If the binder contents were disposed of separately, the binders themselves could have been donated to local schools or even other businesses. By reusing and donating office supplies, corporations can decrease the amount of new supplies that need to be produced, resulting in a net savings of money, energy, and natural resources.

Green Calgary recommends clearly labelling the collection bins with depictions of the allowable materials. Additionally, providing education to building employees and tenants on what materials go in each bin will greatly assist in the diversion of organic waste and recyclable materials from the landfill. We recommend providing an organic waste bin for each desk or cubicle block, ensuring that the organic waste bin is present for all catered events, and nominating a 'Green Leader' on each floor or department to ensure continued compliance with the waste and recycling programs.

Green Calgary recommends that informational posters which target problem materials be placed in strategic areas. For example, a poster could be placed in breakrooms, in the atriums, or in an elevator that specifically notes the location of organic waste and recycling bins, as well as bins with pictographic representations of what materials are to go in each. Proper signage is necessary for the success of all waste diversion programs. These signs help to limit contamination and unwanted material in the bins; anything over a 5% contamination rate reduces the value of the recyclable commodity and will be automatically landfilled by the hauler.

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 creating a Community Based Social Marketing program to identify potential barriers to behavior change and develop strategies to eliminate these barriers, which may result in more sustainable behaviour.

5.1 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 (MT). 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 2016, that charge (known as a tipping fee) is \$113 per tonne. 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 organic waste are almost completely divertible, and in this assessment made up 69% of all the 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 haul*

Appendix A – Waste Material Breakdown

Paper - Recyclable	Boxboard	
	Cardboard-whole	
	Coffee cups	
	Fountain, Dixie cups	
	Magazines, catalogues, manuals	
	Mixed paper	
	Newspaper	
	Office paper	
	Paper bags, packaging paper	
	Paper hand towels-fibre	
	Pulp board	
	Percent of Total Waste	35.5%
Paper - Non-Recyclable	TO contaminated boxboard	
	Percent of Total Waste	0.9%
Plastic - Recyclable	Mixed containers	
	Plastic film & wrapping	
	Percent of Total Waste	6.2%
Plastic - Non-Recyclable	Rigid & durable plastic	
	Styrofoam packaging	
	TO container - plastic (non-recyclable)	
	TO container - Styrofoam	
	Wrappers (i.e. chip, creamers, stir stix)	
	Percent of Total Waste	3.5%
Organic - Recyclable	Coffee grounds	
	Compostable cups	
	Edible organics	
	Food soiled napkins	
	Liquids	
	Percent of Total Waste	32.6%
Metal - Recyclable	Ferrous; i.e tin can	
	Percent of Total Waste	0.6%
Refundable - Recyclable	BC-aluminum	
	BC-carton, juice tetra, pouches	
	BC-glass	
	BC-plastic	
	Percent of Total Waste	7.8%
Garbage - Recyclable	Binders	
	Percent of Total Waste	5.3%
Garbage - Non-Recyclable	Black bags	
	Disposable wipes	
	Rubber, vinyl gloves	
	Washroom waste	
	Percent of Total Waste	6.8%
Textiles - Recyclable	Mixed Textiles	
	Percent of Total Waste	0.2%
Miscellaneous - Recyclable	Single use coffee packets	
	Percent of Total Waste	0.6%

Appendix B – Photographs of Materials in Waste Stream



Photo 1: Full day's waste (recycling above, garbage below)



Photo 2: Pop cans in the garbage stream



Photo 3: Coffee cups in the garbage stream



Photo 4: Coffee cups in the garbage stream

Appendix C – Raw Data Tables

Actual Diversion Rate		
	Weight (MT)	Percent
Waste	26.4	38
Recycled	43.6	62
Total	70.0	100%

Potential Diversion Rate		
	Weight (MT)	Percent
Waste	2.9	4%
Recycled	67.1	96%
Total	70.0	100%

Material Composition of Waste Stream		
Material	Weight (MT)	Percent
Paper	9.66	36.5%
Plastics	2.58	9.8%
Organics	8.62	32.6%
Metals	0.17	0.6%
Glass	0.00	0.0%
Beverage Containers	2.04	7.7%
Garbage	3.18	12.0%
Miscellaneous	0.15	0.6%
Textile	0.04	0.2%
Composites	0.00	0.0%
Total	26.4	100%

Material Composition of Recycling Stream		
Material	Weight (MT)	Percent
Paper	35.5	81.4%
Plastic	1.2	2.7%
Organics	2.8	6.5%
Metal	0.1	0.2%
Beverage Containers	1.7	3.8%
Miscellaneous	2.3	5.3%