

CITY OF BUFFALO



December 28, 2018

Waste Characterization Study

Final Report



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WASTE COMPOSITION STUDY

1. INTRODUCTION

The City of Buffalo is in the process of completing an updated Comprehensive Recycling Analysis (CRA) that is compliant with rules and regulations of the New York State Department of Environmental Conservation (NYSDEC). The last CRA was developed in 1995, and finalized in 1999. As part of the update to the CRA, the City of Buffalo engaged MSW Consultants to perform its first ever citywide Waste Characterization Study (WCS). This report documents the findings of the WCS.

Solid waste collection services are provided by the Division of Streets/Sanitation, which provides services to nearly 260,000 residents. The East Side Transfer Station, which is owned by the City and operated by Waste Management Inc. of NY, receives residential and commercial trash from City trucks, residential and commercial self-haulers, and commercial trash from Waste Management and other private haulers. Waste Management also transports East Side Transfer Station solid waste to their landfill in Sardinia, New York. In 2017, the landfill diversion rate was 28 percent, and the City has established a landfill diversion goal of 34 percent to match the national average.

Other waste services provided by the City include special collections of bulky items and yard waste, post-holiday set outs, textiles and clothing, as well as special events collection (waste and recycling), and scheduled days for community paper shredding, household hazardous waste and E-waste collections.

Single-stream recyclables are collected from residential and commercial addresses within the city by Modern Recycling, Inc. and delivered to Buffalo Recycling Enterprises for processing.

The City also has contracts with various businesses for other recycling and reuse services:

- ◆ Buffalo Reiver Compost to process yard waste.
- ◆ Electronics Recyclers International, Inc. for pickup and disposal of electronic waste (from the City-operated electronic waste collection facility).
- ◆ NLR, Inc. for pickup and disposal of Universal Waste accepted from residents by the City (fluorescent bulbs, ballasts, mercury and rechargeable batteries).

2. OBJECTIVES

The objectives of this WCS were to:

- ◆ Quantify the total amount of waste and recyclables collected by the City of Buffalo's curbside residential collection system as well as commercial waste and recyclables collected by the City and private haulers.
- ◆ Estimate the composition of these disposed wastes and mixed recyclables to identify opportunities for increasing diversion within the framework of the existing diversion goals.
- ◆ Provide critical inputs and baseline recycling system data for the City's CRA, which will be completed in a subsequent phase.

3. METHODOLOGY

3.1 GENERATOR SECTORS AND MATERIAL STREAMS

This project defined two discreet waste streams to be characterized: (1) Municipal Solid Wastes (MSW) – including single family residential, multi-family residential, commercial, and industrial wastes – disposed at the East Side Transfer Station, and (2) Single Stream Recyclables, delivered to Buffalo Recycling Enterprises. This study did not attempt to characterize C&D waste or self-haul (citizen-hauled) waste.

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Prior to conducting any field data collection, a Sampling Plan was developed to ensure that the incoming truckloads of disposed waste that were ultimately sampled and characterized were representative of the entire incoming waste stream. For the purposes of this study, a total of two generator sectors were defined:

- ◆ **Single and Multi-Family Residential:** Includes residentially generated garbage and trash from single and multi-family households that is collected by the Division of Streets/Sanitation, primarily in compactor vehicles. There was an initial intent to characterize single and multi-family residential wastes as separate waste generation sectors, but it was learned during the course of this study that such wastes are mixed during curbside collection.
- ◆ **Commercial/Industrial (C/I):** Includes municipal solid wastes generated by commercial and institutional (schools, hospitals, prisons, etc.) facilities and delivered primarily by private haulers in compactor trucks or in compacting roll-off boxes. A smaller fraction of commercial waste is collected from the downtown Buffalo area, and various commercial venues, such as Coca-Cola Field (a ballpark). This stream may have included some non-compacted wastes delivered in dump trucks or other vehicles. Note that commercial wastes exclude any “special” wastes that may be generated in these sectors.

Allocation of incoming refuse loads into these two sectors was based on scalehouse records at the East Side Transfer Station.

This study also included sampling at the Buffalo Recycling Enterprises Materials Recovery Facility (MRF) for the following recyclable materials:

- ◆ **Residential Single-Stream Recycling:** Includes curbside collection of single-stream recyclables as set out by residential customers within the City limits.
- ◆ **Commercial Single Stream Recycling:** At the request of the City, several trucks delivering from a commercial collection route were also sampled.

3.2 SCHEDULE

Refuse samples were collected and sorted during the course of four days, beginning Monday, July 9 and concluding on Thursday, July 12, 2018. Single stream recycling samples were collected and sorted during a single workday, on Friday, July 13, 2018.

3.3 SAMPLING TARGETS

The sampling targets for the 2018 Study were established in general proportion to wastes delivered from each generator sector. For this study, waste generation quantities were based upon annualized collection weights (tons) over a 12-month period as reported by the City of Buffalo, Waste Management, and Modern Recycling. Table 3-1 summarizes the basis for the sampling plan, the targeted sample distribution by sector, and the actual samples obtained.

WASTE COMPOSITION STUDY

Table 3-1 Targeted Sampling Plan – All Waste Sectors

Hauler	Sector	Annual Tons	% of Total	Samples Targeted	Samples Actual
Buffalo Streets Dept.	Residential	90,296	49.0%	20	19
Buffalo Streets Dept.	ICI	26,363	14.3%	5	7
Waste Management & Modern Recycling	ICI	51,122	27.7%	15	14
Modern Recycling	Single Stream	15,231	8.3%	11	10
Modern Recycling	Single Stream - Commercial	1,338	0.7%	1	2
Total		184,349	100.0%	52	52

3.3.1 RESIDENTIAL SAMPLE ALLOCATION

The City divides its residential refuse collection into six sanitation districts. Collection of the 20 targeted samples from this waste sector was based upon the proportional contribution of each district to the total residential tonnage reported. Table 3-2 below provides the approximate residential waste tonnages reported from each district in 2017, as well as the corresponding sample targets and actual samples collected.

Table 3-2 Targeted Sampling Plan – Residential Refuse

Sanitation District	Annual Tons	% of Total	Samples Targeted	Samples Actual	
1A	15,049	16.7%	3	4	
1B	14,587	16.2%	3	4	
1C	15,652	17.3%	3	2	
2A	14,354	15.9%	2	2	
2B	14,382	15.9%	2	4	
2C	15,209	16.8%	3	3	
Other	1,064	1.2%	0	0	
Total		90,296	100.0%	20	19

As can be seen in both Table 3-1 and Table 3-2, the sampling targets were generally met – slight variations to the sample plan were encountered due to conditions in the field at the time of sample collection.

3.3.2 C/I SAMPLE ALLOCATION

The 21 C/I samples obtained at the East Side Transfer Station were collected in a random fashion, using the “nth” truck sample methodology, whereby the anticipated number of trucks for the day was divided into the daily sample collection target. For example, if 50 C/I loads were expected on a given day, and the daily sample collection target was 10, every eligible 5th vehicle would have been selected for sampling.

3.3.3 SINGLE STREAM RECYCLING SAMPLE ALLOCATION

Modern Recycling collects single-stream recyclables from 13 collection routes within the City. As 11 single stream samples were targeted, the first 11 trucks delivering from one of the 13 routes were selected, without repeating. One commercial sample was also targeted, at the request of the City. During the sample selection phase, several of the curbside residential collection routes did not deliver as expected during the course of the workday, while some routes were delivered to the facility several times during this period. As such, additional samples were collected from these routes, and a second commercial load was sampled, resulting in a slight variation to the sample plan.

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3.4 SAMPLE SELECTION

During the sampling collection process, MSW Consultants interviewed drivers to verify the origin and sector of each truckload from which a sample was collected. Residential loads were also identified by the sanitation district where they were collected. Each sample was recorded as Residential or C/I. Based on input from City staff, Multi-Family wastes were considered as being part of the residential sector, as these wastes are routinely mixed during curbside collection.

3.5 SORTING PROCEDURE

Each sample of waste or recyclables was sorted into 49 material categories, as approved by the City prior to performing the sorting phase of the 2018 Study. Consistent with industry standards, residential and C/I refuse samples collected weighed between 200 and 250 pounds; while recycling samples ranged from 125 to 150 pounds. Table 3-3 below shows the breakdown of the 49 material categories within their respective material groups. Please refer to Appendix A for Material Category definitions.

Table 3-3 Material Categories and Groups

Paper	Glass
Newspaper	Glass Beverage Containers - NY State Deposit
Corrugated Cardboard (OCC)/Kraft Paper (uncoated)	Glass Beverage Containers - Non Deposit
Office Paper (High Grade)	Glass Containers - Non-Beverage
Mixed Recyclable Paper (Low Grade)	Remainder/Composite Glass
Aseptic Boxes & Gable Top Cartons	
Compostable Paper	Organics
Remainder/Composite Paper	Food Waste
	Yard Waste
Plastic	Miscellaneous Organics
PET (#1) Bottles - NY State Deposit	Construction & Demolition Materials (C&D)
PET (#1) Bottles - Non-Deposit	Wood - Treated
PET (#1) Non-bottle Containers	Wood - Untreated
HDPE (#2) Natural Containers	Asphalt
HDPE (#2) Bottles - Colored	Asphalt Roofing
Plastic Containers #3 thru #7	Brick, Concrete, and Rock
Plastic Film & Bags - Clean	Carpet & Carpet Padding
Plastic Film & Bags - Other	Drywall/Gypsum Board
Expanded Polystyrene "Styrofoam"	Remainder/Composite Construction & Demolition
Remainder/Composite Plastic	Household Hazardous Waste (HHW)
Metal	Household Hazardous Waste
Aluminum Beverage Cans - NY State Deposit	Medical Waste & Sharps
Aluminum Beverage Cans - Non-Deposit	Other Materials
Aluminum Containers, Plates and foils	Textiles
Steel Cans & Containers	Rubber Products
Other Ferrous (magnetic)	Disposable Diapers & Sanitary Products
Other Non-Ferrous (not magnetic)	Bottom Fines & Dirt
Remainder/Composite Metal	Bulky Items
Electronics	Other Miscellaneous
Electronics	
Televisions and Monitors	

3.6 RESULTS OVERVIEW

The New York Department of Environmental Conservation (DEC) uses a specific terminology with respect to the statewide regulation of MSW. These terms, among others, were incorporated into the results discussion of this report, and are presented below:

- ◆ **Disposed Residential MSW:** Disposed refuse comprised of Residential Wastes.
- ◆ **Disposed C/I MSW:** Disposed refuse comprised of Commercial/Industrial wastes.
- ◆ **Combined MSW:** Disposed Municipal Solid Waste consisting of both Disposed Residential MSW and Disposed C/I MSW.
- ◆ **Recyclables:** The Recyclables stream includes materials from residential curbside single-stream collection. A smaller commercial component, mostly from roll-off compactors within the City, was also included in this study, at the request of the City.
- ◆ **Aggregate Waste:** Aggregate Waste includes the total composition of the Disposed Residential MSW, Disposed C/I MSW and Recycling streams.

In addition, the following statistical measures are presented to illustrate the composition of the City's various material streams.

- ◆ **Sample Mean:** The sample mean, or average, composition is considered the "most likely" fraction for each material category in the waste stream. The sample mean is determined by (i) converting the weight of each material in each sample to a percentage (i.e., dividing the constituent weight by the total sample weight) to normalize the sample composition to a 100 percent scale; and (ii) calculating the average percentage composition for each material category. Note that the sample mean, while a good estimate, is unlikely to be identical to the population mean value. The meaningfulness of the sample mean is enhanced by the following statistical measure.
- ◆ **Confidence Intervals:** The confidence intervals presented in this report reflect the upper and lower range within which the population mean can be expected to fall. Confidence intervals require the following "inputs":
 - ◆ The "level of confidence", or how sure one wants to be that the interval being constructed will actually encompass the population mean;
 - ◆ The sample mean, around which the confidence interval will be constructed;
 - ◆ The sample standard deviation, which is used as a measure of the variability of the population from which the sample was obtained; and
 - ◆ The number of sampling units that comprised the sample (a.k.a. sample size).

Confidence intervals have been calculated at a 90 percent level of confidence, meaning that we can be 90 percent sure that the population mean falls within the upper and lower confidence intervals shown. (The converse is also true: that there is a 10 percent chance that the population mean falls outside of the sample mean.) In general, as the number of samples increases, the width of the confidence intervals decreases.

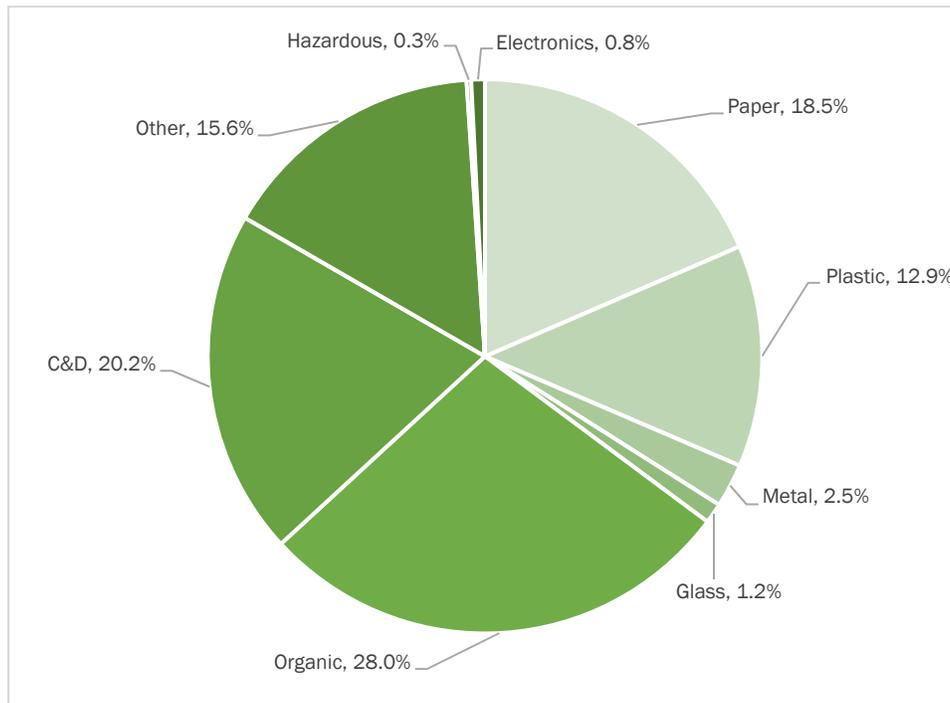
4. COMPOSITION OF DISPOSED MUNICIPAL SOLID WASTE

4.1 COMBINED MSW (RESIDENTIAL AND C/I ONLY)

Figure 4-1 presents the composition of Combined MSW by major material group. As shown, the Organic material group constituted the largest portion of the Combined MSW refuse stream at 28 percent, followed by the C&D material group at 20.2 percent, and the Paper material group at 18.5 percent.

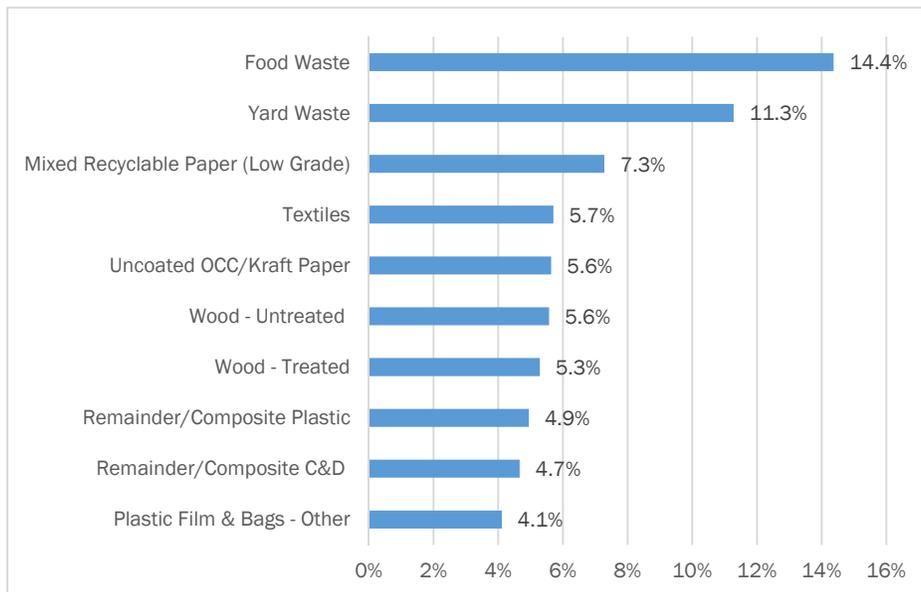
WASTE COMPOSITION STUDY

Figure 4-1 Composition of Combined MSW (Residential and C/I only)



The top ten most prevalent material categories for Combined MSW are shown in Figure 4-2 below. Food Waste topped the list as the most prevalent Combined MSW category, with Yard Waste next at 11.3 percent, which may be reflective of the seasonality of the sample collection (summer).

Figure 4-2 Top 10 Materials in Combined MSW (Residential and C/I only)



One of the primary objectives of any waste characterization study is to identify the fraction of the waste stream that could be recycled or otherwise diverted from disposal. However, it is important to clearly define what makes a particular material recoverable or not. For the remainder of this section, individual material categories have been classified based on the ability to recycle or otherwise divert the material from disposal. Materials have been classified according to the following recoverability potential:

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- ◆ **Targeted Curbside Recyclables:** Material categories that are actively targeted in the City of Buffalo’s curbside recycling program are included here. This includes traditional recyclable fiber; and plastic, metal and glass bottles and cans.
- ◆ **Specialty Items:** Specialty items are materials that the City defines as “Drop-offs, pickups, and seasonal items,” such as yard waste and Christmas trees, tires, e-waste, plastic bags, Styrofoam, clothing, etc. The City tracks these items at their drop-off locations and through special pick-ups data.
- ◆ **Compostable:** Organic materials that can be composted are included in this classification along with materials that are suitable as mulch. Note that commercial facilities and an appropriate mix of these uncontaminated materials would be required to create an adequate compost or mulching operation to process Buffalo’s organic wastes.
- ◆ **Non-Recyclable:** Materials that are not known to be recyclable in Buffalo, or for which no known local market exists. Some materials in this classification could theoretically become recyclable if sufficient material volume existed to create cost-effective and appropriate collection methods, processing facilities, and a suitable end market.

Table 4-1 Recoverability Classification of Material Categories

Classification	No.	Material Category	Classification	No.	Material Category	
Targeted Curbside Recyclables	1	Newsprint	Non-Recyclable	23	Other Non-Ferrous (not magnetic)	
	2	Uncoated OCC/Kraft Paper		24	Remainder/Composite Metal	
	3	Office Paper (High Grade)		28	Remainder/Composite Glass	
	4	Mixed Recyclable Paper (Low Grade)		31	Miscellaneous Organics	
	5	Aseptic Boxes & Gable Top Cartons		32	Wood - Treated	
	8	PET (#1) Bottles - NYS Deposit		33	Wood - Untreated	
	9	PET (#1) Bottles - Non-Deposit		34	Asphalt	
	10	PET (#1) Non-bottle Containers		35	Asphalt Roofing	
	11	HDPE (#2) Natural Containers		36	Brick, Concrete, and Rock	
	12	HDPE (#2) Bottles - Colored		37	Carpet & Carpet Padding	
	13	Plastic Containers #3 thru #7		38	Drywall/Gypsum Board	
	18	Aluminum Bev. Cans - NYS Deposit		39	Remainder/Composite Construction & Demolition	
	Compostable	6		Compostable Paper	Specialty Items	45
29		Food Waste	46	Disposable Diapers & Sanitary Products		
Non-Recyclable		7	Remainder/Composite Paper	47		Bottom Fines & Dirt
		15	Plastic Film & Bags - Other	49		Other Miscellaneous
		17	Remainder/Composite Plastic	14		Plastic Film & Bags - Clean
		22	Other Ferrous (magnetic)	16		Expanded Polystyrene "Styrofoam"
	30	Yard Waste	40	Household Hazardous Waste		
		41	Medical Waste & Sharps			
		42	Electronics			
		43	Televisions and Monitors			
		44	Textiles			
		48	Bulky Items			

Figure 4-3 shows the recoverability of Combined MSW according to the recoverability classifications defined above. While there is a relatively low prevalence of City-targeted curbside recyclables being disposed in the combined refuse stream, this percentage is still significant and suggests that improvements are possible within this waste sector.

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Figure 4-3 Recoverability of Combined MSW (Residential and C/I only)

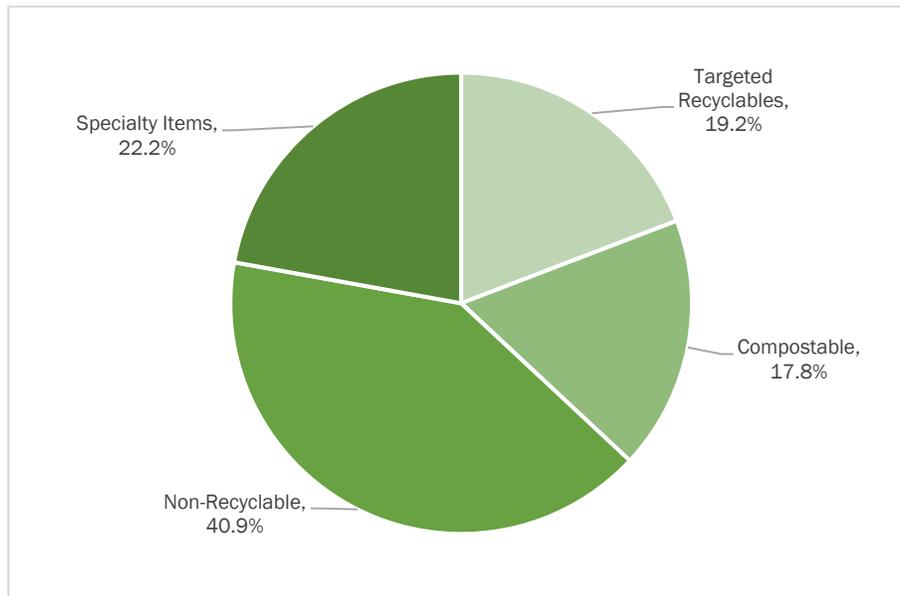


Table 4-2 provides a detailed statistical profile of the Combined MSW waste stream delivered to the East Side Transfer Station.

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Table 4-2 Detailed Composition of Combined MSW (Residential and C/I)

Material Category	Est.	Conf.	Tons	Material Category	Est.	Conf.	Tons
	Percent	Int (+/-)			Percent	Int (+/-)	
Paper	18.5%	5.8%	31,056	Organic	28.0%	4.1%	46,962
Newsprint	0.6%	1.4%	940	Food Waste	14.4%	2.9%	24,107
Uncoated OCC/Kraft Paper	5.6%	4.7%	9,459	Yard Waste	11.3%	2.9%	18,926
Office Paper (High Grade)	0.7%	0.7%	1,255	Miscellaneous Organics	2.3%	1.2%	3,929
Mixed Recyclable Paper (Low Grade)	7.3%	2.3%	12,214	Metal	2.5%	0.8%	4,275
Aseptic Boxes & Gable Top Cartons	0.2%	0.1%	329	Al. Bev. Cans - NY Deposit	0.1%	0.0%	230
Compostable Paper	3.4%	0.6%	5,725	Al. Bev. Cans - No Deposit	0.0%	0.3%	78
Remainder/Composite Paper	0.7%	0.6%	1,134	Al. Containers, Plates and foils	0.5%	0.2%	770
Plastic	12.9%	2.5%	21,718	Steel Cans & Containers	0.3%	0.1%	576
PET (#1) Bottles - NY Deposit	0.5%	0.3%	766	Other Ferrous	0.7%	0.4%	1,143
PET (#1) Bottles - No Deposit	0.6%	0.2%	1,056	Other Non-Ferrous	0.3%	0.2%	465
PET (#1) Non-bottle Containers	0.1%	0.0%	238	Remainder/Composite Metal	0.6%	0.4%	1,012
HDPE (#2) Natural Containers	0.2%	0.1%	312	C&D	20.2%	4.5%	33,836
HDPE (#2) Bottles - Colored	0.5%	0.2%	781	Wood - Treated	5.3%	1.4%	8,868
Plastic Containers #3 thru #7	0.8%	0.1%	1,390	Wood - Untreated	5.6%	2.3%	9,352
Plastic Film & Bags - Clean	0.8%	0.5%	1,288	Asphalt	0.0%	0.0%	0
Plastic Film & Bags - Other	4.1%	0.8%	6,901	Asphalt Roofing	1.2%	0.9%	1,931
Expanded Polystyrene "Styrofoam"	0.4%	0.1%	688	Brick, Concrete, and Rock	0.7%	0.6%	1,125
Remainder/Composite Plastic	4.9%	2.6%	8,298	Carpet & Carpet Padding	2.8%	1.5%	4,717
Glass	1.2%	1.3%	1,975	Drywall/Gypsum Board	0.0%	0.0%	18
Glass Bev. Containers - NY Deposit	0.2%	0.1%	252	Remainder/Composite C&D	4.7%	2.0%	7,824
Glass Bev. Containers - No Deposit	0.6%	1.0%	1,084	Other	15.6%	2.6%	26,175
Glass Containers - Non-Bev.	0.2%	0.2%	405	Textiles	5.7%	1.4%	9,571
Remainder/Composite Glass	0.1%	0.4%	234	Rubber Products	0.7%	0.3%	1,252
Hazardous	0.3%	0.3%	445	Disp. Diapers & Sanitary Prod.	1.8%	0.5%	3,051
Household Hazardous Waste	0.2%	0.2%	327	Bottom Fines & Dirt	4.0%	0.6%	6,675
Medical Waste & Sharps	0.1%	0.1%	118	Bulky Items	3.0%	1.6%	4,975
Electronics	0.8%	0.8%	1,341	Other Miscellaneous	0.4%	0.3%	650
Electronics	0.5%	0.5%	907				
Televisions and Monitors	0.3%	0.3%	434	Grand Total	100%		167,781
				No. of Samples	40		

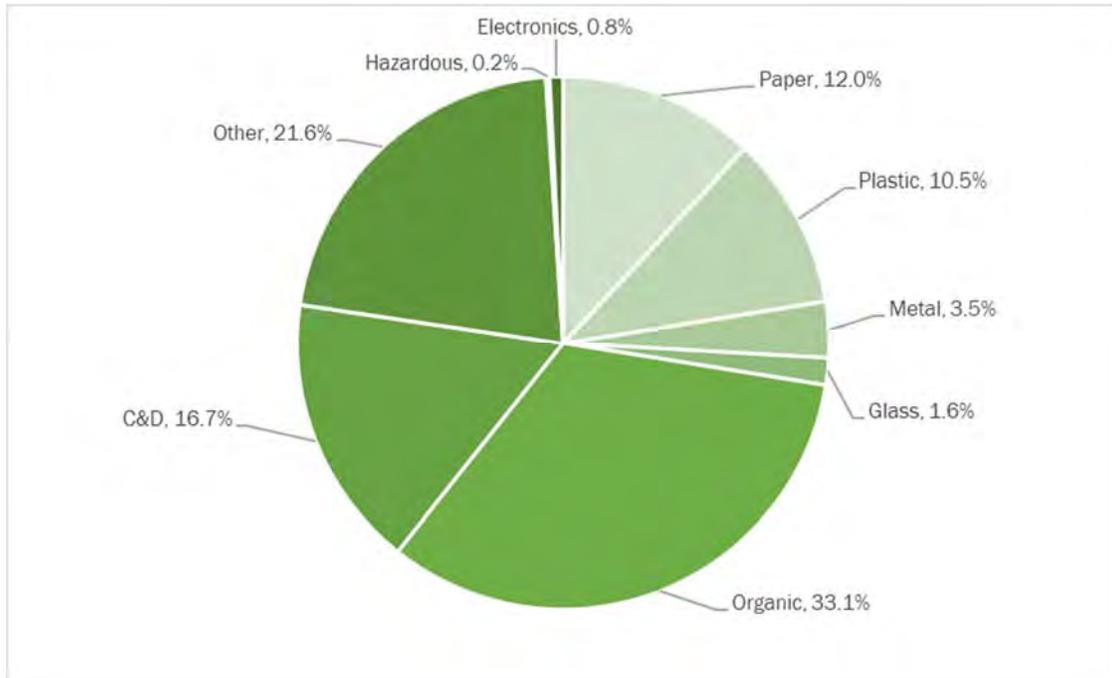
It should be noted that the sum of the mean percentages for all of the individual materials within a material group sum to the mean percentage shown for the group. For example, the sum of all of the paper materials is the same as the 18.5 percent shown for Paper as a material group. However, the same does not hold true for the confidence intervals. Confidence intervals are calculated individually for each row in this table; the sum of the confidence intervals for each individual material will not equal the confidence interval for the material group as a whole.

4.2 DISPOSED RESIDENTIAL MSW COMPOSITION

According to waste tonnage information from the City of Buffalo and the East Side Transfer Station (previously presented in Table 3-1), Disposed Residential MSW comprises approximately 49 percent of the City's Aggregate Waste (Residential, C/I, plus Recyclables) stream. Figure 4-4 below presents the composition of disposed residential refuse by major material group. As shown, the Organic material group constituted the largest portion of the residential refuse stream at 33.1 percent, followed by Other Materials at 21.6 percent, and C&D Materials at 16.7 percent.

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Figure 4-4 Composition of Disposed Residential MSW by Material Group



The top ten most prevalent material categories for Disposed Residential MSW are shown in Figure 4-5 below. Yard Waste topped the list as the most prevalent Disposed Residential MSW category, which may be reflective of the seasonality of sample collection (summer). It is encouraging that none of the City’s targeted recyclables, with the exception of Mixed Recyclable (low grade) Paper appear on this list.

Figure 4-5 Top 10 Material Categories in Disposed Residential MSW

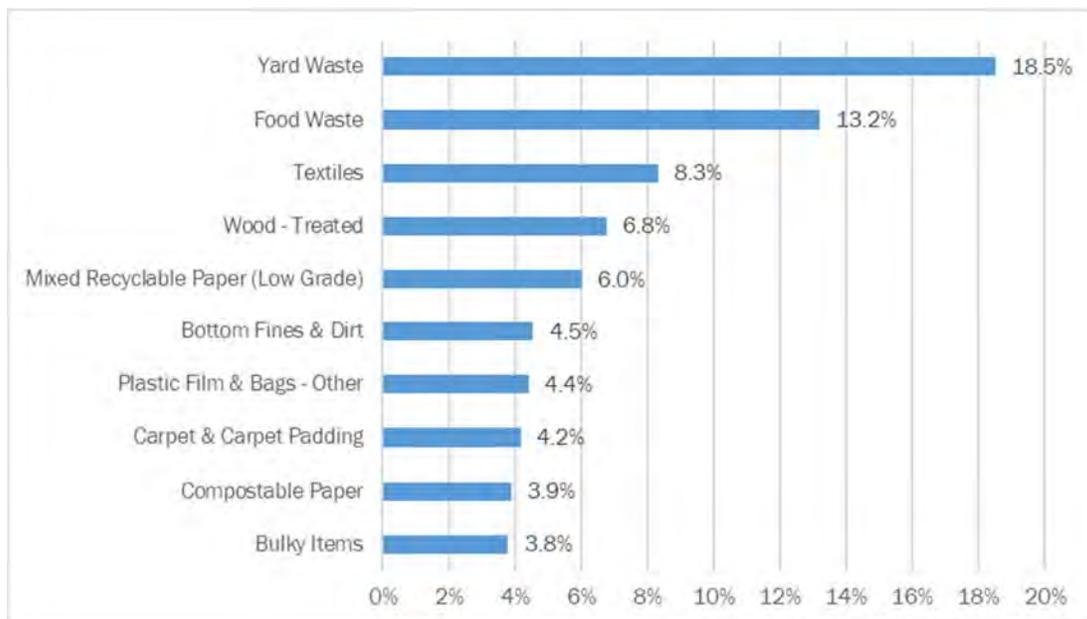


Figure 4-6 shows the recoverability of Disposed Residential MSW according to the recoverability classifications defined previously in this section. While there is a relatively low prevalence of City-targeted

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curbside recyclables being disposed in residential refuse, this percentage is still significant and suggests that improvements are possible in the existing curbside program.

Figure 4-6 Recoverability of Disposed Residential MSW

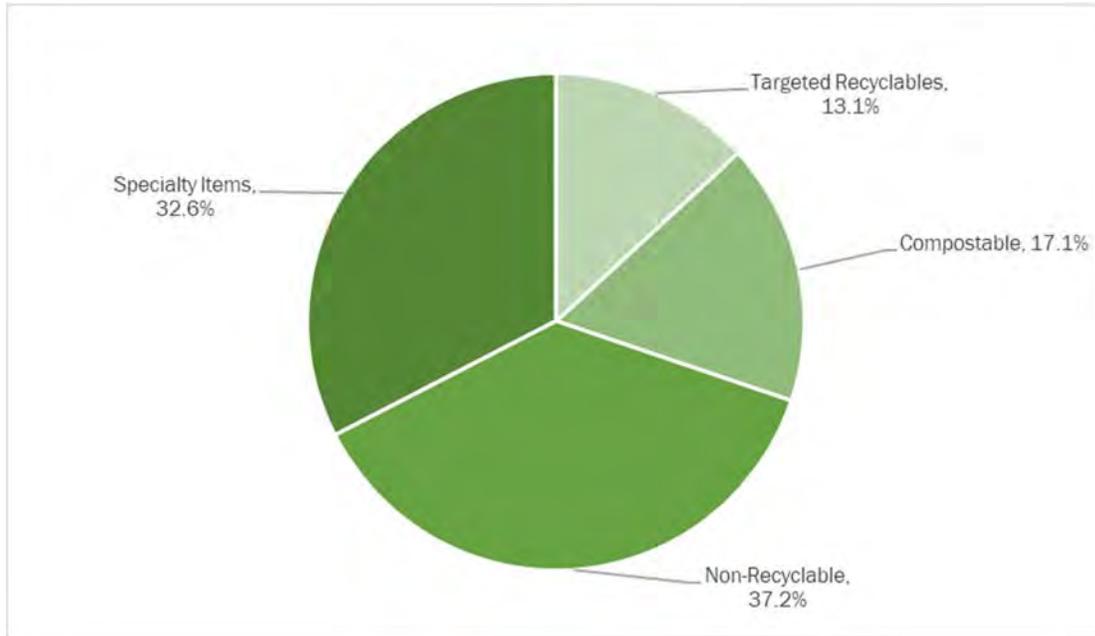


Table 4-3 provides a detailed statistical profile of the Disposed Residential MSW stream delivered to the East Side Transfer Station.

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Table 4-3 Detailed Composition of Disposed Residential MSW

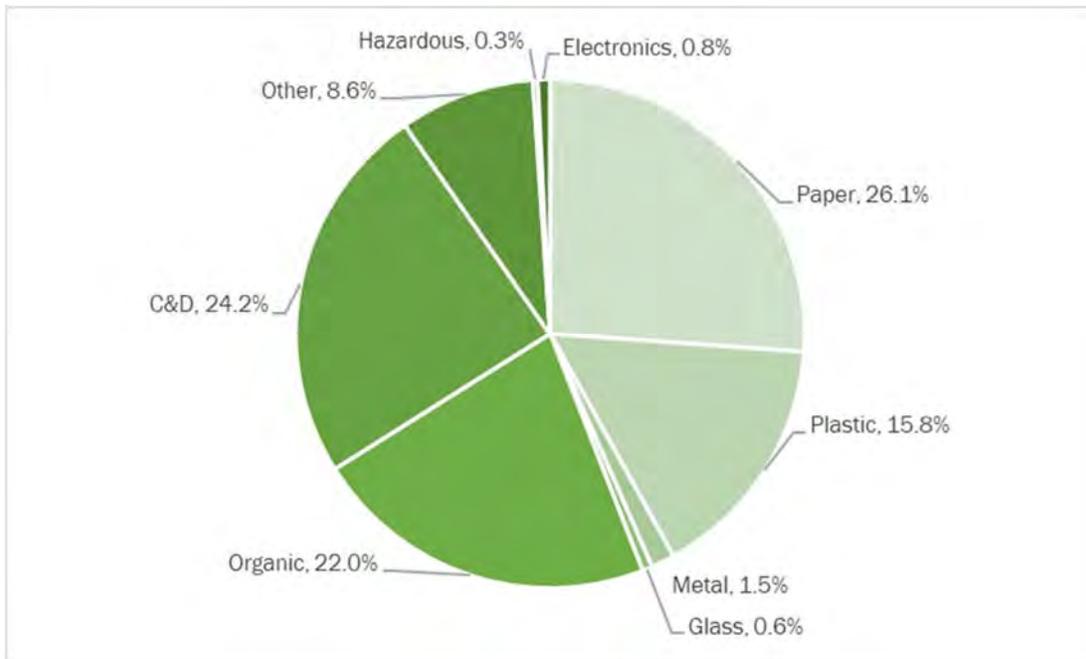
Material Category	Est.	Conf.	Tons	Material Category	Est.	Conf.	Tons
	Percent	Int (+/-)			Percent	Int (+/-)	
Paper	12.0%	1.3%	10,800	Organic	33.1%	5.0%	29,920
Newsprint	0.7%	0.3%	640	Food Waste	13.2%	2.3%	11,902
Uncoated OCC/Kraft Paper	0.5%	0.3%	438	Yard Waste	18.5%	5.5%	16,717
Office Paper (High Grade)	0.4%	0.2%	342	Miscellaneous Organics	1.4%	1.1%	1,301
Mixed Recyclable Paper (Low Grade)	6.0%	0.8%	5,431	Metal	3.5%	1.8%	3,116
Aseptic Boxes & Gable Top Cartons	0.2%	0.1%	204	Al. Bev. Cans - NY Deposit	0.1%	0.0%	135
Compostable Paper	3.9%	0.8%	3,518	Al. Bev. Cans - No Deposit	0.1%	0.0%	45
Remainder/Composite Paper	0.3%	0.1%	227	Al. Containers, Plates and foils	0.4%	0.2%	389
Plastic	10.5%	1.6%	9,470	Steel Cans & Containers	0.5%	0.1%	435
PET (#1) Bottles - NY Deposit	0.2%	0.1%	225	Other Ferrous	1.0%	1.1%	902
PET (#1) Bottles - No Deposit	0.8%	0.2%	692	Other Non-Ferrous	0.5%	0.4%	426
PET (#1) Non-bottle Containers	0.2%	0.1%	157	Remainder/Composite Metal	0.9%	0.7%	784
HDPE (#2) Natural Containers	0.2%	0.1%	176	C&D	16.7%	3.2%	15,048
HDPE (#2) Bottles - Colored	0.4%	0.1%	342	Wood - Treated	6.8%	2.5%	6,120
Plastic Containers #3 thru #7	1.0%	0.2%	902	Wood - Untreated	2.1%	1.3%	1,864
Plastic Film & Bags - Clean	0.3%	0.1%	280	Asphalt	0.0%	0.0%	0
Plastic Film & Bags - Other	4.4%	0.7%	3,980	Asphalt Roofing	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.6%	0.1%	543	Brick, Concrete, and Rock	0.5%	0.5%	410
Remainder/Composite Plastic	2.4%	1.3%	2,173	Carpet & Carpet Padding	4.2%	3.9%	3,773
Glass	1.6%	0.4%	1,485	Drywall/Gypsum Board	0.0%	0.0%	18
Glass Bev. Containers - NY Deposit	0.1%	0.1%	120	Remainder/Composite C&D	3.2%	2.0%	2,863
Glass Bev. Containers - No Deposit	1.0%	0.3%	891	Other	21.6%	3.0%	19,517
Glass Containers - Non-Bev.	0.3%	0.1%	277	Textiles	8.3%	1.9%	7,514
Remainder/Composite Glass	0.2%	0.1%	196	Rubber Products	1.1%	0.6%	951
Hazardous	0.2%	0.2%	206	Disp. Diapers & Sanitary Prod.	3.2%	1.0%	2,901
Household Hazardous Waste	0.1%	0.1%	97	Bottom Fines & Dirt	4.5%	0.9%	4,104
Medical Waste & Sharps	0.1%	0.1%	109	Bulky Items	3.8%	2.5%	3,418
Electronics	0.8%	1.0%	732	Other Miscellaneous	0.7%	0.6%	629
Electronics	0.3%	0.2%	298	Grand Total	100%		90,296
Televisions and Monitors	0.5%	0.8%	434	No. of Samples	19		

4.3 DISPOSED C/I MSW COMPOSITION

As previously shown in Table 3-1, Disposed C/I MSW comprises approximately 42 percent of the City's Combined MSW (Residential, C/I, plus Recyclables) stream. Figure 4-7 presents the composition of disposed C/I refuse by major material group. As shown, the Paper material group constituted the largest portion of the C/I refuse stream at 26 percent, followed by C&D material at 24 percent, and Organic material at 22 percent.

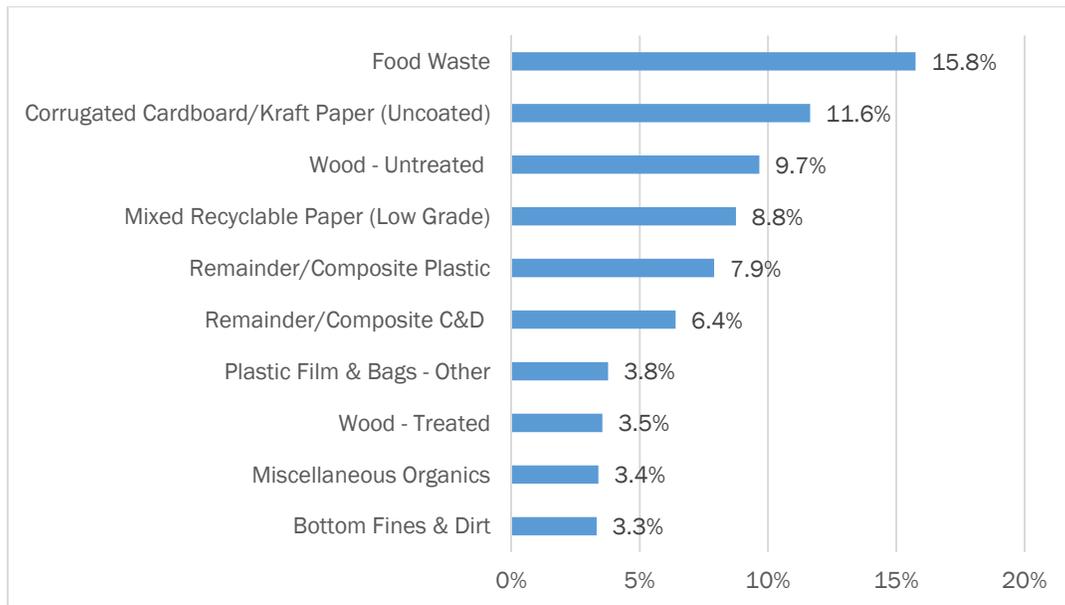
WASTE COMPOSITION STUDY

Figure 4-7 Composition of Disposed C/I MSW by Material Group



The top ten most prevalent material categories for Disposed C/I MSW are shown in Figure 4-8 below. Food Waste topped the list as the most prevalent Disposed C/I MSW category, followed by OCC and untreated wood. The percentage of OCC as the second-most prevalent material category suggests there is a significant amount of recyclable material remaining in the Disposed C/I MSW stream.

Figure 4-8 Top 10 Material Categories in Disposed C/I MSW



WASTE COMPOSITION STUDY

As can be seen in Figure 4-9, targeted recyclables in the Disposed C/I MSW stream were a little over 26 percent, providing additional evidence that a significant amount of recyclables remains in C/I waste, primarily recyclable paper and OCC.

Figure 4-9 Recoverability of Disposed C/I MSW

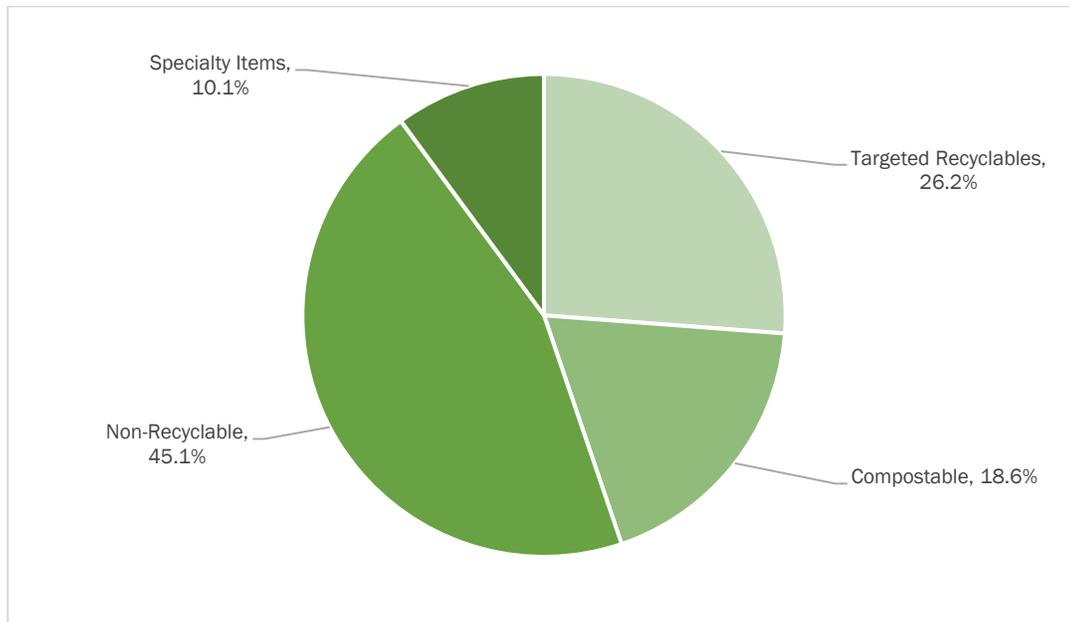


Table 4-4 provides a detailed statistical profile of the Disposed C/I MSW stream delivered to the East Side Transfer Station.

WASTE COMPOSITION STUDY

Table 4-4 Detailed Composition of Disposed C/I MSW

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	26.1%	7.9%	20,255	Organic	22.0%	6.6%	17,042
Newsprint	0.4%	0.3%	300	Food Waste	15.8%	6.3%	12,205
Uncoated OCC/Kraft Paper	11.6%	6.1%	9,021	Yard Waste	2.9%	2.5%	2,209
Office Paper (High Grade)	1.2%	1.5%	913	Miscellaneous Organics	3.4%	2.8%	2,628
Mixed Recyclable Paper (Low Grade)	8.8%	5.2%	6,783	Metal	1.5%	0.8%	1,159
Aseptic Boxes & Gable Top Cartons	0.2%	0.1%	125	Al. Bev. Cans - NY Deposit	0.1%	0.1%	96
Compostable Paper	2.8%	1.2%	2,207	Al. Bev. Cans - No Deposit	0.0%	0.0%	33
Remainder/Composite Paper	1.2%	0.9%	907	Al. Containers, Plates and foils	0.5%	0.4%	381
Plastic	15.8%	5.8%	12,248	Steel Cans & Containers	0.2%	0.1%	141
PET (#1) Bottles - NY Deposit	0.7%	0.7%	541	Other Ferrous	0.3%	0.4%	242
PET (#1) Bottles - No Deposit	0.5%	0.2%	364	Other Non-Ferrous	0.1%	0.0%	39
PET (#1) Non-bottle Containers	0.1%	0.0%	81	Remainder/Composite Metal	0.3%	0.5%	228
HDPE (#2) Natural Containers	0.2%	0.1%	136	C&D	24.2%	9.3%	18,787
HDPE (#2) Bottles - Colored	0.6%	0.5%	439	Wood - Treated	3.5%	2.2%	2,748
Plastic Containers #3 thru #7	0.6%	0.2%	489	Wood - Untreated	9.7%	5.1%	7,488
Plastic Film & Bags - Clean	1.3%	1.1%	1,008	Asphalt	0.0%	0.0%	0
Plastic Film & Bags - Other	3.8%	1.3%	2,921	Asphalt Roofing	2.5%	2.2%	1,931
Expanded Polystyrene "Styrofoam"	0.2%	0.1%	145	Brick, Concrete, and Rock	0.9%	1.5%	715
Remainder/Composite Plastic	7.9%	6.3%	6,124	Carpet & Carpet Padding	1.2%	1.4%	944
Glass	0.6%	0.4%	490	Drywall/Gypsum Board	0.0%	0.0%	0
Glass Bev. Containers - NY Deposit	0.2%	0.1%	131	Remainder/Composite C&D	6.4%	4.6%	4,961
Glass Bev. Containers - No Deposit	0.2%	0.1%	193	Other	8.6%	4.4%	6,657
Glass Containers - Non-Bev.	0.2%	0.2%	127	Textiles	2.7%	1.9%	2,057
Remainder/Composite Glass	0.0%	0.0%	38	Rubber Products	0.4%	0.3%	301
Hazardous	0.3%	0.8%	238	Disp. Diapers & Sanitary Prod.	0.2%	0.2%	150
Household Hazardous Waste	0.3%	0.4%	230	Bottom Fines & Dirt	3.3%	1.2%	2,571
Medical Waste & Sharps	0.0%	0.0%	9	Bulky Items	2.0%	3.2%	1,557
Electronics	0.8%	2.0%	608	Other Miscellaneous	0.0%	0.0%	22
Electronics	0.8%	1.1%	608	Grand Total	100%		77,485
Televisions and Monitors	0.0%	0.0%	0	No. of Samples	21		

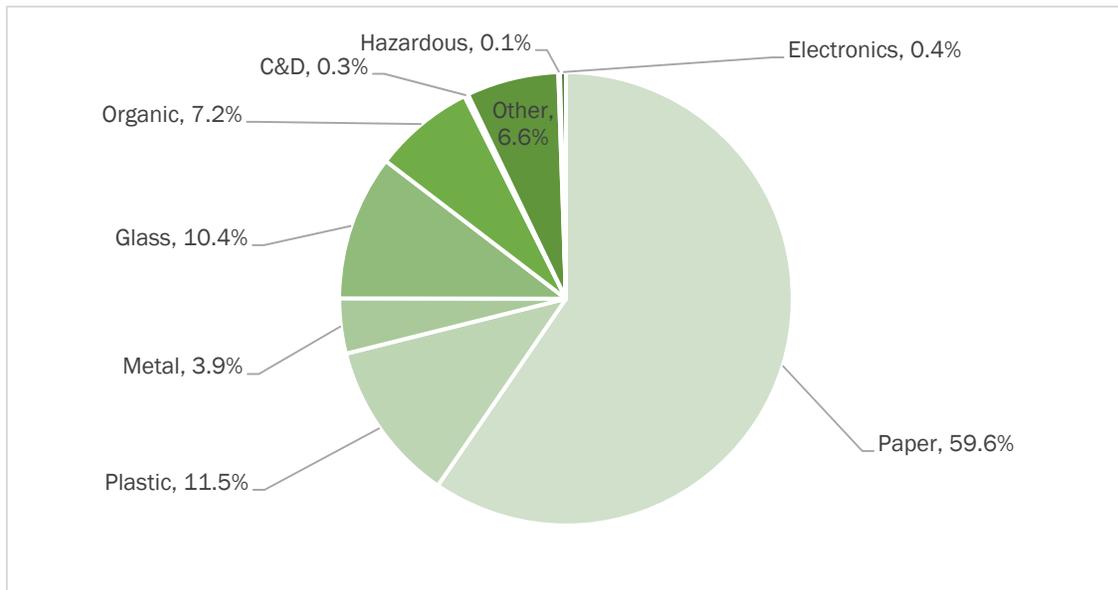
5. COMPOSITION OF RECYCLABLES

This study only incorporated sampling and sorting of recyclables for one day, encompassing 12 samples. The small sample size and representation of only one day out of the week on which recyclables are collected raises legitimate questions about the statistical representativeness of the samples. Because of this, no attempt has been made to provide a full statistical analysis of the results. However, selected findings are included below and are believed to illuminate useful information about the composition of recyclables in Buffalo. It is recommended that the City expand the sampling and sorting across other days of the week in the future if it becomes necessary to obtain more statistically rigorous results.

The estimated composition of residential curbside recyclables delivered to Buffalo Recycling Enterprises is shown in Figure 5-1 below. This figure excludes the two commercial single stream recycling samples obtained for this study. As expected, Paper is the most commonly occurring material group, constituting about almost 60 percent of collected recyclables, with recyclable plastics being the next highest at 11.5 percent.

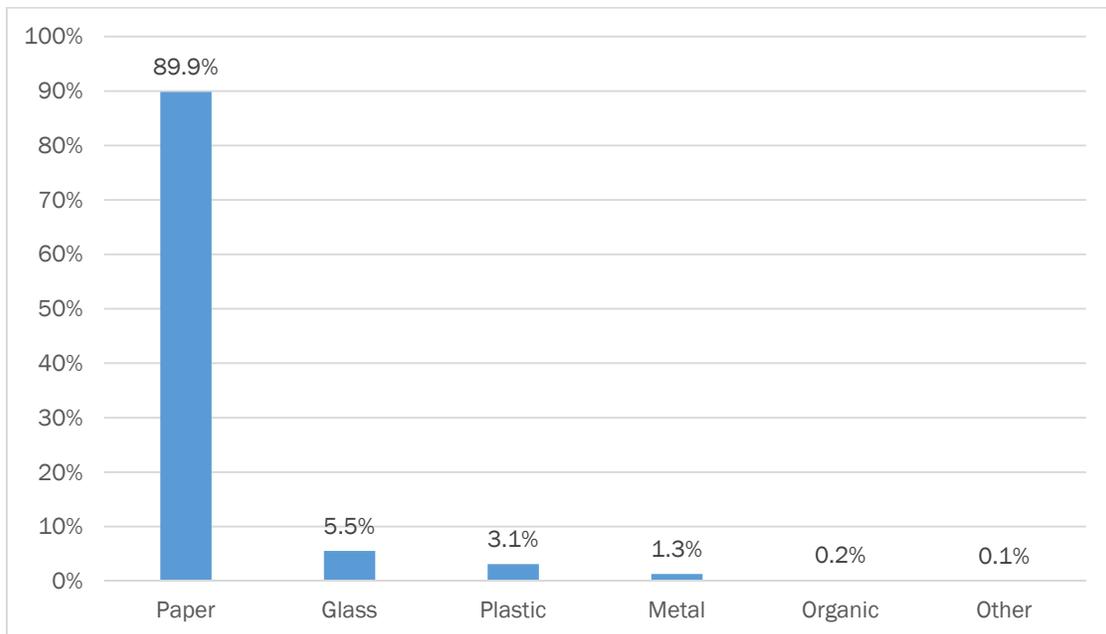
WASTE COMPOSITION STUDY

Figure 5-1 Composition of Curbside Residential Recyclables by Material Group



By contrast Figure 5-2 shows the material group composition of C/I recyclables delivered to BRE. The C&D, Electronics, and Household Hazardous Waste groups are not shown due to effectively zero percentages.

Figure 5-2 Composition of Commercial Recyclables by Material Group

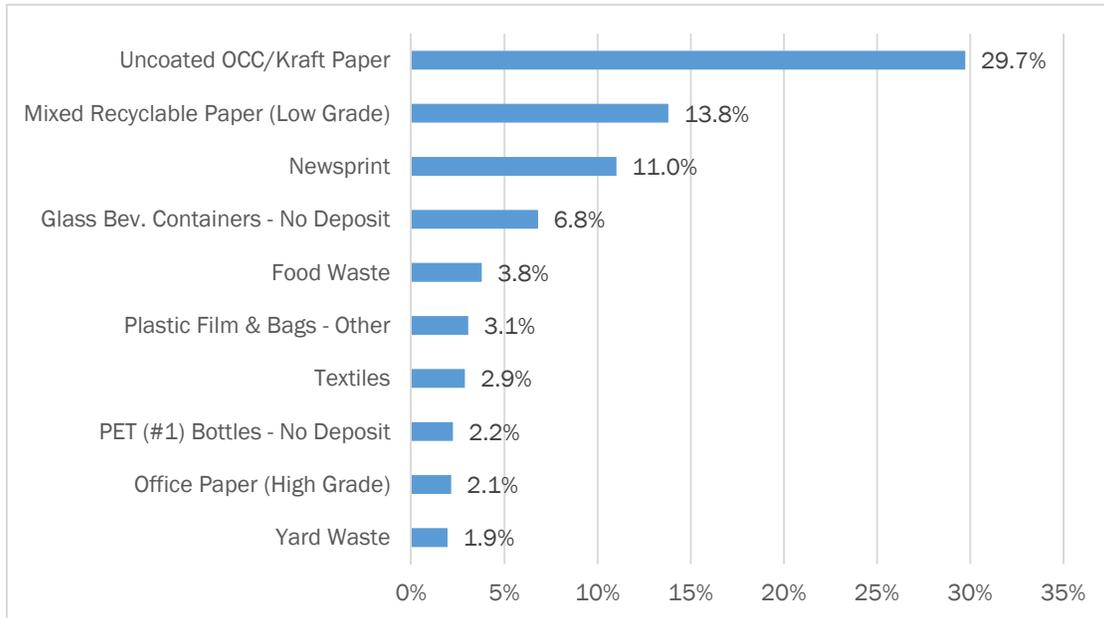


The top ten most prevalent material categories in curbside residential recycling are shown in Figure 5-3, Corrugated Cardboard/Kraft Paper topped the list by far as the most prevalent recycling category, at almost 30 percent, followed by Mixed Recyclable Paper (low grade) at almost 14 percent, and Newsprint at 11 percent. The prevalence of corrugated cardboard is consistent with other single stream recycling

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composition studies that have been performed in the past year, which reflect the increasing influence of e-commerce and home delivery services on the recycling stream. On a negative note, four of the material categories in the targeted recyclable top ten were contaminants: Food Waste (3.8%), Plastic Film & Bags – Other (3.1%), Textiles (2.9%), and Yard Waste (1.9%).

Figure 5-3 Top Ten Material Categories for Curbside Recyclables



The City provided monthly tonnage reports for refuse and curbside recyclables collected. This information compiled in Table 5-1, which indicates a recycling rate of 14.4 percent

Table 5-1 Citywide Recycling Rate

Stream	Tons	% of Total
Disposed Residential Refuse	90,296	85.6%
Curbside Recyclables to MRF	15,231	14.4%
Total	105,527	100.0%

While recycling rates are informative (although often calculated differently from one city to the next), capture rates can be more so. A capture rate indicates the fraction of any recyclable material that is actually diverted for recycling. So, capture rates can only be calculated for the materials that are targeted in the City’s curbside recycling collection program. The formula for calculating the capture rate for any specific material is shown below.

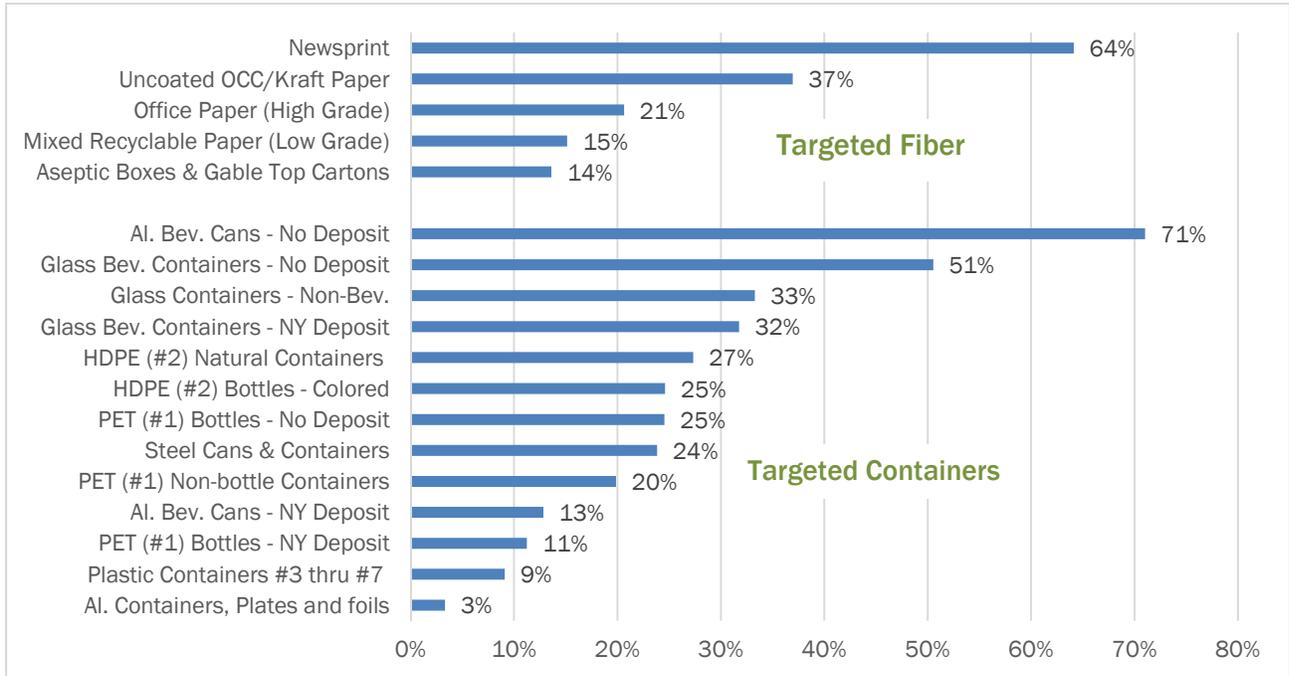
$$\frac{\text{Tons Recycled}}{\text{Tons Disposed as Refuse} + \text{Tons Recycled}} = \text{Capture Rate}$$

Figure 5-4 compares the capture rates achieved by the City for each of the materials targeted in the City’s recycling program. For added clarity, the figure has been divided into Targeted Fiber and Container groups. In the Targeted Fiber group, Newsprint has the highest capture rate, at 64 percent, with OCC the next highest at 37 percent. In the Targeted Containers group, capture rates range from a high of 71

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percent for aluminum beverage cans (no deposit), to a low of about 3 percent for aluminum containers, plates, and foils. In 2017, the City of Buffalo achieved a capture rate for all targeted recyclable materials of 28.2 percent.

Figure 5-4 Citywide Capture Rates by Targeted Recyclable Material

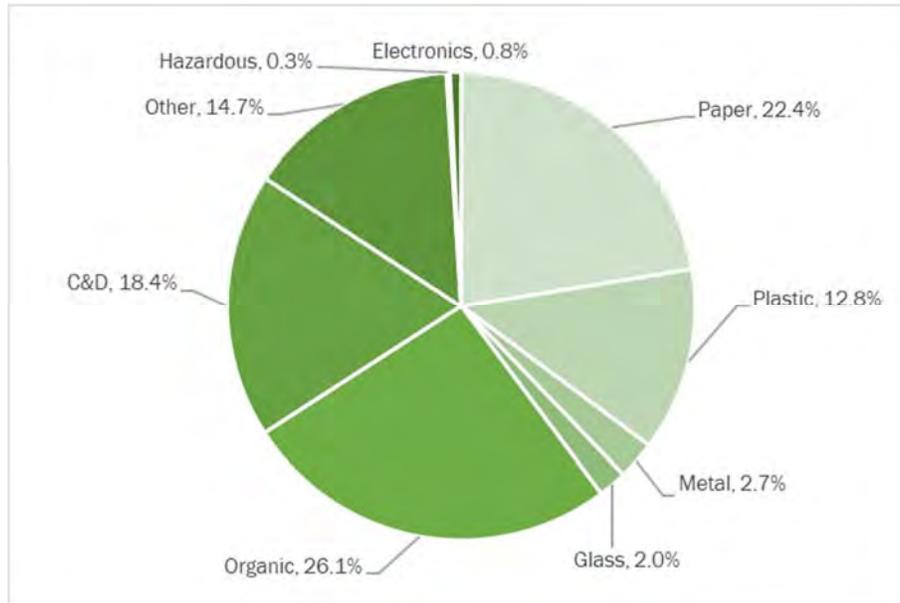


6. COMPOSITION OF AGGREGATE WASTE (DISPOSED MSW AND RECYCLED COMBINED)

The composition of the City of Buffalo’s Aggregate Waste stream is shown in Figure 6-1 below, expressed by major material group, and weighted by percent contribution to the overall waste stream. As shown, Organics is the most commonly occurring material group, constituting 26.1 percent of the waste stream, with Paper materials being the next highest at 22.4 percent.

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Figure 6-1 Aggregate Waste Generation (Disposed MSW plus Recycled)



The top ten most prevalent material categories in the City’s Aggregate Waste are shown in Figure 6-2. Food Waste topped the list as the most prevalent refuse category at 13.4 percent, followed by yard waste at 10.4 percent. Both of these material categories are components of the Organic Materials group. As the sample collection phase of this project occurred in July, the presence of Yard Waste so high on the list is not surprising, and would likely be less prevalent if sample collection was performed in winter or early spring, or if an additional seasonal sample collection phase was added as part of the study.

Figure 6-2 Top 10 Materials in Aggregate Waste (Disposed MSW plus Recycled)

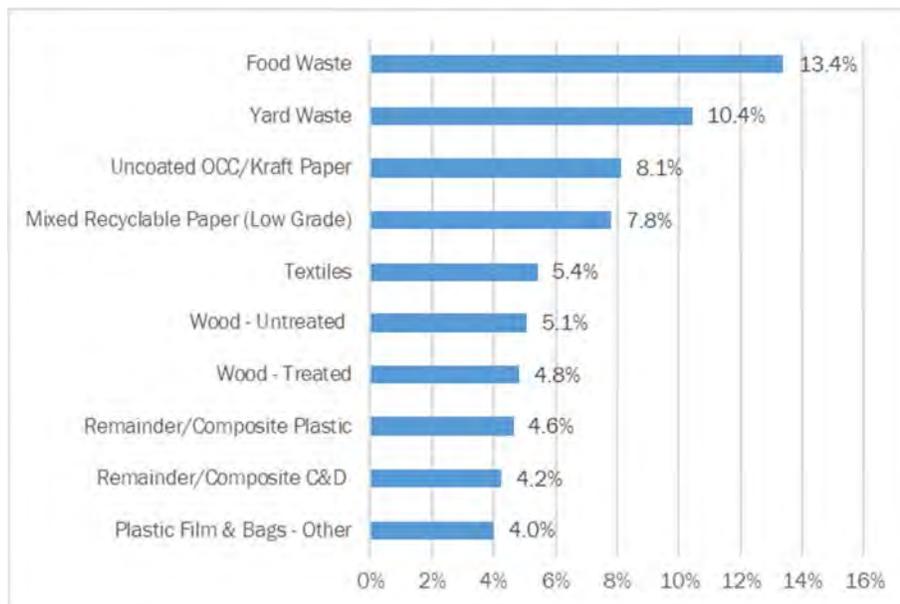


Table 6-1 provides a detailed statistical profile of the City’s Aggregate Waste stream.

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Table 6-1 Detailed Aggregate Waste Composition (Disposed plus Recycled)

Material Category	Est.	Conf.	Tons	Material Category	Est.	Conf.	Tons
	Percent	Int (+/-)			Percent	Int (+/-)	
Paper	22.4%	6.6%	41,330	Organic	26.1%	5.4%	48,062
Newsprint	1.4%	5.1%	2,620	Food Waste	13.4%	2.5%	24,685
Uncoated OCC/Kraft Paper	8.1%	10.8%	15,005	Yard Waste	10.4%	1.7%	19,222
Office Paper (High Grade)	0.9%	1.5%	1,581	Miscellaneous Organics	2.3%	1.2%	4,155
Mixed Recyclable Paper (Low Grade)	7.8%	3.8%	14,393	Metal	2.7%	1.5%	4,890
Aseptic Boxes & Gable Top Cartons	0.2%	0.1%	381	Al. Bev. Cans - NY Deposit	0.1%	0.1%	264
Compostable Paper	3.2%	0.3%	5,855	Al. Bev. Cans - No Deposit	0.1%	1.4%	269
Remainder/Composite Paper	0.8%	2.0%	1,495	Al. Containers, Plates and foils	0.4%	0.1%	796
Plastic	12.8%	2.9%	23,516	Steel Cans & Containers	0.4%	0.4%	756
PET (#1) Bottles - NY Deposit	0.5%	0.3%	863	Other Ferrous	0.6%	0.1%	1,163
PET (#1) Bottles - No Deposit	0.8%	0.7%	1,399	Other Non-Ferrous	0.3%	0.2%	518
PET (#1) Non-bottle Containers	0.2%	0.1%	297	Remainder/Composite Metal	0.6%	0.8%	1,122
HDPE (#2) Natural Containers	0.2%	0.3%	429	C&D	18.4%	0.5%	33,879
HDPE (#2) Bottles - Colored	0.6%	0.5%	1,036	Wood - Treated	4.8%	0.3%	8,900
Plastic Containers #3 thru #7	0.8%	0.3%	1,529	Wood - Untreated	5.1%	0.0%	9,357
Plastic Film & Bags - Clean	0.7%	0.2%	1,331	Asphalt	0.0%	0.0%	0
Plastic Film & Bags - Other	4.0%	2.2%	7,376	Asphalt Roofing	1.0%	0.0%	1,931
Expanded Polystyrene "Styrofoam"	0.4%	0.0%	702	Brick, Concrete, and Rock	0.6%	0.0%	1,125
Remainder/Composite Plastic	4.6%	0.8%	8,554	Carpet & Carpet Padding	2.6%	0.0%	4,717
Glass	2.0%	3.6%	3,629	Drywall/Gypsum Board	0.0%	0.0%	23
Glass Bev. Containers - NY Deposit	0.2%	0.6%	369	Remainder/Composite C&D	4.2%	0.0%	7,825
Glass Bev. Containers - No Deposit	1.2%	3.4%	2,192	Other	14.7%	3.2%	27,176
Glass Containers - Non-Bev.	0.3%	0.6%	607	Textiles	5.4%	3.0%	10,010
Remainder/Composite Glass	0.2%	1.7%	461	Rubber Products	0.7%	0.1%	1,280
Hazardous	0.3%	0.2%	464	Disp. Diapers & Sanitary Prod.	1.8%	0.8%	3,231
Household Hazardous Waste	0.2%	0.1%	346	Bottom Fines & Dirt	3.8%	0.4%	6,921
Medical Waste & Sharps	0.1%	0.0%	118	Bulky Items	2.7%	0.0%	4,975
Electronics	0.8%	0.0%	1,403	Other Miscellaneous	0.4%	0.6%	759
Electronics	0.5%	0.6%	970				
Televisions and Monitors	0.2%	0.0%	434	Grand Total	100%		184,350
				No. of Samples	52		

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

- ◆ **Establishing a Baseline:** This Study served as a good first effort to measure the composition of disposed and recycled municipal solid waste originating in the City of Buffalo. The study distributed field data collection across residential and commercial wastes destined for disposal, and also captured one day of sampling from the recycling stream. Although the study captured a relatively small sample of recycling samples, overall it provided a reasonably representative snapshot of waste stream. In the opinion of MSW Consultants, the results of this study are in line with the results experienced by other cities that have performed similar studies and reasonably characterize the City's disposed MSW stream. These data should serve as a useful input to the upcoming Comprehensive Recycling Analysis.
- ◆ **Opportunity for Diversion of Organics:** A significant fraction of the disposed waste stream is made up of organic materials. While some of these are recyclable fibers, and not all organics are compostable, the City would appear to have options for significantly increasing diversion were it to target the organics waste fraction, especially yard wastes during the growing season.
- ◆ **Enhanced Diversion of Traditional Recyclables:** Although the City offers curbside recycling service, the relatively low capture rates observed in the City suggest that improvement to the existing recycling programs are possible and could have a meaningful impact on diversion levels.
- ◆ **Renovation Wastes:** The City of Buffalo is largely built out within its borders. Consequently, a significant fraction of the residential stream was found to be renovation wastes (C&D). This suggests that policies aimed at contractors, home builders and the like may be yet another path to divert wastes from disposal.

7.2 RECOMMENDATIONS

- ◆ **Intermittent Waste Characterization:** Comprehensive city-wide studies provide essential data about the overall disposed waste stream for city recycling planners, and also quantify the impact of the City's recycling program effort. The City should consider updating this study every five to seven years to document changes to the overall waste stream as well as measure program effectiveness.
- ◆ **Enhanced Yard Waste Recycling:** The City accepts yard waste (leaves, grass, shrubs, etc.) during a curbside collection program every autumn. Residents seeking to have yard waste composted during other times of the year must drop off the material at the Engineering Garage. Given the significant percentage of yard waste in the residential refuse, an expansion of yard waste collection program during the summer months would likely have a positive impact on removing yard waste from the refuse stream and increase diversion.
- ◆ **Contamination and Residual Composition Monitoring:** Studies that determine the composition of recyclables and residuals from the City's recyclables processing facility will provide opportunities for increasing recovery efficiency and the potential for additional processing. Cost-effective contamination monitoring and residual composition test services exist to help processors keep better track of the quality of their supply (for example, identifying problem recycling routes) and efficiently recovering targeted recyclables.
- ◆ **Other Specialization in Future Studies:** Several large cities that have regularly conducted waste characterization studies have, over time, structured the studies to investigate certain waste streams in greater detail. In addition to measuring the composition of disposed and recycled wastes in total and by generator sector, some cities (and state-wide studies) have opted to focus on:
 - ◆ Targeted generator sampling of the most prevalent business types (e.g., grocery stores, manufacturing retail malls, etc.) that generate significant quantities of waste;
 - ◆ Enhanced research into waste generation indicators for certain waste streams, especially C&D debris, to improve future sampling plans for this waste stream;
 - ◆ Calculating energy and heating values in disposed waste for incineration and thermal conversion processes.

The City of Buffalo should consider integrating one or more of these tests in the future. Such future efforts would be limited by available funding, but could provide additional insight into diversion and recycling opportunities for Buffalo.

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APPENDIX A

MATERIAL CATEGORIES

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2018 City of Buffalo Waste Characterization Study
Material Definitions

PAPER

1 NEWSPRINT: Paper used chiefly for printing newspapers – uncoated ground wood paper.

CORRUGATED CARDBOARD/KRAFT PAPER (UNCOATED): Corrugated boxes or paper bags made from Kraft paper. Wavy center layer sandwiched between two outer layers without wax coating on the inside or outside.

2 Examples include cardboard shipping containers and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. Does not include chipboard. Examples of Kraft paper include paper grocery bags, unsoiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.

3 OFFICE PAPER (HIGH GRADE): Paper that is free of ground wood fibers; usually sulfite or sulphate paper; includes office printing and writing papers such as white ledger, color ledger, envelopes, and computer printout paper, bond, rag, or stationary grade paper. This subtype does not include fluorescent-dyed paper or deep-tone dyed paper such as goldenrod colored paper.

4 MIXED RECYCLABLE PAPER (LOW GRADE): Recyclable paper other than the paper mentioned above. Examples include manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, carbonless forms, junk mail, chipboard and uncoated paperboard, groundwood paper, and deep-toned or fluorescent dyed paper. Cereal, show, and gift boxes

5 ASEPTIC BOXES & GABLE TOP CARTONS: Aseptic containers (multi-layered packaging that contains shelf-stable food products such as apple juice, soup, soy/rice milk, etc.) and "gable top" cartons (non-refrigerated items such as granola and crackers; refrigerated items such as milk, juice, egg substitutes, etc.). Rigid food and beverage cartons are usually paper-based, may be any shape, and may include a plastic pour spout as part of the carton.

6 COMPOSTABLE PAPER: Low-grade, biodegradable paper that cannot be recycled, as well as food contaminated paper. Examples include paper towels, paper plates, waxed papers and waxed cardboard, and tissues.

7 REMAINDER/COMPOSITE PAPER: Products made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture. Examples include corrugated cardboard coated with plastic, cellulose insulation, blueprints, sepia, onion skin, foiled lined fast food wrappers, frozen juice containers, carbon paper, self-adhesive notes, softcover and hardcover books, and photographs.

PLASTIC

8 PET (#1) BOTTLES - NY STATE DEPOSIT: Clear or colored PET bottles that also bear a NY State Deposit marking. The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". A PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This category only includes PET bottles or jars that did not previously contain hazardous materials.

9 PET (#1) BOTTLES - NON-DEPOSIT: Clear or colored PET bottles that Do Not bear a NY State Deposit marking (may have other state deposit markings). The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". A PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This category only includes PET bottles or jars that did not previously contain hazardous materials.

10 PET (#1) NON-BOTTLE CONTAINERS: Non-bottle containers such as PET jars, rectangular PET clamshell or tray containers used for produce; etc. The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The color is usually transparent, green, or clear.

11 HDPE (#2) NATURAL CONTAINERS : Natural colored HDPE bottles/jars. This plastic is usually either cloudy white, allowing light to pass through it (natural). When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE". This category only includes HDPE containers that did not previously contain hazardous materials. Includes natural buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material.

2018 City of Buffalo Waste Characterization Study

Material Definitions

- 12 HDPE (#2) BOTTLES - COLORED: Colored HDPE bottles/jars. In contrast with natural HDPE, the colored HDPE is usually a solid color and opaque. When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE". This category only includes HDPE bottles that did not previously contain hazardous materials.
- 13 PLASTIC CONTAINERS #3 THRU #7 : "Tubs, Cups, and Lids". Containers made of types of plastic other than HDPE or PET. Items may be made of PVC, PP, or PS. When marked for identification, these items may bear the number 3, 4, 5, 6, or 7 in the triangular recycling symbol. This subtype also includes unmarked plastic containers. This category only includes plastic #3-#7 containers that did not previously contain hazardous materials.
- 14 PLASTIC FILM & BAGS - CLEAN: Clean film plastic retail bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Also includes dry-cleaning plastic bags intended for one-time use, and non-bag commercial and industrial packaging film used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.
- 15 PLASTIC FILM & BAGS - OTHER: Plastic film or bags that are contaminated or otherwise non-recyclable. Examples include garbage bags, contaminated shopping bags, and other types of plastic bags (sandwich bags, zip (recloseable) bags, produce bags, frozen vegetable bags), flexible plastic packaging, painting tarps, food wrappers such as candy-bar wrappers.
- 16 EXPANDED POLYSTYRENE "STYROFOAM": Food and Non-food packaging. Includes clamshell "Styrofoam" food containers, as well as cups, plates, and bowls. Includes finished products made of expanded polystyrene such as block Styrofoam padding and packing peanuts.
- 17 REMAINDER/COMPOSITE PLASTIC: Plastic that cannot be put in any other type or subtype. Includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, produce trays, foam packing blocks (not including expanded polystyrene blocks), plastic strapping, new plastic laminate (e.g. Formica), vinyl, linoleum, plastic lumber, imitation ceramics, handles and knobs, plastic lids, some kitchen ware, toys, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications); durable plastic such as plastic outdoor furniture, plastic toys and sporting goods, CDs, and rigid plastic housewares (such as mop buckets), dishes, cups, and cutlery.
- METAL**
- 18 ALUMINUM BEVERAGE CANS - NY STATE DEPOSIT: Aluminum Beverage containers bearing NY State Deposit marking.
- 19 ALUMINUM BEVERAGE CANS - NON-DEPOSIT: Aluminum Beverage containers that Do Not bear a NY State Deposit marking (may have other state deposit markings).
- 20 ALUMINUM CONTAINERS, PLATES AND FOILS: Aluminum food containers, includes cat food cans, aluminum pie plates and non-rigid baking pans, as well as aluminum foils.
- 21 STEEL CANS & CONTAINERS: Steel or tin food or other containers.
- 22 OTHER FERROUS (MAGNETIC): Any other iron or steel that is magnetic. This subtype does not include steel cans or containers for food. Examples include empty or dry paint cans, structural steel beams, boilers, metal clothes hangers, metal pipes, some cookware, security window bars, scrap ferrous items and galvanized items such as nails and flashing. This category also includes mixed metal items made of both ferrous metal and non-ferrous metal combined. Examples include small non-electronic appliances such as toasters and motors.

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OTHER NON-FERROUS (NOT MAGNETIC): Any metal item that is not magnetic, as well as stainless steel.

- 23 These items may be made of copper, brass, bronze, lead, zinc, or other metals. Examples include copper wire, shell casings, and brass pipe.

- 24 REMAINDER/COMPOSITE METAL : Items made mostly of metal but combined with other materials (such as plastics, wood, etc.). Examples: hair dryers, insulated wire, and finished products that contain a mixture of metals and other materials, whose weight is derived significantly from the metal portion of its construction.

GLASS

- 25 GLASS BEVERAGE CONTAINERS - NY STATE DEPOSIT: Includes all NY State deposit glass beverage containers, regardless of color. Includes examples such as wine bottles, beer and soft drink bottles.

- 26 GLASS BEVERAGE CONTAINERS - NON DEPOSIT: Includes all non-deposit glass beverage containers, regardless of color (may include deposit markings from other states). Includes examples such as wine bottles, beer and soft drink bottles.

- 27 GLASS CONTAINERS - NON-BEVERAGE: All glass non-beverage containers, such as those for mayonnaise, jam jars, and other food and non-food products.

- 28 REMAINDER/COMPOSITE GLASS : Glass that cannot be put in any other type. It includes items made mostly of glass but combined with other materials. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Uncoated plate glass - includes window and door glass, table-tops, and some auto glass (side windows).

ORGANICS

- 29 FOOD WASTE: Food wastes and scraps, including meat, bone, dairy, grains, rinds, teabags, coffee grounds with filters, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside. Compostable peanuts, food packaging with food scraps, and small wooden produce crates are also included in this category.

- 30 YARD WASTE: Plant material, including woody material, from any public or private landscapes. Examples include leaves, grass clippings, plants, brush and branch prunings and trimmings.

- 31 MISCELLANEOUS ORGANICS: Organic material that is not food or yard waste. Includes cork, popsicle sticks, hair, animal waste, cigarette butts, chopsticks, woven baskets, and small non-construction related wood products.

CONSTRUCTION & DEMOLITION WASTE

- 32 WOOD – TREATED: Wood that contains an adhesive, paint, stain, fire retardant, pesticide or preservative. Does not include wood furniture.

- 33 WOOD – UNTREATED : Any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative; includes such items as bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings.

- 34 ASPHALT: Includes asphalt paving materials, set or unset.

- 35 ASPHALT ROOFING: Composite shingles and other roofing material made with asphalt. Examples include asphalt shingles and attached roofing tar and tar paper.

- 36 BRICK, CONCRETE, AND ROCK: Includes all types of fire-clay bricks. Includes Portland cement mixtures (set or unset), with or without aggregate materials (gravel, etc.). Includes rock gravel larger than 2" in diameter.

- 37 CARPET & CARPET PADDING: Flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Carpet padding may include plastic, foam, felt, or other material used under the carpet to provide insulation and padding.

- 38 DRYWALL/GYPSUM BOARD: Interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypsum board, gyproc, and wallboard.

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39 REMAINDER/COMPOSITE CONSTRUCTION & DEMOLITION : Construction and demolition material that cannot be put in any other type or subtype. This type may include items from different types combined, which would be very hard to separate. Also includes fiberglass insulation, ceramic fixtures, and other miscellaneous C&D Materials not mentioned above.

HHW

40 HOUSEHOLD HAZARDOUS WASTE: Hazardous household items containing paints, thinners, solvents, vehicle equipment fluids, cleaners, pesticides/herbicides and fertilizers. Includes fluorescent bulbs and CFLs, light ballasts, and mercury-containing devices. Also includes dry batteries, rechargeable batteries and lead-acid batteries.

41 MEDICAL WASTE & SHARPS : Treated or untreated medical waste. Includes bandages, gauze, diabetic strips, syringes, needles, other sharps, and medical tubing. Includes similar items from veterinary usage, medical research, or industrial laboratories.

ELECTRONICS

42 ELECTRONICS: Includes personal computers, laptop computers, notebook computers, processors, keyboards, etc. Includes stereos, VCRs, DVD players, etc. This category does not include automated typewriters or typesetters.

43 TELEVISIONS AND MONITORS: Stand-alone display systems containing a CRT or any other type of display primarily intended to receive video programming via broadcast. Examples also include non-CRT units such as plasma and LCD monitors.

OTHER

44 TEXTILES: Includes clothing, fabrics, curtains, blankets, stuffed animals, and other cloth material. Does not include carpeting.

45 RUBBER PRODUCTS: Finished products and scrap materials made of natural and synthetic rubber, such as bathmats, inner tubes (not tires), rubber hoses, and foam rubber. Includes rubber gloves and footwear (if predominately rubber).

46 DISPOSABLE DIAPERS & SANITARY PRODUCTS: Adult and baby disposable diapers, and feminine hygiene products.

47 BOTTOM FINES & DIRT: Small mixed fragments 2" and smaller, and includes miscellaneous fines (paper, plastic, glass, etc.), sand, and dirt.

48 BULKY ITEMS: Large, hard-to-handle items that are not defined separately. Examples include all sizes and types of furniture, mattresses, box springs, and base components.

49 OTHER MISCELLANEOUS : Any other type of waste material not listed in any other sort category. Includes cosmetics, shampoos, lotions, etc.





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