NORTHEAST MARYLAND WASTE DISPOSAL AUTHORITY

ON BEHALF OF

MARYLAND DEPARTMENT OF THE ENVIRONMENT

2016 MARYLAND STATEWIDE WASTE CHARACTERIZATION STUDY

FINAL REPORT

July 14, 2017

MSW CONSULTANTS
MidAtlantic Solid Waste Consultants

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ACKNOWLEDGEMENTS

This study would not have been successful without the cooperation and assistance of multiple disposal facilities across the State of Maryland. MSW Consultants would like to thank the following facilities for hosting the field data collection during this project:

◆ Appeal Landfill of Calvert County,
◆ Cecil County Central Landfill,
◆ Charles County Landfill,
◆ Forty West Municipal Landfill of Washington County,
◆ Garrett County Landfill,
◆ Northwest Transfer Station, City of Baltimore,
◆ Quarantine Road Landfill, City of Baltimore
◆ Northern Landfill of Carroll County,
◆ Somerset County Landfill.

We would also like to extend our gratitude to the study organizers for their assistance in the organization and data collection for this project:

◆ Maryland Department of the Environment (MDE),
◆ Northeast Maryland Waste Disposal Authority (NMWDA).

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EXECUTIVE SUMMARY

ES 1. INTRODUCTION

The Maryland Recycling Act (MRA) (Md. Code Ann., Envir. 9-1701–9-1730) requires all Maryland counties and Baltimore City to recycle from 20 to 35 percent (depending on population) of waste generated. By 2020, Maryland has established a voluntary waste diversion goal of 60 percent, and a voluntary recycling rate of 55 percent.

The Maryland Department of the Environment (the Department) works toward Maryland's waste diversion goals by partnering with jurisdictions and the public and private sectors to develop markets for recyclable materials and by working with other State agencies to increase the volume of materials diverted from disposal. Like many state environmental agencies, the Department recognizes the importance of establishing a baseline snapshot of the disposed waste stream for use by stakeholders' intent on reducing disposal and increasing diversion. In 2016, the Department partnered with the Northeast Maryland Waste Disposal Authority (NMWDA) to design and perform the state's inaugural statewide waste characterization study.

This Executive Summary highlights notable findings from this 2016 Maryland Statewide Waste Composition Study.

ES 2. STATEWIDE MUNICIPAL SOLID WASTE DISPOSAL

Although Maryland tracks multiple waste streams that are either recycled or destined for disposal (C&D debris, industrial waste, land clearing debris and others), this characterization study targeted the municipal solid waste (MSW) portion of disposed solid waste. More broadly, there was a total of 6,526,007 tons of MSW generated in Maryland in 2014. Of that total, 2,741,945 tons were recycled, while the remaining 3,784,062 tons made up MSW destined for disposal. Table ES-1 provides the statewide quantity of MSW disposed in 2014, the most recent year for which data are available. As shown in this table, the vast majority (almost 80 percent) of the MSW destined for disposal originates from largely suburban counties. This table also provides the estimated contribution of disposed waste by generator sector. As shown, rural areas are weighted towards residential wastes, and urban areas are weighted toward institutional/commercial/industrial (ICI) waste; suburban areas of the state are assumed to have a 50/50 split. These allocations are estimates only, but are based on other studies that have more rigorously investigated waste generation by demographic sector (Connecticut, 2015; Pennsylvania, 2003; Illinois, 2009).

Table ES-1 Disposed MSW Originating from Maryland Counties by Demographic Region (2014)

Demographic Region	MSW Destined for Disposal, 2014 (tons)	Percent of Statewide	Residential/ ICI Split [1]	Residential Waste Disposal (tons)	ICI Waste Disposal (tons)
Urban	591,874	15.6%	40%/60%	236,750	355,125
Suburban	3,018,599	79.8%	50%/50%	1,509,300	1,509,300
Rural	173,588	4.6%	60%/40%	104,153	69,435
Total	**3,784,062**	**100.0%**		**1,850,202**	**1,933,860**

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

[1] It was not possible to compile the breakdown of disposed waste by generator sector. These estimated percentages are consistent with other studies that have more rigorously investigated waste generation by demographic sector (Connecticut, 2015; Pennsylvania, 2003; Illinois, 2009) and are reasonable for aggregation in the professional opinion of MSW Consultants.

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The data in the above tables serve as weighting factors for the aggregation of facility-level composition data collection in this study.

ES 3. SAMPLING PLAN OVERVIEW

This study captured samples of disposed waste at nine facilities in Maryland, and also attempted to integrate the results of other county-level waste composition studies performed in the state in the past five years. Figure ES-1 plots the location of the host facilities, as well as the five studies that have been completed in recent years.

Figure ES-1 Waste Characterization Sources for Data Analysis

Host Facilities for Field Data Collection:

1. Appeal Municipal Landfill
2. Cecil Co. Central Municipal Landfill
3. Charles Co. Municipal Landfill
4. Forty West Municipal Landfill
5. Garrett Co. Solid Waste Disposal & Recovery Facility
6. Northern Municipal Landfill
7. Northwest Transfer Station
8. Quarantine Road Municipal Landfill
9. Somerset Co. Municipal Landfill

Recent Maryland Waste Characterization Studies:

A. Alpha Ridge Processing Facility & Transfer Station
B. Shady Grove Processing Facility & Transfer Station
C. Newland Park Municipal Landfill
D. Millersville Municipal Landfill & Resource Recovery Facility
E. Brown Station Road Area B Sanitary Landfill

Table ES-2 summarizes the disposal facilities that hosted sampling and sorting for this study, and identifies the number of samples obtained at each. The table also indicates the number of samples obtained by generator sector (residential or ICI) of origin. As expected, a reasonable mix of Residential and ICI samples were obtained from all of the host facilities, with three exceptions: the two Baltimore facilities received predominantly Residential wastes during the study, and the Somerset County Landfill received predominantly ICI loads. The latter finding was somewhat surprising given that rural disposal locations often receive a higher fraction of direct haul residential materials.

All samples were obtained during two seasonal sampling events, spanning summer (July 12-27) and fall (October 10-21) 2016. Sampling was largely successful as a total of 191 out of the proposed 209 samples were collected.

Table ES-2 Sampling Summary

Host Acceptance Facilities	Residential	ICI	Total
Cecil County Landfill	8	14	22
Carroll County Northern Landfill	15	11	26
Somerset County Landfill	2	17	19
Charles County Landfill	13	16	29
Appeal Landfill (Calvert County)	7	15	22
City of Baltimore Landfill	9	1	10
Northwest Transfer Station (City of Baltimore)	19	0	19
Garrett County Landfill	10	12	22
Forty West Muni LF (Washington County)	6	16	22
Total	**89**	**102**	**191**

ES 4. RESULTS

ES 4.1 STATEWIDE AGGREGATE DISPOSED WASTE COMPOSITION

Figure ES-2 shows the tonnage of disposed wastes in 2014, applied to the composition data from the 2016 waste sort, aggregating the Residential and ICI generator sectors. As shown, Organics and Paper are the most common material groups. Other Materials includes textiles and leather products, disposable diapers and sanitary products, bulky items, tires, other/not elsewhere classified, and supermix-bottom fines and dirt.

Figure ES-2 Maryland Statewide Waste Composition and Quantities Disposed (tons)
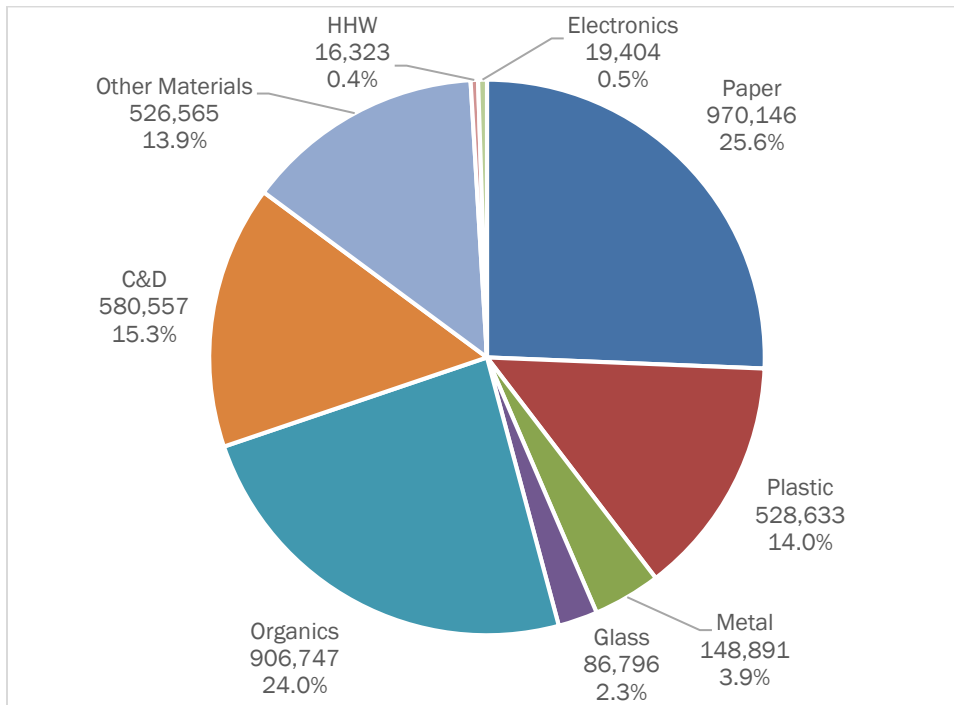
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Figure ES-3 shows the top 10 most prevalent materials in the Maryland statewide disposed MSW stream from the 2016 waste sort. As shown, Food Waste was found to be the most prevalent material at almost 18 percent of the stream. Several grades of recyclable fiber also made the top 10 list.

Figure ES-3 Top 10 Most Prevalent Materials in Statewide Disposed MSW Stream
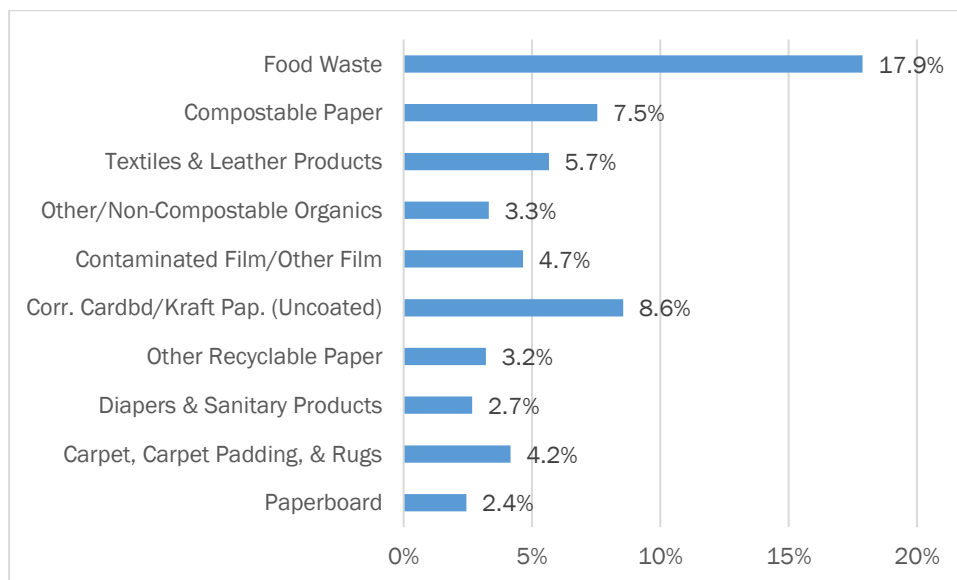
Figure ES-4 presents the composition of disposed waste in terms of the potential for diverting materials from disposal. This figure was developed by assigning a "Diversion Strategy" to each individual constituent in the waste stream. Specifically, each material was defined as one of the four categories listed below, as further detailed in Table ES-3:

◆ **Curbside Recyclables:** Includes recyclable fiber (e.g., newsprint, corrugated cardboard, magazines, paperboard, office paper and other mixed paper), recyclable containers (e.g., metal, plastic and glass containers: aluminum cans, steel cans, glass bottles, plastic bottles #1-#7) and other curbside recyclables (e.g., durable plastic, #1 non-bottle PET).

◆ **Compostables/Mulchables:** Includes compostable/mulchable organics – food waste, compostable paper, leaves, grass, pruning's and trimmings. Also included is clean lumber which can be chipped and composted, as well as other wood materials that can be used in composting/mulching of wood products, such as canes, crutches, crates, barrels and wood found in furniture. Also included is land clearing debris, recycled earthen materials (i.e. clays, sands, gravels and silts), topsoil, tree stumps, roots mats, brush and branches, logs, vegetation and rock from land clearing operations, which if not recycled are typically discarded in land clearing debris, rubble or C&D landfills.

◆ **Other Non-Curbside Recyclables:** Includes recyclables other than curbside recyclables that can be accepted at municipal drop-off locations or third-party recyclers or retailers (e.g., wood pallets, lead acid/single-use/rechargeable batteries, C&D debris, scrap metal, lightbulbs, fluids/oils, paint, other HHW, textiles/leather products, clean film bags, computer/electronics, tires, etc.).

◆ **Not Currently/Widely Recyclable:** Includes all other materials that are not currently recyclable (e.g., mattresses/box springs, expanded polystyrene, non-container glass, rubber products, cosmetics, shampoos, lotions, disposable diapers/sanitary products, supermix-bottom fines and dirt smaller than 2" (paper, plastic, glass, organic material etc.).

Figure ES-4 Statewide Divertibility of Disposed Wastes
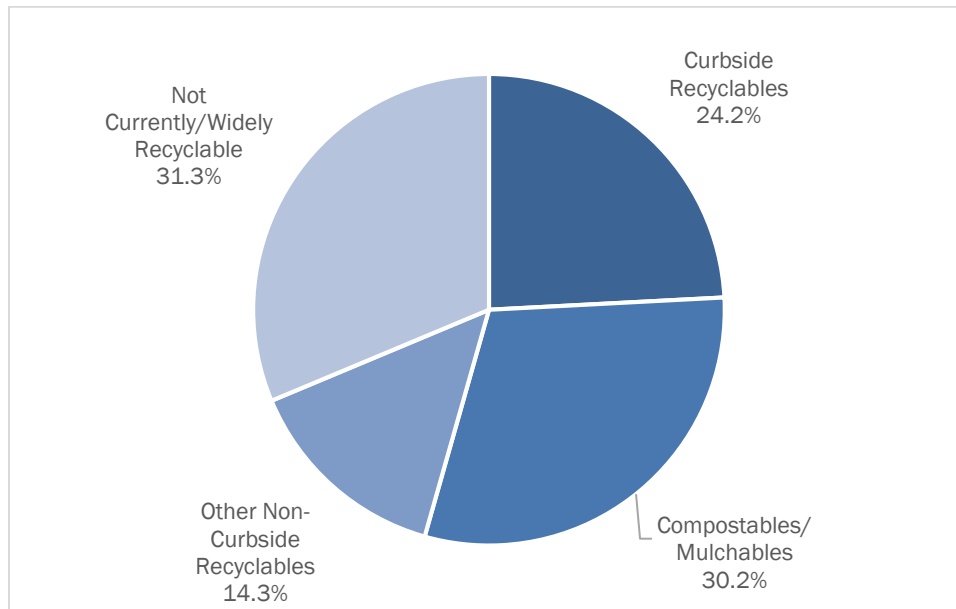
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table ES-3 Divertibility Strategy Assignments for Material Categories

Curbside Recyclables	Other Non-Curbside Recyclables (cont.)
Newsprint	Computers & Related Electronic Products
Corrugated Cardboard/Kraft Paper (Uncoated)	Textiles & Leather Products
Magazines	Tires
Paperboard	**Compostables/Mulchables**
(High Grade) Office Paper	Compostable Paper
Other Recyclable Paper	Food Waste
PET (#1) Bottles/Jars	Grass
PET (#1) Other	Leaves
HDPE (#2) Bottles – Natural Only	Brush, Pruning's and Trimmings
HDPE (#2) Colored Bottles & All Non-Bottle HDPE	Wood – Clean Lumber
#3 thru #7 Bottles	**Not Currently/Widely Recyclable**
Durable Plastic Products #3 thru #7	Non-Recyclable Paper
Aluminum Cans & Containers	Plastic Packaging #3 thru #7
Tin/Steel Containers	Expanded Polystyrene "Styrofoam"
Clear Glass Containers	Contaminated Film/Other Film
Brown Glass Containers	Remainder/Composite Plastic
Green Glass Containers	Non-Container/Other Glass
Other Non-Curbside Recyclables	Other/Non-Compostable Organics
Books	Wood – Painted/Treated
Clean Film and Clean Shopping Bags	Non-C&D Wood
Other Aluminum	Drywall/Gypsum Board
Other Non-Ferrous	Carpet, Carpet Padding, & Rugs
Other Ferrous	Medical Waste & Sharps
Wood – Pallets	Disposable Diapers & Sanitary Products
Concrete, Brick, Rock, & Other C&D	Bulky Items
Batteries – Lead Acid	Other/Not Elsewhere Classified
Batteries – Other Rechargeable	Supermix – Bottom Fines & Dirt
Batteries – All Other	
Other Hazardous Waste	

As shown in Figure ES-4, over 24 percent of the disposed MSW stream contains Curbside Recyclables that could be recycled in existing curbside recycling programs. Further, there is a significant amount of organic material in the stream. Overall, 68.7 percent of the waste stream is able to be diverted under curbside, other non-curbside and organics (compostables/mulchables) recycling programs. Currently, 31.3 percent of the waste stream is not able to be widely diverted under any recycling programs.

It is also important to note that the above figure represents the rosiest possible definition of what is "recoverable" in existing programs. To perform this study, manual sorters were trained to separate all items for placement in the correct category, and did not make any adjustments for contamination of sorted materials, nor the ability of a mechanical processing system to accurately separate such materials for recovery. The results of this exercise can be considered an "academic" characterization of the waste stream. Many of the recyclable and compostable organic items would never be recovered or diverted because of contamination, or because they are so intermingled with non-recoverable items prior to placement in the waste receptacle (or as a result of the collection process) that no processing line could economically separate and recover the item.

ES 4.2 DISPOSED WASTE COMPOSITION BY GENERATOR SECTOR

Figure ES-5 compares the percentage composition of material groups for Residential and ICI waste. On a percentage basis, it is shown that ICI waste contains a higher incidence of Paper, while the Residential sector disposes a higher percentage of Organics.

Figure ES-5 Comparison of Disposed Waste Composition by Generator Sector
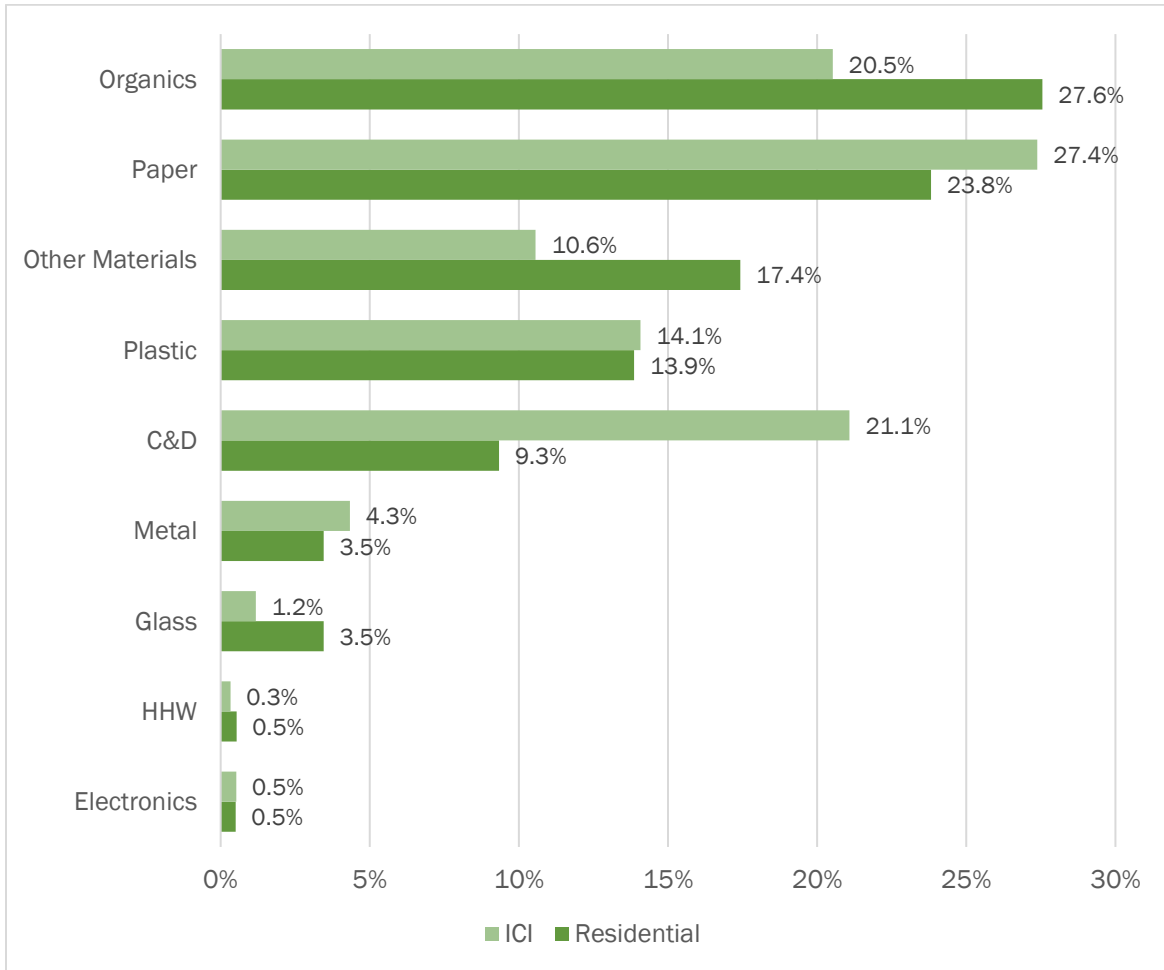
Figure ES-6 shows the most prevalent materials in both Residential and ICI. As shown, the most prevalent material in both generator sectors was Food Waste, and many materials are high in both lists.

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Figure ES-6 Comparison of Residential and ICI Most Prevalent Materials

Material	ICI	Residential
Food Waste	18.3%	17.5%
Compostable Paper	6.6%	8.5%
Textiles & Leather Products	4.4%	7.0%
Other/Non-Compostable Organics	1.8%	4.9%
Corr. Cardbd/Kraft Pap. (Uncoated)	12.2%	4.8%
Contaminated Film/Other Film	4.5%	4.8%
Diapers & Sanitary Products	0.9%	4.5%
Other Recyclable Paper	3.0%	3.4%
Fines & Dirt	1.2%	3.3%
Wood - Painted/Treated	4.7%	2.8%
Carpet, Carpet Padding, & Rugs	5.8%	2.4%
Remainder/Composite Plastic	3.9%	1.9%
Concrete/Brick/Rock/Other C&D	3.4%	1.5%
Wood - Clean Lumber	3.2%	0.8%

■ ICI ■ Residential

Figure ES-7 compares the divertibility of wastes from each generator sector. The divertibility between the residential and ICI sectors are similar with the residential sector having a higher occurrence of Not Currently/Widely Recyclable and Compostables/Mulchables categories in the disposed waste stream compared to the ICI sector.

Figure ES-7 Comparison of Divertibility by Generator Sector

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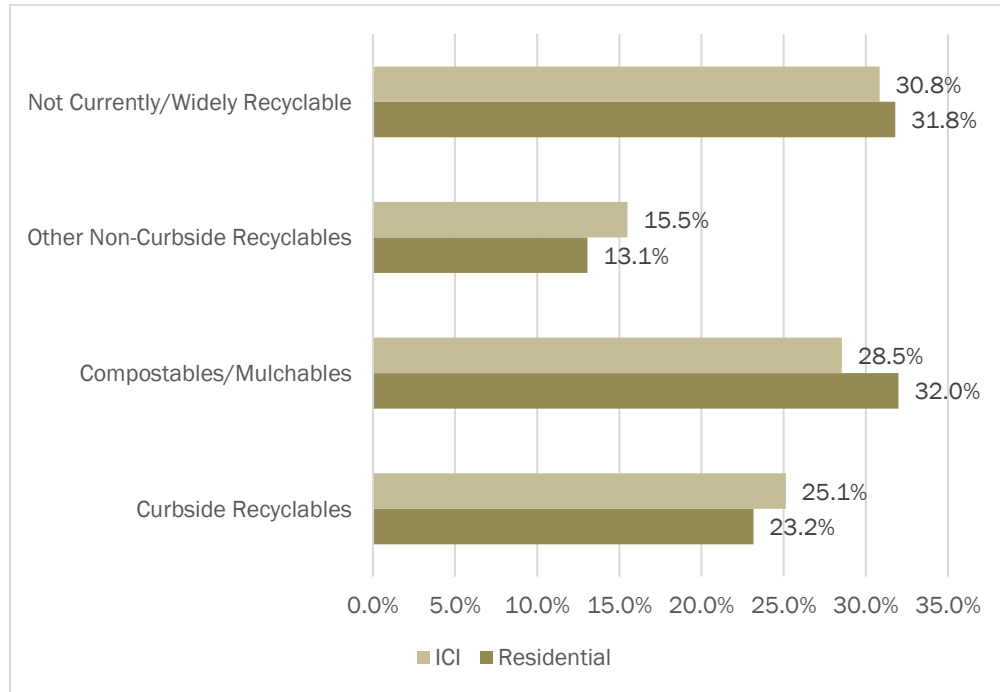
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ES 4.3 DISPOSED WASTE COMPOSITION BY DEMOGRAPHIC REGION

Figure ES-8 compares the percentage composition of material groups for Urban, Suburban and Rural Residential waste. As shown, there is a higher percentage of Paper, Plastic, Metal, Glass and Electronics in the Rural Residential waste stream. The Urban Residential waste stream has the highest percentage of Organic materials and Other wastes. The majority of samples originated from Suburban areas as is consistent with the state's demographics. It is less meaningful to rigorously compare the results across demographic regions because of the relatively small samples size for Urban and Rural wastes (and in the case of Urban wastes, all samples originated from the City of Baltimore). The composition estimates for these two demographic regions exhibit lower certainty (i.e., wider confidence intervals) compared to the results from Suburban areas.

Figure ES-8 Comparison of Residential Composition by Demographic Region
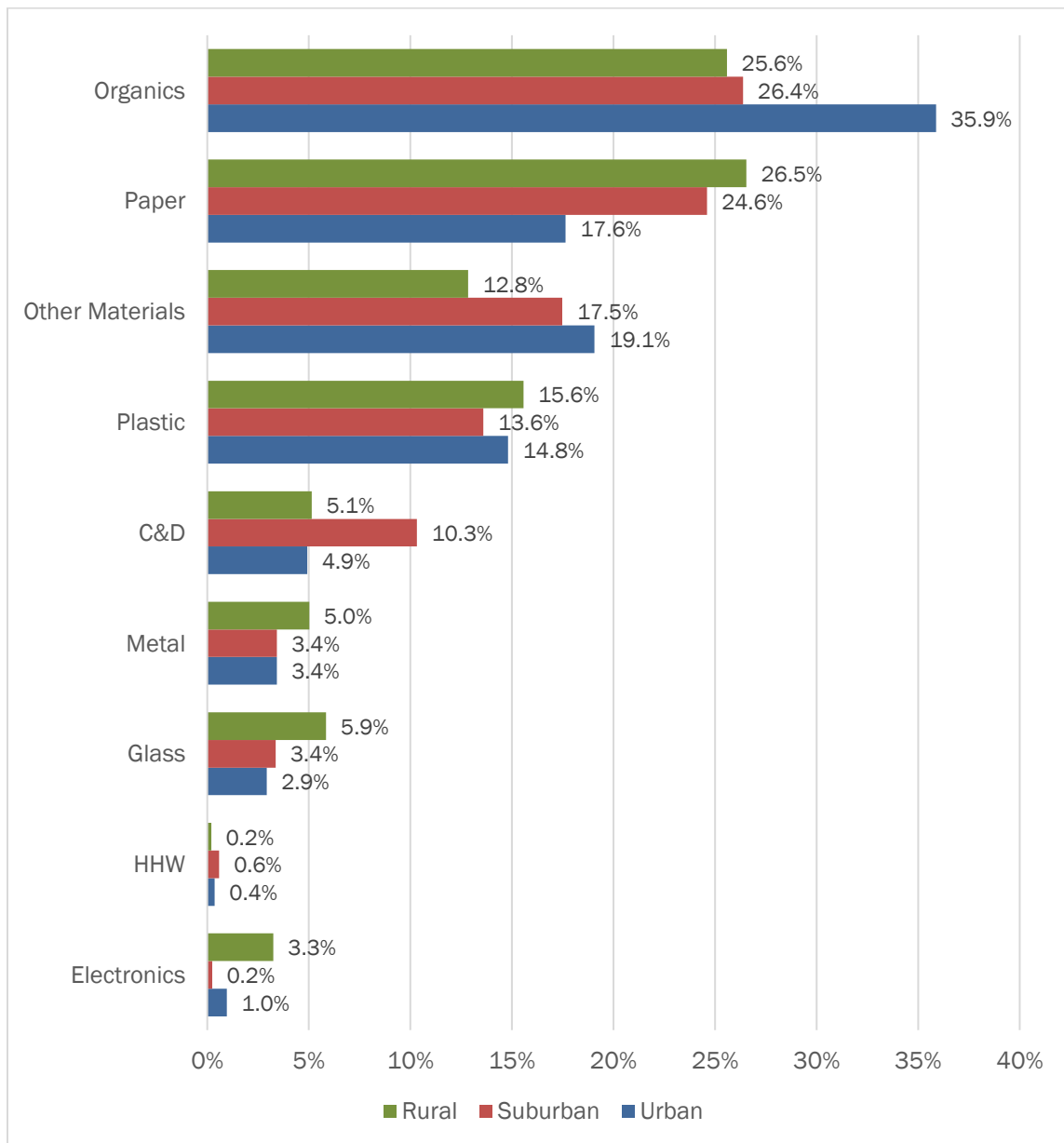
Figure ES-9 compares the percentage composition of material groups for Suburban and Rural ICI waste. As shown, A significantly higher fraction of Organics were found in the Rural ICI stream.

Figure ES-9 Comparison of ICI Composition by Demographic Region
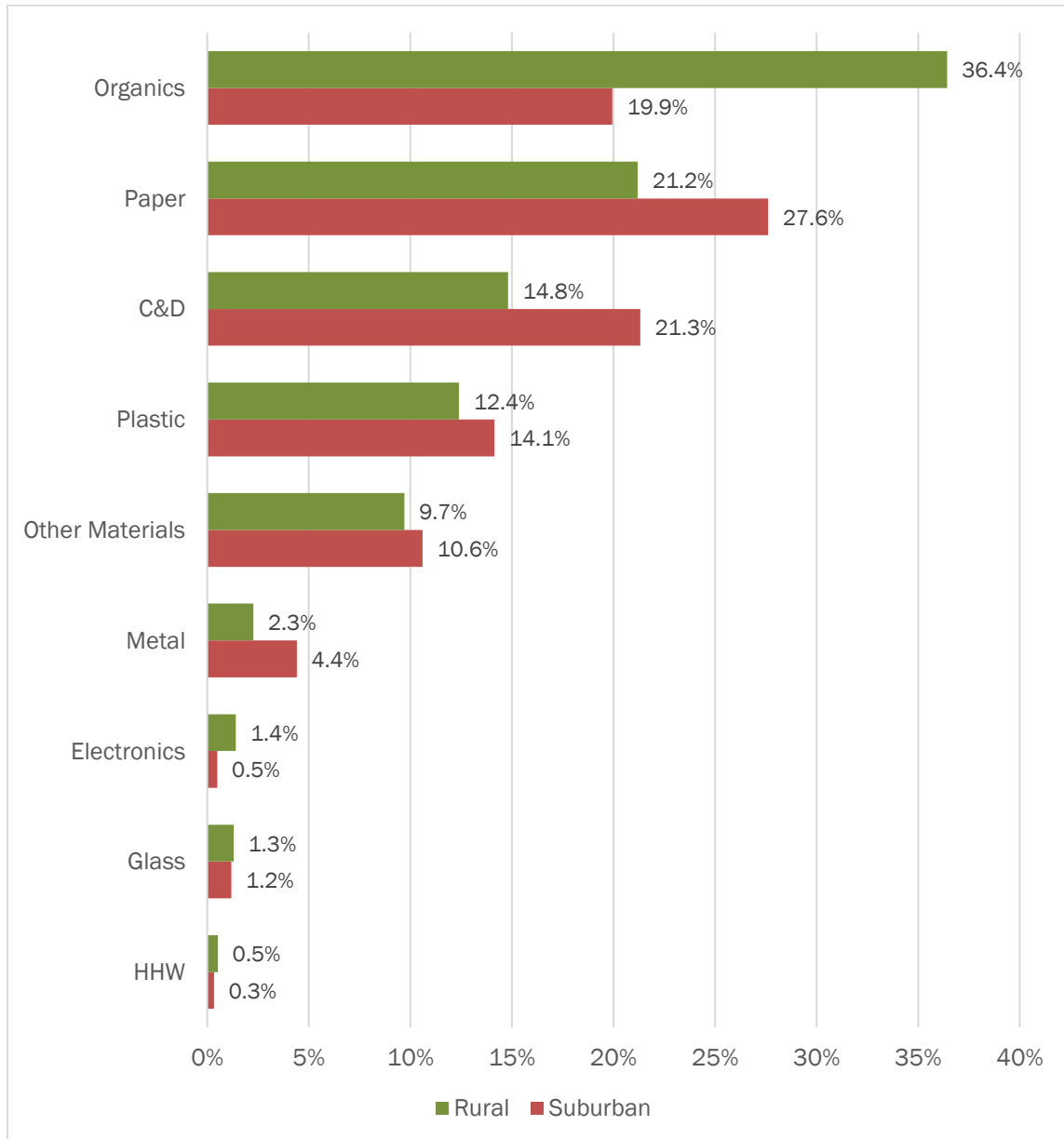
ES 5. CONCLUSIONS

The 2016 Study served as a good first effort to measure the composition of disposed municipal solid waste originating throughout Maryland. The study distributed field data collection across the state's landfills (and one transfer station) to capture representative samples of disposed wastes from rural areas to the west and east of the state, as well as in the more suburban and urban center. It should be noted that this study provided a reasonably representative snapshot of residential wastes and ICI wastes, as well as the aggregate disposed waste stream.

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The study also found that there are still targeted fiber and container recyclables in the Residential waste stream which could be diverted through curbside recycling programs. Further, at least half of the disposed waste stream is made up of organic materials, which means that significant improvements to current diversion rates will require strategies to reduce disposal of organic wastes.

The full report contains detailed tabular and graphical data for the statewide aggregate waste stream, for Residential and ICI generators, and by demographic region. Facility-specific results are also included. A number of additional conclusions and recommendations are provided for future consideration should the Department opt to update this study on a recurring basis.

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1. INTRODUCTION

1.1 BACKGROUND

The Maryland Recycling Act (MRA) (Md. Code Ann., Envir. 9-1701–9-1730) requires all Maryland counties and Baltimore City to recycle from 20 to 35 percent (depending on population) of waste generated. By 2020, Maryland has established a voluntary waste diversion goal of 60 percent, and a voluntary recycling rate of 55 percent.

The Maryland Department of the Environment (the Department) works toward Maryland's waste diversion goals by partnering with jurisdictions and the public and private sectors to develop markets for recyclable materials and by working with other State agencies to increase the volume of materials diverted from disposal. Like many state environmental agencies, the Department recognizes the importance of establishing a baseline snapshot of the disposed waste stream for use by stakeholders intent on reducing disposal and increasing diversion. In 2016, the Department partnered with the Northeast Maryland Waste Disposal Authority (NMWDA) to design and perform the state's inaugural statewide waste characterization study.

The Department and the NMWDA established a budgetary and operational framework for the 2016 Maryland Statewide Waste Characterization Study (2016 Study). MSW Consultants was retained to design and perform a comprehensive research protocol for the 2016 Study within this framework. MSW Consultants subsequently performed the field data collection, analyzed results and developed this report.

1.2 OBJECTIVES

As Maryland's inaugural statewide waste characterization effort, the 2016 Study sought to achieve multiple important objectives:

◆ Gather waste composition data using a proven, transparent methodology that is statistically representative of the State's disposed residential and commercial waste streams;

◆ Capture representative samples of wastes originating from the Residential and Institutional/ Commercial/Industrial (ICI) sectors for the purpose of differentiating composition from each of these sectors;

◆ Capture representative samples of wastes originating from rural, suburban and urban areas of the state in a manner that allows for aggregating a statewide composition in proportion to the contribution from each demographic stratum;

◆ Determine the types and quantities of potentially recoverable recyclable and compostable materials found in the disposed waste stream; and

◆ Have the final study methodology and results serve as a comprehensive baseline, so that future updates can reasonably duplicate the methodology and form a consistent time series to inform the Department and other stakeholders about progress towards state diversion goals.

It is important to note that the 2016 Study focused only on the disposed Municipal Solid Waste (MSW) stream. This Study did not attempt to characterize other waste streams such as construction and demolition (C&D) debris, industrial/agricultural wastes, or special wastes; nor did this Study attempt to evaluate the composition of other material streams that are being diverted from disposal.

1.3 REPORT ORGANIZATION

In addition to this Introduction and an Executive Summary, the report is divided into the following sections:

◆ **Methodology:** This section presents an overview of waste generation and disposal data available from county and disposal facility reports, and used for the purpose of aggregating waste composition

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1. INTRODUCTION

results. This section also summarizes the sampling plan that was developed to guide the study process and to provide statistically defensible data. Finally, this section summarizes the field data collection methods, and analytical methods applied in the study.

◆ **Results:** This section presents results about the composition of disposed aggregate statewide municipal solid waste; the composition of MSW from the residential and ICI generator sectors; and the differences in composition from urban/suburban and rural areas of the state. Results are presented in both tabular and graphical format to highlight findings of interest. Results are also provided for individual host facilities, although the facility-level results do not have the same level of statistical rigorousness as the statewide results.

◆ **Conclusions and Recommendations:** This section presents conclusions that can be drawn from the 2016 Study as well as recommendations for usage of the data and for future study.

◆ **Appendices:** Supplemental data and analysis are contained in several appendices.

2. METHODOLOGY

2.1 INTRODUCTION

This section summarizes Maryland state waste disposal data to which the composition results from this study can be applied. This section also summarizes key elements of the study design and methodology. A complete Study Design containing additional details to the sampling and sorting process was developed to guide field data collection and is included as Appendix A (excluding original appendices).

2.2 REPORTED STATEWIDE DISPOSED MSW

Although Maryland tracks multiple waste streams that are destined for recycling and disposal (C&D debris, industrial waste, land clearing debris and others), this characterization study targeted the municipal solid waste (MSW) portion of disposed solid waste. The Department provided a summary report of the county-level MSW disposal for calendar year 2014, the most recent year for which data are available.

Table 2-2 aggregates disposed wastes originating in counties which are urban, suburban and rural in nature. As shown in this table, the vast majority (almost 80 percent) of the disposed MSW originates from largely suburban counties. This table also provides the estimated contribution of disposed waste by generator sector. As shown, rural areas are weighted towards residential wastes, and urban areas are weighted toward ICI waste; suburban areas of the state are assumed to have a 50/50 split. These allocations are estimates only, but are based on other studies that have more rigorously investigated waste generation by demographic sector (Connecticut, 2015; Pennsylvania, 2003; Illinois, 2009).

The data in these tables serve as weighting factors for the aggregation of facility-level composition data collection in this study.

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2. METHODOLOGY

Table 2-1 summarizes the reported county-level MSW disposal. This table also indicates each county's targeted recycling threshold, and identifies the county as being either urban, suburban or rural based on guidance provided by the NMWDA that factored in both population and also on the Department's threshold for achieving county recycling rates. As shown in this table, over 3.78 million tons of MSW generated in Maryland were ultimately disposed at in-state and out-of-state landfills and waste-to-energy facilities.

Table 2-2 aggregates disposed wastes originating in counties which are urban, suburban and rural in nature. As shown in this table, the vast majority (almost 80 percent) of the disposed MSW originates from largely suburban counties. This table also provides the estimated contribution of disposed waste by generator sector. As shown, rural areas are weighted towards residential wastes, and urban areas are weighted toward ICI waste; suburban areas of the state are assumed to have a 50/50 split. These allocations are estimates only, but are based on other studies that have more rigorously investigated waste generation by demographic sector (Connecticut, 2015; Pennsylvania, 2003; Illinois, 2009).

The data in these tables serve as weighting factors for the aggregation of facility-level composition data collection in this study.

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Table 2-1 MSW Disposed by County of Origin

County	Population, 2015 [1]	MSW Destined for Disposal, 2014 (tons) [2]	Recycling Threshold [3]	2014 Recycling Rate	Demography
Allegany	72,528	49334	20%	41%	Suburban
Anne Arundel	564,195	404824	35%	38%	Suburban
Baltimore City	621,849	591874	35%	15%	Urban
Baltimore County	831,128	663585	35%	29%	Suburban
Calvert	90,595	44388	20%	31%	Suburban
Carroll	167,627	102332	35%	38%	Suburban
Cecil	102,382	60900	20%	41%	Suburban
Charles	156,118	77936	35%	51%	Suburban
Dorchester	32,384	32393	20%	28%	Rural
Frederick	245,322	131928	35%	50%	Suburban
Garrett	29,460	20307	20%	51%	Rural
Harford	250,290	146913	35%	43%	Suburban
Howard	313,414	280576	35%	45%	Suburban
Mid-Shore [4]	138,782	105901	20%	54%	Rural
Montgomery	1,040,116	486798	35%	56%	Suburban
Prince George's	909,535	311679	35%	59%	Suburban
Somerset	25,768	14987	20%	20%	Rural
St. Mary's	111,413	42925	20%	35%	Suburban
Washington	149,585	55302	20%	61%	Suburban
Wicomico	102,370	92883	20%	36%	Suburban
Worcester	51,540	66296	20%	27%	Suburban
Total	**6,006,401**	**3,784,062**			

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

[1] Source: US Census Bureau.

[2] Source: Maryland Solid Waste Management and Diversion Report: 2015 (Calendar Year 2014 Data), Maryland Department of the Environment.

[3] Recycling rates shown in this column were not applicable until 2015.

[4] Mid-Shore Regional Recycling Program includes Caroline, Kent, Queen Anne's and Talbot Counties.

Table 2-2 Disposed MSW Originating from Maryland Counties by Demographic Region (2014)

Demographic Region	MSW Destined for Disposal, 2014 (tons)	Percent of Statewide	Residential/ ICI Split [1]	Residential Waste Disposal (tons)	ICI Waste Disposal (tons)
Urban	591,874	15.6%	40%/60%	236,750	355,125
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Total	**3,784,062**	**100.0%**		**1,850,202**	**1,933,860**

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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2. METHODOLOGY

2.3 HOST FACILITIES AND FIELD DATA COLLECTION SCHEDULE

2.3.1 FACILITIES HOSTING FIELD DATA COLLECTION

The Department identified acceptance facilities to host field data collection. Additionally, at least five waste characterization studies have been performed in Maryland in the past five years and the results of these studies were evaluated for inclusion in the statewide waste composition analysis.

A total of nine acceptance facilities hosted field data collection for this study. Table 2-3 identifies the facilities hosting field data collection and indicates the date(s) on which sampling and sorting took place in both seasonal field data collection events. This table also indicates the demographic region served by each host disposal facility.

Table 2-3 2016 Field Data Collection Schedule by Host Facility

Facility	County	Demographic Region	Season 1 Dates	Season 2 Dates
Northern Landfill	Carroll	Suburban	July 12-13	Oct 21
Forty West Landfill	Washington	Suburban	Jul 14	Oct 20
Garrett County Landfill	Garrett	Rural	Jul 15	Oct 19
Northwest Transfer Station	City of Baltimore	Urban	Jul 19 & Jul 21	Not sampled
Quarantine Road Landfill	City of Baltimore	Urban	Not sampled	Oct 17-18
Charles County Landfill	Charles	Suburban	Jul 20	Oct 10-11
Central Landfill	Cecil	Suburban	Jul 25	Oct 14
Appeal Landfill	Calvert	Suburban	Jul 26	Oct 12
Somerset County Landfill	Somerset	Rural	Jul 27	Oct 13

2.3.2 SUPPLEMENTAL DATA SOURCES

In addition to field data collection at the host facilities above, the Department noted that five waste composition studies have been performed for Maryland counties in the past five years. These studies contain disposed waste composition data that could potentially supplement the field data collection for this statewide waste characterization study. Table 2-4 summarizes the supplemental waste characterization studies that are evaluated later in this report for integration in the statewide composition estimates.

Table 2-4 Recent Maryland Waste Characterization Studies

Facility	County	Demographic Region	Study Date
Newland Park Landfill	Wicomico	Suburban	Jul 2014
Shady Grove Transfer Station	Montgomery	Suburban	Jul 2013
Alpha Ridge Transfer Station	Howard	Suburban	Nov 2012
Millersville Landfill	Anne Arundel	Suburban	Oct 2014
Brown Station Road Landfill	Prince George's	Suburban	Sep 2015

Table 2-5 identifies critical elements of the design of these studies. Of particular importance, only two of these studies were designed to the same degree of rigorousness as the Maryland Statewide Study. Specifically, the Montgomery County study and the Prince George's County study both follow the methodology for the 2016 Statewide Study because of two critical attributes:

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◆ The all separately investigate both the residential and ICI generator sectors, and

◆ They all perform a comprehensive sort of the waste into recyclable, compostable, and non-recoverable constituents.

Table 2-5 Recent Maryland Waste Composition Studies

Study	Generator Sector(s)	No. of Material Categories	No. of Seasons	No. of Samples	Conf Int.	Used in 2016 Study
Anne Arundel	Residential only	35	2	90	95%	No
Prince George's	Residential, ICI and public schools	39	4	193	95%	Yes
Howard	Residential only	19	1	40	90%	No
Wicomico	"residential, construction, homeowner drop-off"	26	1	21	90%	No
Montgomery	Single family residential, multi-family residential and non-residential	64	4	300	95%	Yes

Conversely, the other studies did not provide comparable data that could be integrated into the Maryland Statewide Study for the following reasons:

◆ The Anne Arundel County study focused only on the residential waste stream, and the sorting procedures focused only on pulling out select recyclables and compostable materials and did not meet the same degree of sorting detail as the 2016 Statewide Study.

◆ The Wicomico County study had a limited focus, a simplified sort procedure and mixed generator sectors.

◆ The Howard County study focused only on the residential sector and was not intended to provide county-wide composition data. Rather, it was intended only to compare the composition of residential waste from a pilot test curbside organics program to another non-pilot route.

Based on the above analysis, the Montgomery County and Prince George's County study results are used to supplement the results of the 2016 Statewide Study.

2.3.3   SUMMARY OF WASTE COMPOSITION DATA SOURCES

Figure 2-1 plots the location of the host facilities, as well as the five studies that have been completed in recent years. As stated in the preceding section, only two of the five existing studies were ultimately included in the statewide analysis.

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Figure 2-1 Waste Characterization Sources for Data Analysis
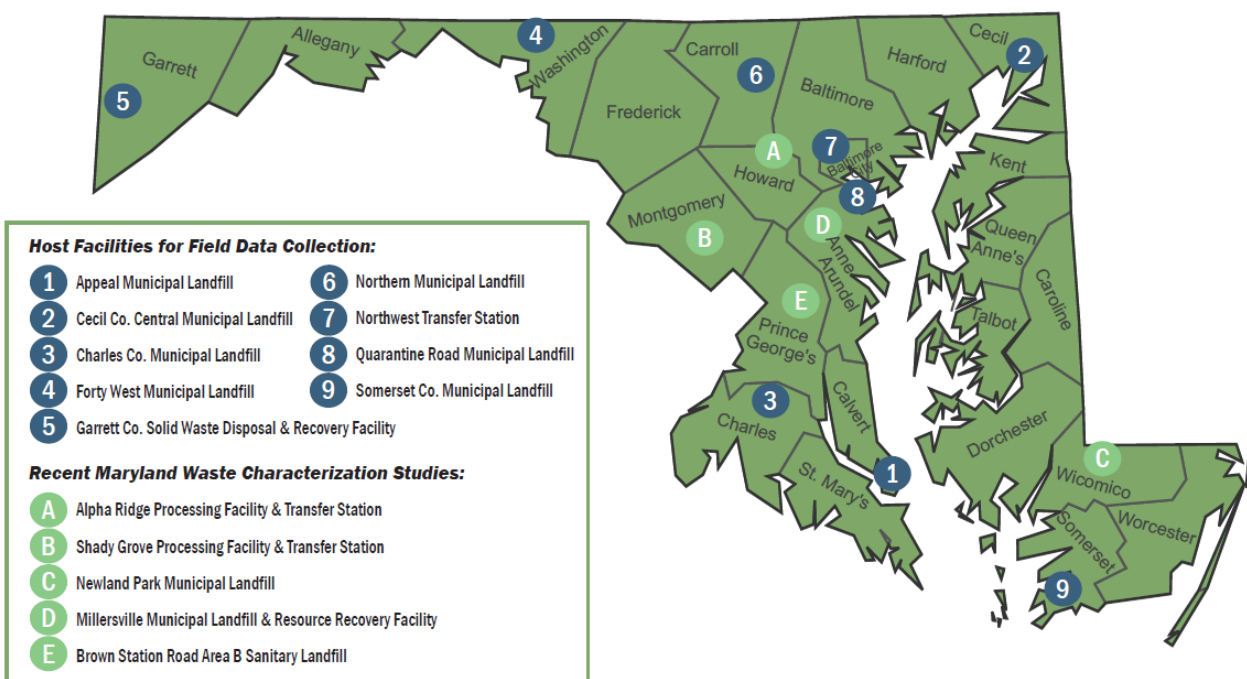
2.4 SAMPLING TARGETS

A total of eight facilities were originally identified to host field data collection for this study. After completion of the first season of field data collection, it was determined that a ninth facility should be added. Specifically, the City of Baltimore Landfill was added with the hope of obtaining loads of waste originating in the ICI sector.

Table 2-6 summarizes the host facilities and shows the targeted number of samples from each. As shown, the sampling was largely successful with the exception of the Baltimore-area host facilities. While residential waste deliveries were routinely available at both the Northwest Transfer Station and the City of Baltimore Landfill, few ICI deliveries were available at these locations. As a result, it was not possible to obtain the targeted number of ICI samples from these facilities. Sampling targets were generally obtained at all other facilities.

Table 2-7 provides the count of samples obtained in each of the two seasons of field data collection. As shown, sampling was reasonably well balanced between seasons.

Table 2-6 Sampling Targets – Planned vs Actual

Host Acceptance Facilities	Planned Samples	Actual Samples Obtained			
		Residential	ICI	Total	Difference
Cecil County Landfill	22	8	14	22	0
Carroll County Northern Landfill	27	15	11	26	-1
Somerset County Landfill	22	2	17	19	-3
Charles County Landfill	27	13	16	29	+2
Appeal Landfill (Calvert County)	22	7	15	22	0
Quarantine Road Landfill	0	9	1	10	+10
Northwest Transfer Station (City of Baltimore)	44	19	0	19	-25
Garrett County Landfill	22	10	12	22	0
Forty West Muni LF (Washington County)	22	6	16	22	0
Total	208	89	101	191	-17

Table 2-7 Sample Summary by Seasons

Host Acceptance Facilities	Summer Season	Fall Season	Total Samples
Cecil County Landfill	11	11	22
Somerset County Landfill	9	10	19
Charles County Landfill	11	18	29
Appeal Landfill (Calvert County)	11	11	22
City of Baltimore Landfill	0	10	10
Northwest Transfer Station (City of Baltimore)	19	0	19
Garrett County Landfill	11	11	22
Forty West Muni LF (Washington County)	11	11	22
Northern Landfill (Carroll County)	18	8	26
Total	101	90	191

2.5   OVERVIEW OF METHODOLOGY

A complete Study Design was prepared prior to field data collection and is included as Appendix A to this report. Key elements of the study are summarized below.

◆ **Generator Sectors**: Inbound loads were categorized by generator sector for this study. Each load was classified as originating from:

   ◆ **Residential:** Includes waste generated in single family and multi-family residential households.

   ◆ **Industrial/Commercial/Institutional (ICI):** Includes waste generated in commercial, industrial, and institutional establishments.

◆ **Material Categories**: A total of 53 material categories were defined for this project. These are summarized in Table 2-8. Complete definitions are contained in Appendix B.

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Table 2-8 Material Categories

Paper	Organics
Newsprint	Food Waste
Corrugated Cardboard/Kraft Paper (Uncoated)	Grass
Magazines	Leaves
Paperboard	Brush, Pruning's and Trimmings
(High Grade) Office Paper	Other/Non-Compostable Organics
Books	**C&D Materials**
Other Recyclable Paper	Wood – Clean Lumber
Compostable Paper	Wood – Painted/Treated
Non-Recyclable Paper	Wood – Pallets
Plastic	Non-C&D Wood
PET (#1) Bottles/Jars	Drywall/Gypsum Board
PET (#1) Other	Concrete, Brick, Rock, & Other C&D
HDPE (#2) Bottles – Natural Only	Carpet, Carpet Padding, & Rugs
HDPE (#2) Colored Bottles & All Non-Bottle HDPE	**Household Hazardous Waste**
#3 thru #7 Bottles	Medical Waste & Sharps
Plastic Packaging #3 thru #7	Batteries – Lead Acid
Durable Plastic Products #3 thru #7	Batteries – Other Rechargeable
Expanded Polystyrene "Styrofoam"	Batteries – All Other
Clean Film and Clean Shopping Bags	Other Hazardous Waste
Contaminated Film/Other Film	**Electronics**
Remainder/Composite Plastic	Computers & Related Electronic Products
Metal	**Other Materials**
Aluminum Cans & Containers	Textiles & Leather Products
Other Aluminum	Disposable Diapers & Sanitary Products
Other Non-Ferrous	Bulky Items
Tin/Steel Containers	Tires
Other Ferrous	Other/Not Elsewhere Classified
Glass	Supermix – Bottom Fines & Dirt
Clear Glass Containers	
Brown Glass Containers	
Green Glass Containers	
Non-Container/Other Glass	

◆ **Sampling**: Host facilities were asked to provide recent scale transaction data to illustrate the number of loads received and the distribution of inbound waste by waste sector. Samples of inbound solid waste were obtained systematically from the universe of deliveries. The Field Supervisor had a pre-determined sampling frequency to select every nth vehicle depending on expected number of loads for each generator sector and sampling targets. In order to meet sampling targets and keep the sort team actively sorting, the sampling frequency was often shortened by sampling trucks more frequently, especially at suburban and rural landfills that received a limited number of trucks per day.

Vehicle drivers confirmed generator sector (Residential or ICI), hauler name, town of origin, vehicle type, load weight, and truck number. Sampling was conducted by the Field Supervisor who used a loader to collect a systematic "grab" from the load from a pre-determined area of the tipped load. A sample weighing a minimum of 200 pounds was pre-weighed before being labeled and sent to the sort table. Pictures of sampling are shown in Figure 2-2.

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Figure 2-2 Sampling of Inbound MSW
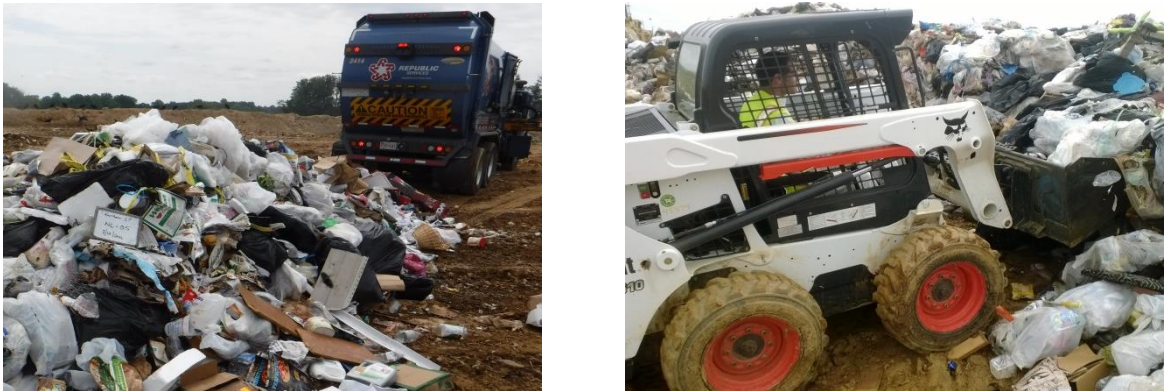
◆ **Sorting**: Samples were manually sorted into pre-labeled bins. Sorting was performed by a dedicated traveling team of sorters managed by a professional crew chief. Sorting is shown in Figure 2-3.

Figure 2-3 Sorting and Data Recording

◆ **Data Recording**: All data was recorded in real time with a tablet computer containing pre-programmed data entry forms. The pre-programmed forms tabulate weight data for each sample so that the Crew Chief can confirm that sorted weights meet targeted sample weights. Entered data is synchronized to a cloud storage system via cellular connection, where it can be reviewed for QA/QC the following day by technical staff in the office.

◆ **Data Analysis**: A complete statistical analysis is performed on the composition data to develop the statistical mean, standard deviation and confidence intervals for each material category.

Appendix C contains a more detailed photo journal of the sampling and sorting process, examples of selected material categories, and shows the sorting work area.

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3. RESULTS

3.1 INTRODUCTION

This section provides extensive data about the composition of disposed wastes originating in Maryland. It is important to note that results are presented in both unadjusted and adjusted form:

◆ **Unadjusted Waste Composition** reflects the composition determined through the customized field data collection procedures performed for this study. In other words, these results are built up from the underlying samples collected at the nine disposal facilities that hosted field data collection in 2016. The majority of the figures and graphics presented in this chapter reflect the Unadjusted results.

◆ **Adjusted Waste Composition** reflects the impact of integrating other third-party waste composition data into the Unadjusted results. There are inherent limitations when integrating data from different studies, driven by differences in generator sectors targeted, material category differences, and degree of sortation between studies. Ultimately, it was only possible to integrate Prince George's County and Montgomery County waste composition data into the Unadjusted results.[1] The more limited, Adjusted waste composition results are shown for Statewide Residential Waste, Statewide ICI Waste, and Statewide Aggregate Waste.

Detailed results are shown in the following sections.

3.2 STATEWIDE AGGREGATE DISPOSED MSW COMPOSITION

Figure 3-1 shows the tonnage of disposed wastes in 2014, applied to the Unadjusted composition data from the 2016 waste sort, aggregating the Residential and ICI generator sectors. As shown, Organics and Paper are the most common material groups and comprise roughly half the disposed waste stream.

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[1] Waste composition studies performed for Wicomico County, Howard County, and Anne Arundel County were omitted from the integration due to incompatibilities in study methodologies and/or material category definitions.

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Figure 3-1 2016 Maryland Statewide Disposed Municipal Solid Waste Composition, Tons (Unadjusted)
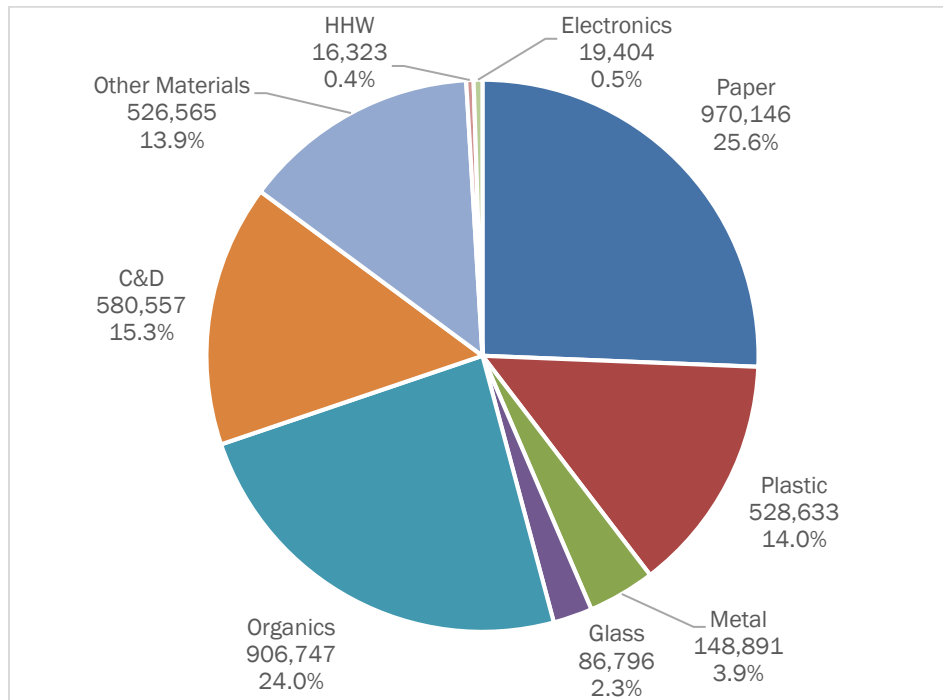
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-2 shows the top 10 most prevalent materials in the Maryland statewide disposed MSW stream. As shown, Food Waste was found to be the most prevalent material at almost 18 percent of the stream. Several grades of recyclable fiber also made the top 10 list.

Figure 3-2 Top 10 Most Prevalent Materials in Statewide Disposed MSW Stream (Unadjusted)
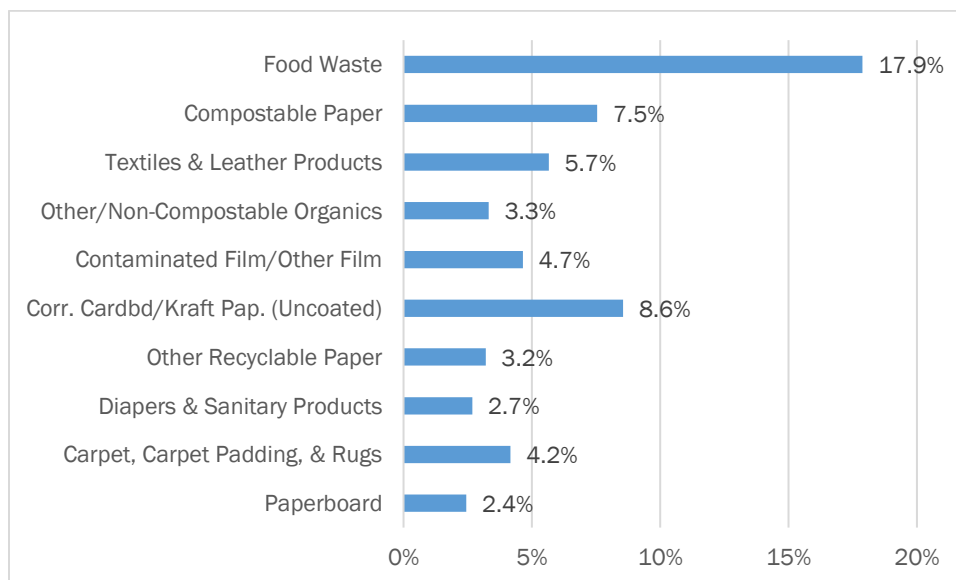
Table 3-1 provides a detailed statistical profile of the 2016 statewide aggregate disposed MSW stream. For each material category, the mean percent, confidence intervals, and estimated tonnage are shown.

Confidence intervals are calculated at a 90 percent level of confidence. 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 25.6 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.

Table 3-1 Detailed Statewide Disposed MSW Composition (Unadjusted)

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**25.6%**	**1.9%**	**970,146**	**Organics**	**24.0%**	**2.2%**	**906,747**
Newsprint	1.6%	0.5%	59,160	Food Waste	17.9%	2.2%	676,590
Corr. Cardbd/Kraft Pap. (Uncoated)	8.6%	1.1%	323,743	Grass	1.2%	0.7%	45,255
Magazines	0.7%	0.1%	25,084	Leaves	0.3%	0.2%	12,973
Paperboard	2.4%	0.5%	92,311	Brush/Prunings/Trimmings	1.2%	0.6%	46,231
(High Grade) Office Paper	0.5%	0.2%	18,868	Other/Non-Compostable	3.3%	0.7%	125,697
Books	0.3%	0.7%	9,715	**C&D Debris**	**15.3%**	**2.4%**	**580,557**
Other Recyclable Paper	3.2%	0.6%	121,091	Wood - Clean Lumber	2.0%	0.7%	77,433
Compostable Paper	7.5%	0.8%	285,516	Wood - Painted/Treated	3.8%	0.9%	143,191
Non-Recyclable Paper	0.9%	0.2%	34,657	Wood - Pallets	1.8%	1.0%	69,761
Plastic	**14.0%**	**1.3%**	**528,633**	Non-C&D Wood	0.3%	0.1%	11,803
PET(#1) Bottles/Jars	1.4%	0.1%	51,479	Drywall/Gypsum Board	0.7%	0.4%	26,949
PET(#1) Other	0.2%	0.2%	8,710	Concrete/Brick/Rock/Other C&D	2.5%	1.1%	93,878
HDPE(#2) Bottles - Natural	0.3%	0.1%	12,135	Carpet, Carpet Padding, & Rugs	4.2%	1.3%	157,542
HDPE(#2) Color Bottle/All Non-Bot.	0.5%	0.1%	17,595	**Household Hazardous Waste**	**0.4%**	**0.2%**	**16,323**
#3 thru #7 Bottles	0.1%	0.0%	2,611	Medical Waste & Sharps	0.2%	0.1%	6,993
Plastic Packaging #3 - #7	1.2%	0.1%	46,320	Batteries - Lead Acid	0.0%	0.0%	1,711
Durable Plastic Products #3 - #7	1.2%	0.4%	44,018	Batteries - Other Rechargeable	0.0%	0.0%	36
Expanded Polystyrene "Styrofoam"	0.8%	0.2%	31,046	Batteries - All Other	0.0%	0.0%	468
Clean Film & Clean Shopping Bags	0.7%	0.2%	27,831	Other Hazardous Waste/HHW	0.2%	0.1%	7,115
Contaminated Film/Other Film	4.7%	0.5%	176,020	**Electronics**	**0.5%**	**0.6%**	**19,404**
Remainder/Composite Plastic	2.9%	1.0%	110,869	Computers/Related Elec. Prods.	0.5%	0.4%	19,404
Metal	**3.9%**	**0.7%**	**148,891**	**Other Wastes**	**13.9%**	**1.7%**	**526,565**
Aluminum Cans & Containers	0.4%	0.1%	16,654	Textiles & Leather Products	5.7%	1.2%	214,234
Other Aluminum	0.4%	0.2%	13,865	Diapers & Sanitary Products	2.7%	0.4%	101,232
Other Non-Ferrous	0.5%	0.2%	19,231	Bulky Items	2.0%	1.0%	76,789
Tin/Steel Containers	1.2%	0.4%	43,837	Tires	0.2%	0.2%	8,352
Other Ferrous	1.5%	0.5%	55,303	Other/Not Classified	1.1%	0.5%	41,826
Glass	**2.3%**	**0.4%**	**86,796**	Fines & Dirt	2.2%	0.4%	84,131
Clear Glass Containers	1.1%	0.2%	42,116				
Brown Glass Containers	0.6%	0.2%	24,167				
Green Glass Containers	0.3%	0.1%	10,939	**Grand Total**	**100%**		**3,784,062**
Non-Container/Other Glass	0.3%	0.1%	9,574	*No. of Samples*	*191*		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-3 presents the composition of disposed waste in terms of the potential for diverting materials from disposal. This figure was developed by assigning a "Diversion Strategy" to each individual constituent in the waste stream. Specifically, each material was defined as one of the four categories listed below, as further detailed in Table 3-2:

◆ **Curbside Recyclables**: Includes recyclable fiber (e.g., newsprint, corrugated cardboard, magazines, paperboard, office paper and other mixed paper), recyclable containers (e.g., metal, plastic and glass

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containers: aluminum cans, steel cans, glass bottles, plastic bottles #1-#7) and other curbside recyclables (e.g., durable plastic, #1 non-bottle PET).

◆ **Compostables/Mulchables**: Includes compostable/mulchable organics – food waste, compostable paper, leaves, grass, pruning's and trimmings. Also included is clean lumber, which can be chipped and composted, as well as other wood materials that can be used in composting/mulching of wood products, such as canes, crutches, crates, barrels and wood found in furniture. Also included is land clearing debris, recycled earthen materials (i.e. clays, sands, gravels and silts), topsoil, tree stumps, roots mats, brush and branches, logs, vegetation and rock from land clearing operations, which if not recycled are typically discarded in land clearing debris, rubble or C&D landfills.

◆ **Other Non-Curbside Recyclables**: Includes recyclables other than curbside recyclables that can be accepted at municipal drop-off locations or third-party recyclers or retailers (e.g., wood pallets, lead acid/single-use/rechargeable batteries, C&D debris, scrap metal, lightbulbs, fluids/oils, paint, other HHW, textiles/leather products, clean film bags, computer/electronics, tires, etc.).

◆ **Not Currently/Widely Recyclable:** Includes all other materials that are not currently recyclable (e.g., mattresses/box springs, expanded polystyrene, non-container glass, rubber products, cosmetics, shampoos, lotions, disposable diapers/sanitary products, supermix-bottom fines and dirt smaller than 2" (paper, plastic, glass, organic material etc.).

Figure 3-3 Statewide Divertibility of Disposed Wastes (Unadjusted)
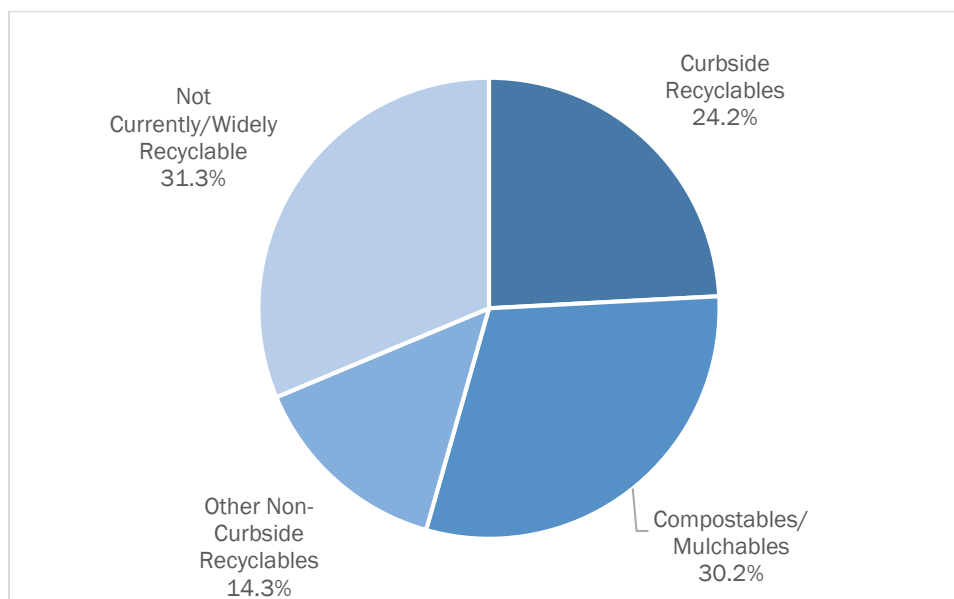
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-2 Divertibility Strategy Assignments for Material Categories

Curbside Recyclables	Compostables/Mulchables
Newsprint	Compostable Paper
Corrugated Cardboard/Kraft Paper (Uncoated)	Food Waste
Magazines	Grass
Paperboard	Leaves
(High Grade) Office Paper	Brush, Pruning's and Trimmings
Other Recyclable Paper	Wood – Clean Lumber
PET (#1) Bottles/Jars	**Not Currently/Widely Recyclable**
PET (#1) Other	Non-Recyclable Paper
HDPE (#2) Bottles – Natural Only	Plastic Packaging #3 thru #7
HDPE (#2) Colored Bottles & All Non-Bottle HDPE	Expanded Polystyrene "Styrofoam"
#3 thru #7 Bottles	Contaminated Film/Other Film
Durable Plastic Products #3 thru #7	Remainder/Composite Plastic
Aluminum Cans & Containers	Non-Container/Other Glass
Tin/Steel Containers	Other/Non-Compostable Organics
Clear Glass Containers	Wood – Painted/Treated
Brown Glass Containers	Non-C&D Wood
Green Glass Containers	Drywall/Gypsum Board
Other Non-Curbside Recyclables	Carpet, Carpet Padding, & Rugs
Books	Medical Waste & Sharps
Clean Film and Clean Shopping Bags	Disposable Diapers & Sanitary Products
Other Aluminum	Bulky Items
Other Non-Ferrous	Other/Not Elsewhere Classified
Other Ferrous	Supermix – Bottom Fines & Dirt
Wood – Pallets	
Concrete, Brick, Rock, & Other C&D	
Batteries – Lead Acid	
Batteries – Other Rechargeable	
Batteries – All Other	
Other Hazardous Waste	
Computers & Related Electronic Products	
Textiles & Leather Products	
Tires	

Statewide aggregate composition results have been adjusted to include third party composition studies for Montgomery and Prince George's County. Figure 3-4 shows the Adjusted composition by major material group. Table 3-3 contains the detailed Adjusted composition.

The integration of Montgomery County and Prince George's County waste composition slightly modifies the Unadjusted waste composition:

◆ The percentages of Glass, Paper and Plastic increase slightly.

◆ The percentage of Metal decreases slightly.

◆ Other material groups are largely unchanged.

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Figure 3-4 2016 Maryland Statewide Disposed Municipal Solid Waste Composition (Adjusted)
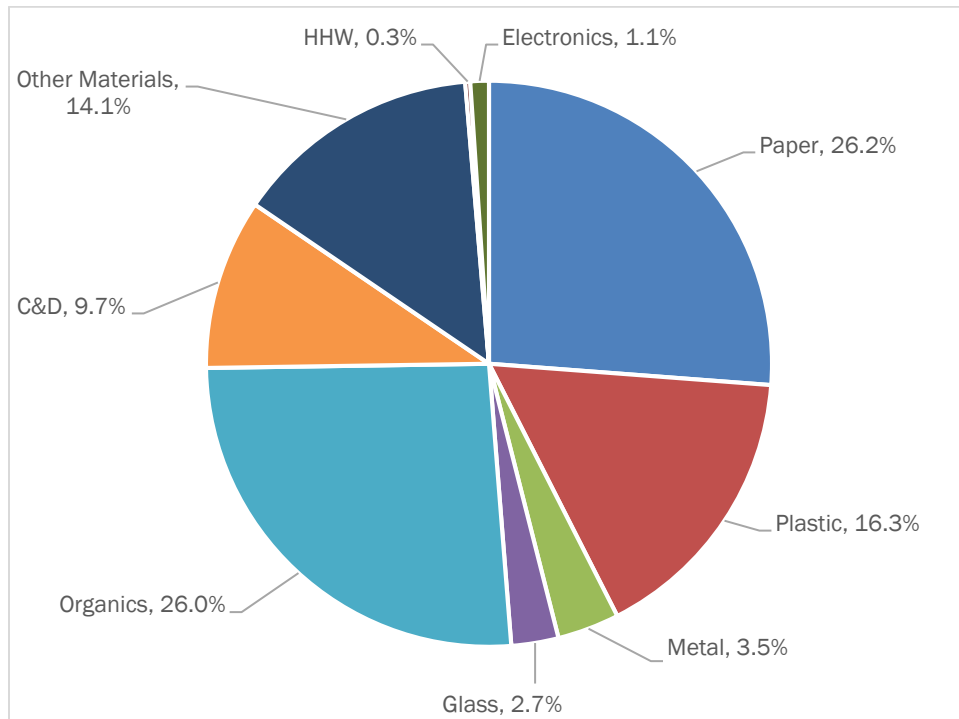
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-3 Adjusted Statewide Aggregate Disposed MSW Composition

Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average	Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average
Paper	**25.6%**	**27.7%**	**25.8%**	**26.2%**	**Organic**	**24.0%**	**21.6%**	**31.6%**	**26.0%**
Newspaper	1.6%	2.4%	2.3%	2.0%	Food Waste	17.9%	15.8%	22.8%	19.1%
Corrugated Cardboard	8.6%	6.1%	2.4%	5.9%	Other Organics	3.3%	0.0%	7.0%	3.8%
Mixed Recyclable Paper	7.1%	10.2%	11.6%	9.3%	Leaves	0.3%	2.2%	0.3%	0.8%
Non-Recyclable Paper	8.5%	9.0%	9.5%	8.9%	Grass	1.2%	1.5%	0.3%	1.0%
Plastic	**14.0%**	**19.8%**	**16.8%**	**16.3%**	Brush/Prunings	1.2%	2.1%	1.2%	1.4%
PET Bottles	1.4%	2.1%	1.5%	1.6%	**C&D Debris**	**15.3%**	**7.0%**	**4.5%**	**9.7%**
HDPE Bottles	0.8%	1.0%	0.8%	0.8%	Wood/Lumber/Pallets	8.0%	3.6%	2.7%	5.2%
#3-#7 Bottles	0.1%	0.1%	0.0%	0.0%	Gypsum Drywall	0.7%	0.6%	0.4%	0.6%
Other Rigid Plastic	5.5%	3.9%	4.1%	4.7%	Carpet/Padding	4.2%	1.6%	1.0%	2.5%
Expanded Polystyrene	0.8%	1.9%	2.0%	1.5%	Other C&D	2.5%	1.3%	0.4%	1.5%
Plastic Film	5.4%	10.9%	8.4%	7.7%	**HHW**	**0.4%**	**0.1%**	**0.2%**	**0.3%**
Metal	**3.9%**	**2.9%**	**3.5%**	**3.5%**	**Electronics**	**0.5%**	**1.0%**	**1.8%**	**1.1%**
Aluminum Cans/Foil	0.4%	0.9%	1.0%	0.7%	**Other Waste**	**13.9%**	**16.7%**	**12.6%**	**14.1%**
Steel Cans	1.2%	0.9%	1.2%	1.1%	Textiles	5.7%	4.9%	4.2%	5.0%
Other Ferrous	1.5%	1.1%	1.3%	1.3%	Other MSW	8.3%	11.9%	8.4%	9.2%
Other Non-ferrous	0.9%	0.0%	0.0%	0.4%					
Glass	**2.3%**	**3.3%**	**2.8%**	**2.7%**	**Total**	**100.0%**	**100.1%**	**99.6%**	**99.9%**
Glass Bottles	2.0%	3.3%	2.6%	2.5%	*No. Samples*	*121*	*193*	*300*	*614*
Non-container Glass	0.3%	0.0%	0.2%	0.2%					

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Finally, Figure 3-5 calculates the divertibility based on the adjusted results shown above, using the same "Divertibility Strategies" as defined above.

Figure 3-5 Statewide Divertibility of Disposed Wastes (Adjusted)

Curbside Recyclables 23.0%
Not Currently/Widely Recyclable 33.6%
Compostables/Mulchables 26.1%
Other Non-Curbside Recyclables 17.3%

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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3.3   RESIDENTIAL DISPOSED WASTE COMPOSITION

This section contains the estimated composition of the State of Maryland's Residential waste stream. Figure 3-6 shows the composition of Residential wastes in 2016. As shown, Organics and Paper are the most common material groups, although a significant contribution comes from Other Wastes.

Figure 3-6 2016 Residential Disposed Waste Composition

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-7 identifies the ten most prevalent material categories in Maryland Residential waste. As shown, Food Waste was found to be the most prevalent material at about 18 percent of the stream.

Figure 3-7 Top 10 Most Prevalent Materials in Residential Disposed Waste
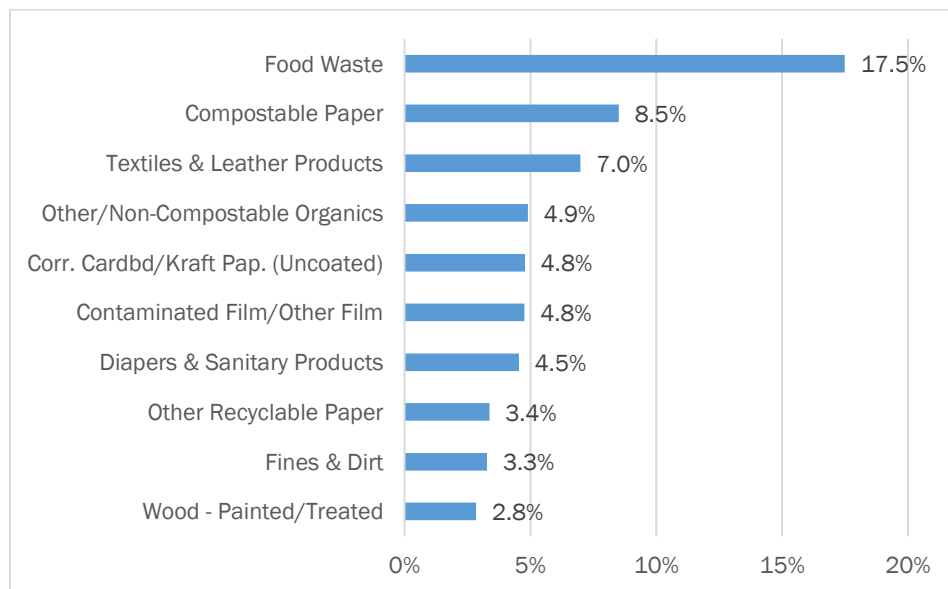
Table 3-4 provides the detailed statistical profile of the Residential waste stream in Maryland.

Table 3-4 Detailed Residential Disposed MSW Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**23.8%**	**1.4%**	**440,674**	**Organics**	**27.6%**	**2.1%**	**509,750**
Newsprint	1.8%	0.5%	32,436	Food Waste	17.5%	1.5%	323,595
Corr. Cardbd/Kraft Pap. (Uncoated)	4.8%	0.8%	88,502	Grass	2.4%	1.4%	44,502
Magazines	0.9%	0.2%	15,967	Leaves	0.5%	0.4%	9,549
Paperboard	2.7%	0.2%	50,644	Brush/Prunings/Trimmings	2.2%	1.1%	41,370
(High Grade) Office Paper	0.5%	0.2%	8,645	Other/Non-Compostable	4.9%	1.1%	90,735
Books	0.3%	0.1%	4,890	**C&D Debris**	**9.3%**	**2.0%**	**172,769**
Other Recyclable Paper	3.4%	0.5%	62,397	Wood - Clean Lumber	0.8%	0.5%	15,400
Compostable Paper	8.5%	0.6%	157,553	Wood - Painted/Treated	2.8%	1.0%	52,600
Non-Recyclable Paper	1.1%	0.2%	19,641	Wood - Pallets	0.9%	0.6%	15,978
Plastic	**13.9%**	**0.9%**	**256,417**	Non-C&D Wood	0.3%	0.1%	4,785
PET(#1) Bottles/Jars	1.7%	0.2%	32,303	Drywall/Gypsum Board	0.6%	0.5%	10,909
PET(#1) Other	0.1%	0.0%	1,701	Concrete/Brick/Rock/Other C&D	1.5%	0.9%	28,222
HDPE(#2) Bottles - Natural	0.3%	0.0%	6,038	Carpet, Carpet Padding, & Rugs	2.4%	1.1%	44,875
HDPE(#2) Color Bottle/All Non-Bot.	0.6%	0.1%	10,381	**Household Hazardous Waste**	**0.5%**	**0.2%**	**9,884**
#3 thru #7 Bottles	0.1%	0.1%	2,234	Medical Waste & Sharps	0.1%	0.1%	1,837
Plastic Packaging #3 - #7	1.4%	0.1%	26,193	Batteries - Lead Acid	0.1%	0.1%	1,711
Durable Plastic Products #3 - #7	1.6%	0.6%	29,914	Batteries - Other Rechargeable	0.0%	0.0%	36
Expanded Polystyrene "Styrofoam"	0.8%	0.1%	14,469	Batteries - All Other	0.0%	0.0%	252
Clean Film & Clean Shopping Bags	0.6%	0.1%	10,234	Other Hazardous Waste/HHW	0.3%	0.1%	6,048
Contaminated Film/Other Film	4.8%	0.4%	88,071	**Electronics**	**0.5%**	**0.8%**	**9,296**
Remainder/Composite Plastic	1.9%	0.4%	34,877	Computers/Related Elec. Prods.	0.5%	0.6%	9,296
Metal	**3.5%**	**0.5%**	**65,143**	**Other Wastes**	**17.4%**	**1.7%**	**322,322**
Aluminum Cans & Containers	0.6%	0.1%	11,043	Textiles & Leather Products	7.0%	1.2%	129,280
Other Aluminum	0.3%	0.0%	5,881	Diapers & Sanitary Products	4.5%	0.8%	84,060
Other Non-Ferrous	0.4%	0.1%	7,068	Bulky Items	1.3%	0.6%	24,580
Tin/Steel Containers	1.1%	0.1%	20,012	Tires	0.1%	0.1%	1,439
Other Ferrous	1.1%	0.4%	21,138	Other/Not Classified	1.2%	0.4%	22,307
Glass	**3.5%**	**0.6%**	**63,948**	Fines & Dirt	3.3%	0.8%	60,657
Clear Glass Containers	1.7%	0.3%	30,709				
Brown Glass Containers	0.9%	0.4%	17,401				
Green Glass Containers	0.4%	0.1%	8,231	**Grand Total**	**100%**		**1,850,202**
Non-Container/Other Glass	0.4%	0.1%	7,607	*No. of Samples*	89		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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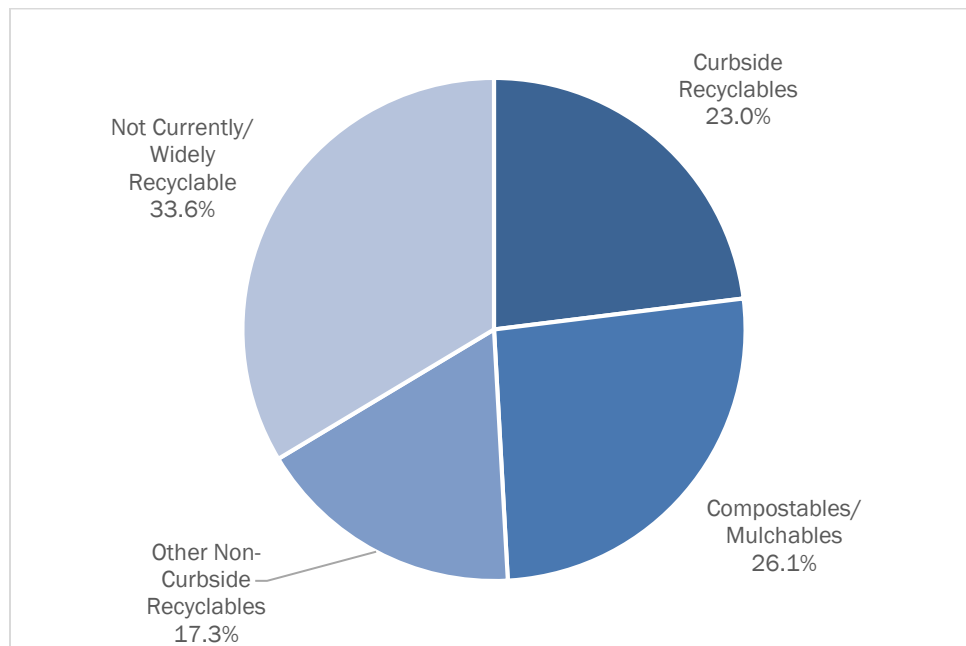
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Figure 3-8 presents the composition of disposed Residential waste in terms of the potential for diverting materials from disposal using the "Diversion Strategy" assignments listed in Section 3.2.

Figure 3-8 Divertibility of Disposed Wastes from the Residential Sector (Unadjusted)
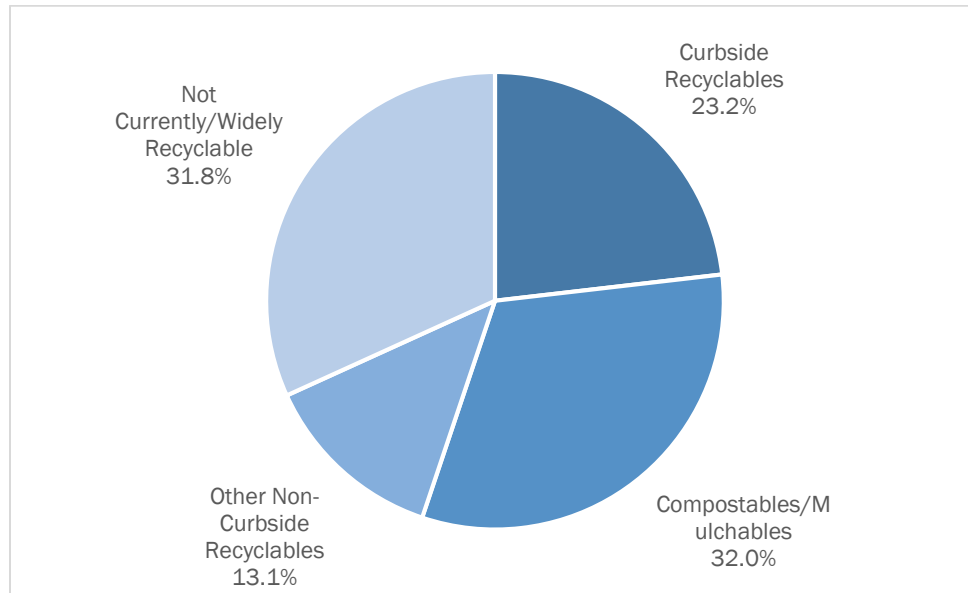
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-9 shows the Adjusted Residential composition (i.e., incorporating the impact of Prince George's and Montgomery County waste composition) by major material group.

Table 3-5 contains the detailed Adjusted composition.

The integration of Montgomery County and Prince George's County waste composition slightly modifies the Unadjusted Residential waste composition:

◆ The percentages of Paper and Plastic increase slightly.

◆ The percentages of Glass and C&D Debris decrease slightly.

◆ Other material groups are largely unchanged.

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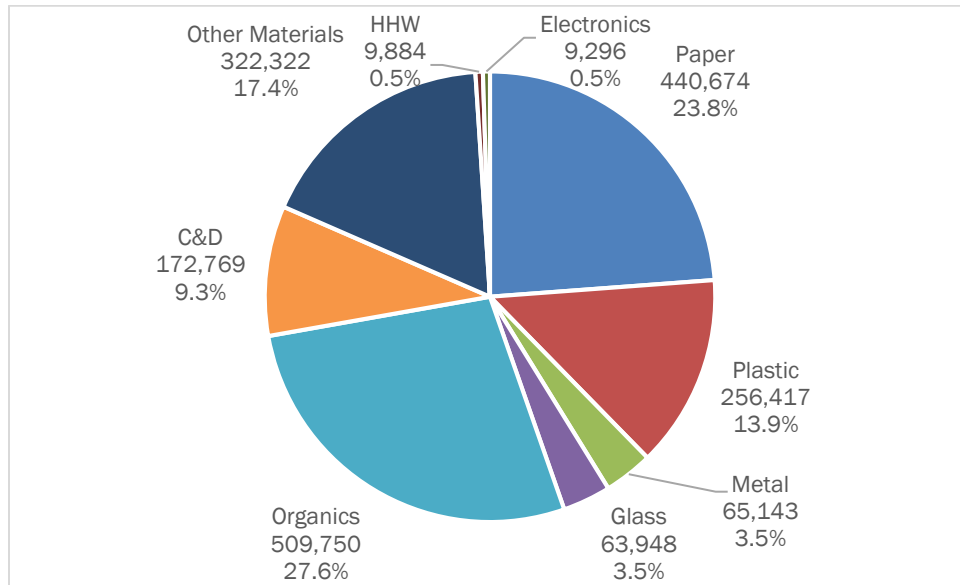## Figure 3-9 2016 Residential Disposed Waste Composition (Adjusted)
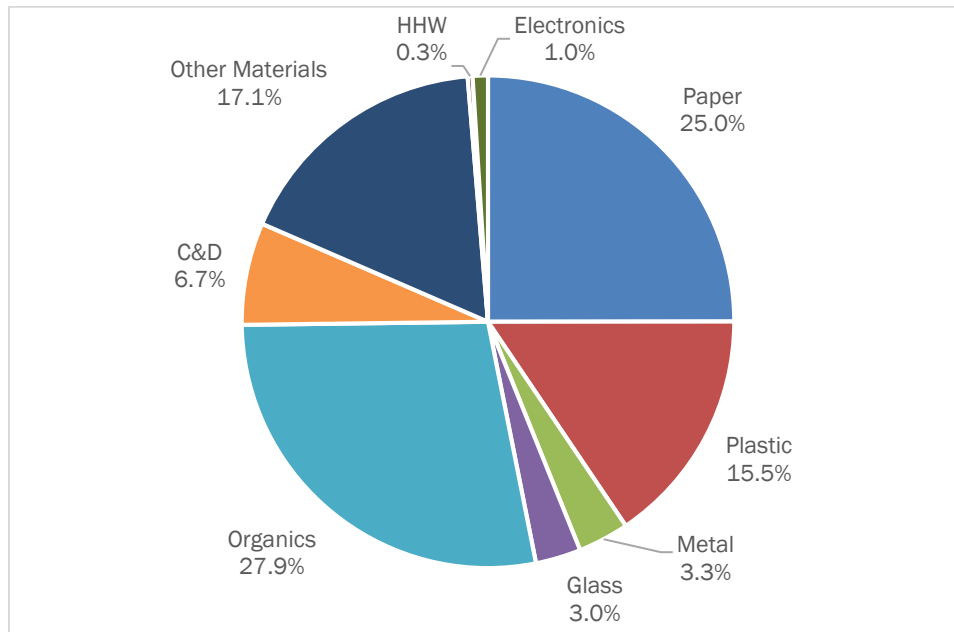
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-5 Adjusted Statewide Residential Disposed MSW Composition

Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average	Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average
Paper	**23.8%**	**25.2%**	**26.2%**	**25.0%**	**Organic**	**27.6%**	**24.1%**	**31.0%**	**27.9%**
Newspaper	1.8%	3.0%	2.3%	2.2%	Food Waste	17.5%	17.1%	21.0%	18.6%
Corrugated Cardboard	4.8%	3.4%	1.2%	3.2%	Other Organics	4.9%	0.0%	7.9%	4.8%
Mixed Recyclable Paper	7.7%	9.9%	11.9%	9.6%	Leaves	0.5%	2.8%	0.3%	1.0%
Non-Recyclable Paper	9.6%	8.9%	10.8%	9.8%	Grass	2.4%	1.7%	0.4%	1.6%
Plastic	**13.9%**	**18.7%**	**15.5%**	**15.5%**	Brush/Prunings	2.2%	2.5%	1.4%	2.0%
PET Bottles	1.7%	2.0%	1.0%	1.6%	**C&D Debris**	**9.3%**	**5.8%**	**4.0%**	**6.7%**
HDPE Bottles	0.9%	1.1%	0.6%	0.9%	Wood/Lumber/Pallets	4.8%	3.0%	2.4%	3.6%
#3-#7 Bottles	0.1%	0.0%	0.0%	0.1%	Gypsum Drywall	0.6%	0.8%	0.3%	0.5%
Other Rigid Plastic	5.0%	3.5%	3.9%	4.3%	Carpet/Padding	2.4%	0.7%	0.8%	1.5%
Expanded Polystyrene	0.8%	1.9%	1.5%	1.3%	Other C&D	1.5%	1.3%	0.6%	1.1%
Plastic Film	5.3%	10.2%	8.4%	7.5%	**HHW**	**0.5%**	**0.1%**	**0.2%**	**0.3%**
Metal	**3.5%**	**3.1%**	**3.3%**	**3.3%**	**Electronics**	**0.5%**	**0.9%**	**1.7%**	**1.0%**
Aluminum Cans/Foil	0.6%	1.0%	1.1%	0.8%	**Other Waste**	**17.4%**	**18.3%**	**16.0%**	**17.1%**
Steel Cans	1.1%	1.1%	0.9%	1.0%	Textiles	7.0%	5.3%	5.4%	6.0%
Other Ferrous	1.1%	1.0%	1.3%	1.2%	Other MSW	10.4%	13.0%	10.6%	11.1%
Other Non-ferrous	0.7%	0.0%	0.1%	0.3%					
Glass	**3.5%**	**3.4%**	**2.1%**	**3.0%**					
Glass Bottles	3.0%	3.4%	1.8%	2.7%	**Total**	**100.0%**	**99.6%**	**100.0%**	**99.9%**
Non-container Glass	0.4%	0.0%	0.3%	0.3%	*No. of Samples*	*49*	*130*	*180*	*359*

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Figure 3-10 calculates the divertibility based on the adjusted results shown in the table above.

Figure 3-10 Divertibility of Disposed Wastes from the Residential Sector (Adjusted)
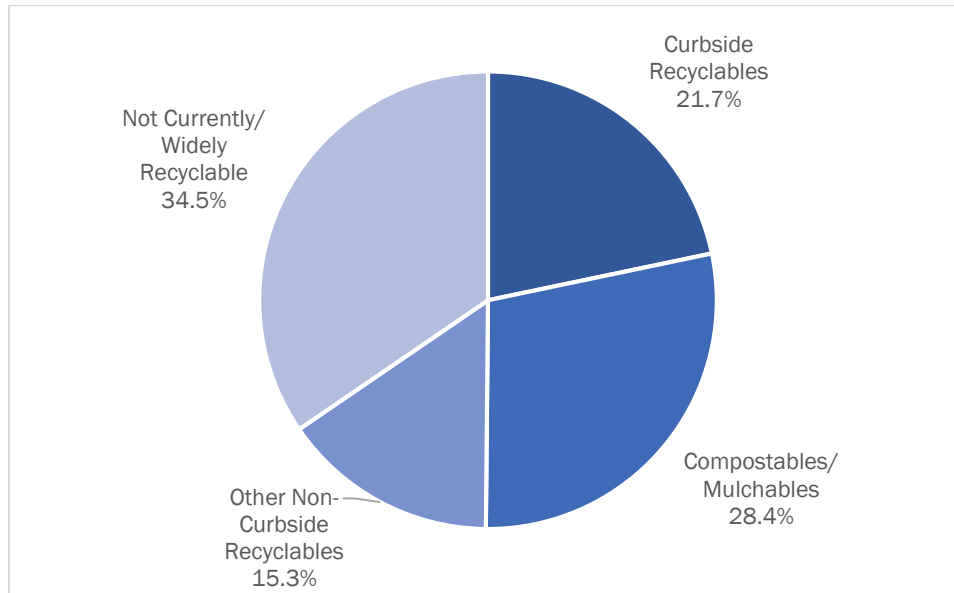
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

3.4   ICI DISPOSED WASTE COMPOSITION

Figure 3-11 shows the composition and tonnage of ICI wastes in 2016. As shown, Paper, C&D and Organics are the most common material groups in the ICI stream.

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Figure 3-11 2016 Disposed ICI Waste Composition (Unadjusted)

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-12 shows the top ten most prevalent materials in the Maryland ICI waste stream. Food Waste is the most commonly disposed material category at about 18 percent. Corrugated cardboard was also found to be commonly occurring in the ICI stream.

Figure 3-12 Top 10 Most Prevalent Materials in Disposed ICI Waste (Unadjusted)

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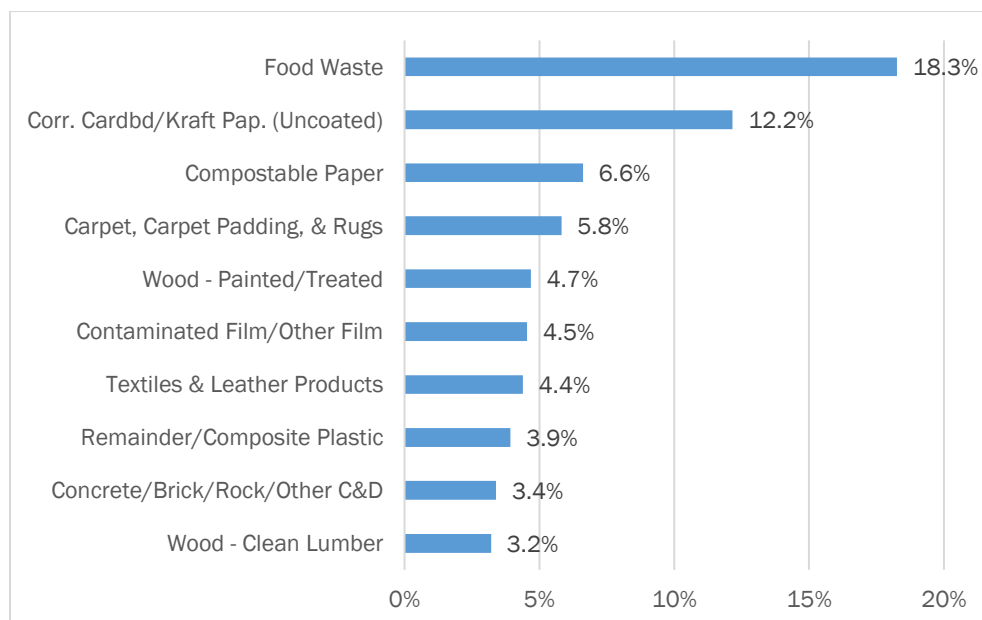
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Table 3-6 provides a detailed statistical profile of the statewide disposed ICI waste stream.

Table 3-6 Detailed Disposed ICI MSW Composition (Unadjusted)

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**27.4%**	**3.3%**	**529,472**	**Organics**	**20.5%**	**3.8%**	**396,997**
Newsprint	1.4%	0.9%	26,724	Food Waste	18.3%	3.9%	352,996
Corr. Cardbd/Kraft Pap. (Uncoated)	12.2%	1.8%	235,242	Grass	0.0%	0.0%	753
Magazines	0.5%	0.2%	9,117	Leaves	0.2%	0.1%	3,424
Paperboard	2.2%	0.9%	41,667	Brush/Prunings/Trimmings	0.3%	0.5%	4,862
(High Grade) Office Paper	0.5%	0.3%	10,223	Other/Non-Compostable	1.8%	0.8%	34,963
Books	0.2%	1.4%	4,825	**C&D Debris**	**21.1%**	**3.9%**	**407,788**
Other Recyclable Paper	3.0%	1.0%	58,694	Wood - Clean Lumber	3.2%	1.3%	62,032
Compostable Paper	6.6%	1.4%	127,963	Wood - Painted/Treated	4.7%	1.4%	90,591
Non-Recyclable Paper	0.8%	0.3%	15,016	Wood - Pallets	2.8%	1.7%	53,783
Plastic	**14.1%**	**2.3%**	**272,217**	Non-C&D Wood	0.4%	0.2%	7,018
PET(#1) Bottles/Jars	1.0%	0.1%	19,176	Drywall/Gypsum Board	0.8%	0.6%	16,041
PET(#1) Other	0.4%	0.4%	7,009	Concrete/Brick/Rock/Other C&D	3.4%	1.9%	65,656
HDPE(#2) Bottles - Natural	0.3%	0.1%	6,097	Carpet, Carpet Padding, & Rugs	5.8%	2.3%	112,667
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.1%	7,214	**Household Hazardous Waste**	**0.3%**	**0.5%**	**6,439**
#3 thru #7 Bottles	0.0%	0.0%	378	Medical Waste & Sharps	0.3%	0.3%	5,156
Plastic Packaging #3 - #7	1.0%	0.2%	20,127	Batteries - Lead Acid	0.0%	0.0%	0
Durable Plastic Products #3 - #7	0.7%	0.5%	14,104	Batteries - Other Rechargeable	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.9%	0.3%	16,576	Batteries - All Other	0.0%	0.0%	216
Clean Film & Clean Shopping Bags	0.9%	0.4%	17,597	Other Hazardous Waste/HHW	0.1%	0.2%	1,067
Contaminated Film/Other Film	4.5%	0.8%	87,948	**Electronics**	**0.5%**	**1.1%**	**10,109**
Remainder/Composite Plastic	3.9%	1.9%	75,991	Computers/Related Elec. Prods.	0.5%	0.5%	10,109
Metal	**4.3%**	**1.3%**	**83,748**	**Other Wastes**	**10.6%**	**2.9%**	**204,243**
Aluminum Cans & Containers	0.3%	0.1%	5,611	Textiles & Leather Products	4.4%	1.9%	84,954
Other Aluminum	0.4%	0.3%	7,984	Diapers & Sanitary Products	0.9%	0.3%	17,173
Other Non-Ferrous	0.6%	0.4%	12,163	Bulky Items	2.7%	1.7%	52,210
Tin/Steel Containers	1.2%	0.7%	23,826	Tires	0.4%	0.3%	6,914
Other Ferrous	1.8%	0.8%	34,165	Other/Not Classified	1.0%	0.8%	19,519
Glass	**1.2%**	**0.6%**	**22,848**	Fines & Dirt	1.2%	0.4%	23,474
Clear Glass Containers	0.6%	0.3%	11,408				
Brown Glass Containers	0.3%	0.2%	6,766				
Green Glass Containers	0.1%	0.1%	2,708	**Grand Total**	**100%**		**1,933,860**
Non-Container/Other Glass	0.1%	0.1%	1,967	*No. of Samples*	*102*		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-13 presents the composition of disposed residential waste in terms of the potential for diverting materials from disposal using the "Diversion Strategy" assignments listed in Section 3.2.

Figure 3-13 ICI Divertibility of Disposed Wastes (Unadjusted)
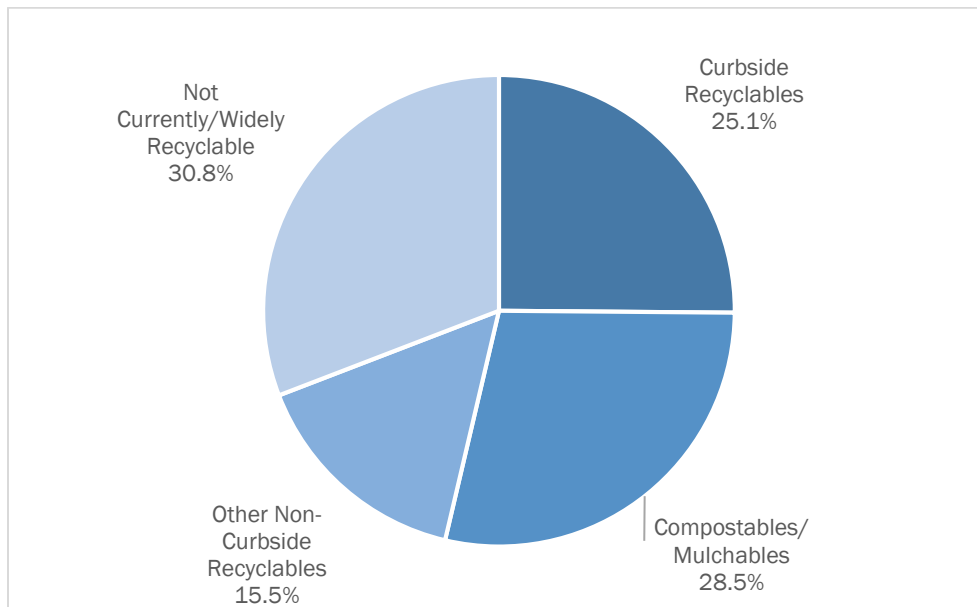
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-14 shows the Adjusted ICI composition (i.e., incorporating the impact of Prince George's and Montgomery County waste composition) by major material group. Table 3-7 contains the detailed Adjusted ICI composition.

The integration of Montgomery County and Prince George's County waste composition slightly modifies the Unadjusted ICI waste composition:

◆ The percentages of Plastic, Glass and Organics increase slightly.

◆ The percentage of Metal decreases slightly.

◆ The percentage of C&D decreases more significantly.

◆ Other material groups are largely unchanged.

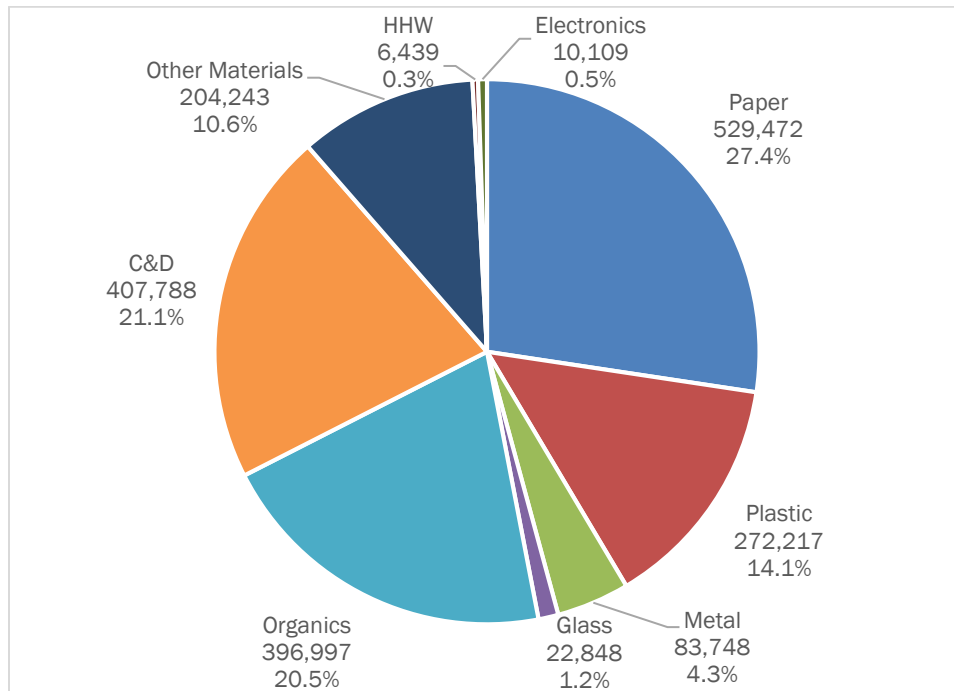## Figure 3-14 2016 Disposed ICI Waste Composition (Adjusted)
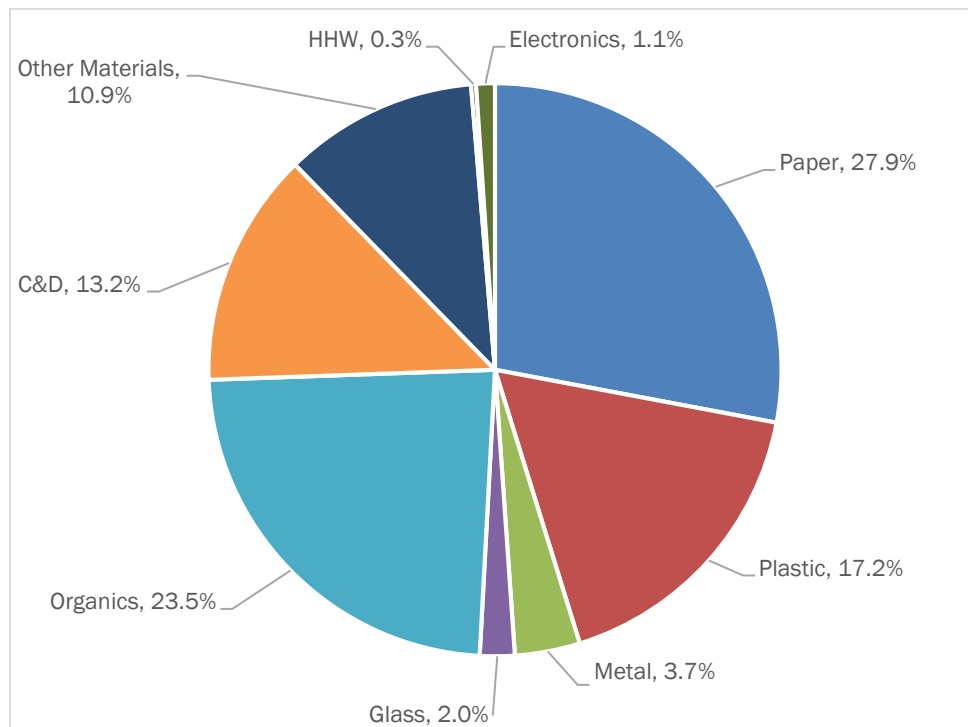
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-7 Adjusted Statewide Disposed ICI MSW Composition

Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average	Material	Statewide Average	Prince George's County	Mont. County	Adjusted Statewide Average
Paper	**27.4%**	**32.3%**	**25.5%**	**27.9%**	**Organic**	**20.5%**	**15.8%**	**32.7%**	**23.5%**
Newspaper	1.4%	1.1%	2.2%	1.6%	Food Waste	18.3%	12.5%	24.8%	19.1%
Corrugated Cardboard	12.2%	11.8%	3.3%	9.1%	Other Organics	1.8%	0.0%	6.3%	2.9%
Mixed Recyclable Paper	6.4%	10.4%	10.9%	8.9%	Leaves	0.2%	0.8%	0.2%	0.3%
Non-Recyclable Paper	7.4%	9.0%	9.1%	8.3%	Grass	0.0%	1.2%	0.3%	0.4%
Plastic	**14.1%**	**21.7%**	**18.1%**	**17.2%**	Brush/Prunings	0.3%	1.3%	1.1%	0.8%
PET Bottles	1.0%	2.1%	1.7%	1.5%	**C&D Debris**	**21.1%**	**10.6%**	**5.1%**	**13.2%**
HDPE Bottles	0.7%	0.7%	0.7%	0.7%	Wood/Lumber/Pallets	11.0%	5.6%	3.3%	7.2%
#3-#7 Bottles	0.0%	0.0%	0.0%	0.0%	Gypsum Drywall	0.8%	0.2%	0.4%	0.5%
Other Rigid Plastic	6.1%	4.5%	4.5%	5.2%	Carpet/Padding	5.8%	3.7%	1.0%	3.7%
Expanded Polystyrene	0.9%	1.9%	2.5%	1.7%	Other C&D	3.4%	1.1%	0.4%	1.8%
Plastic Film	5.5%	12.5%	8.7%	8.2%	**HHW**	**0.3%**	**0.0%**	**0.4%**	**0.3%**
Metal	**4.3%**	**2.4%**	**3.7%**	**3.7%**	**Electronics**	**0.5%**	**1.1%**	**1.7%**	**1.1%**
Aluminum Cans/Foil	0.3%	0.7%	0.9%	0.6%	**Other Waste**	**10.6%**	**13.4%**	**9.7%**	**10.9%**
Steel Cans	1.2%	0.5%	1.6%	1.2%	Textiles	4.4%	4.3%	3.0%	3.9%
Other Ferrous	1.8%	1.2%	1.2%	1.4%	Other MSW	6.2%	9.1%	6.7%	7.0%
Other Non-ferrous	1.0%	0.0%	0.0%	0.4%					
Glass	**1.2%**	**2.3%**	**2.7%**	**2.0%**					
Glass Bottles	1.1%	2.3%	2.5%	1.8%	**Total**	**100.0%**	**99.6%**	**99.6%**	**99.8%**
Non-container Glass	0.1%	0.0%	0.2%	0.1%	*No. Samples*	*72*	*63*	*120*	*255*

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Figure 3-15 presents the calculated divertibility based on the adjusted results shown in the table above.

Figure 3-15 ICI Divertibility of Disposed Wastes (Adjusted)
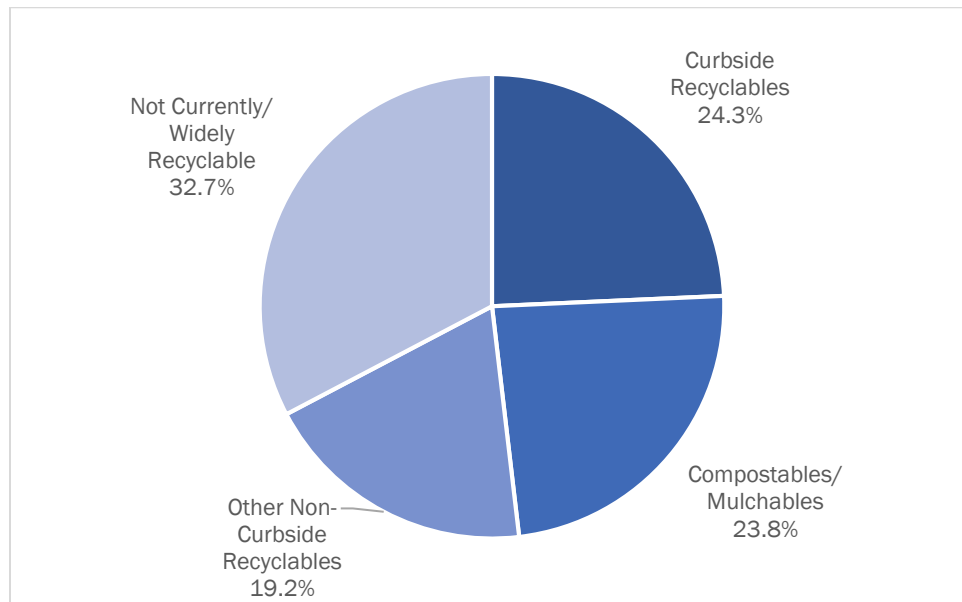
Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

3.5 RESULTS BY DEMOGRAPHIC REGION

The following subsections provide detailed statistical results for Residential and ICI wastes from the Urban, Suburban and Rural regions of the state. These data sets are Unadjusted, i.e., they do not attempt to integrate composition data from third party studies.

Table 3-8 provides a count of the number of samples obtained for each combination of generator sector and demographic origin.

Table 3-8 Urban, Suburban and Rural Disposed Waste Sample Counts

Sector	Residential Samples	ICI Samples	Total Samples
Urban	28	1	29
Suburban	49	72	121
Rural	12	29	41
Total	89	102	191

As shown in the table, the majority of samples originated from Suburban areas. This is consistent with the state's demographics. But, because of the relatively small samples size for Urban and Rural wastes, the composition estimates for these two demographic regions exhibit lower certainty (i.e., wider confidence intervals) compared to the results from Suburban areas. It is therefore less meaningful to rigorously compare the results across demographic regions.

Finally, no data are available to use as weighting factors to aggregate Residential and ICI waste within each demographic stratum. Because of these reasons, this report presents the tabular results separately for Residential and ICI waste within each demographic region, but does not aggregate waste composition by demographic stratum or attempt to compare the results.

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3.5.1 URBAN DISPOSED WASTE COMPOSITION

Table 3-9 presents the composition of Residential waste generated in Urban areas of the state.

Table 3-9 Urban/Residential Disposed Waste Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**17.6%**	**1.7%**	**41,750**	**Organics**	**35.9%**	**3.5%**	**84,943**
Newsprint	0.8%	0.2%	1,832	Food Waste	15.4%	1.9%	36,442
Corr. Cardbd/Kraft Pap. (Uncoated)	3.6%	1.2%	8,498	Grass	8.4%	3.8%	20,002
Magazines	0.6%	0.3%	1,479	Leaves	1.1%	0.8%	2,706
Paperboard	2.1%	0.4%	5,002	Brush/Prunings/Trimmings	6.1%	2.9%	14,421
(High Grade) Office Paper	0.7%	0.4%	1,575	Other/Non-Compostable	4.8%	1.7%	
Books	0.5%	0.3%	1,162	**C&D Debris**	**4.9%**	**2.3%**	**11,669**
Other Recyclable Paper	2.6%	0.5%	6,203	Wood - Clean Lumber	0.2%	0.3%	507
Compostable Paper	6.0%	0.7%	14,100	Wood - Painted/Treated	0.8%	0.8%	1,842
Non-Recyclable Paper	0.8%	0.2%	1,899	Wood - Pallets	0.0%	0.0%	48
Plastic	**14.8%**	**1.9%**	**35,071**	Non-C&D Wood	0.1%	0.0%	149
PET(#1) Bottles/Jars	1.9%	0.3%	4,396	Drywall/Gypsum Board	0.6%	0.9%	1,492
PET(#1) Other	0.0%	0.0%	117	Concrete/Brick/Rock/Other C&D	0.5%	0.5%	1,186
HDPE(#2) Bottles - Natural	0.2%	0.1%	556	Carpet, Carpet Padding, & Rugs	2.7%	1.9%	6,446
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.1%	1,007	**Household Hazardous Waste**	**0.4%**	**0.2%**	**874**
#3 thru #7 Bottles	0.0%	0.0%	12	Medical Waste & Sharps	0.2%	0.1%	401
Plastic Packaging #3 - #7	1.4%	0.2%	3,259	Batteries - Lead Acid	0.0%	0.0%	0
Durable Plastic Products #3 - #7	2.5%	1.6%	5,875	Batteries - Other Rechargeable	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.9%	0.2%	2,196	Batteries - All Other	0.0%	0.0%	77
Clean Film & Clean Shopping Bags	0.5%	0.2%	1,236	Other Hazardous Waste/HHW	0.2%	0.1%	396
Contaminated Film/Other Film	5.8%	0.5%	13,647	**Electronics**	**1.0%**	**0.7%**	**2,278**
Remainder/Composite Plastic	1.2%	0.2%	2,770	Computers/Related Elec. Prods.	1.0%	0.6%	2,278
Metal	**3.4%**	**0.9%**	**8,110**	**Other Wastes**	**19.1%**	**3.4%**	**45,139**
Aluminum Cans & Containers	0.6%	0.1%	1,484	Textiles & Leather Products	10.2%	2.4%	24,216
Other Aluminum	0.3%	0.1%	668	Diapers & Sanitary Products	4.3%	1.3%	10,191
Other Non-Ferrous	0.4%	0.2%	880	Bulky Items	0.6%	0.9%	1,337
Tin/Steel Containers	1.0%	0.2%	2,364	Tires	0.0%	0.0%	0
Other Ferrous	1.1%	0.8%	2,714	Other/Not Classified	0.6%	0.5%	1,426
Glass	**2.9%**	**1.3%**	**6,917**	Supermix - Fines & Dirt	3.4%	1.1%	7,969
Clear Glass Containers	1.1%	0.4%	2,631				
Brown Glass Containers	1.0%	1.1%	2,257				
Green Glass Containers	0.3%	0.2%	734	**Grand Total**	**100%**		**236,750**
Non-Container/Other Glass	0.5%	0.2%	1,295	*No. of Samples*	*28*		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Only one sample of ICI waste was obtained from Urban areas of the state. One sample is not sufficient to represent the ICI stream and the composition of this sample is not shown here.

3.5.2 SUBURBAN DISPOSED WASTE COMPOSITION

Table 3-10 presents the composition of Residential waste generated in Suburban areas of the state.

Table 3-10 Suburban/Residential Disposed Waste Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**24.6%**	**1.7%**	**371,277**	**Organics**	**26.4%**	**2.5%**	**398,159**
Newsprint	1.8%	0.5%	26,537	Food Waste	17.8%	2.2%	269,221
Corr. Cardbd/Kraft Pap. (Uncoated)	5.0%	1.0%	75,261	Grass	1.6%	1.0%	23,850
Magazines	0.9%	0.3%	13,300	Leaves	0.4%	0.5%	6,584
Paperboard	2.8%	0.3%	42,406	Brush/Prunings/Trimmings	1.7%	0.9%	25,922
(High Grade) Office Paper	0.5%	0.2%	6,832	Other/Non-Compostable	4.8%	1.3%	
Books	0.2%	0.2%	3,649	**C&D Debris**	**10.3%**	**3.0%**	**155,745**
Other Recyclable Paper	3.4%	0.7%	51,422	Wood - Clean Lumber	1.0%	0.8%	14,686
Compostable Paper	8.9%	1.0%	134,991	Wood - Painted/Treated	3.4%	1.6%	50,570
Non-Recyclable Paper	1.1%	0.4%	16,879	Wood - Pallets	1.1%	1.0%	15,930
Plastic	**13.6%**	**1.0%**	**205,133**	Non-C&D Wood	0.3%	0.1%	4,401
PET(#1) Bottles/Jars	1.7%	0.2%	25,425	Drywall/Gypsum Board	0.6%	0.7%	9,417
PET(#1) Other	0.1%	0.0%	1,444	Concrete/Brick/Rock/Other C&D	1.8%	1.6%	26,779
HDPE(#2) Bottles - Natural	0.3%	0.1%	5,100	Carpet, Carpet Padding, & Rugs	2.3%	1.5%	33,961
HDPE(#2) Color Bottle/All Non-Bot.	0.5%	0.1%	7,909	**Household Hazardous Waste**	**0.6%**	**0.3%**	**8,808**
#3 thru #7 Bottles	0.1%	0.1%	2,208	Medical Waste & Sharps	0.1%	0.1%	1,422
Plastic Packaging #3 - #7	1.4%	0.2%	21,602	Batteries - Lead Acid	0.1%	0.2%	1,711
Durable Plastic Products #3 - #7	1.6%	0.6%	23,792	Batteries - Other Rechargeable	0.0%	0.0%	36
Expanded Polystyrene "Styrofoam"	0.8%	0.1%	11,361	Batteries - All Other	0.0%	0.0%	314
Clean Film & Clean Shopping Bags	0.6%	0.1%	8,530	Other Hazardous Waste/HHW	0.4%	0.2%	5,324
Contaminated Film/Other Film	4.5%	0.3%	68,150	**Electronics**	**0.2%**	**0.2%**	**3,625**
Remainder/Composite Plastic	2.0%	0.6%	29,613	Computers/Related Elec. Prods.	0.2%	0.1%	3,625
Metal	**3.4%**	**0.6%**	**51,803**	**Other Wastes**	**17.5%**	**2.3%**	**263,814**
Aluminum Cans & Containers	0.6%	0.1%	8,505	Textiles & Leather Products	6.5%	1.5%	98,102
Other Aluminum	0.3%	0.1%	4,973	Diapers & Sanitary Products	4.7%	1.1%	70,841
Other Non-Ferrous	0.4%	0.2%	6,027	Bulky Items	1.5%	1.0%	23,243
Tin/Steel Containers	1.0%	0.2%	15,835	Tires	0.1%	0.1%	1,439
Other Ferrous	1.1%	0.5%	16,462	Other/Not Classified	1.3%	0.6%	19,860
Glass	**3.4%**	**0.6%**	**50,935**	Supermix - Fines & Dirt	3.3%	1.3%	50,330
Clear Glass Containers	1.6%	0.4%	24,038				
Brown Glass Containers	0.9%	0.3%	13,655				
Green Glass Containers	0.5%	0.2%	7,071	**Grand Total**	**100%**		**1,509,300**
Non-Container/Other Glass	0.4%	0.2%	6,171	*No. of Samples*	**49**		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Table 3-11 presents the composition of ICI waste generated in Suburban areas of the state.

Table 3-11 Suburban/ICI Disposed Waste Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**27.6%**	**3.9%**	**416,711**	**Organics**	**19.9%**	**3.5%**	**300,905**
Newsprint	1.4%	1.1%	20,579	Food Waste	17.7%	3.6%	267,702
Corr. Cardbd/Kraft Pap. (Uncoated)	12.3%	2.2%	185,839	Grass	0.0%	0.1%	608
Magazines	0.5%	0.3%	7,345	Leaves	0.2%	0.2%	2,772
Paperboard	2.2%	1.3%	33,292	Brush/Prunings/Trimmings	0.2%	0.2%	2,704
(High Grade) Office Paper	0.5%	0.5%	8,243	Other/Non-Compostable	1.8%	1.0%	
Books	0.1%	0.1%	2,199	**C&D Debris**	**21.3%**	**4.7%**	**321,791**
Other Recyclable Paper	3.1%	1.4%	47,082	Wood - Clean Lumber	3.3%	1.9%	50,192
Compostable Paper	6.6%	1.2%	100,089	Wood - Painted/Treated	4.7%	1.6%	71,473
Non-Recyclable Paper	0.8%	0.4%	12,043	Wood - Pallets	2.6%	1.2%	39,917
Plastic	**14.1%**	**2.8%**	**213,401**	Non-C&D Wood	0.4%	0.3%	5,664
PET(#1) Bottles/Jars	1.0%	0.2%	15,145	Drywall/Gypsum Board	0.9%	0.9%	12,978
PET(#1) Other	0.4%	0.5%	5,406	Concrete/Brick/Rock/Other C&D	3.3%	2.0%	50,389
HDPE(#2) Bottles - Natural	0.3%	0.1%	4,760	Carpet, Carpet Padding, & Rugs	6.0%	3.1%	91,179
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.1%	5,709	**Household Hazardous Waste**	**0.3%**	**0.5%**	**4,920**
#3 thru #7 Bottles	0.0%	0.0%	284	Medical Waste & Sharps	0.3%	0.4%	4,163
Plastic Packaging #3 - #7	1.1%	0.2%	15,939	Batteries - Lead Acid	0.0%	0.0%	0
Durable Plastic Products #3 - #7	0.7%	0.3%	11,125	Batteries - Other Rechargeable	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.9%	0.5%	13,252	Batteries - All Other	0.0%	0.0%	174
Clean Film & Clean Shopping Bags	0.9%	0.6%	13,984	Other Hazardous Waste/HHW	0.0%	0.0%	583
Contaminated Film/Other Film	4.6%	0.9%	68,899	**Electronics**	**0.5%**	**0.7%**	**7,397**
Remainder/Composite Plastic	3.9%	2.3%	58,897	Computers/Related Elec. Prods.	0.5%	0.4%	7,397
Metal	**4.4%**	**1.6%**	**66,520**	**Other Wastes**	**10.6%**	**3.7%**	**159,886**
Aluminum Cans & Containers	0.3%	0.1%	4,404	Textiles & Leather Products	4.5%	2.6%	67,474
Other Aluminum	0.4%	0.4%	6,418	Diapers & Sanitary Products	0.9%	0.3%	13,152
Other Non-Ferrous	0.7%	0.5%	9,841	Bulky Items	2.7%	2.0%	40,229
Tin/Steel Containers	1.2%	1.0%	18,858	Tires	0.4%	0.4%	5,597
Other Ferrous	1.8%	0.9%	26,999	Other/Not Classified	1.0%	0.7%	14,653
Glass	**1.2%**	**0.8%**	**17,768**	Supermix - Fines & Dirt	1.2%	0.5%	18,780
Clear Glass Containers	0.6%	0.4%	8,963				
Brown Glass Containers	0.3%	0.2%	5,199				
Green Glass Containers	0.1%	0.1%	2,039	**Grand Total**	**100%**		**1,509,300**
Non-Container/Other Glass	0.1%	0.1%	1,567	***No. of Samples***	***72***		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

3.5.3   RURAL DISPOSED WASTE COMPOSITION

Table 3-12 presents the composition of Residential waste generated in Rural areas of the state.

Table 3-12 Rural/Residential Disposed Waste Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**26.5%**	**4.3%**	**27,647**	**Organics**	**25.6%**	**5.0%**	**26,648**
Newsprint	3.9%	3.0%	4,067	Food Waste	17.2%	3.9%	17,931
Corr. Cardbd/Kraft Pap. (Uncoated)	4.6%	2.9%	4,742	Grass	0.6%	1.0%	651
Magazines	1.1%	0.6%	1,188	Leaves	0.2%	0.4%	258
Paperboard	3.1%	0.4%	3,237	Brush/Prunings/Trimmings	1.0%	1.0%	1,026
(High Grade) Office Paper	0.2%	0.2%	238	Other/Non-Compostable	6.5%	4.6%	
Books	0.1%	0.1%	79	**C&D Debris**	**5.1%**	**3.6%**	**5,355**
Other Recyclable Paper	4.6%	1.5%	4,771	Wood - Clean Lumber	0.2%	0.2%	208
Compostable Paper	8.1%	0.9%	8,462	Wood - Painted/Treated	0.2%	0.3%	188
Non-Recyclable Paper	0.8%	0.5%	863	Wood - Pallets	0.0%	0.0%	0
Plastic	**15.6%**	**3.4%**	**16,212**	Non-C&D Wood	0.2%	0.3%	235
PET(#1) Bottles/Jars	2.4%	0.4%	2,482	Drywall/Gypsum Board	0.0%	0.0%	0
PET(#1) Other	0.1%	0.1%	140	Concrete/Brick/Rock/Other C&D	0.2%	0.2%	256
HDPE(#2) Bottles - Natural	0.4%	0.1%	382	Carpet, Carpet Padding, & Rugs	4.3%	3.6%	4,469
HDPE(#2) Color Bottle/All Non-Bot.	1.4%	0.5%	1,465	**Household Hazardous Waste**	**0.2%**	**0.5%**	**202**
#3 thru #7 Bottles	0.0%	0.0%	15	Medical Waste & Sharps	0.0%	0.0%	14
Plastic Packaging #3 - #7	1.3%	0.3%	1,333	Batteries - Lead Acid	0.0%	0.0%	0
Durable Plastic Products #3 - #7	0.2%	0.1%	247	Batteries - Other Rechargeable	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.9%	0.3%	912	Batteries - All Other	-0.1%	0.3%	-139
Clean Film & Clean Shopping Bags	0.4%	0.2%	468	Other Hazardous Waste/HHW	0.3%	0.3%	328
Contaminated Film/Other Film	6.0%	2.2%	6,274	**Electronics**	**3.3%**	**4.5%**	**3,392**
Remainder/Composite Plastic	2.4%	1.8%	2,494	Computers/Related Elec. Prods.	3.3%	3.8%	3,392
Metal	**5.0%**	**2.0%**	**5,230**	**Other Wastes**	**12.8%**	**2.9%**	**13,369**
Aluminum Cans & Containers	1.0%	0.3%	1,054	Textiles & Leather Products	6.7%	2.6%	6,962
Other Aluminum	0.2%	0.1%	240	Diapers & Sanitary Products	2.9%	1.3%	3,028
Other Non-Ferrous	0.2%	0.1%	161	Bulky Items	0.0%	0.0%	0
Tin/Steel Containers	1.7%	0.5%	1,813	Tires	0.0%	0.0%	0
Other Ferrous	1.9%	1.8%	1,962	Other/Not Classified	1.0%	0.7%	1,021
Glass	**5.9%**	**1.9%**	**6,096**	Supermix - Fines & Dirt	2.3%	1.0%	2,358
Clear Glass Containers	3.9%	1.3%	4,039				
Brown Glass Containers	1.4%	0.7%	1,489				
Green Glass Containers	0.4%	0.3%	427	**Grand Total**	**100%**		**104,153**
Non-Container/Other Glass	0.1%	0.1%	141	*No. of Samples*	*12*		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Table 3-13 presents the composition of ICI waste generated in Rural areas of the state.

Table 3-13 Rural/ICI Disposed Waste Composition

Material Category	Est. Percent	Conf. Int (+/-)	Tons	Material Category	Est. Percent	Conf. Int (+/-)	Tons
Paper	**21.2%**	**5.9%**	**14,713**	**Organics**	**36.4%**	**9.1%**	**25,292**
Newsprint	1.9%	1.3%	1,303	Food Waste	32.1%	9.6%	22,306
Corr. Cardbd/Kraft Pap. (Uncoated)	8.2%	2.7%	5,676	Grass	0.0%	0.0%	2
Magazines	0.1%	0.1%	44	Leaves	0.0%	0.0%	0
Paperboard	0.8%	0.3%	542	Brush/Prunings/Trimmings	2.2%	1.8%	1,522
(High Grade) Office Paper	0.1%	0.1%	41	Other/Non-Compostable	2.1%	1.7%	
Books	3.0%	4.8%	2,109	**C&D Debris**	**14.8%**	**7.0%**	**10,282**
Other Recyclable Paper	0.8%	0.4%	534	Wood - Clean Lumber	0.0%	0.1%	31
Compostable Paper	6.2%	3.9%	4,324	Wood - Painted/Treated	3.3%	2.9%	2,300
Non-Recyclable Paper	0.2%	0.1%	140	Wood - Pallets	6.4%	5.2%	4,474
Plastic	**12.4%**	**3.9%**	**8,604**	Non-C&D Wood	0.0%	0.0%	22
PET(#1) Bottles/Jars	0.7%	0.2%	467	Drywall/Gypsum Board	0.0%	0.0%	9
PET(#1) Other	0.5%	0.7%	330	Concrete/Brick/Rock/Other C&D	4.9%	4.5%	3,411
HDPE(#2) Bottles - Natural	0.3%	0.1%	217	Carpet, Carpet Padding, & Rugs	0.0%	0.1%	34
HDPE(#2) Color Bottle/All Non-Bot.	0.2%	0.2%	162	**Household Hazardous Waste**	**0.5%**	**1.2%**	**361**
#3 thru #7 Bottles	0.0%	0.0%	26	Medical Waste & Sharps	0.0%	0.0%	13
Plastic Packaging #3 - #7	0.6%	0.3%	438	Batteries - Lead Acid	0.0%	0.0%	0
Durable Plastic Products #3 - #7	0.5%	0.7%	361	Batteries - Other Rechargeable	0.0%	0.0%	0
Expanded Polystyrene "Styrofoam"	0.3%	0.1%	206	Batteries - All Other	0.0%	0.0%	1
Clean Film & Clean Shopping Bags	0.5%	0.5%	323	Other Hazardous Waste/HHW	0.5%	0.7%	347
Contaminated Film/Other Film	4.1%	1.7%	2,838	**Electronics**	**1.4%**	**3.3%**	**972**
Remainder/Composite Plastic	4.7%	3.2%	3,236	Computers/Related Elec. Prods.	1.4%	1.6%	972
Metal	**2.3%**	**1.6%**	**1,576**	**Other Wastes**	**9.7%**	**4.8%**	**6,737**
Aluminum Cans & Containers	0.2%	0.1%	170	Textiles & Leather Products	2.3%	1.5%	1,604
Other Aluminum	0.1%	0.0%	56	Diapers & Sanitary Products	1.3%	0.9%	925
Other Non-Ferrous	0.0%	0.0%	6	Bulky Items	3.6%	3.6%	2,515
Tin/Steel Containers	0.8%	0.5%	530	Tires	0.0%	0.0%	0
Other Ferrous	1.2%	1.4%	814	Other/Not Classified	2.0%	2.3%	1,418
Glass	**1.3%**	**0.7%**	**899**	Supermix - Fines & Dirt	0.4%	0.2%	275
Clear Glass Containers	0.5%	0.2%	336				
Brown Glass Containers	0.5%	0.5%	343				
Green Glass Containers	0.3%	0.3%	189	**Grand Total**	**100%**		**69,435**
Non-Container/Other Glass	0.0%	0.0%	31	*No. of Samples*	**29**		

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

3.6 FACILITY-SPECIFIC RESULTS

This section provides the detailed statistical profiles for the nine disposal sites surveyed during the study, as well as the reported results from the two waste characterization studies performed prior to this project, and integrated into the results.

Table 3-14 provides a detailed statistical profile of the disposed waste stream at the Northwest Transfer Station.

Table 3-14 Detailed Disposed MSW Composition, Northwest Transfer Station [1]

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**17.3%**	**2.0%**	**Organics**	**36.4%**	**4.5%**
Newsprint	1.0%	0.3%	Food Waste	15.3%	2.4%
Corr. Cardbd/Kraft Pap. (Uncoated)	2.9%	1.2%	Grass	9.2%	4.9%
Magazines	0.9%	0.4%	Leaves	0.9%	0.7%
Paperboard	1.8%	0.3%	Brush/Prunings/Trimmings	6.3%	3.8%
(High Grade) Office Paper	1.0%	0.5%	Other/Non-Compostable	4.8%	2.0%
Books	0.6%	0.4%	**C&D Debris**	**4.8%**	**2.9%**
Other Recyclable Paper	2.4%	0.7%	Wood - Clean Lumber	0.3%	0.4%
Compostable Paper	5.7%	0.6%	Wood - Painted/Treated	1.0%	1.2%
Non-Recyclable Paper	1.0%	0.3%	Wood - Pallets	0.0%	0.0%
Plastic	**14.8%**	**2.1%**	Non-C&D Wood	0.1%	0.0%
PET(#1) Bottles/Jars	1.8%	0.4%	Drywall/Gypsum Board	0.0%	0.1%
PET(#1) Other	0.0%	0.0%	Concrete/Brick/Rock/Other C&D	0.2%	0.2%
HDPE(#2) Bottles - Natural	0.2%	0.1%	Carpet, Carpet Padding, & Rugs	3.1%	2.4%
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.1%	**Household Hazardous Waste**	**0.4%**	**0.2%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.1%	0.1%
Plastic Packaging #3 - #7	1.5%	0.3%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	2.4%	1.7%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	1.0%	0.2%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	0.2%	0.2%	Other Hazardous Waste/HHW	0.2%	0.2%
Contaminated Film/Other Film	5.9%	0.7%	**Electronics**	**0.7%**	**0.7%**
Remainder/Composite Plastic	1.2%	0.2%	Computers/Related Elec. Prods.	0.7%	0.6%
Metal	**3.2%**	**1.1%**	**Other Wastes**	**19.1%**	**4.2%**
Aluminum Cans & Containers	0.6%	0.1%	Textiles & Leather Products	9.2%	2.9%
Other Aluminum	0.3%	0.1%	Diapers & Sanitary Products	4.7%	1.8%
Other Non-Ferrous	0.3%	0.2%	Bulky Items	0.8%	1.3%
Tin/Steel Containers	0.8%	0.2%	Tires	0.0%	0.0%
Other Ferrous	1.1%	1.0%	Other/Not Classified	0.4%	0.2%
Glass	**3.5%**	**1.8%**	Supermix - Fines & Dirt	3.9%	1.5%
Clear Glass Containers	1.1%	0.4%			
Brown Glass Containers	1.3%	1.7%			
Green Glass Containers	0.4%	0.3%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.7%	0.3%	*No. of Samples*	*19*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

[1] All samples obtained at this facility originated from the residential sector, during one-season.

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Table 3-15 provides a detailed statistical profile of the disposed waste stream at the Baltimore City Landfill.

Table 3-15 Detailed Disposed MSW Composition, Baltimore City Landfill [1]

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**17.1%**	**3.6%**	**Organics**	**31.3%**	**7.2%**
Newsprint	0.2%	0.2%	Food Waste	14.1%	3.7%
Corr. Cardbd/Kraft Pap. (Uncoated)	4.9%	2.3%	Grass	6.2%	5.0%
Magazines	0.0%	0.0%	Leaves	1.5%	1.9%
Paperboard	2.4%	1.0%	Brush/Prunings/Trimmings	5.1%	4.0%
(High Grade) Office Paper	0.0%	0.0%	Other/Non-Compostable	4.4%	2.8%
Books	0.3%	0.4%	**C&D Debris**	**6.8%**	**4.0%**
Other Recyclable Paper	2.9%	0.8%	Wood - Clean Lumber	0.0%	0.1%
Compostable Paper	5.9%	1.9%	Wood - Painted/Treated	2.4%	3.3%
Non-Recyclable Paper	0.4%	0.3%	Wood - Pallets	0.0%	0.0%
Plastic	**16.4%**	**4.1%**	Non-C&D Wood	0.1%	0.1%
PET(#1) Bottles/Jars	1.7%	0.6%	Drywall/Gypsum Board	1.7%	2.5%
PET(#1) Other	0.0%	0.0%	Concrete/Brick/Rock/Other C&D	1.0%	1.2%
HDPE(#2) Bottles - Natural	0.2%	0.1%	Carpet, Carpet Padding, & Rugs	1.7%	2.7%
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.2%	**Household Hazardous Waste**	**0.3%**	**0.3%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.3%	0.3%
Plastic Packaging #3 - #7	1.0%	0.4%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	5.2%	5.1%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.8%	0.2%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	1.1%	0.3%	Other Hazardous Waste/HHW	0.0%	0.0%
Contaminated Film/Other Film	4.9%	1.1%	**Electronics**	**1.4%**	**1.2%**
Remainder/Composite Plastic	1.1%	0.3%	Computers/Related Elec. Prods.	1.4%	1.1%
Metal	**5.9%**	**3.2%**	**Other Wastes**	**19.1%**	**4.9%**
Aluminum Cans & Containers	0.6%	0.2%	Textiles & Leather Products	13.0%	3.6%
Other Aluminum	0.2%	0.1%	Diapers & Sanitary Products	3.1%	1.5%
Other Non-Ferrous	0.6%	0.3%	Bulky Items	0.0%	0.0%
Tin/Steel Containers	1.2%	0.5%	Tires	0.0%	0.0%
Other Ferrous	3.2%	3.4%	Other/Not Classified	0.9%	1.3%
Glass	**1.6%**	**0.8%**	Supermix - Fines & Dirt	2.2%	1.0%
Clear Glass Containers	1.1%	0.6%			
Brown Glass Containers	0.2%	0.2%			
Green Glass Containers	0.1%	0.1%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.2%	0.2%	*No. of Samples*	*10*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

[1] All samples obtained at this facility originated from the Residential sector, during one-season.

Table 3-16 provides a detailed statistical profile of the disposed waste stream at the Appeal Landfill in Calvert County.

Table 3-16 Detailed Disposed MSW Composition, Appeal Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**31.6%**	**5.1%**	**Organics**	**21.2%**	**5.2%**
Newsprint	0.9%	0.4%	Food Waste	18.5%	5.4%
Corr. Cardbd/Kraft Pap. (Uncoated)	12.7%	3.5%	Grass	0.6%	0.7%
Magazines	1.0%	0.7%	Leaves	0.3%	0.3%
Paperboard	2.5%	0.6%	Brush/Prunings/Trimmings	0.3%	0.3%
(High Grade) Office Paper	0.3%	0.2%	Other/Non-Compostable	1.4%	1.0%
Books	0.3%	0.3%	**C&D Debris**	**17.1%**	**8.1%**
Other Recyclable Paper	4.2%	2.2%	Wood - Clean Lumber	2.3%	2.1%
Compostable Paper	8.1%	1.8%	Wood - Painted/Treated	3.7%	2.5%
Non-Recyclable Paper	1.7%	1.2%	Wood - Pallets	4.6%	2.7%
Plastic	**12.6%**	**2.0%**	Non-C&D Wood	0.1%	0.0%
PET(#1) Bottles/Jars	1.3%	0.3%	Drywall/Gypsum Board	0.0%	0.0%
PET(#1) Other	0.1%	0.0%	Concrete/Brick/Rock/Other C&D	0.3%	0.4%
HDPE(#2) Bottles - Natural	0.5%	0.4%	Carpet, Carpet Padding, & Rugs	6.3%	6.2%
HDPE(#2) Color Bottle/All Non-Bot.	0.3%	0.1%	**Household Hazardous Waste**	**0.8%**	**1.3%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.7%	1.1%
Plastic Packaging #3 - #7	1.3%	0.3%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	0.6%	0.3%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.9%	0.7%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	0.3%	0.1%	Other Hazardous Waste/HHW	0.1%	0.1%
Contaminated Film/Other Film	4.6%	1.0%	**Electronics**	**0.9%**	**1.5%**
Remainder/Composite Plastic	2.7%	1.9%	Computers/Related Elec. Prods.	0.9%	0.9%
Metal	**3.5%**	**1.6%**	**Other Wastes**	**10.7%**	**3.7%**
Aluminum Cans & Containers	0.5%	0.2%	Textiles & Leather Products	3.1%	1.6%
Other Aluminum	0.4%	0.2%	Diapers & Sanitary Products	3.0%	1.7%
Other Non-Ferrous	0.9%	1.1%	Bulky Items	2.9%	2.8%
Tin/Steel Containers	0.6%	0.2%	Tires	0.1%	0.2%
Other Ferrous	1.3%	1.2%	Other/Not Classified	0.4%	0.3%
Glass	**1.5%**	**0.7%**	Supermix - Fines & Dirt	1.2%	0.8%
Clear Glass Containers	0.7%	0.4%			
Brown Glass Containers	0.3%	0.1%			
Green Glass Containers	0.4%	0.4%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.1%	0.1%	*No. of Samples*	*22*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Table 3-17 provides a detailed statistical profile of the disposed waste stream at the Northern Landfill in Carroll County.

Table 3-17 Detailed Disposed MSW Composition, Northern Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**25.3%**	**5.0%**	**Organics**	**24.2%**	**4.9%**
Newsprint	1.4%	0.8%	Food Waste	18.1%	4.3%
Corr. Cardbd/Kraft Pap. (Uncoated)	6.8%	1.9%	Grass	1.3%	1.4%
Magazines	0.9%	0.6%	Leaves	0.5%	0.8%
Paperboard	1.5%	0.4%	Brush/Prunings/Trimmings	0.1%	0.1%
(High Grade) Office Paper	1.3%	1.3%	Other/Non-Compostable	4.1%	1.7%
Books	0.2%	0.3%	**C&D Debris**	**16.5%**	**6.4%**
Other Recyclable Paper	5.6%	3.1%	Wood - Clean Lumber	3.4%	2.1%
Compostable Paper	7.1%	1.4%	Wood - Painted/Treated	5.1%	2.9%
Non-Recyclable Paper	0.6%	0.2%	Wood - Pallets	1.2%	1.3%
Plastic	**13.2%**	**2.0%**	Non-C&D Wood	0.3%	0.2%
PET(#1) Bottles/Jars	1.2%	0.2%	Drywall/Gypsum Board	0.7%	1.0%
PET(#1) Other	0.1%	0.0%	Concrete/Brick/Rock/Other C&D	1.6%	1.9%
HDPE(#2) Bottles - Natural	0.3%	0.1%	Carpet, Carpet Padding, & Rugs	4.2%	4.6%
HDPE(#2) Color Bottle/All Non-Bot.	0.7%	0.2%	**Household Hazardous Waste**	**0.6%**	**0.5%**
#3 thru #7 Bottles	0.1%	0.1%	Medical Waste & Sharps	0.1%	0.2%
Plastic Packaging #3 - #7	0.9%	0.2%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	1.9%	0.9%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.6%	0.1%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	1.1%	1.1%	Other Hazardous Waste/HHW	0.4%	0.4%
Contaminated Film/Other Film	4.7%	1.0%	**Electronics**	**0.5%**	**0.5%**
Remainder/Composite Plastic	1.5%	0.8%	Computers/Related Elec. Prods.	0.5%	0.4%
Metal	**3.3%**	**1.1%**	**Other Wastes**	**14.1%**	**4.1%**
Aluminum Cans & Containers	0.4%	0.1%	Textiles & Leather Products	3.1%	1.5%
Other Aluminum	0.3%	0.1%	Diapers & Sanitary Products	2.5%	1.2%
Other Non-Ferrous	1.0%	1.0%	Bulky Items	2.5%	1.8%
Tin/Steel Containers	0.9%	0.3%	Tires	0.1%	0.1%
Other Ferrous	0.8%	0.5%	Other/Not Classified	2.8%	2.0%
Glass	**2.3%**	**0.6%**	Supermix - Fines & Dirt	3.2%	2.0%
Clear Glass Containers	1.0%	0.3%			
Brown Glass Containers	0.8%	0.4%			
Green Glass Containers	0.3%	0.2%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.2%	0.2%	*No. of Samples*	*26*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-18 provides the detailed statistical profile of the Cecil County Central Landfill disposed waste stream.

Table 3-18 Detailed Disposed MSW Composition, Cecil County Central Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**20.6%**	**3.7%**	**Organics**	**27.0%**	**6.0%**
Newsprint	0.7%	0.4%	Food Waste	22.0%	6.9%
Corr. Cardbd/Kraft Pap. (Uncoated)	8.1%	2.5%	Grass	0.1%	0.1%
Magazines	0.3%	0.2%	Leaves	0.3%	0.4%
Paperboard	1.6%	0.5%	Brush/Prunings/Trimmings	1.4%	1.3%
(High Grade) Office Paper	0.3%	0.4%	Other/Non-Compostable	3.2%	1.5%
Books	0.2%	0.1%	**C&D Debris**	**13.3%**	**4.5%**
Other Recyclable Paper	1.5%	0.6%	Wood - Clean Lumber	1.5%	1.4%
Compostable Paper	7.5%	2.0%	Wood - Painted/Treated	2.1%	2.0%
Non-Recyclable Paper	0.5%	0.1%	Wood - Pallets	2.0%	2.2%
Plastic	**16.6%**	**5.9%**	Non-C&D Wood	0.7%	0.8%
PET(#1) Bottles/Jars	1.2%	0.3%	Drywall/Gypsum Board	1.6%	2.5%
PET(#1) Other	1.1%	1.6%	Concrete/Brick/Rock/Other C&D	0.6%	0.7%
HDPE(#2) Bottles - Natural	0.4%	0.1%	Carpet, Carpet Padding, & Rugs	4.8%	3.1%
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.2%	**Household Hazardous Waste**	**0.2%**	**0.3%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.0%	0.0%
Plastic Packaging #3 - #7	1.4%	0.4%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	1.1%	0.8%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.6%	0.2%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	1.2%	0.9%	Other Hazardous Waste/HHW	0.2%	0.2%
Contaminated Film/Other Film	4.6%	1.3%	**Electronics**	**0.2%**	**0.2%**
Remainder/Composite Plastic	4.5%	4.0%	Computers/Related Elec. Prods.	0.2%	0.1%
Metal	**1.7%**	**0.5%**	**Other Wastes**	**17.2%**	**8.0%**
Aluminum Cans & Containers	0.3%	0.1%	Textiles & Leather Products	10.8%	7.3%
Other Aluminum	0.1%	0.0%	Diapers & Sanitary Products	1.5%	0.6%
Other Non-Ferrous	0.4%	0.4%	Bulky Items	1.1%	1.4%
Tin/Steel Containers	0.6%	0.2%	Tires	0.5%	0.8%
Other Ferrous	0.2%	0.2%	Other/Not Classified	1.3%	0.8%
Glass	**3.1%**	**2.2%**	Supermix - Fines & Dirt	2.1%	1.6%
Clear Glass Containers	1.7%	1.3%			
Brown Glass Containers	0.8%	0.7%			
Green Glass Containers	0.4%	0.3%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.2%	0.2%	*No. of Samples*	*22*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Table 3-19 provides the detailed statistical profile for the disposed waste stream at Charles County Landfill.

Table 3-19 Detailed Disposed MSW Composition, Charles County Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**31.0%**	**5.6%**	**Organics**	**22.2%**	**4.3%**
Newsprint	1.2%	0.5%	Food Waste	18.6%	4.7%
Corr. Cardbd/Kraft Pap. (Uncoated)	13.3%	4.3%	Grass	0.9%	1.0%
Magazines	0.6%	0.3%	Leaves	0.3%	0.4%
Paperboard	4.7%	3.1%	Brush/Prunings/Trimmings	1.1%	0.9%
(High Grade) Office Paper	0.3%	0.3%	Other/Non-Compostable	1.3%	0.6%
Books	0.2%	0.2%	**C&D Debris**	**14.1%**	**6.6%**
Other Recyclable Paper	1.8%	0.6%	Wood - Clean Lumber	0.7%	0.7%
Compostable Paper	8.0%	1.6%	Wood - Painted/Treated	3.9%	1.8%
Non-Recyclable Paper	0.8%	0.3%	Wood - Pallets	0.8%	1.0%
Plastic	**12.7%**	**1.9%**	Non-C&D Wood	0.3%	0.2%
PET(#1) Bottles/Jars	1.4%	0.3%	Drywall/Gypsum Board	0.8%	0.8%
PET(#1) Other	0.1%	0.0%	Concrete/Brick/Rock/Other C&D	2.4%	2.3%
HDPE(#2) Bottles - Natural	0.3%	0.1%	Carpet, Carpet Padding, & Rugs	5.2%	4.6%
HDPE(#2) Color Bottle/All Non-Bot.	0.3%	0.2%	**Household Hazardous Waste**	**0.4%**	**0.4%**
#3 thru #7 Bottles	0.1%	0.1%	Medical Waste & Sharps	0.1%	0.2%
Plastic Packaging #3 - #7	1.1%	0.3%	Batteries - Lead Acid	0.2%	0.3%
Durable Plastic Products #3 - #7	0.8%	0.5%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	1.4%	0.9%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	0.5%	0.2%	Other Hazardous Waste/HHW	0.0%	0.0%
Contaminated Film/Other Film	4.1%	0.9%	**Electronics**	**0.3%**	**0.7%**
Remainder/Composite Plastic	2.5%	1.0%	Computers/Related Elec. Prods.	0.3%	0.4%
Metal	**5.0%**	**2.4%**	**Other Wastes**	**12.2%**	**3.4%**
Aluminum Cans & Containers	0.4%	0.2%	Textiles & Leather Products	5.3%	2.1%
Other Aluminum	0.9%	1.0%	Diapers & Sanitary Products	2.8%	1.2%
Other Non-Ferrous	0.2%	0.3%	Bulky Items	1.3%	1.2%
Tin/Steel Containers	0.9%	0.4%	Tires	0.6%	0.9%
Other Ferrous	2.6%	1.6%	Other/Not Classified	0.5%	0.3%
Glass	**2.2%**	**0.9%**	Supermix - Fines & Dirt	1.8%	1.1%
Clear Glass Containers	1.1%	0.6%			
Brown Glass Containers	0.6%	0.4%			
Green Glass Containers	0.2%	0.2%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.2%	0.1%	*No. of Samples*	*29*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-20 provides a detailed statistical profile of the Garrett County Landfill disposed waste stream.

Table 3-20 Detailed Disposed MSW Composition, Garrett County Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**23.3%**	**3.2%**	**Organics**	**25.0%**	**5.0%**
Newsprint	3.9%	2.1%	Food Waste	18.6%	5.8%
Corr. Cardbd/Kraft Pap. (Uncoated)	7.8%	3.6%	Grass	0.0%	0.0%
Magazines	0.6%	0.4%	Leaves	0.1%	0.2%
Paperboard	1.9%	0.5%	Brush/Prunings/Trimmings	2.5%	2.3%
(High Grade) Office Paper	0.2%	0.2%	Other/Non-Compostable	3.8%	2.4%
Books	0.1%	0.2%	**C&D Debris**	**12.0%**	**6.7%**
Other Recyclable Paper	2.7%	1.2%	Wood - Clean Lumber	0.0%	0.0%
Compostable Paper	5.5%	1.1%	Wood - Painted/Treated	3.0%	3.5%
Non-Recyclable Paper	0.5%	0.3%	Wood - Pallets	3.3%	5.3%
Plastic	**13.5%**	**2.6%**	Non-C&D Wood	0.1%	0.2%
PET(#1) Bottles/Jars	1.5%	0.4%	Drywall/Gypsum Board	0.0%	0.0%
PET(#1) Other	0.1%	0.0%	Concrete/Brick/Rock/Other C&D	3.3%	3.0%
HDPE(#2) Bottles - Natural	0.4%	0.1%	Carpet, Carpet Padding, & Rugs	2.3%	2.1%
HDPE(#2) Color Bottle/All Non-Bot.	0.8%	0.3%	**Household Hazardous Waste**	**0.7%**	**1.1%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.0%	0.0%
Plastic Packaging #3 - #7	1.0%	0.3%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	0.6%	0.9%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.6%	0.2%	Batteries - All Other	-0.1%	0.2%
Clean Film & Clean Shopping Bags	0.4%	0.2%	Other Hazardous Waste/HHW	0.8%	0.9%
Contaminated Film/Other Film	4.5%	1.5%	**Electronics**	**3.6%**	**3.8%**
Remainder/Composite Plastic	3.6%	2.2%	Computers/Related Elec. Prods.	3.6%	2.9%
Metal	**3.5%**	**1.3%**	**Other Wastes**	**14.3%**	**4.5%**
Aluminum Cans & Containers	0.6%	0.2%	Textiles & Leather Products	5.2%	2.4%
Other Aluminum	0.2%	0.0%	Diapers & Sanitary Products	2.5%	1.0%
Other Non-Ferrous	0.1%	0.1%	Bulky Items	4.8%	4.6%
Tin/Steel Containers	1.3%	0.4%	Tires	0.0%	0.0%
Other Ferrous	1.3%	1.0%	Other/Not Classified	0.6%	0.4%
Glass	**3.9%**	**1.3%**	Supermix - Fines & Dirt	1.2%	0.4%
Clear Glass Containers	2.3%	1.0%			
Brown Glass Containers	1.1%	0.5%			
Green Glass Containers	0.3%	0.2%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.1%	0.1%	*No. of Samples*	*22*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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Table 3-21 provides a detailed statistical profile of the Somerset County Landfill disposed waste stream.

Table 3-21 Detailed Disposed MSW Composition, Somerset County Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**22.1%**	**8.6%**	**Organics**	**42.8%**	**12.1%**
Newsprint	0.8%	1.1%	Food Waste	38.4%	12.7%
Corr. Cardbd/Kraft Pap. (Uncoated)	6.3%	2.0%	Grass	0.4%	0.6%
Magazines	0.1%	0.1%	Leaves	0.0%	0.0%
Paperboard	0.9%	0.5%	Brush/Prunings/Trimmings	1.1%	1.1%
(High Grade) Office Paper	0.0%	0.0%	Other/Non-Compostable	2.9%	2.9%
Books	4.5%	7.2%	**C&D Debris**	**11.9%**	**8.5%**
Other Recyclable Paper	0.9%	0.5%	Wood - Clean Lumber	0.2%	0.2%
Compostable Paper	8.3%	5.8%	Wood - Painted/Treated	1.7%	1.9%
Non-Recyclable Paper	0.2%	0.1%	Wood - Pallets	6.0%	5.3%
Plastic	**13.1%**	**5.7%**	Non-C&D Wood	0.0%	0.0%
PET(#1) Bottles/Jars	0.8%	0.4%	Drywall/Gypsum Board	0.0%	0.0%
PET(#1) Other	0.7%	1.1%	Concrete/Brick/Rock/Other C&D	3.8%	6.0%
HDPE(#2) Bottles - Natural	0.2%	0.1%	Carpet, Carpet Padding, & Rugs	0.1%	0.1%
HDPE(#2) Color Bottle/All Non-Bot.	0.3%	0.3%	**Household Hazardous Waste**	**0.1%**	**0.1%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.0%	0.0%
Plastic Packaging #3 - #7	0.6%	0.3%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	0.2%	0.1%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.3%	0.1%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	0.6%	0.7%	Other Hazardous Waste/HHW	0.0%	0.1%
Contaminated Film/Other Film	4.9%	2.4%	**Electronics**	**0.0%**	**0.0%**
Remainder/Composite Plastic	4.4%	4.4%	Computers/Related Elec. Prods.	0.0%	0.0%
Metal	**2.6%**	**2.6%**	**Other Wastes**	**6.3%**	**4.7%**
Aluminum Cans & Containers	0.3%	0.2%	Textiles & Leather Products	1.7%	0.9%
Other Aluminum	0.1%	0.1%	Diapers & Sanitary Products	0.9%	1.1%
Other Non-Ferrous	0.0%	0.0%	Bulky Items	0.0%	0.0%
Tin/Steel Containers	0.7%	0.8%	Tires	0.0%	0.0%
Other Ferrous	1.4%	2.1%	Other/Not Classified	3.1%	3.4%
Glass	**1.2%**	**1.0%**	Supermix - Fines & Dirt	0.6%	0.7%
Clear Glass Containers	0.5%	0.3%			
Brown Glass Containers	0.4%	0.5%			
Green Glass Containers	0.3%	0.4%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.0%	0.0%	*No. of Samples*	*19*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Table 3-22 provides the detailed statistical profile of the disposed waste stream for Forty West Municipal Landfill in Washington County.

Table 3-22 Detailed Disposed MSW Composition, Forty West Municipal Landfill

Material Category	Est. Percent	Conf. Int (+/-)	Material Category	Est. Percent	Conf. Int (+/-)
Paper	**22.2%**	**6.2%**	**Organics**	**18.0%**	**5.1%**
Newsprint	3.7%	3.5%	Food Waste	11.3%	3.9%
Corr. Cardbd/Kraft Pap. (Uncoated)	5.1%	1.7%	Grass	0.1%	0.2%
Magazines	0.3%	0.2%	Leaves	0.0%	0.0%
Paperboard	1.5%	0.5%	Brush/Prunings/Trimmings	1.2%	1.3%
(High Grade) Office Paper	0.2%	0.3%	Other/Non-Compostable	5.4%	3.2%
Books	0.0%	0.0%	**C&D Debris**	**24.2%**	**8.7%**
Other Recyclable Paper	3.2%	1.7%	Wood - Clean Lumber	4.4%	5.1%
Compostable Paper	7.1%	2.6%	Wood - Painted/Treated	6.0%	3.5%
Non-Recyclable Paper	1.1%	0.8%	Wood - Pallets	2.1%	2.0%
Plastic	**15.1%**	**5.9%**	Non-C&D Wood	0.3%	0.3%
PET(#1) Bottles/Jars	1.2%	0.4%	Drywall/Gypsum Board	0.8%	1.2%
PET(#1) Other	0.1%	0.1%	Concrete/Brick/Rock/Other C&D	8.9%	6.0%
HDPE(#2) Bottles - Natural	0.3%	0.1%	Carpet, Carpet Padding, & Rugs	1.8%	1.6%
HDPE(#2) Color Bottle/All Non-Bot.	0.4%	0.2%	**Household Hazardous Waste**	**0.1%**	**0.1%**
#3 thru #7 Bottles	0.0%	0.0%	Medical Waste & Sharps	0.0%	0.0%
Plastic Packaging #3 - #7	1.3%	0.6%	Batteries - Lead Acid	0.0%	0.0%
Durable Plastic Products #3 - #7	0.9%	0.7%	Batteries - Other Rechargeable	0.0%	0.0%
Expanded Polystyrene "Styrofoam"	0.5%	0.2%	Batteries - All Other	0.0%	0.0%
Clean Film & Clean Shopping Bags	0.8%	1.0%	Other Hazardous Waste/HHW	0.1%	0.1%
Contaminated Film/Other Film	4.7%	1.8%	**Electronics**	**0.0%**	**0.0%**
Remainder/Composite Plastic	4.8%	6.1%	Computers/Related Elec. Prods.	0.0%	0.0%
Metal	**6.3%**	**3.7%**	**Other Wastes**	**12.8%**	**6.5%**
Aluminum Cans & Containers	0.4%	0.1%	Textiles & Leather Products	4.6%	3.0%
Other Aluminum	0.1%	0.0%	Diapers & Sanitary Products	2.1%	1.2%
Other Non-Ferrous	0.2%	0.2%	Bulky Items	3.5%	5.6%
Tin/Steel Containers	3.1%	3.3%	Tires	0.0%	0.0%
Other Ferrous	2.5%	1.5%	Other/Not Classified	0.5%	0.2%
Glass	**1.2%**	**0.9%**	Supermix - Fines & Dirt	2.1%	0.6%
Clear Glass Containers	0.4%	0.2%			
Brown Glass Containers	0.3%	0.3%			
Green Glass Containers	0.1%	0.1%	**Grand Total**	**100%**	
Non-Container/Other Glass	0.4%	0.4%	*No. of Samples*	*22*	

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

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3. RESULTS

Table 3-23 provides the detailed statistical profile of the disposed waste stream as reported in Montgomery County's 2013 Waste Composition Study. These results represent the county-wide aggregate residential and ICI (non-residential) municipal solid waste stream disposed at the County's Shady Grove Transfer Station. Although not shown, this report also contained results separately for the Residential and ICI waste streams.

Table 3-23 Detailed Aggregate Disposed MSW Composition, Montgomery County Transfer Station

Material Category	Est. Percent	Std. Dev.	95% Confidence Upper	95% Confidence Lower	Material Category	Est. Percent	Std. Dev.	95% Confidence Upper	95% Confidence Lower
Paper	**25.8%**				**Wood**	**2.7%**			
Newspaper/Newsprint Catalogs	2.3%	3.0%	2.0%	2.7%	Lumber	0.3%	1.7%	0.1%	0.5%
Corrugated Cardboard	2.4%	2.5%	2.1%	2.7%	Pallets	0.1%	1.1%	<0.1%	0.3%
Magazines	1.3%	1.6%	1.1%	1.4%	Other Wood	2.3%	4.6%	1.8%	2.8%
Paperboard	2.4%	1.7%	2.2%	2.6%	**Ferrous Metal**	**2.5%**			
Aseptic/Poly-coated	1.9%	2.0%	1.6%	2.1%	Ferous/Bi-metal Cans	1.3%	3.5%	1.0%	1.7%
Office Paper	1.7%	2.3%	1.4%	1.9%	Other Ferrous	1.2%	3.8%	0.8%	1.7%
Shredded Paper	0.3%	0.8%	0.2%	0.4%	**Non-Ferrous Metal**	**1.0%**			
Books	0.3%	1.2%	0.2%	0.5%	Aluminum Cans	0.5%	0.6%	0.4%	0.6%
Other Recyclable Paper	3.7%	2.5%	3.4%	4.0%	Aluminum Tins/Foil	0.5%	0.5%	0.4%	0.5%
Non-Recyclable Paper	9.5%	4.7%	8.9%	10.0%	Other Aluminum	<0.1%	0.4%	<0.1%	0.1%
Plastic	**16.8%**				Brass	<0.1%	<0.1%	<0.1%	<0.1%
PET (#1) Bottles	1.5%	1.5%	1.3%	1.7%	Copper	<0.1%	0.1%	<0.1%	<0.1%
PET (#1) Trays and Tubs	0.6%	0.6%	0.5%	0.7%	Other Non-Ferrous	<0.1%	0.6%	<0.1%	0.1%
HDPE (#2) Natural Bottles	0.4%	0.5%	0.3%	0.4%	**Glass**	**2.8%**			
HDPE (#2) Pigmented Bottles	0.4%	0.4%	0.3%	0.4%	Clear Glass	1.5%	1.8%	1.3%	1.7%
#3-#7 Plastic Bottles	<0.1%	<0.1%	<0.1%	<0.1%	Brown Glass	0.5%	0.9%	0.4%	0.6%
Expanded Polystyrene (styrofoam)	1.1%	1.1%	0.9%	1.2%	Green Glass	0.6%	1.2%	0.5%	0.8%
Other #6 Polystyrene	0.9%	3.4%	0.5%	1.3%	Non-container Glass	0.2%	0.9%	0.1%	0.3%
Plastic Flower Pots	0.1%	1.1%	<0.1%	0.3%	**Inorganic**	**5.3%**			
Other Recyclable Container	1.3%	1.3%	1.2%	1.5%	Concrete/Brick/Rock	0.4%	2.5%	0.2%	0.7%
Film Plastic - Shopping Bags	0.5%	0.7%	0.4%	0.5%	Sheet Rock	0.4%	2.0%	0.2%	0.6%
Film Plastic - Other	7.9%	3.9%	7.4%	8.3%	Latex Paints	0.1%	1.2%	<0.1%	0.2%
Other Rigid Plastic	2.1%	3.1%	1.8%	2.5%	Fluorescent Lamps	<0.1%	<0.1%	<0.1%	<0.1%
Organic	**40.8%**				Electronics	1.8%	4.1%	1.3%	2.2%
Food Waste	22.8%	15.8%	21.0%	24.6%	Miscellaneous Inorganics	2.6%	7.2%	1.8%	3.5%
Clothing/Linens/Textiles/Leather	4.2%	4.7%	3.6%	4.7%	**HHW**	**0.1%**			
Carpets/Rugs	1.0%	4.9%	0.4%	1.5%	Lead-Acid Batteries	<0.1%	<0.1%	<0.1%	<0.1%
Rubber	<0.1%	0.2%	<0.1%	0.1%	Other Rechargeable Batt	<0.1%	<0.1%	<0.1%	<0.1%
Tires	0.2%	2.5%	<0.1%	0.5%	Other Batteries	<0.1%	<0.1%	<0.1%	<0.1%
Diapers & Sanitary Products	3.3%	3.4%	2.9%	3.7%	Oil-based Paints/Thinners	<0.1%	<0.1%	<0.1%	<0.1%
Fines	2.3%	1.0%	2.2%	2.4%	Poisons	<0.1%	<0.1%	<0.1%	<0.1%
Miscellaneous Organics	7.0%	2.0%	6.7%	7.2%	Corrosives/Solvents	<0.1%	<0.1%	<0.1%	<0.1%
Yard Waste	**1.8%**				Medical	<0.1%	0.6%	<0.1%	0.1%
Grass	0.3%	1.3%	0.2%	0.5%	Fuel/Lubricants/Auto	<0.1%	0.2%	<0.1%	<0.1%
Leaves	0.3%	1.4%	0.1%	0.4%	HW Containers	0.1%	1.0%	<0.1%	0.2%
Brush/Pruning	1.2%	3.1%	0.9%	1.6%	Other Hazardous	<0.1%	0.6%	<0.1%	0.1%
					Grand Total	**100%**			
					No. of Samples	*300*			

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Source: *Montgomery County Waste Composition Study*, Montgomery County Department of Environmental Protection, July 26, 2013.

Table 3-24 provides the detailed statistical profile of the disposed waste stream as reported in Prince George's County's 2015 Waste Composition Study. These results represent the county-wide aggregate residential and ICI (non-residential) municipal solid waste stream disposed at the County's Brown Station Road Landfill. Although not shown, this report also contained results separately for the Residential and ICI waste streams.

Table 3-24 Detailed Aggregate Disposed MSW Composition, Prince George's County Brown Station Road Landfill

Material Category	Residential	Commercial	Schools	Totals	Material Category	Residential	Commercial	Schools	Totals
Recyclable Paper	**18.1%**	**24.9%**	**25.0%**	**20.5%**	**Divertible**	**14.8%**	**18.1%**	**0.0%**	**15.4%**
Newspaper/print	3.0%	1.1%	<0.1%	2.4%	Electronics	0.9%	0.6%	<0.1%	0.8%
Corrugated Cardboard	3.4%	11.8%	10.0%	6.1%	CRTs	<0.1%	0.7%	<0.1%	0.2%
Magazines/Catalogs/Other Books	1.1%	1.7%	1.0%	1.3%	Paint	0.1%	<0.1%	<0.1%	0.1%
Kraft Paper/Paperboard	3.3%	2.1%	2.0%	3.0%	Scrap Metal	1.0%	1.2%	<0.1%	1.1%
Office Paper/Junk Mail/Misc. Paper	5.5%	6.6%	10.0%	6.0%	Pallets/Lumber	0.8%	3.1%	<0.1%	1.5%
Aseptic/Wax Coated Paper	1.8%	1.7%	2.0%	1.8%	Other Wood	2.1%	2.4%	<0.1%	2.1%
Recyclable Containers	**12.3%**	**11.0%**	**17.0%**	**12.1%**	Concrete/Brick/Rock	0.3%	0.1%	<0.1%	0.3%
PET #1 Bottles	2.0%	2.1%	4.0%	2.1%	Dirt	0.7%	0.3%	<0.1%	0.6%
HDPE #2 Bottles	1.1%	0.7%	2.0%	1.0%	Sheet Rock	0.8%	0.2%	<0.1%	0.6%
Other #3-#7 Bottles	0.0%	<0.1%	<0.1%	0.1%	Carpet/Carpet Padding	0.7%	3.8%	<0.1%	1.6%
Jars, Jugs, Tubs, Trays	1.3%	1.7%	1.0%	1.4%	Shingles	0.3%	0.6%	<0.1%	0.4%
Flower Pots	0.1%	<0.1%	<0.1%	0.1%	Textiles	5.3%	4.3%	<0.1%	4.9%
Other Rigid Plastic	2.2%	2.9%	2.0%	2.4%	Shopping Bags	1.5%	0.8%	<0.1%	1.3%
Ferrous Cans	1.1%	0.6%	<0.1%	0.9%	**Other MSW**	**23.6%**	**22.7%**	**23.0%**	**23.3%**
Aluminum Cans/Foil	1.0%	0.8%	<0.1%	0.9%	Furniture	0.7%	0.8%	1.0%	0.7%
Glass Bottle/Jars	3.4%	2.3%	8.0%	3.3%	Plastic Film	6.7%	9.3%	8.0%	7.5%
Compostable	**31.3%**	**23.2%**	**27.0%**	**28.8%**	Garbage Bags	2.0%	2.3%	<0.1%	2.1%
Compostable Paper	7.2%	7.3%	7.0%	7.2%	Polystyrene	1.9%	1.9%	2.0%	1.9%
Vegetative Food	11.9%	9.2%	15.0%	11.2%	Other MSW	12.4%	8.3%	12.0%	11.2%
Non-Vegetative Food	5.2%	3.3%	2.0%	4.6%					
Leaves	2.8%	0.8%	3.0%	2.2%					
Grass	1.7%	1.2%	<0.1%	1.5%	**Grand Total**	**100%**			
Brush	2.5%	1.3%	<0.1%	2.1%	*No. of Samples*	*200*			

Note, it is possible that subtotals presented in tables and figures do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

Source: *Waste Characterization Study 2014/2015,* Prince George's County Department of the Environment, June 7, 2016.

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4. CONCLUSIONS & RECOMMENDATIONS

4.1 CONCLUSIONS

◆ **Inaugural Study**: The 2016 Study served as a good first effort to measure the composition of disposed municipal solid waste originating throughout Maryland. The study distributed field data collection across the state's landfills (and one transfer station) to capture representative samples of disposed wastes from rural areas to the west and east of the state, as well as in the more suburban and urban center. Although the study did not capture enough samples from the ICI sector in the City of Baltimore, it provided a reasonably representative snapshot of residential wastes and ICI wastes, as well as the aggregate disposed waste stream. In the opinion of MSW Consultants, the statewide results for Residential, ICI and aggregate disposed wastes are in line with the results experienced by other states that have performed similar large-scale studies and reasonably characterize the State's disposed MSW stream.

◆ **Incremental Diversion of Traditional Recyclables**: Although curbside recycling programs are widespread in many areas of the state, curbside access is not universal in Maryland and traditional curbside recyclables were found consistently in the disposed waste stream. This suggests that the state still has opportunities to increase its recycling rate both by optimizing the use of existing programs, and also by expanding access to more remote areas of the state.

◆ **Opportunity for Diversion of Organics**: At least half of the disposed waste stream is made up of organic materials. While some of these are recyclable fibers, and not all organics are compostable, there are emerging technologies that purport to convert organic wastes into energy, fuels and the like. While this will entice many to push for aggressive diversion of these materials, it should be noted that the food waste and compostable papers may be more difficult to separate and recover than these results might suggest. Mechanical and optical sorting capabilities are not able to achieve the level of accuracy of the manual sorting that occurred in this study. However, if food waste is source-separated and de-packaged, it would be entirely suitable for composting and other energy recovery processes.

◆ **Integration of Multiple Waste Composition Studies**: While the existence of additional waste composition studies conducted by Maryland counties would appear to supplement this statewide study, in practice it is difficult to combine such studies while achieving consistent, comprehensive results. Two of the five county-level studies were ultimately integrated into the statewide results, although at a loss of detail compared to the overall reported results.

◆ **Demographic Influence**: Not surprisingly, Maryland's waste stream originates predominantly from suburban areas, with relatively little urban and rural waste. The statewide composition data contained herein consequently reflect this weighting towards suburban wastes.

4.2 RECOMMENDATIONS

◆ **Continue Performing Statewide Studies**: Statewide studies both inform about the overall disposed waste stream for state-level planners, and also provide data to municipal and private solid waste and recycling stakeholders for a variety of uses. The Department joins state agencies from roughly fifteen other states at conducting statewide waste characterization analyses on a regular basis, and should continue to perform a similar project over five to seven year intervals. Should the Department update this study in the future, the following improvements are recommended:

♦ **Increase Sampling and Sorting in the Baltimore/Washington Metro Area**: Future waste composition studies should consider capturing a higher number of samples from additional host facilities in the Baltimore-Washington region. Such data, if collected using the statewide study

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4. CONCLUSIONS & RECOMMENDATIONS

methodology (rather than a third party methodology with inconsistencies) would better represent the statewide waste stream.[1]

- ◆ **Capture City of Baltimore ICI Waste**: Due to the difficulty of predicting the availability of loads from a particular sector on a particular day, there resulted a shortage of ICI MSW at the sampling locations in the City. The scope of this study only focused on MSW destined for publicly operated facilities and most ICI waste was delivered to private disposal facilities in the Baltimore region during the sampling periods of this study. In future studies, the Department should attempt to incorporate one or more private facilities in the City or other public facilities outside the City in the Baltimore region that receive ICI wastes.

◆ **Consider Statewide Disposal Facility Gate Survey**: The Department maintains excellent records of disposed wastes through its facility reporting system. However, no data are available to further break down the generator sector for disposed wastes, and also in some cases there may be C&D and other non-MSW included in the MSW disposal tonnages. The Department may wish to conduct gate surveys at some or all of the state's disposal facilities – especially at transfer stations that may be exporting wastes out of state – to build a better understanding of the breakdown of Residential and ICI waste. (Of course, this can only be completed with cooperation from facility owners, many of which are private and may opt not to participate in such research if it risks divulging sensitive customer data.)

◆ **Consider Expanded Sampling/Surveying of Other Waste Streams**: The 2016 Study focused exclusively on MSW. However, C&D debris and other special waste streams (industrial, agricultural) were not targeted. The waste management industry has developed effective surveying protocols for C&D debris and other non-MSW waste types (e.g., CalRecycle, 2006). These protocols have been successfully applied in studies across the country. The Department may wish to consider expanding future studies to capture the composition of C&D debris and other special wastes so that Maryland's entire waste stream can be aggregated with the MSW waste stream.

◆ **Specialization in Future Studies**: A number of other states that have regularly conducted statewide waste characterization studies have, over time, structured the studies to investigate certain waste streams in greater detail. Specialized analysis has often been conducted in response to feedback from solid waste and recycling stakeholders in the state. For example, in addition to measuring the composition of disposed wastes in total and by generator sector, some states 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;

- ◆ Measuring contamination rates in disposed material (for both particulate matter and moisture) as a means of investigating Mixed Waste Processing potential;

- ◆ Calculating energy and heating values in disposed waste for incineration and thermal conversion processes; and

- ◆ Determining the composition of residuals from recyclables processing facilities to test recovery efficiency, expansion of targeted materials, and potential for additional processing.

If the Department continues to support large statewide waste characterization studies, it may 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 in Maryland.

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[1] Alternatively, the Department may wish to issue a set of standardized material categories to be used by counties or cities that opt to conduct their own waste characterization studies in the future.

◆ **Consider More Detailed Analysis of Organic Wastes**: Because of the interest in capturing energy from organic wastes and/or increasing composting of organics it could be useful to expand the categories of sampling to specifically address what percent of food waste (especially) is contaminated by packaging. This can be critical to the success of organics processing facilities.

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APPENDIX A

STUDY DESIGN

(EXCLUDING ORIGINAL APPENDICES)

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1. INTRODUCTION

The Maryland Department of the Environment (MDE) is conducting an inaugural statewide disposed waste characterization study. This study will establish a baseline snapshot of the disposed waste stream for use by stakeholders' intent on reducing landfill disposal and increasing diversion. MDE has partnered with the Northeast Maryland Waste Disposal Authority (NMWDA, or the Authority) to assist with the project. The Authority has subsequently contracted with MSW Consultants to design and perform a comprehensive state-wide waste characterization study (2016 Study).

The 2016 Study will be carried out over the course of two seasons. MDE has selected eight disposal facilities (landfills and transfer stations) to host sampling and sorting activities. Solid waste from both the Residential and Industrial/Commercial/ Institutional (ICI) waste sectors will be subjected to a statistical sampling process, with representative, randomly chosen samples and loads of waste to be characterized in terms of the weight of certain defined material types that are present. An analysis of the weight data associated with each sample of waste will produce estimates of the average composition of the waste from each sector.

This Study Design describes the approach, methodology, logistical arrangements, and data collection procedures that will be implemented, and the various report deliverables that will be submitted during the 2016 Study.

2. ROLES AND RESPONSIBILITIES

Katherine McIlroy with NMWDA will serve as the primary contact for the Project Team during the implementation of the study. MSW Consultants has collaborated with the Authority and MDE in finalizing the solid waste disposal facilities that will host the various components of field data collection. This collaboration will also be focusing on a sampling plan for identified waste generators apportioned amongst the selected host facilities.

MSW Consultants' professional consulting staff have redundant waste characterization management, field supervisory experience, operations and analytical experience, with consistent training to use our firm's proven approach for waste characterization. The staff below, all of whom have significant experience with waste and recycling stream characterization project work, will support this project. Their roles are listed:

◆ Joe Vetrano, LEED AP (Project Manager and Field Supervisor),

◆ Walt Davenport, President (Client Manager and Technical Advisor),

◆ John Culbertson, Vice President (Sampling Plan, Statistical Analysis, Trainer),

◆ Denny Holt, Senior Analyst (Field Supervisor),

◆ Carl Hursh, Senior Consultant (Field Supervisor/Crew Chief),

◆ Randy Bowen, Analyst (Crew Chief),

◆ Natalee Henry, Analyst (Field Supervisor/Crew Chief).

The following roles will be implemented during field data collection:

The **Field Supervisor** will initiate the sampling process each day using the agreed upon approach. He will arrive before the facility opens to make contact with facility scale house personnel, the loader operator, or other designated personnel. He will also be the designated person to check in and check out with the scale house each day. He will be in charge of tracking samples that need to be taken that day. Lastly, he will be in charge of administering the Health and Safety Plan. If Mr. Holt is unavailable on certain days, then an alternate Field Supervisor will be designated. The Authority Project Manager shall be notified of any such changes.

The **Crew Chief** will be in charge of managing the sorting function at each host facility, and verifying and recording sample data. They will be in charge of weighing out all the materials after each sample has been sorted. Lastly, they will make sure the sorting crew adheres to the Health and Safety Plan. The Crew Chief will also pick up, transport, and manage the sorting crew throughout the project.

The **Trainer** will supplement the Field Supervisor and Crew Chief at the outset of each seasonal sorting event. The Trainer will train the waste sorting crew on technique and definitions, and cover all aspects of safety and health requirements at the beginning of each season.

Sorters will be obtained through On Demand Labor, a local temporary labor company based in Baltimore, Maryland. On Demand Labor will supply a dedicated sort crew to be trained by our professional staff. The dedicated crew will perform all data collection each season (although there will likely be some staff turnover between the first and second season).

3. SITE COORDINATION AND COMMUNICATION

LOGISTICS

Based on input from MDE and the Authority, MSW Consultants drafted a short memorandum for each host facility, describing the host facility requirements. MDE and the Authority were subsequently responsible for contacting each facility to introduce the project and secure participation. The Authority was responsible for securing participation, and for identifying which facilities required special equipment to be provided for the study (including bobcat rental, tent rental, and port-o-lets).

MSW Consultants submitted a detailed information request to the Authority's Project Manager for distribution to each of the selected host facilities to collect data necessary to develop the sampling plan. A copy of the data request is included in Appendix A.

Our approach assumes that each host facility will be able to provide an appropriate work space that is conveniently located to inbound wastes for efficient sampling, sorting, and removal of sorted wastes. MSW Consultants did not perform site visits to the host facilities prior to the sort, but rather relies on the Authority to manage the front-end communications and planning.

COMMUNICATION WITH HOST FACILITIES

Following the data requests, the Authority will communicate directly with each facility. This direct communication will serve the following crucial functions:

◆ Introducing the Field Supervisor to facility personnel;

◆ Clarifying information provided in response to the information request;

◆ Finalizing locations for setting up the work area, taking samples, queuing samples, discarding sorted samples, and other in-process activities;

◆ Confirming procedures requiring coordination between the host facility personnel and the Project Team;

◆ Reviewing facility-specific health and safety procedures and emergency contact numbers; and

◆ Answering any questions or addressing concerns of the Facility Managers.

The management of each disposal facility will be contacted by the Field Supervisor prior to the scheduled visit. The management will be reminded of both the visit and their role in the sampling activities.

4. SAFETY AND HEALTH PLAN

MSW Consultants maintains a customized Safety and Health Plan for waste characterization studies. A copy of this plan is included in Appendix B and has been provided to all host facilities.

5. TRAINING AND SUPERVISION

At the outset of each season the Trainer and Crew Chief will jointly lead a detailed training session in the morning of the first day of the sort. At the conclusion of the training, the sorting crew will be fully prepared to conduct the seasonal sorts. For the rest of the sort, the Crew Chief will oversee and direct the sort crew.

The training will cover all aspects of the safety and health requirements, as well as sorting and weighing procedures and guidance to improve productivity. Training will include:

◆ General facility overview;

◆ Learning and reviewing the material categories and definitions;

◆ Facility-specific health and safety requirements;

◆ Personal protective equipment (PPE) requirements;

◆ Waste handling techniques; and

◆ Productivity strategies and daily sorting quotas.

Throughout the sort the sorting crew will be under close supervision by the Crew Chief. The Crew Chief will ensure the sorting protocol is being followed along with the health and safety requirements outlined in Appendix B. Lastly the Crew Chief will closely evaluate each individual sample to ensure that the material categories are understood and adhered to by the sorting crew.

6. SAMPLING PLAN

DEFINITIONS OF WASTE SECTORS

MSW Consultants will categorize wastes into two generator sectors:

◆ **Residential:** Includes waste generated in single family and multi-family residential households.

◆ **Commercial:** Includes waste generated in commercial, industrial, and institutional establishments.

It is important to note that loads containing less than 80% or either residential or ICI waste, and loads originating from outside of Maryland, will not be sampled. This means that transfer trailer waste will be omitted from the study. This is because it is not possible to discern the generator sector from transfer trailer wastes.

HOST FACILITIES AND SAMPLE ALLOCATION

Table 1-1 summarizes the eight solid waste and recycling facilities that have been recruited to host field data collection for this project. As shown in the far-right column, these facilities were selected after getting input from MDE/NMWDA regarding demographic and geographic distribution

Table 1-1 Host Facilities

County	Host Facility	City	2013 Waste Acceptance (tons)	Density (persons/ square mile)	Service Region Demographic
Carroll	Northern Landfill/Transfer	Westminster	80,617	336	Suburban
Washington	Forty West Municipal Landfill	Hagerstown	80,648	315	Suburban
Garrett	Garrett County Landfill	Oakland	26,397	29	Rural
City of Baltimore	Northwest Transfer Station	Baltimore	55,314	1,260	Urban
Charles	Charles County Landfill	Waldorf	96,686	262	Suburban
Somerset	Somerset County Landfill	Westover	23,897	76	Rural
Cecil	Cecil County Central Landfill	Elkton	115,007	247	Rural
Calvert	Appeal Landfill/Transfer	Lusby	83,706	346	Suburban

Note, it is possible that subtotals presented in the tables and figures below do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

The table below summarizes the recommended sample allocation based on the underlying demography of host facilities.

Table 1-2 Seasonal Sample Distribution by Host Facility, 8 Sites

Disposal Site	Host Facility	Sample Targets		
		Season 1	Season 2	Total
1	Northern Landfill	16	11	27
2	Forty West Municipal Landfill	11	11	22
3	Garrett County Landfill	11	11	22
4	Northwest Transfer Station	22	22	44
5	Charles County Landfill	11	16	27
6	Somerset County Landfill	11	11	22
7	Cecil County Central Landfill	11	11	22
8	Appeal Landfill	11	11	22
Total		104	104	208

Note, it is possible that subtotals presented in the tables and figures below do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

SEASONALITY AND SCHEDULE

Field data collection will occur over two seasons. The first season will occur in July 2016 and represent the summer season. The second season is scheduled to occur in October 2016, reflecting the autumn season.

MSW Consultants will be utilizing a dedicated, traveling sorting team, which will provide the most efficient sorting in the field. MSW Consultants will be completing 10 days of sorting each season, plus one day of training at the outset. Sorting days may be distributed across facilities based on availability and future collaboration with MDE and the Authority.

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Table 1-3 shows the first season field data collection plan. A similar plan will be developed prior to the second season.

Table 1-3 – Season 1 Schedule

Host Facility	Dates of Field Data Collection
Northern Landfill	Tues-Wed, July 12-13
Forty West Municipal Landfill	Thursday, July 14
Garrett County Landfill	Friday, July 15
Northwest Transfer Station	Mon-Tues, July 18-19
Charles County Landfill	Wednesday, July 20
Somerset County Landfill	Thursday, July 21
Cecil County Central Landfill	Monday, July 25
Appeal Landfill	Tuesday, July 26

Note, it is possible that subtotals presented in the tables and figures below do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

SAMPLE WEIGHTS

Consistent with industry standards and RFP specifications, samples will be collected that weigh between 200 and 250 pounds. The Project Team's sampling expertise will ensure that representative and random samples meeting desired weight targets will be acquired consistently throughout the project.

MATERIAL CATEGORIES

Samples of waste will be manually sorted into 53 material categories. Detailed definitions to be used for the waste characterization study are shown in Appendix C.

7. ACQUISITION OF SAMPLES

GENERAL SPACE REQUIREMENTS

In order for the sorting crew to safely and successfully collect and sort samples at each facility they will need a space approximately the size of two truck bays or about 20x40 feet. This space must also allow a front loader to dump 200 to 300 pound samples onto a designated ground area frequently throughout the day. At the end of the day the crew will have accumulated a large pile of garbage or recyclables, made up of both the sorted and unsorted potion of each grab sample, that will be disposed/processed of properly at the direction of the host facility.

VEHICLE SELECTION

The Field Supervisor will follow a systematic selection procedure to identify residential and ICI waste vehicles for sampling. To calculate vehicle sampling frequency for each waste sector, the Project Team will establish a sampling interval for each based on input from the facility scale house each day. Sampling intervals are determined by dividing the total expected number of loads for each sector arriving at the facility on the scheduled day – based on questions asked of each facility in the planning phase of the study – by the number of samples needed each day. The resulting number is the sampling

frequency, which determines whether every third vehicle, every sixth vehicle, or every 20th vehicle is selected for sampling. This strategy is referred to as "selecting every nth vehicle" within a waste sector and subsector. A Vehicle Selection Form is shown in Appendix D – Field Forms.

Vehicle Selection Forms will be created for each day and each location of sampling activity. The Field Supervisor working in coordination with facility scale house personnel, will keep a tally of vehicles from each waste sector as they enter the facility. When the designated nth vehicle in each waste sector arrives, the Field Supervisor will escort the vehicle to the sampling area (or otherwise cause the vehicle to go to this area).

The Field Supervisor will obtain and record pertinent information for each vehicle that is identified for sampling, including waste sector (Residential or ICI), hauler name, vehicle type, and other data that may be needed.

This information will be noted on the vehicle selection form, along with a unique identifying number associated with that vehicle on that day. The field crew supervisor also will note any unusual circumstances associated with the load or the sample.

The sample ID will match the corresponding waste sector prefix (RES and ICI). For example, the first ICI sample will be ICI-01, while the fourth residential sample will be RES-04.

Note that there are five instances where the nth vehicle approach may be modified:

◆ On the day of sampling and sorting, if the number of loads expected to arrive at the facility is less than previously anticipated, the sampling frequency will be shortened and a new nth vehicle selection strategy will be calculated and followed;

◆ If the nth residential vehicle selected is found to contain significant mixture of commercial, industrial, or institutional waste (above 20%), the next load (nth + 1) may be taken as a replacement;

◆ If the nth commercial vehicle selected is found to contain significant mixture of multi-family residential waste (above 20%), the next load (nth + 1) may be taken as a replacement

◆ To meet daily sampling targets, it is critical to keep the sorting crew actively sorting from the moment the work area is set up. To the extent the sort crew is set up and ready to sort, the Project Team may take the next available residential or ICI load in place of the nth vehicle. If this becomes necessary, the remaining vehicles will be taken at every nth interval.

◆ In the event that the waste is not from Maryland.

The Crew Chief will obtain and record the following information on the Field Supervisor tracking sheet for each vehicle that is identified for sampling.

◆ Date and time of day;

◆ Generator sector – Residential, ICI or appropriate qualifier (multi-family, etc.);

◆ Vehicle type – Roll-off Compactor, Residential Dropbox, Packer Truck;

◆ Hauler name and truck number;

◆ Weigh ticket number;

◆ Other data that may be needed

The Crew Chief will also note on the Weight Data Sheet any unusual circumstances associated with the load or the sample.

In cases where an insufficient number of vehicles are available for sampling at a disposal facility, the data collection crew can first change the nth vehicle to reduce the number between samples or make up the missing samples at a different location. This strategy may also be used when samples are missed for some other unforeseen reason. In all cases, the sampling plan will assign the frequencies of vehicles to be selected in such a way as to minimize the chance of "running out of" vehicles to represent a particular waste sector at a disposal facility.

SAMPLE SELECTION: GRAB SAMPLES OF WASTE

Selected loads of waste will be tipped in the designated area at each solid waste facility. From each selected load, one sample of waste will be selected based on systematic "grab" from the load, treating the tipped load as a clock face. For example, if the tipped pile is viewed from the top as a clock face with 12:00 being the part of the load closest to the front of the truck, the first sample will be taken at the 12:00 position. Subsequent samples will be taken from 3 o'clock, 6 o'clock, and 9 o'clock. For the next four loads, the extraction point will shift to 1, 4, 7, and 10 o'clock, and so-on. This concept of systematically rotating around subsequent loads is shown in Figure 1.

Figure 1 Systematic Sampling Guide for Tipped Loads
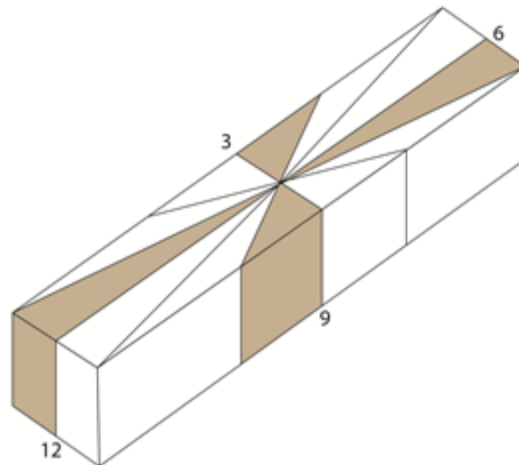
From each extraction point, the loader operator will be instructed to take a grab sample. From each grab, a sample weighing at least 200 pounds will be extracted from the pile and pre-weighed (to verify that the minimum sample weight has been achieved and to prevent sorting overly large samples, which would diminish sorting productivity). Pre-weighed samples will be loaded into barrels for placement on the sort table, although bulky items may be weighed and recorded separately (thereby eliminating the need to sort them at the sort table). Prior to sorting each sample, a sorting crew member will take a photograph of it with the sample placard and identification number visible in the picture.

Depending upon the availability of host facility personnel, the Field Supervisor will either collect the sample directly from the bucket of the front-end loader, or will direct the sample to be dumped on a tarp or a paved surface. When collecting samples directly from the loader bucket, 35-gallon cans or carts will be arranged side-by-side on a tarp, with the loader bucket positioned directly overhead. The Field Supervisor will collect the sample systematically, by working from one side of the bucket to the

other, emptying all of the contents from the front of the bucket to the back, until the desired sample weight was achieved. To help minimize sample collection bias, samples will be collected from the loader bucket in an alternating fashion, that is, working from the left side of the bucket to the right side for one sample, and then from right to left on the next sample.

8. CHARACTERIZATION OF SAMPLES

SORTING PROCEDURE

In Figure 2 below, the photograph presents our typical layout of the sorting table and bins into which each targeted material is to be sorted. Based on our extensive experience, we believe a well-thought-out sort area is crucial to efficient and accurate sorting. Maintaining a consistent sort area also improves safety by establishing boundaries for all workers to follow consistently.

Figure 2 Layout of Sorting Table and Bins

Once the sample has been acquired and placed on the sorting table, the material will be sorted by hand into the prescribed component categories. Plastic 20-gallon bins with sealed bottoms will be used to contain the separated components. The sorting crew members typically specialize in groups of materials, such as papers or plastics.

The Crew Chief will monitor the homogeneity of the component bins as they accumulated, rejecting materials that may be improperly classified. Open bins allow the Crew Chief to see the material at all times and verify the purity of each component as it is weighed, before recording the weight into the database. The materials will be sorted to particle size of 2 inches or less by hand, until no more than a small amount of homogeneous fine material (―mixed residue‖) remains. This layer of mixed 2-inch-minus material will be allocated to the appropriate categories based on the best judgment of the Crew Chief — most often a combination of Other Paper, Other Organics, or Food Waste. The overall goal

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is to sort each sample directly into component categories in order to reduce the amount of indistinguishable fines or miscellaneous categories.

DATA RECORDING

The weigh-out and data recording process is the most critical of process of the sort. The Crew Chief will oversee all weighing and data recording of each sample. Once each sample has been sorted, and fines swept from the table, the weigh-out will be performed. Each bin containing sorted materials from the just completed samples will be carried over to the scale. Sorting laborers will assist with carrying and weighing the bins of sorted material, and the Crew Chief will record all data.

The Crew Chief will use a rugged tablet computer to record the composition weights. The tablet allows for samples to be tallied in real time so that field data collection can immediately identify and rectify errors associated with light sample weights. The tablet synchronizes with the cloud via cellular signal, providing excellent data security. Each sample will be cross-referenced against the Field Supervisor's sample sheet to assure accurate tracking of the samples each day. The real-time data entry offers several important advantages:

◆ The template contains built-in logic and error checking to prevent erroneous entries.

◆ The template sums sample weights in real time so the Crew Chief can confirm achievement of weight targets for each and every sample.

◆ Except where host facilities are outside of cell phone range, the data file syncs routinely and can be accessed and checked by MSW Consultants QA/QC staff back at the office. For remote facilities that cannot synchronize during the work day, it is usually possible to sync in the evening upon returning to the hotel.

The Crew Chief will also carry paper field forms as a back-up in case the tablet computer encounters unforeseen technical difficulties.

SITE MAINTENANCE AND CLEANUP

The Project Team will be guests at each of the host facilities, and it is therefore critical to leave the work area clean and safe for subsequent operations. The sorting crew is also responsible for keeping litter to a minimum. The Project Team will also conclude each day of sorting operations with sufficient time to perform site clean-up. Clean-up will include the following types of activities:

◆ Organized stacking and stowing of sorting supplies in a designated location;

◆ Removal of sorted wastes for burial or transfer (the host facility loader operator will help with this);

◆ Sweeping and cleaning the sort area to prevent windblown litter and other situations that could attract vectors;

◆ Removal and discard of day-use personal protective equipment and decontaminating personnel;

◆ Checking out with the Facility Manager each day; and

◆ Tarping of any unsorted samples, left for sorting the next day.

9. DATA ANALYSIS

STATISTICAL ANALYSIS

Our analysis of physically sorted waste composition data normalizes each sample by converting the sample data from weight to percentage. A statistical analysis is then performed to calculate the mean composition for each of the material categories. The sample mean is determined by (i) summing the weight of each material in each sample; (ii) summing the total weight of all samples, and (iii) dividing the first value by the second value to determine the percent-by-weight composition.

The standard deviation, as well as confidence intervals at a 95 percent level as specified in the RFP, will be provided for each material category, as statistically appropriate, as well as major material groups (e.g., "paper", "plastic", etc.). Precise statistical formulas will be included in the final report.

INTEGRATING EXISTING WASTE COMPOSITION DATA

The Authority provided, and MSW Consultants has performed a cursory review of, five waste characterization studies conducted in Maryland in the past four years. These are summarized in the table below. MSW Consultants maintains a database of over 140 studies dating back 20 years, and we have performed a variety of regional wasteshed analyses that have standardized and combined different waste composition data. The general steps to integrate prior study data into a statewide study include:

◆ Confirming the appropriateness of study methodology (not all studies conform to best practices),

◆ Confirming the alignment of underlying generator sectors,

◆ Confirming the consistency of sorting objectives (not all studies achieve the same degree of rigorousness in sorting),

◆ Mapping material categories from existing studies into the 2016 Maryland Statewide Study and identify shortfalls,

◆ Integrating existing study results into 2016 Maryland Statewide Study using data aggregation method,

◆ Estimating impacts on statistical confidence intervals (not all studies are performed at the same level of confidence.

MSW Consultants will apply this methodology to the studies in Table 1-4, as well as for any other studies completed before the conclusion of this project. It is assumed the Authority will obtain the full Prince George's County report and any other results published on time.

Table 1-4 Recent Maryland Waste Composition Studies

Study	Year	Generator Sector(s)	No. of Material Categories	No. of Seasons	No. of Samples	Conf Int.
Anne Arundel Co	2014	Residential only	35	2	90	95%
Prince George's Co	2014	[1]	35	[1]	[1]	95%
Howard Co	2012	Residential only	19	1	40	90%
Newland Park LF	2014	"residential, construction, homeowner drop-off"	26	1	21	90%
Montgomery Co	2013	Single family residential, multi-family residential and non-residential	64	4	300	95%

Note, it is possible that subtotals presented in the tables and figures below do not sum precisely to the total due to rounding, but the discrepancies are not material to the accuracy of the results.

[1] MSW Consultants requests the Authority's assistance to obtain a copy of this full report.

10. REPORTING

INTERIM REPORT

At the conclusion of Season 1, MSW will proceed with the development of an interim report containing results of the field data collection effort thus far. Specifically, the Interim Report will include:

◆ A tally of planned versus actual samples obtained,

◆ Summary population, population density, median income, and disposed waste tonnage for each host facility jurisdiction,

◆ Composition results for each of the host facilities,

◆ Statewide composition estimates for Residential wastes, applying weighted averages (if available) to individual facility results,

◆ Statewide composition estimates for Commercial wastes, applying weighted averages (if available) to individual facility results,

◆ Aggregate statewide composition estimates, averaging the aggregate Residential and Commercial results.

MSW Consultants will provide a recommendation on data aggregation methodology based on available population, waste disposal, and demographic data supplied by the Authority.

FINAL REPORT

The final report will provide a comprehensive estimate of the composition of MSW generated by the Residential and Commercial sectors within the State and for each host facility. This report will contain the following:

◆ Statewide results for disposed waste

  • Aggregate
  • Residential
  • Commercial

◆ Aggregate annual results by facility for each of the eight facilities

◆ Seasonal results comparisons by disposal facility

  • Residential
  • ICI
  • Aggregate

The final report will contain the following sections:

◆ An executive summary providing key findings,

◆ Introduction and background for the study, including objectives,

◆ A description of the methodology used in the study and a summary of the sampling and sorting plan;

◆ A description of the data collection and analytical techniques used;

◆ A summary of the number of samples characterized;

◆ Waste composition profiles as described above;

◆ A summary of findings, conclusions, and supporting documentation.

It should be noted that the report will rely primarily on graphical and tabular results to convey the outcome of the study. For aggregate statewide results, MSW Consultants will develop figures and tables, with input from the Authority and MDE. For facility-specific results, only tabular results will be provided.

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APPENDIX B

MATERIAL CATEGORIES

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PAPER

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

2   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. 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, un-soiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.

3   MAGAZINES: Stitched or bound paper that is slick and smooth to the touch, reflecting light (glossy). Examples include glossy magazines, catalogs, brochures, and pamphlets.

4   PAPERBOARD: Coated or uncoated thin cardboard with no layers or center wave. Includes cereal boxes, 6-pack boxes for beer or soda, shoe boxes, frozen food boxes. Does NOT INCLUDE: paper for hot products such as coffee or soup, oatmeal cups., or aseptic/gabletop cartons

5   (HIGH GRADE) OFFICE PAPER: Paper that is free of ground wood fibers; usually sulfite or sulfate 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 a goldenrod colored paper.

6   BOOKS: Thin paper between a coated hard or soft cover, with or without a bound spine. Does not include Phonebooks.

7   OTHER RECYCLABLE PAPER: 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, ground wood paper, phonebooks, and deep-toned or fluorescent dyed paper. Also includes Aseptic/Gabletop cartons.

8   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.

9   NON-RECYCLABLE PAPER: Includes non-recyclable items 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, and photographs.

PLASTICS

10   PET (#1) BOTTLES/JARS : Clear or colored PET bottles or jars. When marked for identification, the 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. 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.

11   PET (#1) OTHER: Non-bottle containers such as rectangular PET clamshell or tray containers used for produce; etc. - This category only includes PET containers that did not previously contain hazardous materials.

12   HDPE (#2) BOTTLES - NATURAL ONLY: 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 bottles that did not previously contain hazardous materials.

13   HDPE (#2) COLORED BOTTLES AND ALL NON-BOTTLE HDPE: Includes colored HDPE bottles (solid color, preventing light from passing through) as well as natural buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. This category includes buckets regardless of whether they are attached to metal handles. Examples include large paint buckets and commercial buckets used to contain food for commercial use (restaurants, etc.). These objects are packages containing material for sale, and are not sold as buckets themselves.

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14   #3 THRU #7 BOTTLES: Plastic bottles made of plastics 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.

15   PLASTIC PACKAGING #3 THRU #7: Other types of containers made 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 includes tubs, cups, and associated lids, thermoforms, blister packaging, and similar containers. This category only includes plastic #3-#7 containers that did not previously contain hazardous materials.

16   DURABLE PLASTIC PRODUCTS #3 THRU #7 : Plastic products other than disposable packaging, made of plastic other than HDPE or PET, and intended for more than one use. Items may be made of PVC, PP, or PS. These items are usually made to last for a few months up to many years and include children's toys, furniture, plastic landscape ties, plastic railroad ties, mop buckets, sporting goods, etc.

17   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.

18   CLEAN FILM AND CLEAN SHOPPING BAGS: Clean, 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. Includes clean plastic shopping 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.

19   CONTAMINATED FILM/OTHER FILM: 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, mailing pouches, bank bags, X-ray film, and plastic food wrap.

20   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, plastic cutlery, 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, some kitchen ware, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications).

METALS

21   ALUMINUM CANS & CONTAINERS: Aluminum beverage or other containers. Includes cat food containers.

22   OTHER ALUMINUM: Non-can aluminum products. Includes aluminum pie plates and non-rigid baking pans; and Aluminum Foils.

23   OTHER NON-FERROUS: Any metal item that is not magnetic, as well as stainless steel. These items may be made of copper, brass, bronze, lead, zinc, or other metals. Examples include copper wire, shell casings, and brass pipe.

24   TIN/STEEL CONTAINERS : Rigid containers made mainly of steel, such as food and beverage containers. These items will stick to a magnet and may be tin-coated.

25   OTHER FERROUS: Any other iron or steel that is magnetic. This subtype does not include "tin/steel containers". Examples include empty or dry paint cans, structural steel beams, boilers, metal clothes hangers, metal pipes, some cookware, security bars, and 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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GLASS

26   CLEAR GLASS CONTAINERS: Clear glass bottles and jars for beverages or other products.

27   BROWN GLASS CONTAINERS: Brown glass bottles and jars for beverages or other products.

28   GREEN GLASS CONTAINERS: Green glass bottles and jars for beverages or other products.

29   NON-CONTAINER/OTHER GLASS: Blue, yellow, or red glass containers, and all other non-container glass. Includes flat glass products, and glass products combined with other materials.

ORGANICS

30   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.

31   GRASS: Grass clippings, primarily from public or private yard waste.

32   LEAVES: Leaf materials, primarily from public or private yard waste.

33   BRUSH, PRUNINGS, AND TRIMMINGS: Woody plant material up to 4 inches in diameter from any public or private landscape. Examples include prunings, shrubs, and small branches with branch diameters that do not exceed 4 inches. This subtype includes stumps, tree trunks, and larger branches. This subtype does not include material from agricultural sources.

34   OTHER/NON-COMPOSTABLE ORGANICS: Organic material that cannot be put in any other type or subtype. This type includes items made mostly of organic materials but combined with other materials. Examples include cork, candles, hand soap, hemp rope, hair, cigarette butts, full vacuum bags, and sawdust. Also includes animal carcasses animal wastes/feces, kitty litter, manures and soiled bedding materials from domestic, farm, wild, or ranch animals.

C&D MATERIALS

35   WOOD – CLEAN LUMBER: Clean, bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings.

36   WOOD - PAINTED/TREATED: Wood products that contain an adhesive, paint, stain, fire retardant, pesticide or preservative.

37   WOOD – PALLETS : Clean wood pallets (whole and broken), crates, pieces of crates, and other packaging lumber and panel board.

38   NON-C&D WOOD: Miscellaneous wood products such as housewares (e.g., bowls, spoons), decorative objects, and small furnishings (e.g., lamps, boxes).

39   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.

40   CONCRETE, BRICK, ROCK, & OTHER C&D: Includes Portland cement mixtures (set or unset, with or without aggregate), fired-clay bricks, asphalt paving and rock gravel larger than 2"in diameter. Includes construction and demolition material that cannot be put in any other type or subtype, including asphalt and composite roofing shingles, ceramic tiles, porcelain products (toilets & sinks), fiberglass insulation, and may also include items from different construction types combined, which would be very hard to separate.

41   CARPET, CARPET PADDING, & RUGS: 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.

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HOUSEHOLD HAZARDOUS WASTE

42   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.

43   BATTERIES - LEAD ACID: Lead acid storage batteries. Includes automotive, truck and boat batteries.

44   BATTERIES - OTHER RECHARGEABLE: These batteries are typically found in cellular and cordless phones, digital cameras, laptop computers, portable electronic devices, remote control toys, electric razors, and cordless power tools. Battery types include Nickel-Cadmium (NiCad), Nickel-Metal Hydride (NiMH), and Low Self Discharge (LSD).

45   BATTERIES - ALL OTHER: Any type of battery other than lead acid or rechargeable types. Examples include "dry" household batteries such as AA, AAA, D, button cell, 9-volt. These are batteries commonly used in flashlights, small appliances, tools, toys, watches, and hearing aids.

46   OTHER HAZARDOUS WASTE / OTHER HHW: All household or commercial products characterized as "toxic", "corrosive", "caustic", "flammable", "ignitable", "volatile", "radioactive", "poisonous", "asbestos-containing", "explosive", and "reactive". Includes petroleum/oil or water-based adhesives/glues, cleaners, degreasers, paint strippers, thinners, and solvents, as well as other chemicals, certain cosmetics, and potentially harmful wastes.   Fluorescents bulbs, including CFLs (Compact Fluorescent Lights) and tubular fluorescent bulbs are included in this category along with the associated light ballasts. Also included are containers and filters with fluids or fuels used in vehicles or engines. Examples include antifreeze, oil, and brake fluid. Oil filters include vehicle engine oil filters. Other items include pesticides, herbicides and fertilizers. Finally, this category includes the HHW containers, with or without product in them.

ELECTRONICS

47   COMPUTERS & RELATED ELECTRONIC PRODUCTS: All electronic products, including personal computers, laptop computers, notebook computers, processors, cell phones, tablets, portable handheld calculators, portable digital assistants, electronic toys, stereos, VCRs, DVD players. Also included are peripheral items such as keyboards, monitors, docking stations, etc.

OTHER MATERIALS

48   TEXTILES & LEATHER PRODUCTS: Includes clothing, fabrics, linens, curtains, blankets, stuffed animals, and other cloth material. Includes leather products such as belts and shoes. Does not include carpeting or rubber products.

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

50   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.

51   TIRES: Vehicle Tires of all types. Inner tubes should be sorted into the Other/Not Elsewhere Classified category.

52   OTHER/NOT ELSEWHERE CLASSIFIED : Any other type of waste material not listed in any other sort category. Includes rubber products, cosmetics, shampoos, lotions, etc.

53   SUPERMIX - BOTTOM FINES & DIRT: Remaining mix of materials smaller than 2" square, including miscellaneous fines (paper, plastic, glass, organic material, etc.), sand, and dirt.

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APPENDIX C

PHOTO JOURNAL

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Tipped Load of MSW

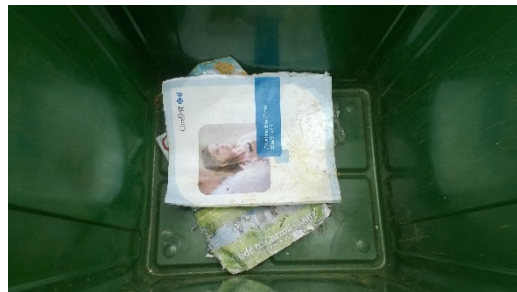*Sample Selection*

Sample Labeling

Sample Labeling

Work Area

Work Area – Sort Table

02 Corrugated Cardboard

03 Magazines

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04 Paperboard

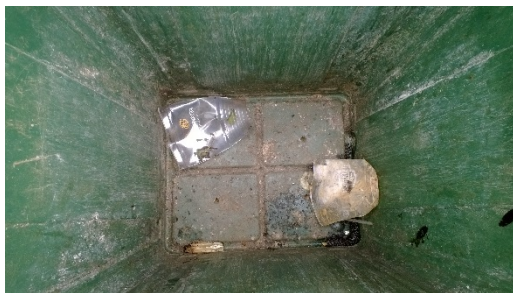
05 High Grade Office Paper
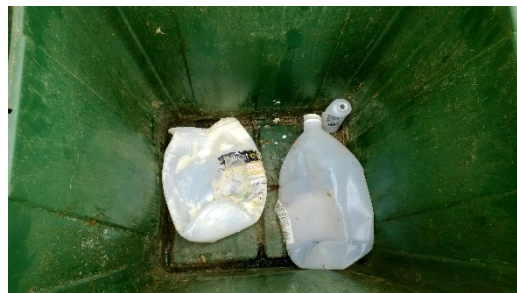

07 Other Recyclable Paper

08 Compostable Paper

09 Non-recyclable Paper

10 PET Bottles

11 PET Non-bottle

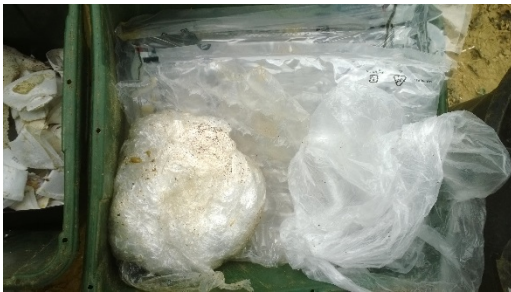*12 HDPE Natural Bottles*

13 HDPE Pigmented and Non-bottle

15 Plastic Package 3-7
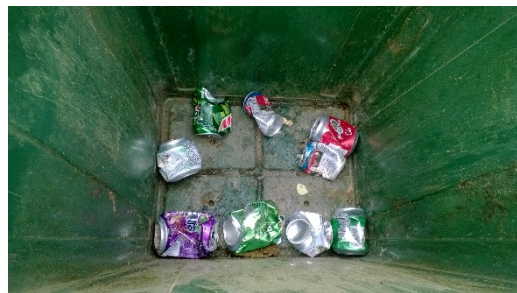

16 Durable Plastic Products

17 EPS

18 Clean Film and Bags

19 Contaminated Film

20 RC Plastic

21 Aluminum Cans

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24 Tin-steel Cans

25 Other Nonferrous

30 Food Waste

40 Concrete-Brick-Other C&D

48 Textiles and Leather

49 Diapers and Sanitary

52 Not Elsewhere Classified

Sample Weighing

Sample Weight Recorded

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