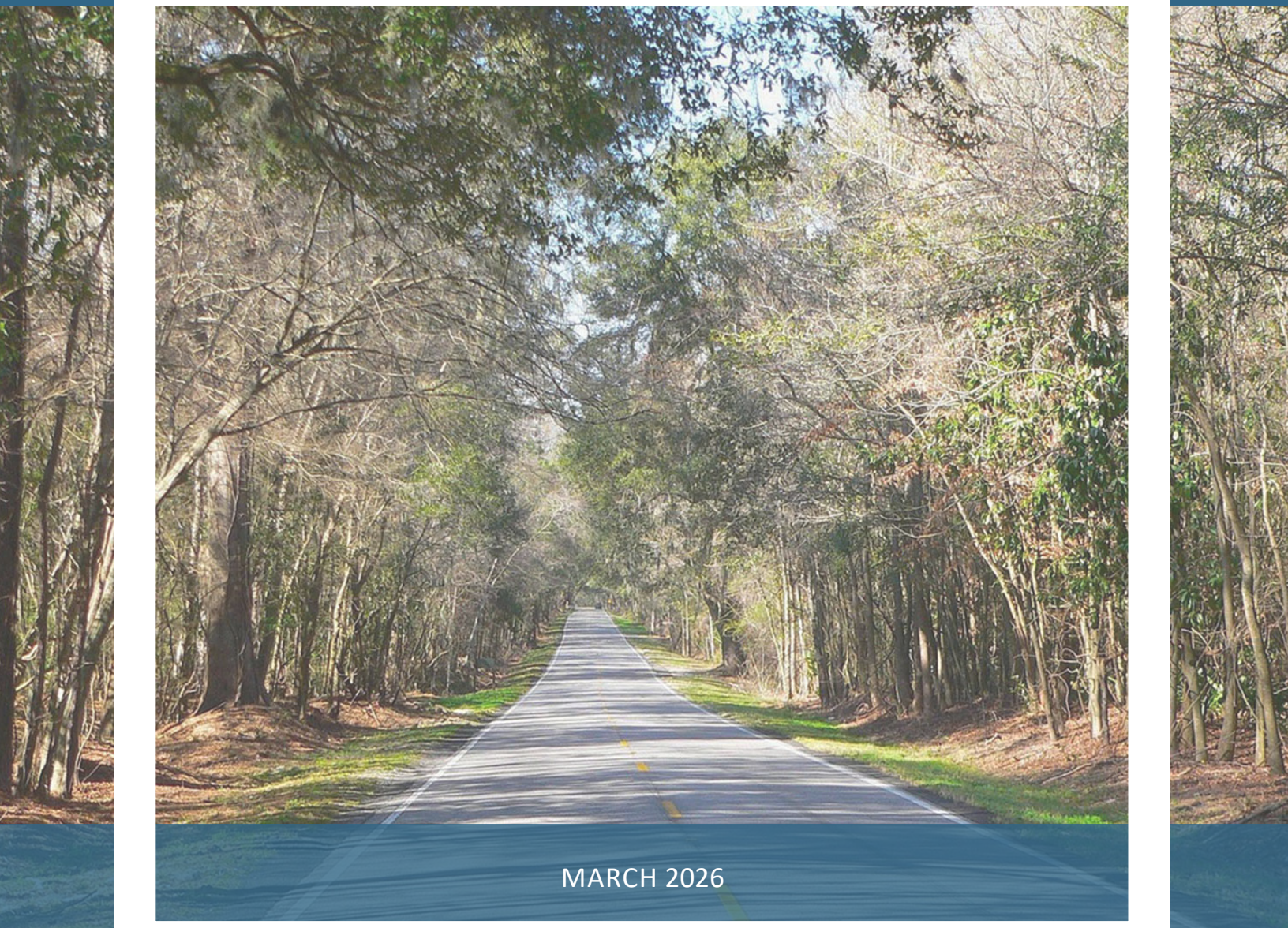
# SOUTH CAROLINA STATEWIDE WASTE CHARACTERIZATION STUDY

SC DEPARTMENT *of* ENVIRONMENTAL SERVICES



MARCH 2026

Prepared by
MidAtlantic Solid Waste Consultants, LLC (MSW Consultants)

SC DEPARTMENT *of*
ENVIRONMENTAL
SERVICES

# ACKNOWLEDGEMENTS

The success of this study is thanks in large part to the many public and private sector solid waste facility staff who partnered with MSW Consultants and SCDES in hosting field data collection activities at their facilities. We want to take this opportunity to recognize our host facilities and the management staff, scalehouse attendants, heavy equipment operators, and others who helped make this study possible:

- Greenville County Landfill
- Republic Services Lee County Landfill
- Capital Waste Services Pee Dee Environmental Landfill
- Lexington County Landfill
- Three Rivers Landfill
- Carolina Waste & Recycling Transfer Station
- WM Hickory Hill Landfill
- MRR Upstate Recycling & Transfer Station
- Lexington County Transfer Station
- Republic Services Spring Grove Landfill
- Pickens County Transfer Station
- Horry County Landfill

This study has been supported by a grant from the U.S. Environmental Protection Agency's Solid Waste Infrastructure for Recycling (SWIFR) Grant Program.

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# ACRONYMS & KEY TERMS

## ACRONYMS

The following acronyms are used throughout this report.

| | |
|---|---|
| **ASTM** | American Society for Testing and Materials |
| **C&D** | Construction and Demolition |
| **HHW** | Household Hazardous Waste |
| **ICI** | Institutional, Commercial, Industrial |
| **MOE** | Margin Of Error |
| **MSW** | Municipal Solid Waste |
| **MSW Consultants** | Mid-Atlantic Solid Waste Consultants |
| **QAPP** | Quality Assurance Project Plan |
| **SCDES** | South Carolina Department of Environmental Services |
| **SMM** | Sustainable Materials Management |
| **SOP** | Standard Operating Procedure |
| **SWMP** | Solid Waste Management Plan |
| **TPD** | Tons per Day |
| **TSW** | Total Solid Waste |
| **US EPA** | United States Environmental Protection Agency |
| **WARM** | Waste Reduction Model |
| **WCS** | Waste Characterization Study |

## KEY TERMS

The following terms and definitions are used throughout this report and are provided here for reference.

**Bulky Waste –** discarded large-format items, often derived from residential or commercial junk cleanouts, "big box" store/warehouse discards, or specialty collection routes

**C&D (Construction and Demolition) Debris -** discarded solid wastes resulting from construction, remodeling, renovation and demolition of structures and roads, and land clearing wastes

**Class 2 Landfill** – disposal facilities permitted to accept C&D debris, land-clearing debris, and industrial process waste

**Class 3 Landfill** – disposal facilities permitted to accept MSW, C&D debris, non-hazardous incinerator ash, and industrial process waste

**Commercial (ICI) Waste** – MSW originating from institutional, commercial, or industrial sources. Such facilities include businesses, hospitals, schools, restaurants, grocery stores and manufacturing facilities

**Confidence Interval –** a statistical concept that attempts to indicate the likely range within which the true value lies. A confidence interval reflects the upper and lower range within which the population mean can be expected to fall. Confidence intervals are customarily calculated at a 90 percent level of confidence,

meaning that one can be 90 percent sure that the mean falls within the upper and lower confidence interval shown.

**Generator Sector –** segments of a waste stream made up of like waste origins (e.g., residential single stream recycling, commercial refuse, etc.)

**HHW (Household Hazardous Waste) –** household waste (from residential sources) that are ignitable, reactive, corrosive or toxic

**Management Pathway** – an alternative method of categorizing material categories in this WCS report which identifies the best method for recovery or disposal of a given material category (see definition), in accordance with the US EPA's sustainable materials management (SMM) hierarchy.

**Material Category –** a product, item, or material (or collection of products, items, or materials) which is defined and targeted for measurement within this WCS. This is the most granular level of categorization employed in the WCS and are often grouped with like categories by material group or by management pathway during analysis.

**Material Group –** traditional method of organizing material categories together by an underlying similarity (e.g. Paper, Plastic, Organics, etc.) reflective of long-standing recycling and waste management industry norms for material diversion.

**Mixed Waste –** refuse loads which contain wastes originating from more than one generator sector (residential and ICI) and/or waste stream (MSW and C&D)

**MOE (margin of error)** – the statistical measure presented in this report to convey the accuracy of the reported sample mean waste composition. The MOE can be used to calculate a confidence interval around the reported sample mean.

**MSW (municipal solid waste) -** items discarded from residential, commercial, and institutional sources, not including industrial, hazardous, or C&D waste

**QAPP –** the US EPA-approved Quality Assurance Project Plan specific to this State of South Carolina Waste Characterization Study and EPA Grant #4Z 04D00924

**Residential Waste –** waste originating from residential households, including, single family households and multi-family apartments and condominiums.

**Sample Mean –** the average fraction of each material category in the waste stream as measured by weight-percent.

**SCDES Regions –** geographic segments that divide South Carolina into four regions (Upstate, Midlands, Pee Dee, and Lowcountry) for greater detail in data analysis, mapped according to SCDES Regional Office Jurisdictions.

**TSW (Total Solid Waste) –** Broadest term capturing all solid waste of every type, including MSW, C&D, bulky waste, and any other solid wastes requiring disposal or processing for recovery.

**Waste Stream/Material Stream –** Avenue of disposal or diversion for a given type of material (e.g. refuse disposal and single stream recycling), generally referring to solid waste materials targeted in this study (MSW and C&D/bulky waste).

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# E. EXECUTIVE SUMMARY

## E.1 INTRODUCTION

The South Carolina Department of Environmental Services (SCDES) sought an inaugural statewide waste characterization study to identify recyclables and to gain a clear understanding of the composition of its statewide solid waste stream, including municipal solid waste (MSW) and construction and demolition (C&D) debris. This resulting study, funded by a grant from the US Environmental Protection Agency, is a methodologically defensible and repeatable characterization of South Carolina's waste. The results herein will serve as the foundation for future waste planning activities and inform the State's 2026 Solid Waste Management Plan.

## E.2 SOUTH CAROLINA WASTE GENERATION

Table E-1 summarizes statewide disposed tonnage of targeted solid waste streams at Class 2 and Class 3 Landfills as reported in the SCDES 2024 Annual Report.[1] Disposed MSW accounts for 3.5 million tons each year. While current reporting requirements do not allow complete documentation of C&D tonnages, it is expected that C&D/Bulky waste accounts for a significant portion of disposed Class 2 landfill tonnage each year.

**Table E-1 Summary of Tonnages by SCDES Region (2024)**

| | | Class 3 Landfills | | | Class 2 Landfills |
|---|---|---|---|---|---|
| SCDES Region | Population | MSW Tons | C&D Tons | Total Tons | Total Tons |
| Lowcountry | 1,256,284 | 879,091 | 36,474 | 2,083,484 | 988,212 |
| Midlands | 1,546,886 | 906,055 | 3,781 | 1,416,528 | 1,291,326 |
| Pee Dee | 979,748 | 633,014 | 30,190 | 2,711,647 | 643,421 |
| Upstate | 1,590,636 | 1,156,271 | 91,070 | 2,518,074 | 879,807 |
| **Total** | **5,373,554** | **3,574,431** | **161,515** | **8,729,733** | **3,802,766** |

## E.3 APPROACH OVERVIEW

While the complete study methodology is detailed later within this report, key points of the study approach included the following:

- **Data Sources:** The study analysis is largely based on data from two sources: disposed tonnage data from the SCDES published *S.C. Solid Waste Management Annual Report for Fiscal Year 2024*, and dedicated waste composition field data collection activities performed as part of this study.
- **Sample Distribution:** Field data collection took place over two data collection seasons, one in the summer and one in the fall of 2025, at thirteen host facilities, landfills and transfer stations, located throughout South Carolina.
- **Data Collection Methods:** Field teams manually sorted 151 samples of MSW with an approach based on the American Society for Testing and Materials standard methodology and visually surveyed 284 samples of C&D/bulky waste employing volumetric estimations and scale data from inbound loads.
- **Material Groups and Categories:** Field teams manually sorted MSW into 57 categories within seven material groups and visually estimated C&D/bulky waste into 38 categories within seven material groups.

[1] Class 1 Landfills are not included here because they exclusively accept land-clearing debris which is not of interest to this study.

- **Results:** The study team weighted and aggregated sample data to calculate statewide composition result sets for MSW and C&D/bulky wastes. Composition is presented in terms of weight percent.

## E.4 FINDINGS

The following figures illustrate the statewide composition of MSW and C&D/bulky wastes as reported in this study. Figure E-1 shows aggregated MSW by material group.

**Figure E-1 Aggregate MSW Composition by Material Group**

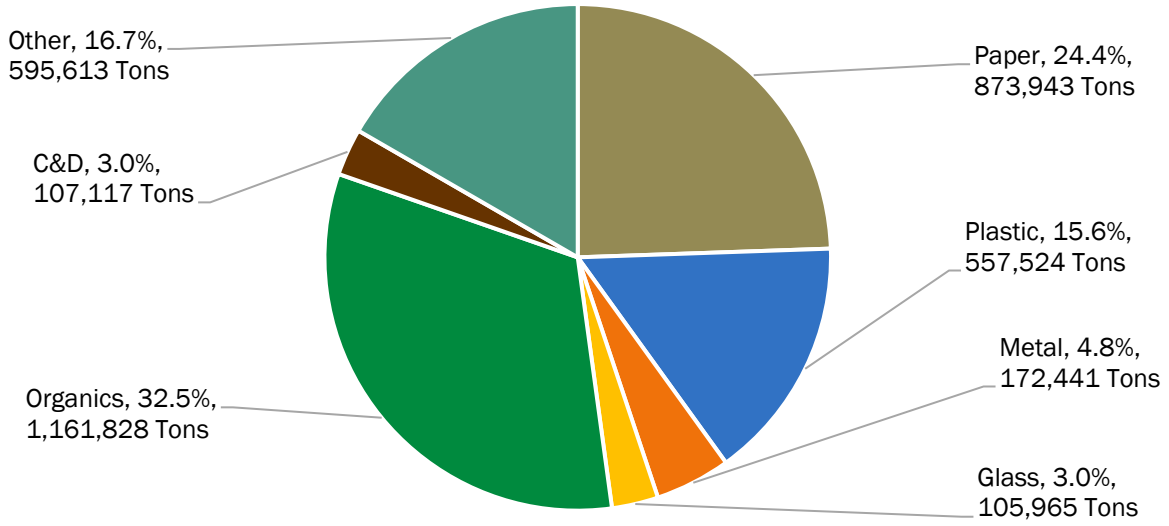



Figure E-2 recasts the aggregated MSW composition by management pathway, the best method for recovery or disposal of a given material based on the capabilities of South Carolina's system. There are five management pathways: single stream recoverable, other recyclable/potential for diversion, compostable, specialty disposal, and landfill. These are defined in more detail in the body of the report.

**Figure E-2 Aggregate MSW Composition by Mgmt. Pathway**

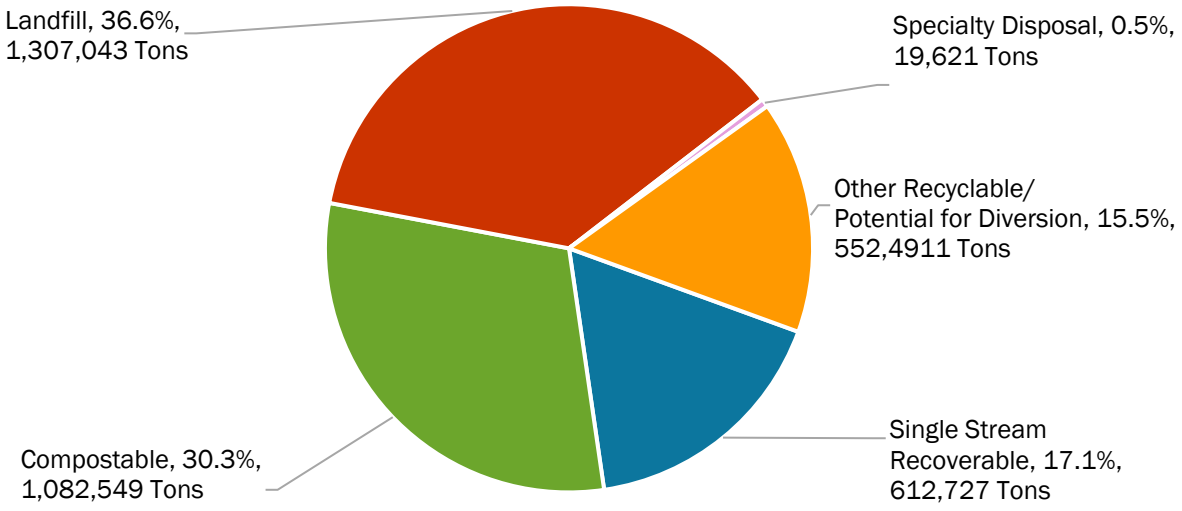


Figure E-3 shows the top ten most prevalent material categories by weight in the aggregated MSW stream.

**Figure E-3 Most Prevalent Material Categories in Aggregate MSW Stream**

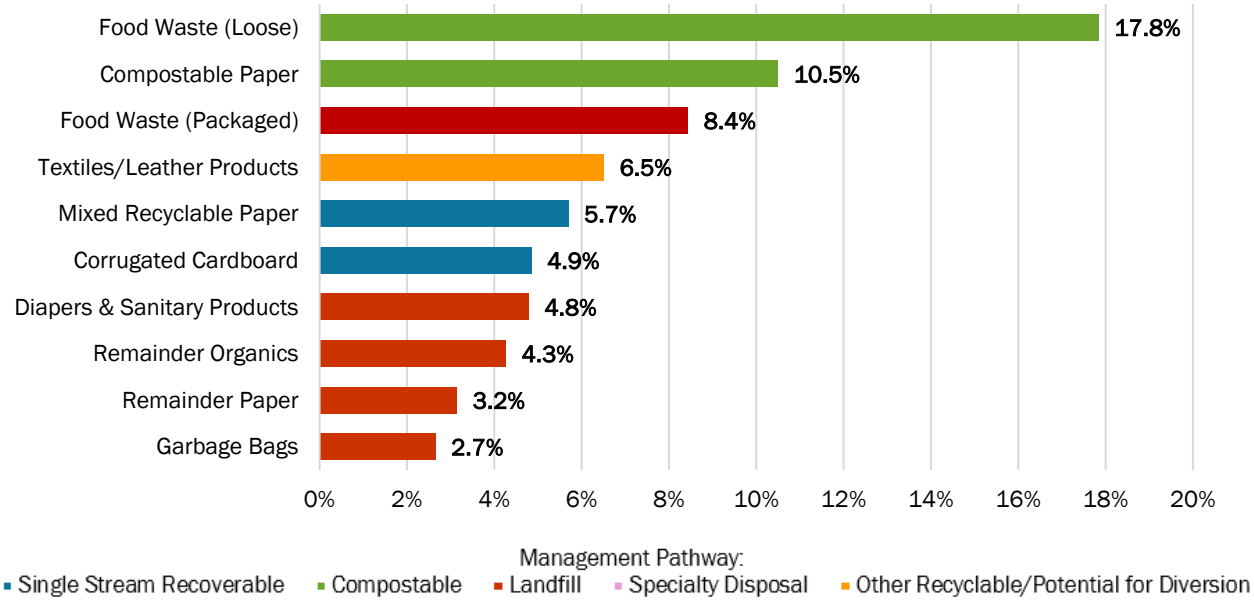



Figure E-4 shows aggregated C&D/bulky waste by material group, and Figure E-5 recasts the aggregated C&D/bulky waste by management pathway.

**Figure E-4 C&D Composition by Material Group**

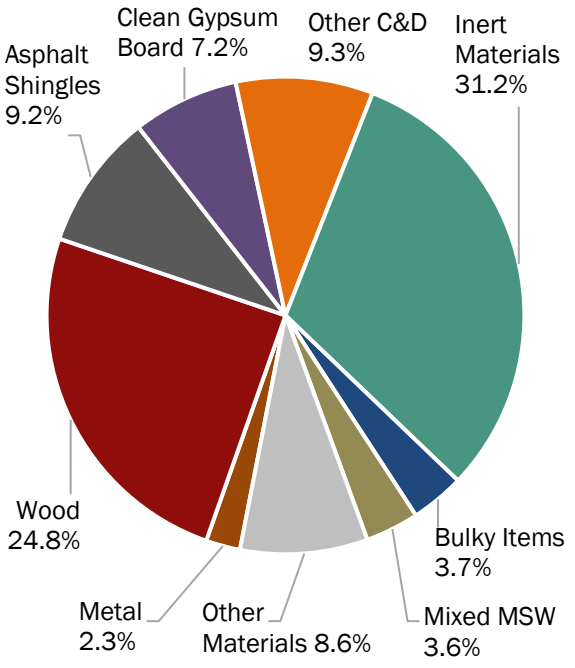



**Figure E-5 C&D Composition by Mgmt. Pathway**

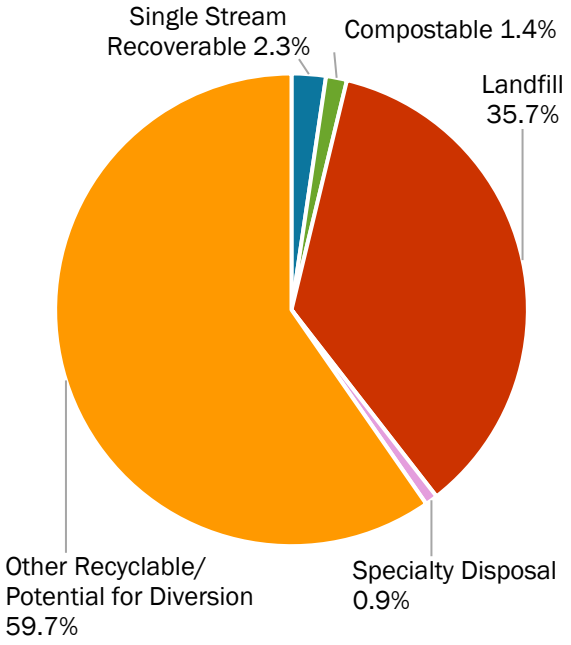
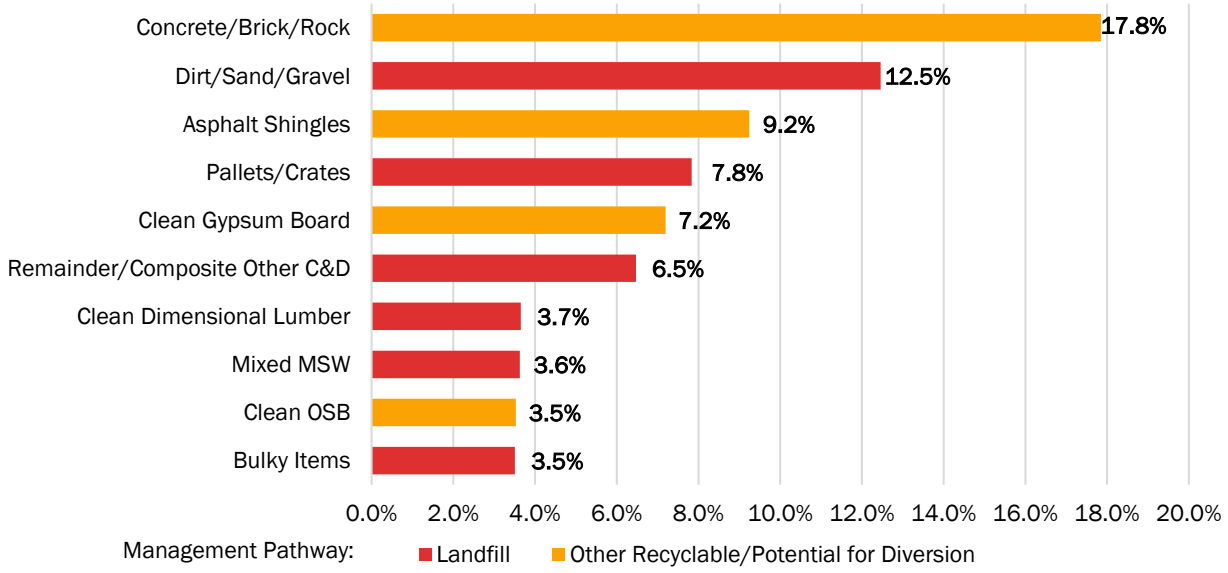


Figure E-6 shows the top ten most prevalent material categories by weight in the C&D/bulky waste stream.

**Figure E-6 Most Prevalent Material Categories in Aggregate C&D/Bulky Stream**




## E.5 KEY TAKEAWAYS

Waste composition studies are crucial to understanding a state's waste stream, and to making informed, data-driven decisions in pursuit of SCDES' mission. As waste streams are constantly changing as a result of both macroeconomic factors and changes to federal, state and even local laws, regular updates to these studies (most often every five to seven years) are necessary to maintain an accurate and timely understanding of managed material streams. In reviewing the results of this 2025 study, the following observations can be made:

**Landfill Disposal**

- **Annual Disposal.** 3.5 million tons of MSW were disposed in South Carolina landfills in 2024. Targeted single stream recyclables accounted for 17.1 percent, or 612,000 tons, of landfilled MSW.
- **Management Pathways.** 36.6 percent of all disposed MSW is assigned to the landfill management pathway category, which means that there are currently no viable alternatives to disposing in the landfill. While the landfill management pathway represents the largest single management pathway within the MSW stream, the majority of landfilled tonnage could be more optimally managed within recycling, composting, or other diversion pathways.
- **Diverting Organics.** The prevalence of food waste in South Carolina's waste stream suggests that future diversion strategies should target this material. While small amounts of food can be diverted through rescue organizations, the State has an opportunity to begin offering incentives and supporting initiatives to develop infrastructure and programs to divert food scraps on a wider basis.
- **C&D Recovery.** Nearly 60 percent of landfilled C&D/bulky waste is capable of being recovered or otherwise diverted from landfill disposal. Much of this is comprised of inert materials, such as concrete and brick, or potentially recoverable wood materials, such as pallets and clean dimensional lumber. It was beyond the scope of this study to evaluate how to increase diversion of C&D waste.
- **Reporting Limitations.** Present reporting requirements do not allow for complete estimation of statewide C&D/bulky waste quantities. If this extra level of detail is required of South Carolina landfills

in the future, SCDES will be able to accurately determine the scale of this waste stream and determine how implemented programs impact C&D/bulky waste disposal.

- **Greenhouse Gas Emissions.** Landfilled waste is a significant generator of greenhouse gases.[2] Recovery of currently landfilled recyclable and compostable materials would remove 1.9 million metric tons equivalent of carbon dioxide ($MTCO_2E$) from South Carolina's air. This is the equivalent of canceling emissions from over 400,000 passenger vehicles or conserving 217 million gallons of gasoline each year.

**Yard Waste Performance**

- **Effective Ban.** Low instance of yard waste materials in MSW suggest the State's ban on yard waste MSW disposal has been effective.

**Recyclable Commodity Performance & Cost Savings**

- **Corrugated Cardboard**. Fifty-five percent of all discarded cardboard in South Carolina is recycled, making corrugated cardboard the most well-captured of recyclable commodities within the state.
- **Low Capture Rates**. With the exception of corrugated cardboard, no other recyclable commodity enjoys a capture rate above ten percent in South Carolina.
- **Lost Value from Disposed Recyclables**. The average ton of landfilled MSW contains $25.62 of recyclable commodities. For comparison, the statewide average landfill disposal cost for one ton of MSW is estimated at $43.18.
- **Potential Value of Recyclables**. South Carolina currently pays $27.1 million dollars in disposal fees to landfill recyclables valued at $91.6 million dollars in the regional commodities market, a difference of nearly $119 million each year.
- **Future Recycling Outlets**. As materials such as clothing and other textiles (6.5 percent of the MSW stream) continue to become a larger part of US waste streams, reuse (and potentially even recycling) outlets are expected to increase compelling options to divert these materials from landfill.

[2] In practice, many South Carolina landfills have installed landfill gas recovery systems, which may mitigate actual release of greenhouse gas (GHG) emissions. The reported GHG emissions are based strictly on the profile of the landfilled wastes and on the impact to GHG emissions were these landfilled materials diverted to recycling or composting.

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# 1. INTRODUCTION

The South Carolina Department of Environmental Services (SCDES) works to preserve and protect South Carolina's natural resources "on behalf of our environment for the benefit of all South Carolinians," and its program administration, public education, and solid waste and recycling regulatory decisions contribute to its success. Recognizing that a baseline snapshot of the disposed waste stream in the state will be a powerful metric for SCDES and its stakeholders as they work to reduce landfill disposal and increase diversion in South Carolina, SCDES applied for and was awarded United States Environmental Protection Agency (US EPA) grant funds to conduct its first statewide waste characterization study (WCS) to establish that baseline.

Through a competitive bidding process, SCDES selected MidAtlantic Solid Waste Consultants LLC (MSW Consultants) to perform the inaugural statewide WCS, with a focus on the municipal solid waste (MSW) stream and the construction and demolition (C&D) waste stream. As part of this study, MSW Consultants reviewed existing data, developed data collection protocols, coordinated with host facilities, collected manual samples for sorting, conducted visual surveys at host facility landfills and transfer stations across the state, and analyzed the resulting data. The methodology for this research was generally consistent with the American Society for Testing and Materials (ASTM) D5231-92 (2024), Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste, with certain modifications and additions as summarized in the Quality Assurance Program Plan (QAPP) developed specifically for this study. This report summarizes the WCS methodology and calculates the composition of disposed MSW and C&D/bulky waste within South Carolina.

The Study aimed to achieve the following objectives:

1. Estimate the composition of South Carolina's MSW and C&D waste streams disposed at state-permitted facilities.
2. Develop a sampling approach that (a) maximizes sample collection of MSW and C&D waste from a range of geographic areas and waste sectors and (b) accounts for seasonal variations by conducting field data collection over more than one season (summer and fall).
3. Perform data collection, analysis, and reporting tasks in a way that is statistically and methodologically defensible, using proven approaches for large-scale waste composition studies, consistent with relevant standard operating procedures (SOPs) and the Quality Assurance Project Plan (QAPP) developed for this project.
4. Conduct and document the study in a manner that facilitates repeatability for future South Carolina characterization efforts, whether they be statewide updates or smaller county or municipal level efforts.

## 1.1 STATEWIDE WASTE GENERATION

Disposal facilities are numerous and widespread in South Carolina. This WCS focuses on the following facilities:

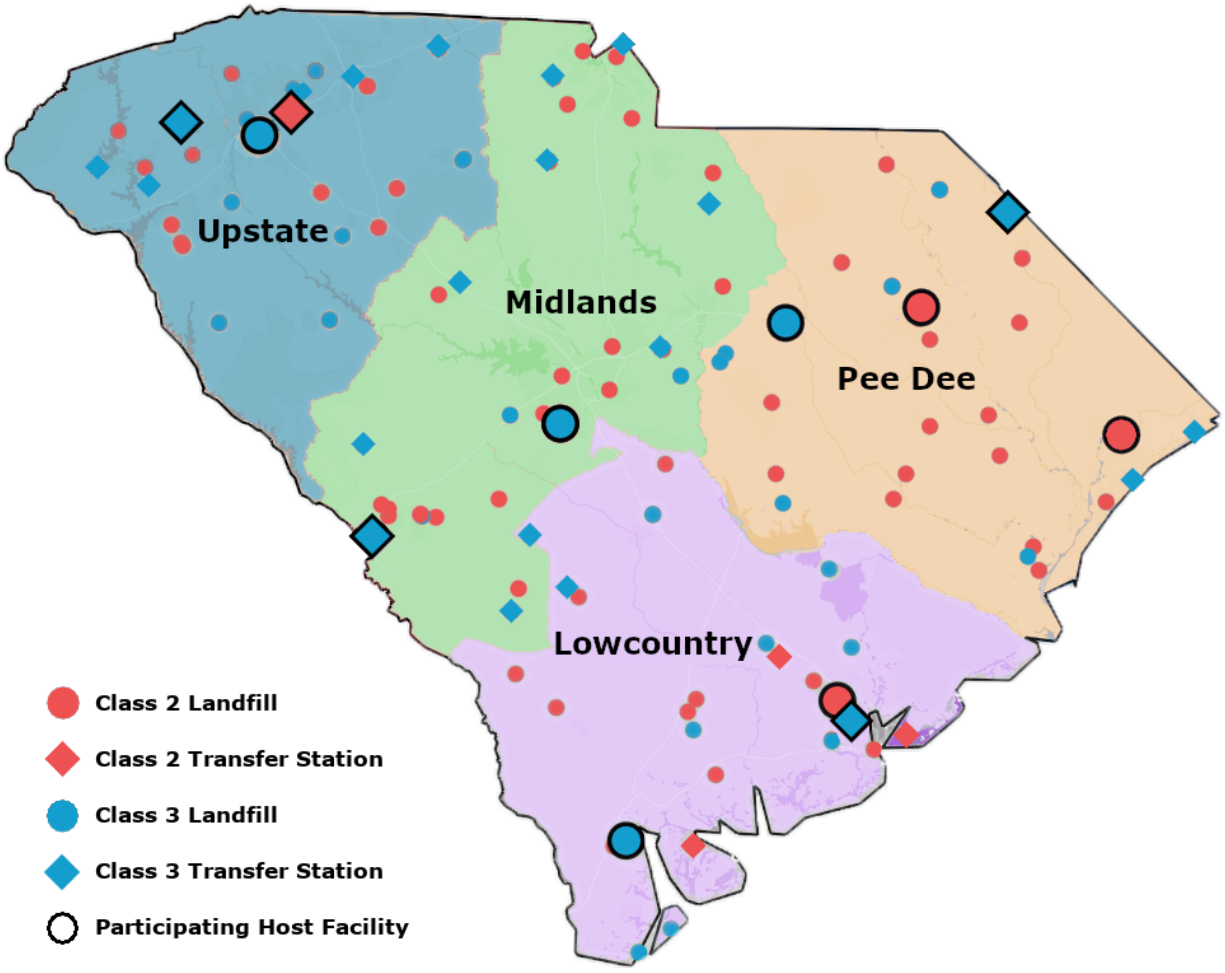
- **Class 2 Landfills –** landfills permitted to accept C&D debris, land-clearing debris, and industrial process waste.[1] Only C&D debris data collection was possible at these facilities.
- **Class 3 Landfills –** landfills permitted to accept MSW, C&D debris, and industrial process waste.[2] These facilities were eligible for both MSW and C&D/bulky waste data collection.

[1] As defined in the SCDES 2024 Solid Waste Management Report.
[2] As defined in the SCDES 2024 Solid Waste Management Report.

- **Transfer Stations –** facilities that accept solid waste from collection vehicles and transfer it to larger vehicles for movement to another facility for processing and disposal. Transfer Stations hosted both MSW and C&D/bulky waste data collection. Transfer stations are also permitted as Class 2 or Class 3 facilities.

MSW and C&D wastes are managed throughout the state by 29 Class 3 landfills, 77 Class 2 landfills and 43 transfer stations. Figure 1-1 is a map of all active facilities that meet the provided tons per day (TPD) thresholds (Class 2 landfills: 200 TPD, Class 2 transfer stations: 100 TPD, Class 3 landfills: 800 TPD, Class 3 transfer stations: 200 TPD).

Figure 1-1 Map of South Carolina Disposal Facilities by SCDES Region




SCDES submits a Solid Waste Management Annual Report each year, in accordance with the South Carolina Solid Waste Policy and Management Act of 1991. As a necessary step in the development of this report, permitted solid waste facilities must report their own disposed/processed annual tonnage,[3] which SCDES aggregates to calculate countywide and statewide total solid waste (TSW). According to the SCDES

[3] SCDES Annual Report data is collected from multiple sources including reports from local governments and permitted public/private solid waste facilities. SCDES thoroughly reviews this information and uses industry standard calculations to enhance accuracy and minimize duplication.

FY 2024 Annual Report, South Carolina landfills reported disposing of 13.3 million tons of waste during the 2024 fiscal year.[4] Table 1-1 provides a high-level summary of South Carolina's reported TSW.

Table 1-1 Summary of South Carolina Waste by Waste Type (FY 2024)

| Facility Type | Waste Type | Reported Tons | % of TSW |
|---|---|---|---|
| **Class 1 Landfills*** | **All** | **43,832** | **0.3%** |
| **Class 2 Landfills** | **All** | **3,802,766** | **28.5%** |
| **Class 3 Landfills** | **All** | **8,729,733** | **65.5%** |
| | MSW | 3,574,431 | 26.8% |
| | Ash | 3,176,841 | 23.8% |
| | C&D | 161,515 | 1.2% |
| | Industrial | 877,176 | 6.6% |
| | Tires | 24,380 | 0.2% |
| | Other | 915,390 | 6.9% |
| **Out of State Imported Wastes** | **All** | **731,786** | **5.5%** |
| **Other Disposal** | **All** | **14,764** | **0.1%** |
| **Total Disposed Tons** | | **13,322,881** | **100.0%** |

*Class 1 landfills exclusively dispose of land-clearing debris, which is not of interest to this report.

Reported tonnages show total disposed MSW of 3.5 million tons, but this reported figure only captures the C&D/bulky waste tonnage disposed at Class 3 facilities. It is reported by SCDES that a substantial portion of Class 2 waste is comprised of C&D/bulky waste, but reporting requirements do not require Class 2 facilities to itemize inbound tonnages the same way as Class 3 facilities. Because there is no recognized state-reported tonnage of C&D/bulky waste (by SCDES Regions or otherwise), this report relies on other means, described later in this section, to estimate the statewide composition of C&D/bulky wastes, and does not apply the resulting composition to any official C&D tonnage.

The SCDES FY 2024 Annual Report also aggregates disposed wastes by county which allows for geographic groupings of annual tonnages by SCDES region (Upstate, Midlands, Pee Dee, and Lowcountry). Reported disposal tonnages are broken down by SCDES region in Table 1-2 and are later used to weight composition results by region. As shown, it is possible to break out C&D and MSW reported at Class 3 landfills but not at Class 2 landfills. Detailed county-level tonnages and SCDES Groupings are available in Appendix A.

[4] The reader may note this differs slightly from the SCDES 2024 report, which includes exported wastes. These are disposed outside of South Carolina and are therefore excluded from this study analysis.

Table 1-2 Summary of Tonnage by SCDES Region (2024)

| | | Class 3 | | | Class 2 |
|---|---|---|---|---|---|
| SCDES Region | Population | MSW Tons | C&D Tons | Total Tons | Total Tons |
| Lowcountry | 1,256,284 | 879,091 | 36,474 | 2,083,484 | 988,212 |
| Midlands | 1,546,886 | 906,055 | 3,781 | 1,416,528 | 1,291,326 |
| Pee Dee | 979,748 | 633,014 | 30,190 | 2,711,647 | 643,421 |
| Upstate | 1,590,636 | 1,156,271 | 91,070 | 2,518,074 | 879,807 |
| **Total** | **5,373,554** | **3,574,431** | **161,515** | **8,729,733** | **3,802,766** |

In Table 1-3, these SCDES region tonnages are reframed as percentages. These "percent of tons" values will be used later to appropriately weight SCDES regions when aggregating composition results.

Table 1-3 Summary of Tonnage Contributions by Region

| SCDES Region | Percent of Population | Percent of MSW Tons | Percent of Class 2 Tons |
|---|---|---|---|
| Lowcountry | 23.4% | 24.6% | 26.0% |
| Midlands | 28.8% | 25.3% | 34.0% |
| Pee Dee | 18.2% | 17.7% | 16.9% |
| Upstate | 29.6% | 32.3% | 23.1% |
| **Total** | **100.0%** | **100.0%** | **100.0%** |

## 1.2 METHODOLOGY

A detailed study design was developed and is contained in the study QAPP. This section summarizes the key elements of the study design and captures specific updates to the host facilities, sample targets, and the field research schedule.

### 1.2.1 WASTE GENERATOR SECTORS

MSW and C&D/bulky waste originate from specific waste generator sectors. The study accepted a sample as valid and assigned the sample material to a generator sector based on the following considerations:

- **Residential** – loads delivered to SCDES permitted facilities by commercially or municipally operated vehicles in which 80 percent or more waste is from single-family and/or multi-family residential sources.[5] This includes MSW generated in public housing, condominium complexes, and apartments. Vehicles chosen for sampling in the residential waste sector primarily include packer trucks but may also include roll-off containers from residential drop-off locations if they are believed to contain at least 80 percent waste from residential sources.

[5] Collection of residential refuse is performed by dedicated collection vehicles, most commonly side-loader or rear-loader packer trucks with dedicated collection routes. Conversely, multi-family residential waste is often, or even usually, collected by front-loader packer trucks that collect from mixed commercial routes. For this reason, it is difficult to obtain pure samples of multi-family waste that are not mixed with commercial waste. Sampling of multi-family waste streams is possible, but often requires significant additional coordination from haulers, adjustments to sampling methodology, and may introduce additional uncertainty to composition results. The composition of residential MSW reported in this study is predominantly derived from the single-family residential sector.

- **Institutional/Commercial/Industrial (ICI or Commercial)** – loads delivered to SCDES permitted facilities by commercially operated vehicles in which 80 percent or more waste is from institutional, commercial, or industrial sources. Such sources include businesses, hospitals, schools, offices, restaurants, grocery stores, and manufacturing facilities, and are most often sampled from front-loading packer trucks, "open top" and compactor roll-off dumpsters.[6] This sector does not include C&D debris or bulky waste. Vehicles chosen for sampling in the commercial sector include packer trucks and qualifying roll-off compactors.
- **Unacceptable Loads/Mixed Waste** – loads delivered to SCDES permitted facilities that contain less than 80 percent of either residential or ICI waste, and loads originating from outside of South Carolina. These loads were omitted from sample selection. Mixed loads are most often derived from transfer trailers, or semi-trucks, delivering from transfer stations, but they may also include packer trucks. In the rare event that the field research team was unable to meet sampling without sampling from mixed waste packer truck loads, the field supervisor sampled from the portion of the load the driver indicated was primarily residential or commercial waste. The field supervisor also visually assessed the indicated waste for reasonableness. This did not apply to transfer trailer loads, which the study did not permit to be sampled.
- **C&D/Bulky Waste** – loads delivered to SCDES permitted facilities that contained 80 percent or more material generated from construction and demolition activities, or that are dry waste loads which are primarily bulky waste loads managed similar to C&D loads.

### 1.2.2 SAMPLING METHODS

Field research teams employed two data collection methods to characterize disposed wastes: one team manually sampled and sorted inbound MSW loads, and the second team visually surveyed C&D/bulky waste loads with volumetric estimation, load measurements, and industry standard material densities.

### 1.2.3 SEASONALITY

To reduce the impact from any seasonal fluctuations in the composition of disposed MSW and C&D materials, the field research teams collected data over two separate seasons: a summer season, which took place in late July into early August, and a fall season,[7] which took place in late September into early October.

### 1.2.4 SAMPLE WEIGHTS

Consistent with ASTM standards, field research teams ensured all hand sorted samples met a target weight of 200 to 250 pounds. This approach does not assert that any one sample is representative of the load from which it is collected. Rather, the collection of all sorted samples, when analyzed together, is representative of the population of a given region's tipped loads.

C&D/bulky loads, which are often comprised of very large and/or very heavy constituents, are not a good fit for traditional hand-sorted waste composition sampling and sorting methods. The field research team visually surveyed each entire tipped load as a single sample. Loads often ranged from a few hundred to several thousand pounds.

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[6] As previously mentioned, commercial loads also may contain multi-family residential MSW from apartments and condos. To the greatest extent possible and to avoid taking a sample with visually apparent multi-family wastes, commercial waste loads were visually screened prior to sample selection.

[7] The initially proposed schedule included a spring season and a fall season, exactly 6 months apart; unforeseen scheduling challenges required a reduced 2-month duration between field data collection seasons. In the opinion of MSW Consultants, there was a sufficient distance between collection events to suitably negate seasonal impacts.

### 1.2.5 SAMPLING TARGETS

Across both data collection seasons, the sampling plan targeted 360 total samples: 160 samples of MSW to be manually sorted and 200 loads of C&D/bulky material to be visually surveyed. Table 1-4 breaks down sampling plan targets by region and participating facility and it shows the number of targeted versus actual collected samples.

Table 1-4 Study Sampling Plan Targets vs. Actual Collected Samples

| Season | Region | Facility Class | Host Facility | Targeted Samples | Actual Samples | Δ |
|---|---|---|---|---|---|---|
| **MSW** | | | | | | |
| Summer | Upstate | Class 3 | Greenville County Landfill | 20 | 20 | 0 |
| | Pee Dee | Class 3 | Lee County Landfill | 20 | 14 | -6 |
| | Midlands | Class 3 | Three Rivers Landfill | 20 | 21 | 1 |
| | Lowcountry | Class 3 | Carolina Waste Transfer Station | 20 | 20 | 0 |
| Fall | Lowcountry | Class 3 | Hickory Hill Landfill | 20 | 20 | 0 |
| | Pee Dee | Class 3 | Dillon County Transfer Station | 20 | 16 | -4 |
| | Midlands | Class 3 | Lexington County Transfer Station | 20 | 20 | 0 |
| | Upstate | Class 3 | Pickens County Transfer Station | 20 | 20 | 0 |
| **MSW Subtotal** | | | | **160** | **151** | **-9** |
| **C&D** | | | | | | |
| Summer | Upstate | Class 3 | Greenville County Landfill | 40 | 42 | +2 |
| | Pee Dee | Class 2 | Pee Dee Environmental Landfill | 40 | 45 | +5 |
| | Midlands | Class 3 | Lexington County Landfill | 20 | 18 | -2 |
| Fall | Upstate | Class 2 | MRR Transfer Station | 20 | 15 | -5 |
| | Midlands | Class 3 | Lexington County Landfill | 20 | 38 | +18 |
| | Lowcountry | Class 2 | Spring Grove Landfill | 20 | 16 | -4 |
| | Lowcountry | Class 2 | Horry County Landfill* | 40 | 110 | +70 |
| **C&D Subtotal** | | | | **200** | **284** | **+84** |
| **Grand Total** | | | | **360** | **435** | **+75** |

*During host facility scheduling discussions with Horry County, the county requested to extend scheduled data collection into a standalone Horry County C&D Study. As part of this arrangement, SCDES and Horry County shared data collected through one another's efforts which followed the same data collection methodology.

MSW hand sort samples generally met the Sampling Plan targets, but the number of actual samples in the Pee Dee region fell short of the target due to weather events and on-site equipment failures. Despite this, the study analysis met the necessary thresholds for statistically representative results. C&D/bulky visual survey sampling greatly exceeded the sampling plan 360 total sample target with 435 actual samples.

### 1.2.6 ESTIMATING RESIDENTIAL AND ICI MSW DISPOSAL

The sampling plan dictated that the field research team randomly select inbound trucks using an “every nth truck” sampling method because preexisting data on historic inbound MSW tonnages by generator sector was unavailable. This method typically yields a split of residential and commercial samples that are representative of the true distribution of inbound loads.

As shown in Table 1-5, this approach, further explained in Section 1.3, yielded 58 samples of residential MSW and 93 samples of commercial MSW, which implies 39.2 percent of annual disposed MSW is residential in origin and 60.8 percent is commercial in origin. Based on available data from other wastesheds, this result underestimates the fraction of residential MSW and overestimates commercial MSW.

Table 1-5 Implied Generator Sector Tonnages and Implied Household Generation Rate

| SCDES Region | MSW Tonnage | Sorted Samples | | Percent of Region | | Implied Tonnage | |
|---|---|---|---|---|---|---|---|
| | | Res | ICI | Res | ICI | Res | ICI |
| Lowcountry | 879,091 | 11 | 29 | 27.5% | 72.5% | 241,750 | 637,341 |
| Midlands | 906,055 | 12 | 29 | 29.3% | 70.7% | 265,187 | 640,868 |
| Pee Dee | 633,014 | 15 | 15 | 50.0% | 50.0% | 316,507 | 316,507 |
| Upstate | 1,156,271 | 20 | 20 | 50.0% | 50.0% | 578,136 | 578,136 |
| **Total** | **3,574,431** | **58** | **93** | | | **1,401,579** | **2,172,852** |
| | | | | | | **39.2%** | **60.8%** |

Due to this discrepancy, the project team further investigated the generation rates. Table 1-6 summarizes the first step of the investigation: it pairs the implied residential tonnage with single-family household estimates published by United States Census Bureau [8] to determine regional residential household waste generation rates. As shown, this exercise estimated that a single-family residence generates 0.94 tons per year.

Table 1-6 Unadjusted Household Generation Rate (tons/year)

| SCDES Region | Implied Residential Tonnage | No. Detached Single-Family Households* | Implied Annual Single-Family Household Generation |
|---|---|---|---|
| Lowcountry | 241,750 | 338,116 | 0.71 |
| Midlands | 265,187 | 432,898 | 0.61 |
| Pee Dee | 316,507 | 268,038 | 1.18 |
| Upstate | 578,136 | 446,517 | 1.29 |
| **Total** | **1,401,579** | **1,485,569** | **0.94** |

*Source: United States Census Bureau (2021)

Based on data from other wastesheds, this single-family residential generation rate is lower than the typical range in the southeast.[9] In the professional experience of MSW Consultants, a slightly higher single family household generation rate is appropriate to adjust residential waste generation. Table 1-7 applies this adjusted generation rate, 1.1 tons per single family household per year, to estimate regional residential waste generation.[10] The values in this table serve as the basis for aggregating residential and commercial MSW waste from regional to statewide results.

[8] Source : https://data.census.gov/table/ACSDT5Y2021.B25024?q=B25024

[9] It is also lower than another statewide waste characterization study currently in progress but known to MSW Consultants.

[10] The estimated residential tonnage includes MSW from both single-family and multi-family households. The application of a waste generation factor only to single family residential households was necessitated by the best available data for making this

Table 1-7 Adjusted Household Generation Rate and Adjusted Generator Sector Tonnages

| SCDES Region | Adjusted Annual Single-Family Household Generation in tons | Adjusted Tonnage | |
|---|---|---|---|
| | | Adjusted Residential | Adjusted Commercial |
| Lowcountry | 1.10 | 371,928 | 507,163 |
| Midlands | 1.10 | 476,188 | 429,867 |
| Pee Dee | 1.10 | 294,842 | 338,172 |
| Upstate | 1.10 | 491,169 | 665,102 |
| **Total** | **1.10** | **1,634,126** | **1,940,305** |
| **Percent of Total** | | **45.7%** | **54.3%** |

### 1.2.7 AGGREGATING C&D DISPOSAL TONS

Similar to the MSW data set, the distribution of samples by region in the C&D/bulky data set was inappropriate to indicate regional weighting of C&D/bulky composition. Because there is no reliable quantification of C&D/bulky waste generation by region, nor are there readily available C&D/bulky waste generation indicators, total Class 2 tonnage was used as a proxy to aggregate regional C&D/bulky waste composition.

Table 1-8 shows the regional allocation of samples (overly weighted to the Lowcountry) and the reported Class 2 tonnage side by side. As shown, the Class 2 tonnage provides a more balanced weighting of C&D/bulky waste generation and has been used to aggregate regional composition estimates into the statewide total.

Table 1-8 Summary of C&D Samples and Tonnage by SCDES Region (2024)

| SCDES Region | C&D Actual Samples | Percent of Actual Samples | Class 2 Total Tons | Percent of Class 2 Total Tons |
|---|---|---|---|---|
| Lowcountry | 126 | 44.4% | 988,212 | 26.0% |
| Midlands | 56 | 19.7% | 1,291,326 | 34.0% |
| Pee Dee | 45 | 15.8% | 643,421 | 16.9% |
| Upstate | 57 | 20.1% | 879,807 | 23.1% |
| **Total** | **284** | **100.0%** | **3,802,766** | **100.0%** |

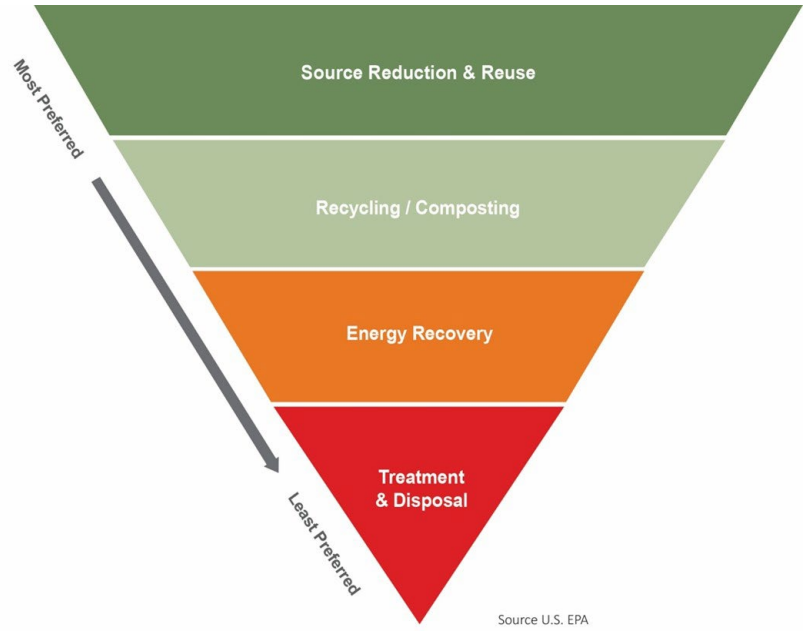
### 1.2.8 MATERIAL CATEGORIES & DEFINITIONS

In collaboration with SCDES, the project team developed two lists of material definitions; they are contained in the QAPP and repeated here in Appendix B and Appendix C for reference. Both lists are organized into material groups (e.g. papers, plastics, metals, organics), a traditional method for understanding materials in WCS literature. The lists also designate a management pathway (i.e. the best method for recovery or disposal of a given material category based on the capabilities of a given system) for each material category. This approach to analyzing waste materials is consistent with the spirit of US EPA's sustainable materials management (SMM) hierarchy, shown in Figure 1-2, which encourages alternatives to landfill disposal when possible. The management pathways are not intended to directly

adjustment. It is the professional opinion of MSW Consultants that the resulting split between residentially generated and commercial generated waste in South Carolina is reasonable for purposes of aggregating statewide MSW composition.

mirror this hierarchy, but to reflect the most environmentally preferred disposition currently available within the state for a given material category.[11]

Figure 1-2 US EPA Waste Management Hierarchy




This study defines the following management pathways:

- **Single Stream Recoverable –** Materials designated with this management pathway are widely accepted in local curbside or commercial single stream recycling programs. They are sortable with standard equipment and routinely marketed.
- **Other Recyclable/Potential for Diversion –** Materials designated with this management pathway have a viable path to recovery through manufacturer take-back, retail drop-off, scrap dealers, or other specialty programs.
- **Compostable –** Materials designated with this management pathway are compostable or digestible and can be processed at permitted organics facilities.
- **Specialty Disposal –** Materials designated with this management pathway include household hazardous waste (HHW) and electronic waste (e-waste) that require specialized handling due to environmental hazards or regulations.
- **Landfill –** Materials designated with this management pathway presently have no practical recovery pathway within current local programs or markets due to material type, composite construction, lack of outlets, or prohibitive cost. These materials are presently best managed through disposal avenues.

Table 1-9 lists MSW material categories with their color-coded management pathway. Complete MSW material category definitions are provided in Appendix B.

[11] Management pathway groups are applied evenly across the State of South Carolina and do not attempt to take any specific capabilities of a given city, county, or other jurisdiction into account. Furthermore, as several different items/products are often clustered into a single material category, it is possible that not every conceivable item/product belonging in that category necessarily falls within the designated management pathway.

Table 1-9 MSW Material Categories & Management Pathways

| Material Group and Category | Material Group and Category |
|---|---|
| **Paper** | **Plastic** |
| Corrugated Cardboard | PET #1 Bottles |
| Mixed Recyclable Paper | PET #1 Non-Bottles |
| Compostable Paper | HDPE #2 Natural Containers |
| Remainder Paper | HDPE #2 Colored Containers |
| Polycoated/Aseptic Containers | Other HDPE #2 |
| **Metal** | PP #5 Containers |
| Aluminum Cans | #3, #4, #6, #7 Containers |
| Steel Cans | Other PP #5 |
| Other Ferrous Metal | Other Rigid Plastic |
| Other Non-Ferrous Metal | Retail Plastic Bags |
| Appliances | Industrial Film |
| **Glass** | Garbage Bags |
| Brown Glass Bottles | Other Film |
| Clear Glass Bottles | Remainder/Composite Plastic |
| Green Glass Bottles | Bulky Plastic |
| Remainder/Composite Glass | **Other** |
| Mixed Cullet | Textiles/Leather Products |
| **Organics** | Mattresses |
| Food Waste (Packaged) | Rubber Materials |
| Food Waste (Loose) | Lithium/Ion Batteries |
| Fats, Cooking Oils, and Grease | Other Batteries |
| Yard Trimmings and Prunings | Sharps/Medical Waste |
| Remainder Organics | Other Hazardous Waste |
| **C&D** | Furniture |
| Asphalt, Brick, and Concrete (ABC) | Other Bulky Items |
| Carpet & Carpet Padding | Remainder Inorganics |
| Drywall/Gypsum Board | Dirt/Fines |
| Clean Dimensional Wood | Wet Cell Batteries |
| Plywood and Other Engineered Wood | Paint |
| Wood - Painted, Treated, Stained | Diapers & Sanitary Products |
| Other/Residual C&D | All Other Waste Not Elsewhere Categorized |

| **Legend: Management Pathways** | |
|---|---|
| Single Stream Recoverable | Other Recyclable/Potential for Diversion |
| Compostable | Specialty Disposal |
| Landfill | |

Table 1-10 lists the C&D/bulky material categories with their color-coded management pathway. Complete C&D/bulky material category definitions are provided in Appendix C. Note that in later composition tables, some category names may be shortened for a better fit.

**Table 1-10 C&D/Bulky Material Categories & Management Pathways**

| Material Group and Category | Material Group and Category |
|---|---|
| **Paper** | **Special Waste** |
| OCC/Kraft | Appliances/White Goods |
| Remainder/Composite Other Paper | Batteries - Lead Acid |
| **Plastic** | Electronics |
| Clean Recoverable Film | Items with CRTs |
| HDPE Buckets | Tires |
| Remainder/Composite Other Plastic | Other Hazardous Waste |
| **Metal** | Paint |
| HVAC Ducting | Vehicle and Equipment Fluids |
| Non-Ferrous Metal | **C&D** |
| Other Ferrous Metal | Asphalt Paving |
| **Glass** | Asphalt Shingles |
| All Glass | Carpet/Padding |
| **Organics** | Ceiling Tiles |
| Yard Waste | Clean Dimensional Lumber |
| Remainder/Composite Other Organics | Clean Gypsum Board |
| **Wood** | Concrete/Brick/Rock |
| Clean OSB | Dirt/Sand/Gravel |
| Other Clean Engineered Wood | Insulation |
| Plywood | Remainder/Composite Other C&D |
| Painted/Stained Wood | **MSW** |
| Treated Wood | Mixed MSW |
| Pallets/Crates | Bulky Items |
| Wood Furniture | |

| Legend: Management Pathways | |
|---|---|
| Single Stream Recoverable | Other Recyclable/Potential for Diversion |
| Compostable | Specialty Disposal |
| Landfill | |

### 1.2.9 HOST FACILITY COORDINATION

During the project initiation phase, SCDES invited prospective host facility representatives to an in-person presentation where SCDES introduced the project, provided a study methodology overview, and initiated scheduling field data collection activities. They scheduled one-on-one calls with each facility and the project team to further discuss key considerations for the work including:

- Reviewing objectives, data collection protocols, and necessary facility support
- Discussing work area requirements and identifying potential on-site locations,
- Discussing availability of operational resources, such as loader assistance,
- Detailing vehicle traffic (by time of day) including delivery patterns, and numbers of vehicles arriving, by vehicle type and/or by waste subsector,
- Finalizing locations for setting up the work area, taking samples, queuing samples, discarding sorted material, and other in-process activities,
- Required PPE and Safety Considerations,
- Availability of facility restrooms/port-o-lets, break areas, smoking areas, etc.
- Answering any questions and addressing the concerns of the Facility Managers
- Confirming addresses, point of contact information, arrival times, etc.

Figure 1-3 illustrates a landfill-hosted work area, and Figure 1-4 is an example work area. Both represent how the project team uses host facility space during WCS field data collection.

Figure 1-3 Work Area Illustration

Figure 1-4 Sorting Crew Processing a Sample at a Landfill

Field research teams were provided with an updated Safety and Health Plan for the WCS. Physical copies of the Safety and Health Plan were present on-site with field staff during all phases of field data collection, and copies of the plan were provided to host facilities upon request.

### 1.2.10 STAFFING PLAN

Staffing for field data collection included professional consulting staff who have redundant waste characterization management, field supervisory, operations, and analytical experience. The field operations sort crew staffing also drew from a network of highly skilled professional sorters. Further details of the staffing plan are contained within the QAPP, but the key field roles are briefly summarized here:

- **Field Supervisor –** field lead responsible for successful MSW field data collection and sample collection
- **Visual Survey Specialist –** field staff responsible for successful C&D/bulky waste field data collection
- **Crew Chief –** sorting lead responsible for safe, efficient, and accurate sorting of MSW samples
- **Sorter –** one of several workers managed by the crew chief and responsible for processing sample material

## 1.3 FIELD DATA COLLECTION

Details about field data collection methods are contained in the QAPP and are summarized here.

- **MSW Sample Selection –** the field research team employed a systematic “every nth truck” selection procedure to identify vehicles eligible for sample collection at host facilities. At each facility, the field supervisor conducted brief interviews of inbound drivers who operated potentially eligible trucks, as shown in

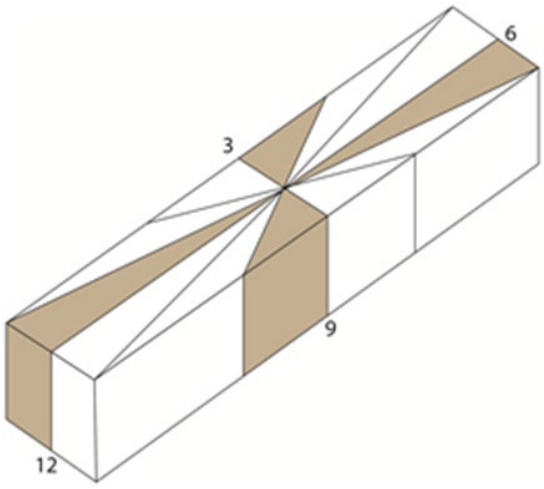
- Figure 1-5, and determined if the truck load met the necessary eligibility requirements. [12] If an inbound load was eligible, the field supervisor recorded pertinent vehicle information and directed the driver to the selected area to tip their load.

Figure 1-5 MSW Vehicle Interview


- **MSW Sample Collection –** The field supervisor directed host facility loader operators to collect samples from a randomly designated location at the perimeter of the load utilizing a random number generator. When selecting the sampled portion of a load, the load is viewed from the top as a clock face with 12 o'clock being the part of the load closest to the front of the truck. The selected hour is indicated to the loader operator (e.g.: 7 o'clock). This concept is illustrated in
- Figure 1-6 where 3, 6, 9 and 12 o'clock are represented by the shaded areas, respectively.

[12]In the case of this study, these requirements were quite simple. Routes were confirmed to consist of at least 80% of a single generator sector. Loads were turned away if they were not deemed suitable or safe for sorting.

Figure 1-6 Load Sampling Illustration




Once a targeted load was tipped out, the Field Supervisor took a photo of the designated sample selection with a visible sample ID placard in the photo frame. The loader operator then grabbed the sample selection with a loader bucket and delivered it to the designated sample staging area. Figure 1-7 shows two images of photographed slices before collection by the loader.

Figure 1-7 Loader-Collected Grab Samples



Depending upon the availability of host facility personnel, the field supervisor either collected the sample directly from the bucket of the loader or directed the operator to dump the sample on a tarp or a paved surface. Figure 1-8 shows a loader delivering a sample grab to the staging area.

Figure 1-8 Loader Delivering Grab Sample


The field supervisor pre-weighed sample material to confirm that the sample met the required 200-pound minimum weight target, then they staged the sample with its ID placard along the sorting area to await sorting, as shown in Figure 1-9.

Figure 1-9 Samples Staged to Await Sorting

- **Sorting Sample Material –** Once the field research team acquired, labeled, and appropriately staged each sample for sorting, the sort crew loaded the sample onto the sort table and manually sorted it into the prescribed component material categories. The crew chief routinely monitored sorted material bins as each sample was sorted to ensure accuracy. Figure 1-10 is a photograph of a sort table loaded with MSW sample material. The sort crew continued this hand sorting process until all material from a given sample was sorted down to a half-inch particle size, whereupon they swept remaining material into the dirt/fines category.

Figure 1-10 Manual Sorting

- **C&D/Bulky Waste Sample Selection –** All inbound South Carolina C&D/bulky waste loads were valid for sampling if they contained 80 percent or more of material generated from C&D activities or they were dry waste loads, which are primarily bulky waste loads managed similar to C&D loads. The greater number of sampling targets, quicker sample processing times, and higher variance between individual loads all incentivized collection of the greatest number of possible samples. In practical terms, this means that the visual survey specialist was encouraged to survey as many samples as possible, picking out the next available truck as soon as they had characterized the previous load and it had removed from the work area.
- **Visual Surveying Protocol –** To visually survey a load, the visual survey specialist recorded the volume and weight measurements of each load in conjunction with their visual assessments of the instance of study material categories. After they recorded key sample details, the visual survey specialist measured the dimensions of the tipped load and performed the visual surveys using a detailed step-by-step protocol that is fully described in the QAPP. Some examples of tipped loads are shown below in Figure 1-11. Figure 1-12 shows a visual survey specialist noting categories identified in the sample load on a tablet computer and an app that compares the volumetrically calculated weight of the load to the actual scale weight of the load. The app enables the visual survey specialist to identify possible

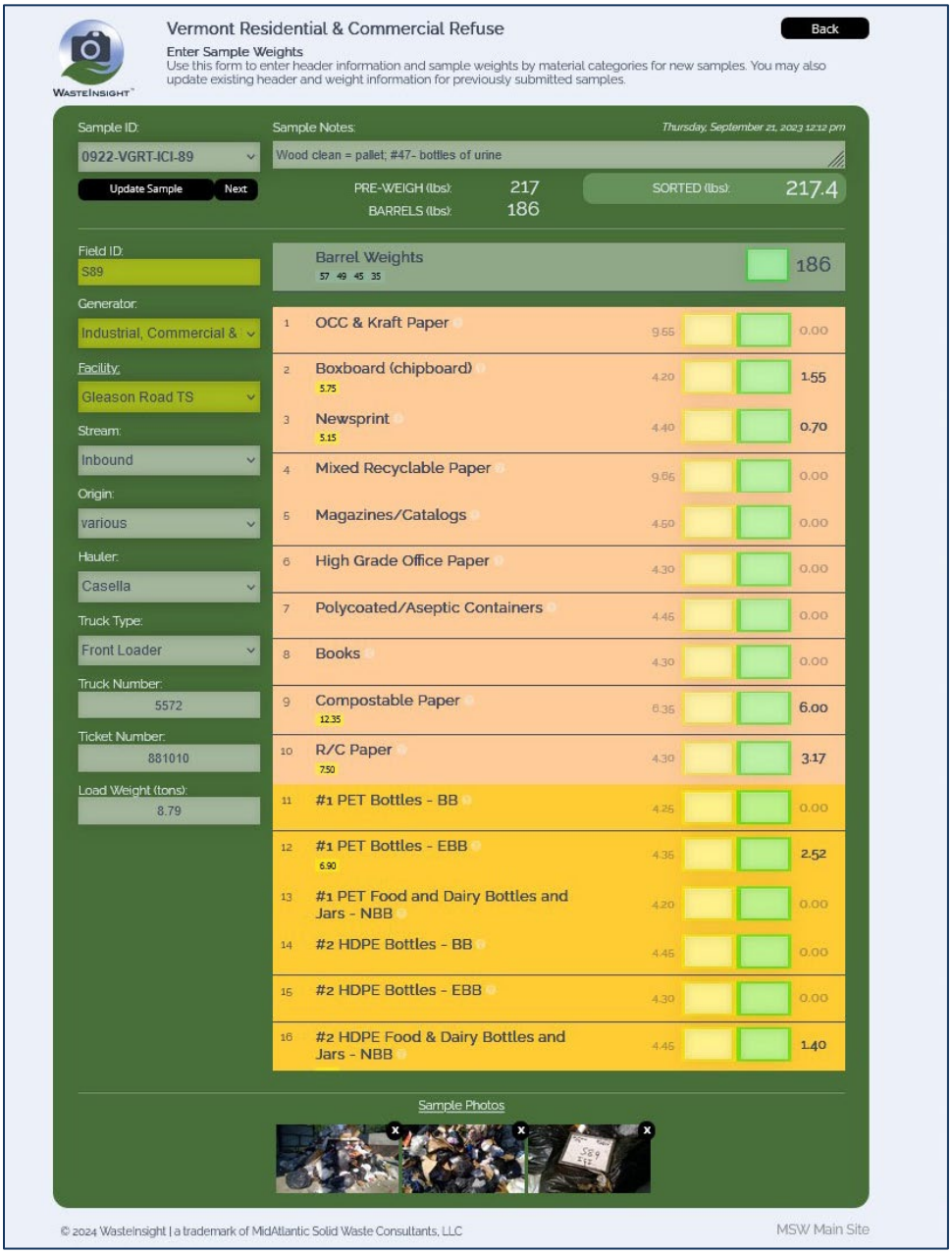
sources of discrepancy and adjustment volumetric estimates and/or density factors to reduce the degree of difference. This last step is critical to the accuracy of the data.

Figure 1-11 Tipped C&D Loads

Figure 1-12 Visual Survey of a C&D/Bulky Waste Load

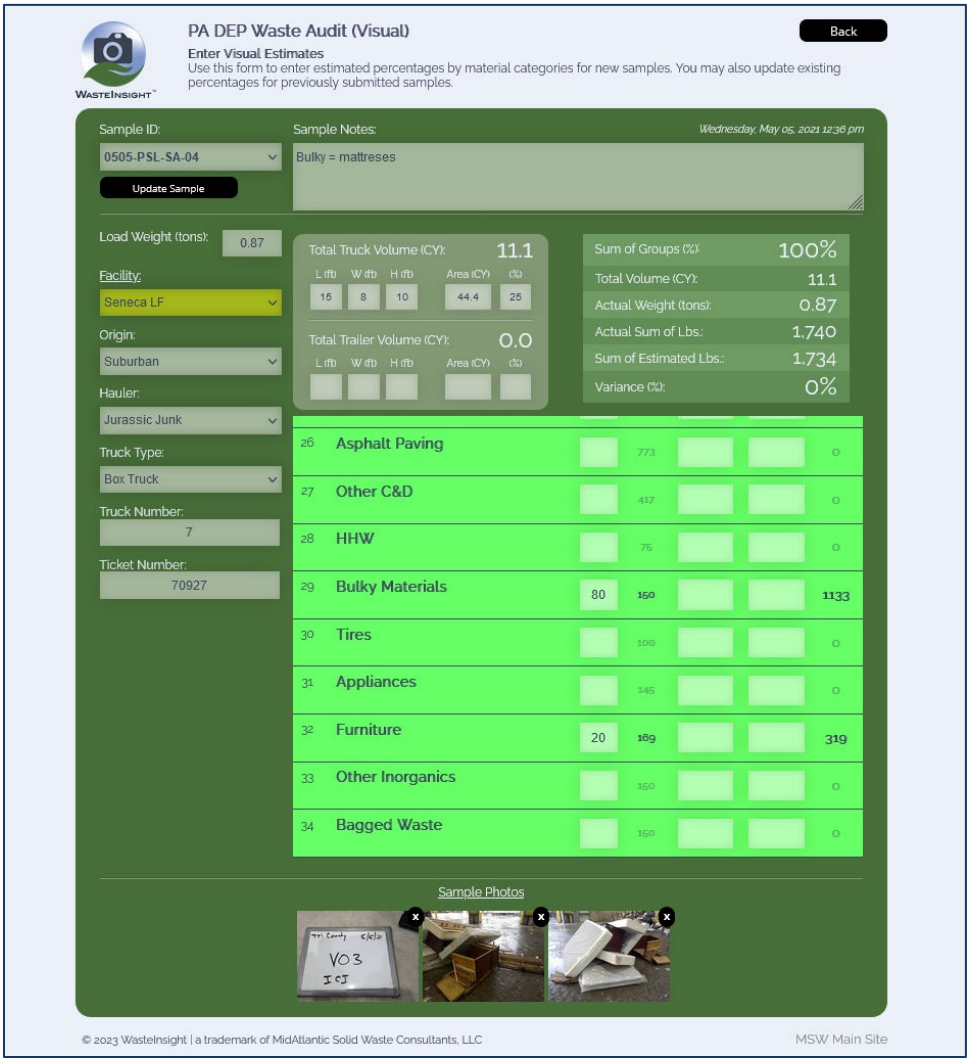
- **Data Recording –** Once the sort crew cleared all sample material from the table, they carried each bin of sorted materials from their places around the sort table to the weigh-out station. At the weigh-out station, a designated crew member weighed the bins and entered weight data into the tablet-based app. The crew chief (for MSW hand sorts) and visual survey specialist (for C&D/bulky surveys) recorded sample weights into the tablet-based data collection app. Figure 1-13 is an example of the data entry screen on the app.

Figure 1-13 Waste Sort Data Entry Interface



C&D/bulky waste visual surveys were also recorded using an app that dynamically calculated the weight of each load as the survey was in progress. Figure 1-14 is a screenshot example of the visual survey tool.

Figure 1-14 Visual Surveying App Interface




- **Site Maintenance & Cleanup –** As guests at each host facility the field research teams left the work area clean and safe for subsequent operations. At the end of each day, the sort crew cleaned up the site with the following procedure:
  - Organize, stack, and stow sorting supplies in the designated location.
  - Remove sorted wastes (with the assistance of a facility loader operator if possible).
  - Sweep and clean the sort area to prevent windblown litter and other situations that may attract vectors.
  - Remove and discard day-use personal protective equipment and decontaminating products.
  - Cover any unsorted samples with a tarp to be staged for sorting the next day, when possible.
  - Check out with the facility manager.

## 1.4 DATA ANALYSIS

When determining the composition of the MSW waste data, weights for each material category within a sample were converted into a percentage of the sample's total weight. Then, the average percentage and margin of error were calculated across all samples. Conversely, the volumetric estimates of C&D samples were converted to weight-based estimates and normalized in the field using facility scale tickets. As such, the absolute weight of each surveyed load of C&D was treated as a sample, and the underlying weights of each constituent in the load were not converted to percentages as was done with manually sorted MSW samples. The absolute load weights were retained because heavier C&D loads should be given a higher weighting in the overall analysis than lighter C&D loads, as they are selected at random.

The resulting statistical measures are provided in the results:

- **Sample Mean -** The sample mean, or average, composition is considered the "most likely" fraction for each material category in the waste stream.
- **Margin of Error (MOE)**: MOEs were calculated for each material category to provide a measure of the uncertainty in the sample mean. Because the estimated composition percentage is based on sampling, there is inherent variability in the estimate. The MOE quantifies this variability and reflects the possible difference between the sample mean and the true population value due to sampling error.[13] MOEs were calculated at a 90 percent level of confidence in this study.

A more detailed description of the statistical analysis is contained in the QAPP.

[13] Adding and subtracting the MOE from the mean composition percentage yields a confidence interval which represents the range within which the true composition is expected to fall, given the sample data.

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# 2. MSW RESULTS

This section estimates the composition of disposed MSW in South Carolina. Aggregate composition results and generator sector composition results are shown first, followed by composition comparisons of generator sector, data collection season, and SCDES region subsets.

## 2.1 AGGREGATE MSW COMPOSITION

Figure 2-1 shows aggregate MSW composition by material group. Of South Carolina's 3,574,431 tons of MSW disposed each year, nearly one third of those tons come from the organics material group, which is largely comprised of food waste. The paper material group is the second largest contributor to annual tonnage; it accounts for about one quarter of disposed MSW. These results are generally consistent with other statewide waste characterization studies, although it was beyond the scope of this report to provide detailed comparisons.

Figure 2-1 Aggregate MSW Composition by Material Group

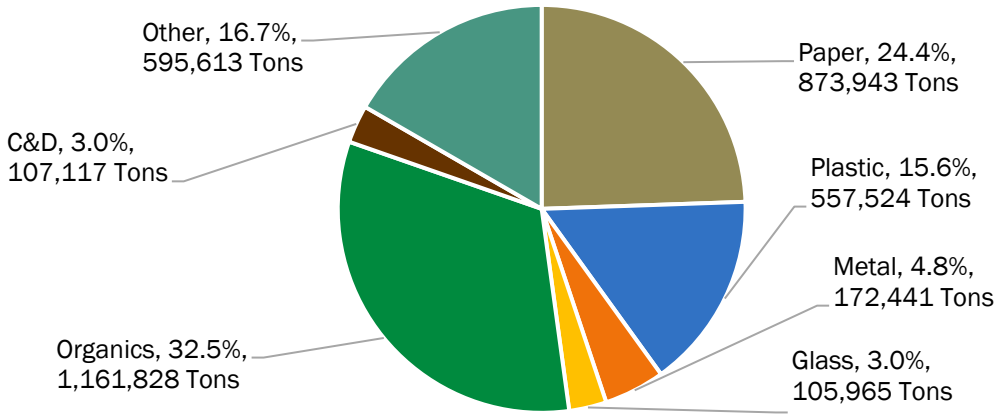



Figure 2-2 shows the same results grouped by management pathway. The landfill management pathway accounts for the largest portion of disposed tonnage; it represents one third of disposed tonnage, closely followed by compostable materials, which account for about 30 percent. They were followed by the other recyclable/potential for diversion management pathway and the single stream recoverable management pathway which account for 19 percent and 17 percent of aggregate MSW, respectively.

Figure 2-2 Aggregate MSW Composition by Management Pathway

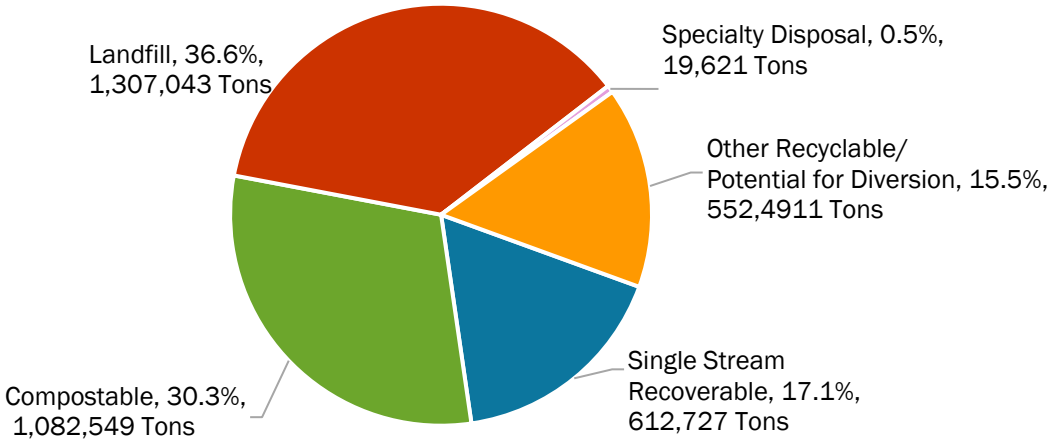


Figure 2-3 shows the ten most commonly occurring material categories by weight in the South Carolina MSW stream. As shown, the top two material categories are nominally divertible through composting or some other proven method for processing organic materials. The third most prominent material category, food waste (packaged) could also be processed as an organic material if it were unpackaged; some fraction of this wasted food may have been able to be donated under certain circumstances. Food waste (loose), compostable paper, and food waste (packaged) remain the three most commonly occurring material categories encountered for both residential and commercial generator sectors. It is also noteworthy that mixed paper and corrugated cardboard, both recyclable in traditional single stream and commercial recycling programs, are also in the top ten.

**Figure 2-3 Most Prevalent Material Categories in Aggregate MSW Stream**

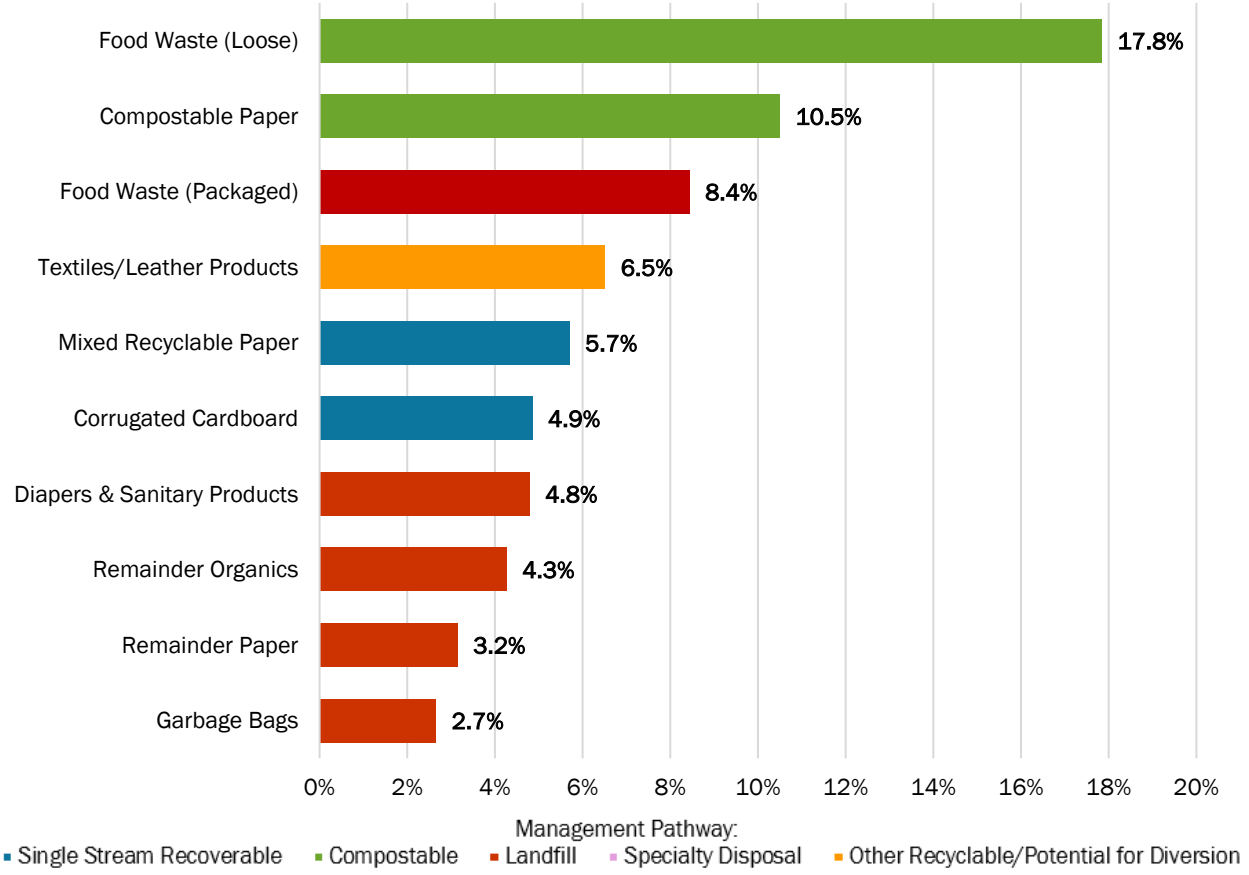


Table 2-3 shows the full composition mean, MOE, and estimated annual tonnage by material category.

**Table 2-1 Detailed Composition of Aggregate MSW**

| Material Category | Mean | MOE | Tons | Material Category | Mean | MOE | Tons |
|---|---|---|---|---|---|---|---|
| **Paper** | **24.4%** | **1.0%** | **873,943** | **Plastic** | **15.6%** | **1.0%** | **557,524** |
| Corrugated Cardboard | 4.9% | 0.8% | 173,633 | PET #1 Bottles | 1.2% | 0.1% | 42,323 |
| Mixed Recyclable Paper | 5.7% | 0.3% | 203,867 | PET #1 Non-Bottle | 0.3% | 0.1% | 11,759 |
| Compostable Paper | 10.5% | 0.6% | 375,338 | HDPE #2 Natural Containers | 0.5% | 0.1% | 18,190 |
| Remainder Paper | 3.2% | 0.3% | 112,646 | HDPE #2 Colored Containers | 0.6% | 0.1% | 22,149 |
| Polycoated/Aseptic Containers | 0.2% | 0.1% | 8,458 | Other HDPE #2 | 0.0% | 0.0% | 354 |
| **Metal** | **4.8%** | **0.9%** | **172,441** | PP #5 Containers | 0.6% | 0.1% | 21,133 |
| Aluminum Cans | 0.7% | 0.1% | 24,539 | #3, #4, #6, #7 Containers | 0.2% | 0.1% | 7,746 |
| Steel Cans | 0.9% | 0.1% | 31,547 | Other PP #5 | 0.2% | 0.0% | 5,672 |
| Other Ferrous Metal | 1.1% | 0.3% | 40,404 | Other Rigid Plastic | 2.3% | 0.5% | 80,497 |
| Other Non-Ferrous Metal | 0.7% | 0.2% | 26,239 | Retail Plastic Bags | 0.4% | 0.1% | 13,426 |
| Appliances | 1.4% | 0.7% | 49,712 | Industrial Film | 0.6% | 0.3% | 21,550 |
| **Glass** | **3.0%** | **0.4%** | **105,965** | Garbage Bags | 2.7% | 0.2% | 94,988 |
| Brown Glass Bottles | 0.5% | 0.1% | 17,596 | Other Film | 2.7% | 0.2% | 94,967 |
| Clear Glass Bottles | 1.2% | 0.2% | 41,113 | Remainder/Composite Plastic | 1.5% | 0.2% | 54,213 |
| Green Glass Bottles | 0.5% | 0.1% | 16,637 | Bulky Plastic | 1.9% | 0.4% | 68,558 |
| Remainder/Composite Glass | 0.3% | 0.1% | 11,411 | **Other** | **16.7%** | **1.2%** | **595,613** |
| Mixed Cullet | 0.5% | 0.3% | 19,207 | Textiles/Leather Products | 6.5% | 0.8% | 232,865 |
| **Organics** | **32.5%** | **1.3%** | **1,161,828** | Mattresses | 0.0% | 0.0% | 945 |
| Food Waste (Packaged) | 8.4% | 0.7% | 301,680 | Rubber Materials | 0.5% | 0.1% | 16,375 |
| Food Waste (Loose) | 17.8% | 0.9% | 637,784 | Lithium/Ion Batteries | | Not Found | |
| Fats, Cooking Oils, and Grease | 0.0% | 0.0% | 275 | Other Batteries | 0.0% | 0.0% | 1,231 |
| Yard Trimmings and Prunings | 1.9% | 0.6% | 69,427 | Sharps/Medical Waste | 0.2% | 0.3% | 8,037 |
| Remainder Organics | 4.3% | 0.5% | 152,662 | Other Hazardous Waste | 0.3% | 0.2% | 9,709 |
| **C&D** | **3.0%** | **0.7%** | **107,117** | Furniture | 0.1% | 0.1% | 3,905 |
| Asphalt, Brick, and Concrete | 0.1% | 0.1% | 2,497 | Other Bulky Items | 0.0% | 0.0% | 669 |
| Carpet & Carpet Padding | 0.2% | 0.1% | 6,162 | Remainder Inorganics | 0.9% | 0.2% | 30,845 |
| Drywall/Gypsum Board | 0.1% | 0.1% | 3,628 | Dirt/Fines | 1.9% | 0.1% | 67,957 |
| Clean Dimensional Wood | 0.1% | 0.1% | 3,370 | Wet Cell Batteries | | Not Found | |
| Plywood/Other Engineered Wood | 0.3% | 0.2% | 12,467 | Paint | 0.1% | 0.1% | 1,876 |
| Wood - Painted, Treated, Stained | 0.9% | 0.3% | 32,498 | Diapers & Sanitary Products | 4.8% | 0.6% | 171,356 |
| Other/Residual C&D | 1.3% | 0.5% | 46,495 | All Other Uncategorized Waste | 1.4% | 0.3% | 49,843 |
| | | | | **Total** | **100.0%** | | **3,574,431** |
| | | | | ***Total Samples*** | ***151*** | | |
| Single Stream Recoverable | 17.1% | 0.8% | 612,727 | Potential for Diversion | 15.5% | 1.2% | 552,491 |
| Compostable | 30.3% | 1.2% | 1,082,549 | Specialty Disposal | 0.5% | 0.3% | 19,621 |
| Landfill | 36.6% | 1.1% | 1,307,043 | | | | |

It should be noted that some material categories, such as wet cell batteries and lithium-ion batteries, were not encountered among the 151 samples collected during field data collection operations. Because estimated annual tons are calculated from the sample mean, this may give the impression these materials are not present in the waste stream, which is highly unlikely. Rather, these materials are encountered so infrequently that this level of sampling was unable to accurately quantify the incidence of such materials. Because of this, these categories have been labeled "Not Found." This same phenomenon is also likely the case for some items banned from landfill disposal such as other hazardous waste, even with some observed and recorded weight. In these cases, number of samples required to accurately determine the

incidence of rarely occurring and very small constituents is beyond the statistical methods used for this research.

## 2.2 RESIDENTIAL MSW COMPOSITION

Figure 2-4 shows residential MSW composition by material group. The composition of residential MSW tracks closely with the aggregate MSW composition, although it features slightly more plastic, metal and other material, and slightly less paper.

**Figure 2-4 Residential MSW Composition by Material Group**

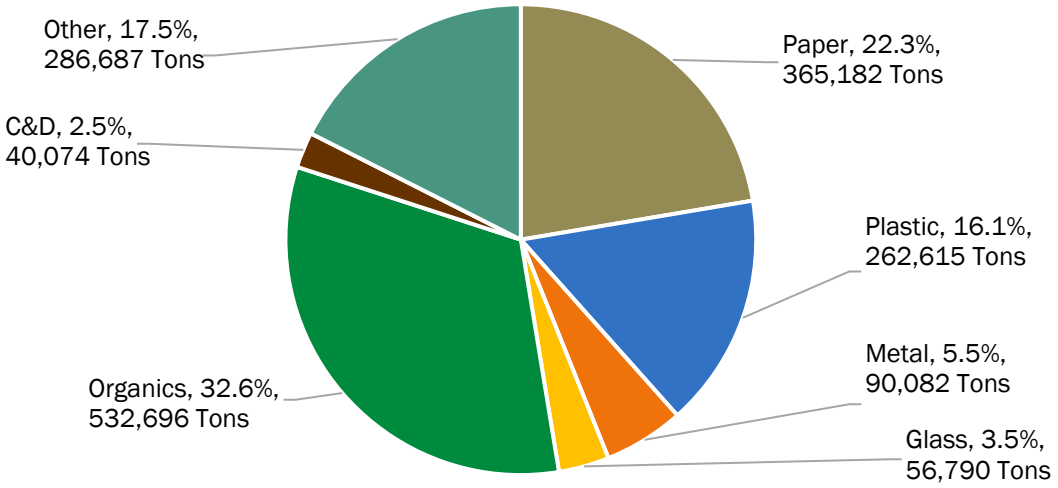



Figure 2-5 shows this same result set segmented by management pathway. Residential MSW compositions track closely with the aggregate, and management pathway rankings remain unchanged between the two result sets.

**Figure 2-5 Residential MSW Composition by Management Pathway**

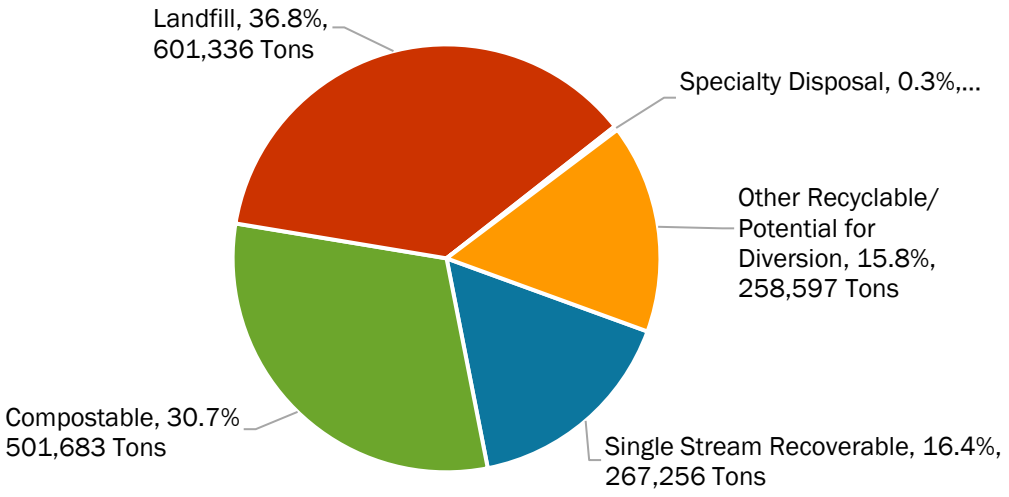


Figure 2-6 shows the top ten contributors to residential MSW composition by weight. As shown, the top four categories are consistent with aggregate MSW; however, residential MSW contains a higher percentage of textiles/leather products, diapers and sanitary products, and other film.

**Figure 2-6 Most Prevalent Material Categories in Residential MSW**

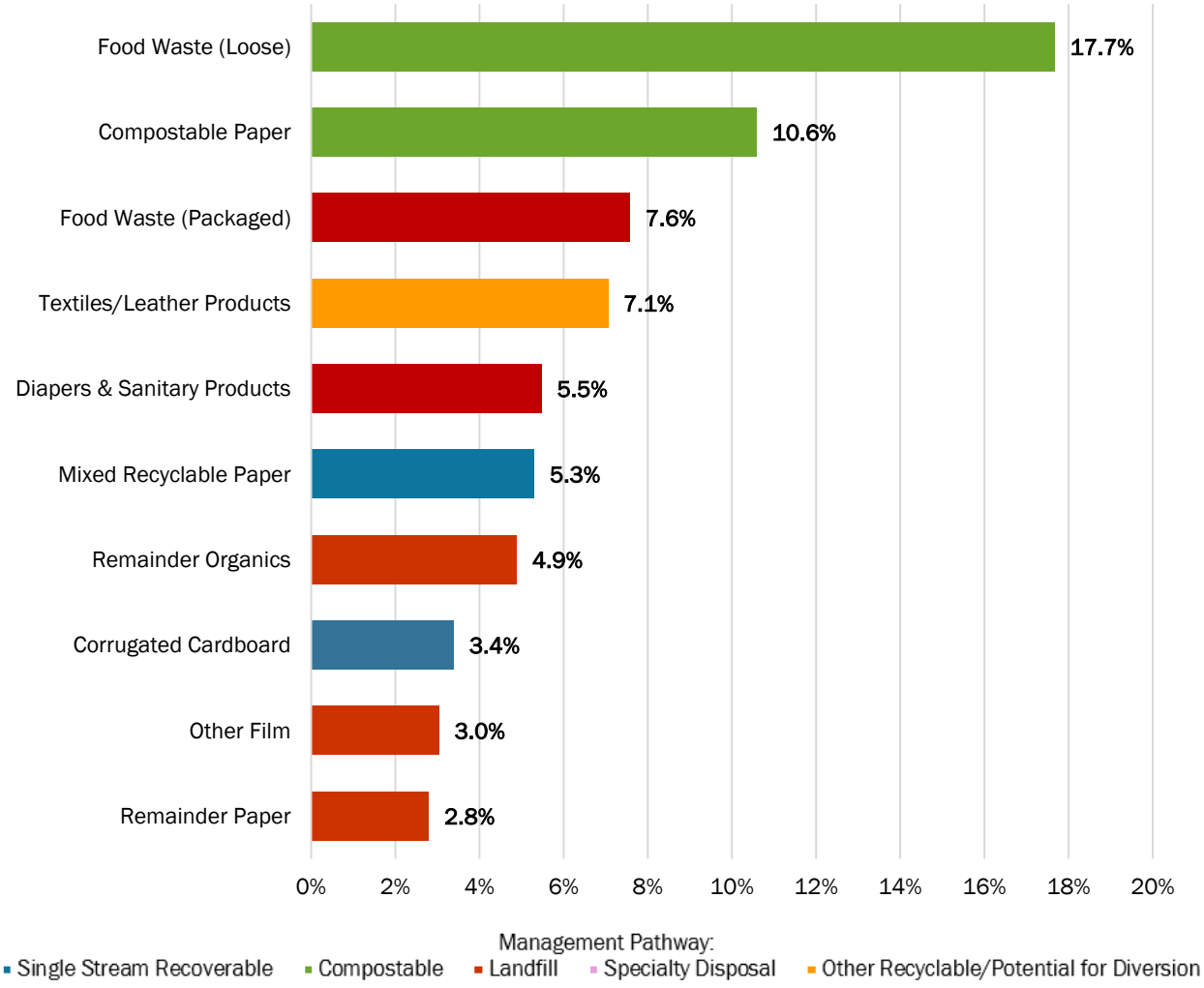



Table 2-4 provides a detailed tabular view of residential MSW composition, estimated at a 90 percent level of confidence. Interestingly, neither furniture nor mattresses nor other bulky items were found in the residential samples. It may be the case that these constituents were primarily delivered in bulky waste loads that tended to be classified as C&D loads at the host disposal facilities, and their incidence is captured in C&D waste composition.

**Table 2-2 Residential MSW Composition**

| Material Category | Mean | MOE | Tons |
|---|---|---|---|
| **Paper** | **22.3%** | **1.2%** | **365,182** |
| Corrugated Cardboard | 3.4% | 0.4% | 55,540 |
| Mixed Recyclable Paper | 5.3% | 0.5% | 86,807 |
| Compostable Paper | 10.6% | 0.8% | 173,076 |
| Remainder Paper | 2.8% | 0.3% | 45,824 |
| Polycoated/Aseptic Containers | 0.2% | 0.1% | 3,936 |
| **Metal** | **5.5%** | **1.4%** | **90,082** |
| Aluminum Cans | 0.8% | 0.1% | 13,155 |
| Steel Cans | 1.0% | 0.3% | 16,910 |
| Other Ferrous Metal | 1.1% | 0.4% | 18,255 |
| Other Non-Ferrous Metal | 0.8% | 0.2% | 12,636 |
| Appliances | 1.8% | 1.2% | 29,126 |
| **Glass** | **3.5%** | **0.8%** | **56,790** |
| Brown Glass Bottles | 0.6% | 0.2% | 10,082 |
| Clear Glass Bottles | 1.2% | 0.2% | 19,708 |
| Green Glass Bottles | 0.4% | 0.2% | 7,251 |
| Remainder/Composite Glass | 0.3% | 0.2% | 5,317 |
| Mixed Cullet | 0.9% | 0.7% | 14,432 |
| **Organics** | **32.6%** | **1.6%** | **532,696** |
| Food Waste (Packaged) | 7.6% | 0.8% | 123,906 |
| Food Waste (Loose) | 17.7% | 1.1% | 288,799 |
| Fats, Cooking Oils, and Grease | 0.0% | 0.0% | 190 |
| Yard Trimmings and Prunings | 2.4% | 0.9% | 39,808 |
| Remainder Organics | 4.9% | 0.8% | 79,994 |
| **C&D** | **2.5%** | **0.8%** | **40,074** |
| Asphalt, Brick, and Concrete | 0.0% | 0.1% | 754 |
| Carpet & Carpet Padding | 0.3% | 0.3% | 4,349 |
| Drywall/Gypsum Board | 0.0% | 0.0% | 414 |
| Clean Dimensional Wood | 0.1% | 0.1% | 1,584 |
| Plywood/Other Engineered Wood | 0.2% | 0.1% | 3,091 |
| Wood - Painted, Treated, Stained | 0.9% | 0.4% | 14,578 |
| Other/Residual C&D | 0.9% | 0.5% | 15,304 |
| Single Stream Recoverable | 16.4% | 0.9% | 267,256 |
| Compostable | 30.7% | 1.4% | 501,683 |
| Landfill | 36.8% | 1.5% | 601,336 |

| Material Category | Mean | MOE | Tons |
|---|---|---|---|
| **Plastic** | **16.1%** | **1.4%** | **262,615** |
| PET #1 Bottles | 1.3% | 0.2% | 21,148 |
| PET #1 Non-Bottle | 0.4% | 0.1% | 6,362 |
| HDPE #2 Natural Containers | 0.6% | 0.2% | 10,379 |
| HDPE #2 Colored Containers | 0.9% | 0.2% | 13,965 |
| Other HDPE #2 | 0.0% | 0.0% | 354 |
| PP #5 Containers | 0.8% | 0.2% | 12,312 |
| #3, #4, #6, #7 Containers | 0.3% | 0.1% | 4,251 |
| Other PP #5 | 0.2% | 0.1% | 3,495 |
| Other Rigid Plastic | 1.9% | 0.4% | 31,773 |
| Retail Plastic Bags | 0.4% | 0.1% | 6,548 |
| Industrial Film | 0.1% | 0.1% | 2,155 |
| Garbage Bags | 2.8% | 0.3% | 45,823 |
| Other Film | 3.0% | 0.5% | 49,821 |
| Remainder/Composite Plastic | 1.4% | 0.3% | 23,096 |
| Bulky Plastic | 1.9% | 0.5% | 31,133 |
| **Other** | **17.5%** | **1.7%** | **286,687** |
| Textiles/Leather Products | 7.1% | 1.3% | 115,386 |
| Mattresses | | Not Found | |
| Rubber Materials | 0.3% | 0.1% | 4,971 |
| Lithium/Ion Batteries | | Not Found | |
| Other Batteries | 0.0% | 0.0% | 761 |
| Sharps/Medical Waste | 0.0% | 0.0% | 528 |
| Other Hazardous Waste | 0.3% | 0.2% | 4,407 |
| Furniture | | Not Found | |
| Other Bulky Items | | Not Found | |
| Remainder Inorganics | 0.9% | 0.3% | 14,427 |
| Dirt/Fines | 2.0% | 0.2% | 32,324 |
| Wet Cell Batteries | | Not Found | |
| Paint | 0.0% | 0.0% | 319 |
| Diapers & Sanitary Products | 5.5% | 0.8% | 89,639 |
| All Other Uncategorized Waste | 1.5% | 0.4% | 23,926 |
| **Total** | **100.0%** | | **1,634,126** |
| ***Total Samples*** | ***58*** | | |
| Potential for Diversion | 15.5% | 1.8% | 252,583 |
| Specialty Disposal | 0.3% | 0.2% | 5,253 |

## 2.3 COMMERCIAL (ICI) MSW COMPOSITION

The second Generator Sector assessed for this study was Industrial, Commercial, and Institutional (also known as ICI or simply, commercial) MSW. Figure 2-7 shows the composition of commercial MSW measured by material group. While similar to aggregate and residential MSW, commercial MSW contains a higher fraction of paper and C&D, and less plastic and glass.

**Figure 2-7 Commercial MSW Composition by Material Group**

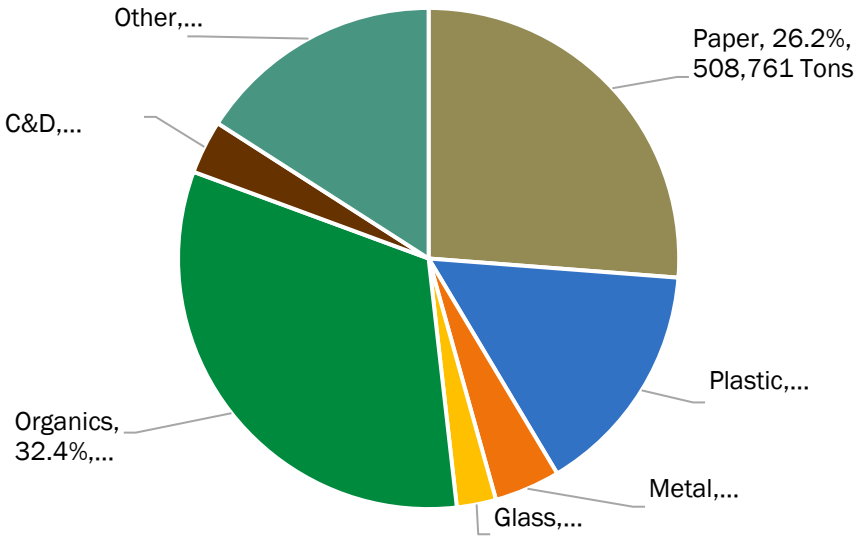



Figure 2-8 shows commercial MSW composition as measured by management pathway. Commercial MSW contains slightly more single stream recoverable and specialty disposal materials, but a lower fraction of compostable organics.

**Figure 2-8 Commercial MSW Composition by Management Pathway**

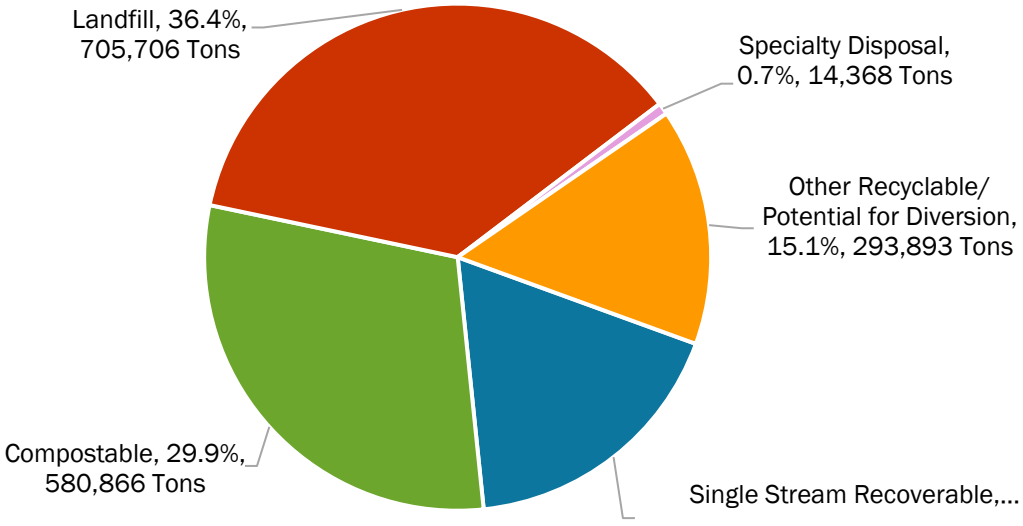



Figure 2-9 shows the ten most commonly occurring material categories encountered by weight in the commercial MSW stream. The order of the top three material categories remains unchanged from the residential generator sector, though both food waste categories are observed to be notably more

prevalent in commercial waste. Recyclable paper categories also see prominent increases in the commercial MSW stream, particularly corrugated cardboard, which jumps to the fourth most prevalent material category in the commercial waste stream.

**Figure 2-9 Most Prevalent Material Categories in Commercial MSW**

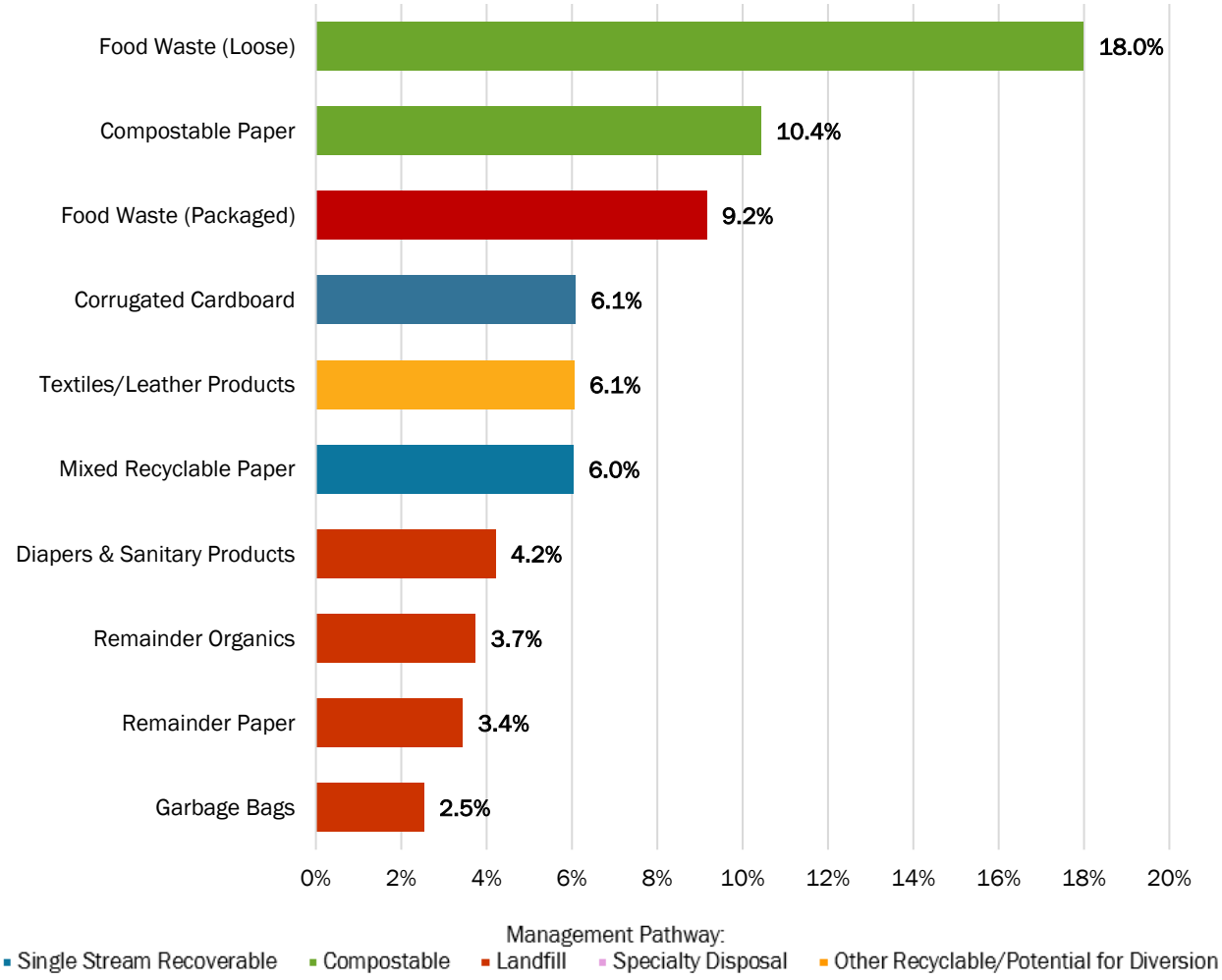



Table 2-5 shows a detailed tabular view of commercial MSW results, measured at a 90 percent level of confidence.

**Table 2-3 Commercial MSW Composition**

| Material Category | Mean | MOE | Tons | Material Category | Mean | MOE | Tons |
|---|---|---|---|---|---|---|---|
| **Paper** | **26.2%** | **1.5%** | **508,761** | **Plastic** | **15.2%** | **1.5%** | **294,908** |
| Corrugated Cardboard | 6.1% | 1.4% | 118,093 | PET #1 Bottles | 1.1% | 0.2% | 21,175 |
| Mixed Recyclable Paper | 6.0% | 0.5% | 117,060 | PET #1 Non-Bottle | 0.3% | 0.1% | 5,396 |
| Compostable Paper | 10.4% | 0.8% | 202,262 | HDPE #2 Natural Containers | 0.4% | 0.1% | 7,812 |
| Remainder Paper | 3.4% | 0.4% | 66,822 | HDPE #2 Colored Containers | 0.4% | 0.1% | 8,184 |
| Polycoated/Aseptic Containers | 0.2% | 0.1% | 4,523 | Other HDPE #2 | | Not Found | |
| **Metal** | **4.2%** | **1.0%** | **82,359** | PP #5 Containers | 0.5% | 0.1% | 8,821 |
| Aluminum Cans | 0.6% | 0.1% | 11,384 | #3, #4, #6, #7 Containers | 0.2% | 0.0% | 3,494 |
| Steel Cans | 0.8% | 0.1% | 14,637 | Other PP #5 | 0.1% | 0.0% | 2,176 |
| Other Ferrous Metal | 1.1% | 0.4% | 22,149 | Other Rigid Plastic | 2.5% | 0.9% | 48,724 |
| Other Non-Ferrous Metal | 0.7% | 0.3% | 13,603 | Retail Plastic Bags | 0.4% | 0.1% | 6,878 |
| Appliances | 1.1% | 0.7% | 20,587 | Industrial Film | 1.0% | 0.5% | 19,395 |
| **Glass** | **2.5%** | **0.4%** | **49,175** | Garbage Bags | 2.5% | 0.2% | 49,166 |
| Brown Glass Bottles | 0.4% | 0.2% | 7,514 | Other Film | 2.3% | 0.2% | 45,146 |
| Clear Glass Bottles | 1.1% | 0.2% | 21,405 | Remainder/Composite Plastic | 1.6% | 0.2% | 31,117 |
| Green Glass Bottles | 0.5% | 0.1% | 9,387 | Bulky Plastic | 1.9% | 0.5% | 37,424 |
| Remainder/Composite Glass | 0.3% | 0.2% | 6,095 | **Other** | **15.9%** | **1.6%** | **308,927** |
| Mixed Cullet | 0.2% | 0.1% | 4,775 | Textiles/Leather Products | 6.1% | 1.0% | 117,480 |
| **Organics** | **32.4%** | **2.0%** | **629,132** | Mattresses | 0.0% | 0.1% | 945 |
| Food Waste (Packaged) | 9.2% | 1.0% | 177,774 | Rubber Materials | 0.6% | 0.2% | 11,405 |
| Food Waste (Loose) | 18.0% | 1.4% | 348,984 | Lithium/Ion Batteries | | Not Found | |
| Fats, Cooking Oils, and Grease | 0.0% | 0.0% | 86 | Other Batteries | 0.0% | 0.0% | 470 |
| Yard Trimmings and Prunings | 1.5% | 0.7% | 29,620 | Sharps/Medical Waste | 0.4% | 0.5% | 7,509 |
| Remainder Organics | 3.7% | 0.6% | 72,668 | Other Hazardous Waste | 0.3% | 0.3% | 5,302 |
| **C&D** | **3.5%** | **1.1%** | **67,043** | Furniture | 0.2% | 0.2% | 3,905 |
| Asphalt, Brick, and Concrete | 0.1% | 0.1% | 1,742 | Other Bulky Items | 0.0% | 0.1% | 669 |
| Carpet & Carpet Padding | 0.1% | 0.1% | 1,813 | Remainder Inorganics | 0.8% | 0.3% | 16,418 |
| Drywall/Gypsum Board | 0.2% | 0.2% | 3,214 | Dirt/Fines | 1.8% | 0.2% | 35,633 |
| Clean Dimensional Wood | 0.1% | 0.1% | 1,786 | Wet Cell Batteries | | Not Found | |
| Plywood/Other Engineered Wood | 0.5% | 0.3% | 9,376 | Paint | 0.1% | 0.1% | 1,557 |
| Wood - Painted, Treated, Stained | 0.9% | 0.4% | 17,921 | Diapers & Sanitary Products | 4.2% | 0.8% | 81,717 |
| Other/Residual C&D | 1.6% | 0.7% | 31,191 | All Other Uncategorized Waste | 1.3% | 0.4% | 25,917 |
| | | | | **Total** | **100.0%** | | **1,940,305** |
| | | | | ***Total Samples*** | ***93*** | | |
| Single Stream Recoverable | 17.8% | 1.3% | 345,471 | Potential for Diversion | 15.1% | 1.7% | 293,893 |
| Compostable | 29.9% | 1.9% | 580,866 | Specialty Disposal | 0.7% | 0.6% | 14,368 |
| Landfill | 36.4% | 1.5% | 705,706 | | | | |

## 2.4 MSW COMPARISONS

This section visualizes comparisons between residential and commercial MSW composition by generator sector, by season, and by SCDES region.

### 2.4.1 MSW COMPOSITION COMPARISONS BY GENERATOR SECTOR

Figure 2-10 compares residential and commercial MSW waste composition by material group. Commercial MSW features notably higher instances of paper materials, but the generator sectors otherwise track closely when viewed by material group.

**Figure 2-10 MSW Generator Sector Composition Comparison by Material Group**

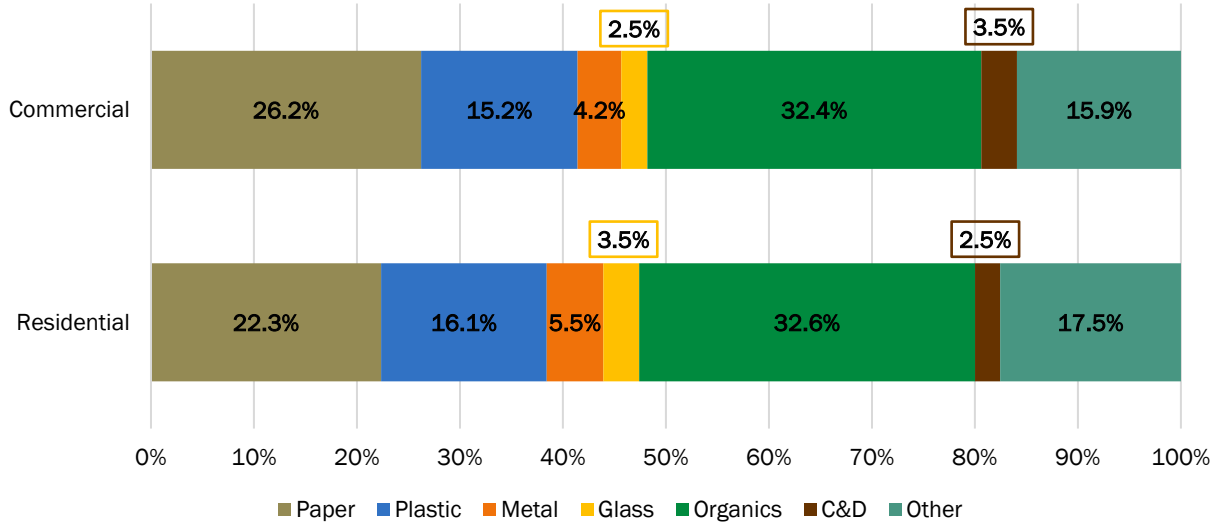
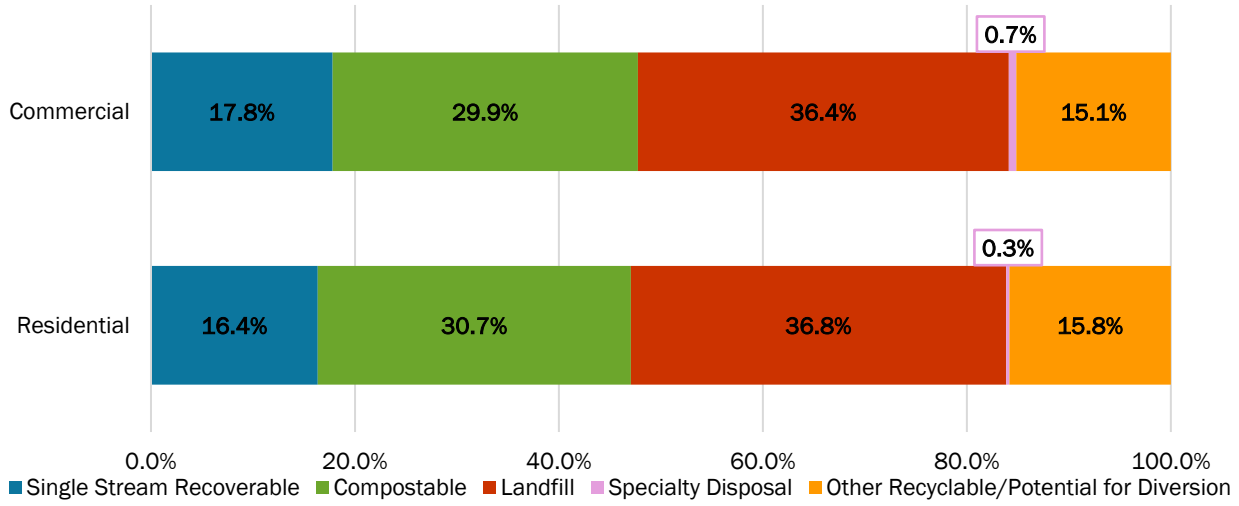



Figure 2-11 compares residential and commercial MSW composition by management pathway. Driven by a higher percentage of recyclable paper, single stream recoverable materials are higher in the commercial stream. Conversely, organics were found to be slightly higher in the residential stream.

**Figure 2-11 MSW Generator Sector Composition Comparison by Management Pathway**



Instance of specialty disposal materials more than doubled from residential to commercial MSW, though the infrequent occurrence and general lightweight nature of these materials make accurate measurement of these materials challenging. Resulting margins of error for such materials are often much larger relative to their composition mean.

Table 2-6 shows a tabular comparison of MSW composition by generator sector.

**Table 2-4 Comparison of Composition by Generator Sector**

| | Residential | | Commercial | |
|---|---|---|---|---|
| **Material Category** | **Mean** | **MOE** | **Mean** | **MOE** |
| **Paper** | **22.3%** | **1.2%** | **26.2%** | **1.5%** |
| Corrugated Cardboard | 3.4% | 0.4% | 6.1% | 1.4% |
| Mixed Recyclable Paper | 5.3% | 0.5% | 6.0% | 0.5% |
| Compostable Paper | 10.6% | 0.8% | 10.4% | 0.8% |
| Remainder Paper | 2.8% | 0.3% | 3.4% | 0.4% |
| Polycoated/Aseptic Cont. | 0.2% | 0.1% | 0.2% | 0.1% |
| **Metal** | **5.5%** | **1.4%** | **4.2%** | **1.0%** |
| Aluminum Cans | 0.8% | 0.1% | 0.6% | 0.1% |
| Steel Cans | 1.0% | 0.3% | 0.8% | 0.1% |
| Other Ferrous Metal | 1.1% | 0.4% | 1.1% | 0.4% |
| Other Non-Ferrous Metal | 0.8% | 0.2% | 0.7% | 0.3% |
| Appliances | 1.8% | 1.2% | 1.1% | 0.7% |
| **Glass** | **3.5%** | **0.8%** | **2.5%** | **0.4%** |
| Brown Glass Bottles | 0.6% | 0.2% | 0.4% | 0.2% |
| Clear Glass Bottles | 1.2% | 0.2% | 1.1% | 0.2% |
| Green Glass Bottles | 0.4% | 0.2% | 0.5% | 0.1% |
| Remainder/Composite Glass | 0.3% | 0.2% | 0.3% | 0.2% |
| Mixed Cullet | 0.9% | 0.7% | 0.2% | 0.1% |
| **Organics** | **32.6%** | **1.6%** | **32.4%** | **2.0%** |
| Food Waste (Packaged) | 7.6% | 0.8% | 9.2% | 1.0% |
| Food Waste (Loose) | 17.7% | 1.1% | 18.0% | 1.4% |
| Fats, Cooking Oils, & Grease | 0.0% | 0.0% | 0.0% | 0.0% |
| Yard Trimmings & Prunings | 2.4% | 0.9% | 1.5% | 0.7% |
| Remainder Organics | 4.9% | 0.8% | 3.7% | 0.6% |
| **C&D** | **2.5%** | **0.8%** | **3.5%** | **1.1%** |
| Asphalt, Brick, and Concrete | 0.0% | 0.1% | 0.1% | 0.1% |
| Carpet & Carpet Padding | 0.3% | 0.3% | 0.1% | 0.1% |
| Drywall/Gypsum Board | 0.0% | 0.0% | 0.2% | 0.2% |
| Clean Dimensional Wood | 0.1% | 0.1% | 0.1% | 0.1% |
| Plywood/Other Eng. Wood | 0.2% | 0.1% | 0.5% | 0.3% |
| Wood- Painted, Treated, Stain | 0.9% | 0.4% | 0.9% | 0.4% |
| Other/Residual C&D | 0.9% | 0.5% | 1.6% | 0.7% |
| Single Stream Recoverable | 16.4% | 0.9% | 17.8% | 1.3% |
| Compostable | 30.7% | 1.4% | 29.9% | 1.9% |
| Landfill | 36.8% | 1.5% | 36.4% | 1.5% |

| | Residential | | Commercial | |
|---|---|---|---|---|
| **Material Category** | **Mean** | **MOE** | **Mean** | **MOE** |
| **Plastic** | **16.1%** | **1.4%** | **15.2%** | **1.5%** |
| PET #1 Bottles | 1.3% | 0.2% | 1.1% | 0.2% |
| PET #1 Non-Bottle | 0.4% | 0.1% | 0.3% | 0.1% |
| HDPE #2 Natural Cont. | 0.6% | 0.2% | 0.4% | 0.1% |
| HDPE #2 Colored Cont. | 0.9% | 0.2% | 0.4% | 0.1% |
| Other HDPE #2 | 0.0% | 0.0% | 0.0% | 0.0% |
| PP #5 Containers | 0.8% | 0.2% | 0.5% | 0.1% |
| #3, #4, #6, #7 Containers | 0.3% | 0.1% | 0.2% | 0.0% |
| Other PP #5 | 0.2% | 0.1% | 0.1% | 0.0% |
| Other Rigid Plastic | 1.9% | 0.4% | 2.5% | 0.9% |
| Retail Plastic Bags | 0.4% | 0.1% | 0.4% | 0.1% |
| Industrial Film | 0.1% | 0.1% | 1.0% | 0.5% |
| Garbage Bags | 2.8% | 0.3% | 2.5% | 0.2% |
| Other Film | 3.0% | 0.5% | 2.3% | 0.2% |
| Remainder/Comp. Plastic | 1.4% | 0.3% | 1.6% | 0.2% |
| Bulky Plastic | 1.9% | 0.5% | 1.9% | 0.5% |
| **Other** | **17.5%** | **1.7%** | **15.9%** | **1.6%** |
| Textiles/Leather Products | 7.1% | 1.3% | 6.1% | 1.0% |
| Mattresses | 0.0% | 0.0% | 0.0% | 0.1% |
| Rubber Materials | 0.3% | 0.1% | 0.6% | 0.2% |
| Lithium/Ion Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Other Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Sharps/Medical Waste | 0.0% | 0.0% | 0.4% | 0.5% |
| Other Hazardous Waste | 0.3% | 0.2% | 0.3% | 0.3% |
| Furniture | 0.0% | 0.0% | 0.2% | 0.2% |
| Other Bulky Items | 0.0% | 0.0% | 0.0% | 0.1% |
| Remainder Inorganics | 0.9% | 0.3% | 0.8% | 0.3% |
| Dirt/Fines | 2.0% | 0.2% | 1.8% | 0.2% |
| Wet Cell Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Paint | 0.0% | 0.0% | 0.1% | 0.1% |
| Diapers & Sanitary Products | 5.5% | 0.8% | 4.2% | 0.8% |
| All Other Uncat. Waste | 1.5% | 0.4% | 1.3% | 0.4% |
| **Total** | **100%** | | **100%** | |
| ***Total Samples*** | ***58*** | | ***93*** | |
| Potential for Diversion | 15.1% | 1.8% | 19.1% | 1.7% |
| Specialty Disposal | 0.7% | 0.2% | 0.7% | 0.6% |

### 2.4.2 MSW COMPOSITION COMPARISONS BY SEASON

Waste composition and tonnage is impacted by changing temperatures, weather conditions, and human behaviors brought with changing seasons. Season 1 data collection took place in the summer and collected 75 samples, and Season 2 data collection took place in the fall, collecting 76 samples. Although it was not a primary objective to measure seasonal differences, a sufficient number of samples were obtained in each season to offer a high-level comparison.

Figure 2-12 compares the composition of MSW in the summer and fall seasons. More paper and organics were identified in the fall, due to seasonal yard waste generation patterns and from heightened e-commerce that led into the holiday season. Conversely, more plastic, metal and glass were present during the summer when beverage consumption is generally higher. [9]

**Figure 2-12 Seasonal MSW Composition Comparison by Material Group**

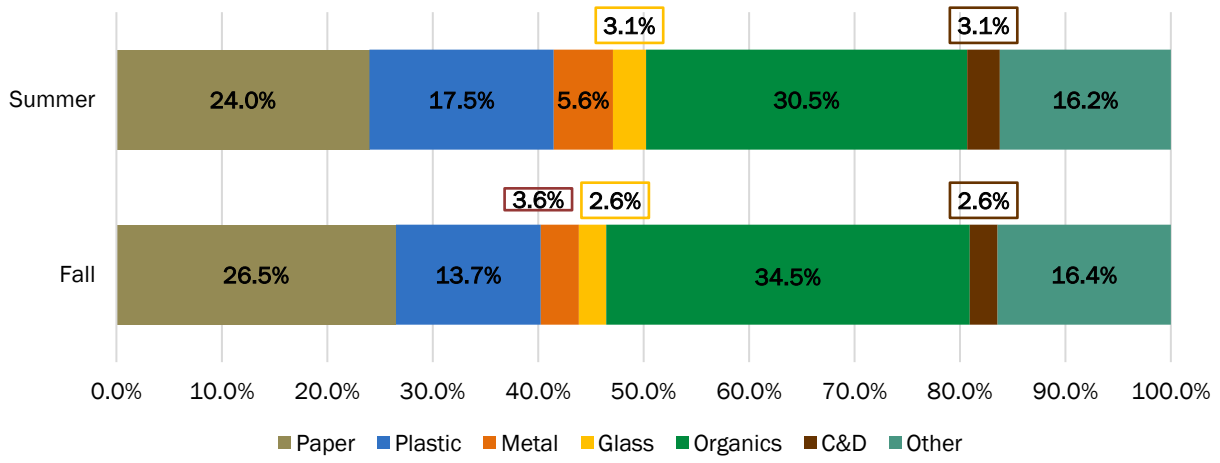
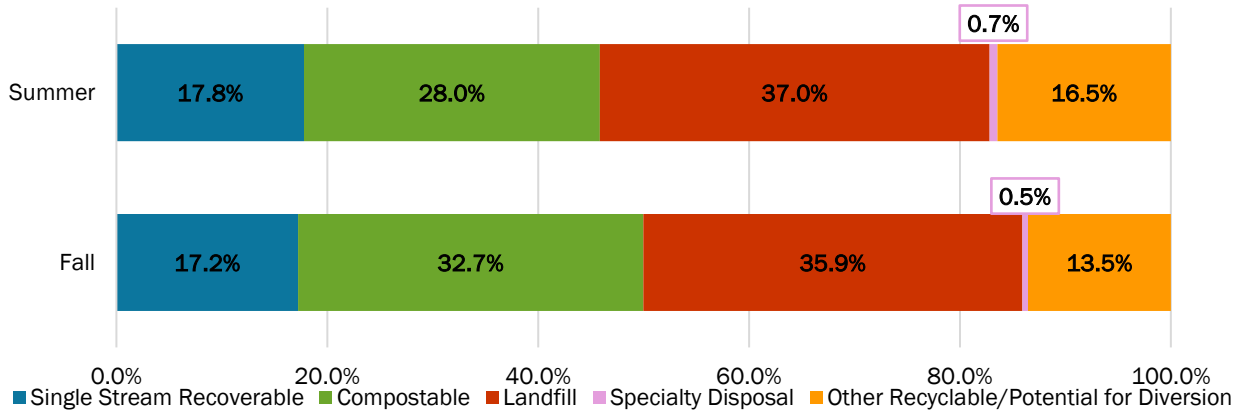



Figure 2-13 shows this same seasonal comparison by Management Pathway.

**Figure 2-13 Seasonal MSW Composition Comparison by Management Pathway**




[9] Note that it was beyond the scope of this study to identify causation for these differences; however, MSW Consultants believes that other studies and data support these findings.

Table 2-7 provides a detailed side-by-side comparison of the estimated composition of MSW in each season.

**Table 2-5 Seasonal MSW Composition Comparison**

| Material Category | Season 1 Mean | Season 1 MO | Season 2 Mean | Season 2 MO | Material Category | Season 1 Mean | Season 1 MO | Season 2 Mea | Season 2 MOE |
|---|---|---|---|---|---|---|---|---|---|
| **Paper** | **24.0%** | **1.7%** | **26.5%** | **1.8%** | **Plastic** | **17.5%** | **1.6%** | **13.7%** | **1.3%** |
| Corrugated Cardboard | 6.4% | 1.7% | 4.3% | 0.9% | PET #1 Bottles | 1.4% | 0.2% | 0.9% | 0.1% |
| Mixed Recyclable Paper | 4.7% | 0.5% | 7.1% | 0.5% | PET #1 Non-Bottle | 0.3% | 0.1% | 0.3% | 0.1% |
| Compostable Paper | 9.2% | 0.7% | 12.1% | 0.7% | HDPE #2 Natural Cont. | 0.5% | 0.1% | 0.5% | 0.1% |
| Remainder Paper | 3.6% | 0.5% | 2.8% | 0.3% | HDPE #2 Colored Cont. | 0.6% | 0.1% | 0.5% | 0.1% |
| Polycoated/Aseptic Con. | 0.2% | 0.1% | 0.2% | 0.1% | Other HDPE #2 | 0.0% | 0.0% | 0.0% | 0.0% |
| **Metal** | **5.6%** | **1.5%** | **3.6%** | **0.5%** | PP #5 Containers | 0.7% | 0.1% | 0.5% | 0.2% |
| Aluminum Cans | 0.7% | 0.1% | 0.6% | 0.1% | #3, #4, #6, #7 Containers | 0.2% | 0.1% | 0.3% | 0.1% |
| Steel Cans | 0.8% | 0.2% | 0.9% | 0.2% | Other PP #5 | 0.1% | 0.1% | 0.2% | 0.0% |
| Other Ferrous Metal | 1.3% | 0.5% | 0.9% | 0.3% | Other Rigid Plastic | 3.7% | 1.0% | 0.9% | 0.2% |
| Other Non-Ferrous Metal | 0.9% | 0.3% | 0.6% | 0.2% | Retail Plastic Bags | 0.3% | 0.1% | 0.5% | 0.1% |
| Appliances | 1.9% | 1.2% | 0.7% | 0.2% | Industrial Film | 0.9% | 0.6% | 0.5% | 0.2% |
| **Glass** | **3.1%** | **0.8%** | **2.6%** | **0.5%** | Garbage Bags | 2.9% | 0.3% | 2.5% | 0.2% |
| Brown Glass Bottles | 0.4% | 0.1% | 0.5% | 0.2% | Other Film | 2.6% | 0.3% | 2.7% | 0.3% |
| Clear Glass Bottles | 1.2% | 0.2% | 1.1% | 0.2% | Remainder/Comp. Plastic | 1.3% | 0.3% | 1.9% | 0.2% |
| Green Glass Bottles | 0.5% | 0.2% | 0.4% | 0.1% | Bulky Plastic | 2.1% | 0.5% | 1.7% | 0.4% |
| Remainder/Composite Glass | 0.2% | 0.1% | 0.5% | 0.2% | **Other** | **16.2%** | **1.8%** | **16.4%** | **1.3%** |
| Mixed Cullet | 0.8% | 0.6% | 0.2% | 0.2% | Textiles/Leather Products | 6.2% | 1.1% | 6.3% | 1.0% |
| **Organics** | **30.5%** | **2.1%** | **34.5%** | **2.2%** | Mattresses | 0.1% | 0.1% | 0.0% | 0.0% |
| Food Waste (Packaged) | 7.8% | 0.7% | 9.1% | 1.1% | Rubber Materials | 0.5% | 0.2% | 0.5% | 0.2% |
| Food Waste (Loose) | 17.0% | 1.4% | 18.7% | 1.2% | Lithium/Ion Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Fats, Cooking Oils, & Grease | 0.0% | 0.0% | 0.0% | 0.0% | Other Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Yard Trimmings and Prunings | 1.9% | 0.6% | 2.0% | 0.9% | Sharps/Medical Waste | 0.6% | 0.8% | 0.0% | 0.0% |
| Remainder Organics | 3.8% | 0.7% | 4.7% | 0.7% | Other Hazardous Waste | 0.1% | 0.0% | 0.5% | 0.4% |
| **C&D** | **3.1%** | **1.1%** | **2.6%** | **0.8%** | Furniture | 0.1% | 0.1% | 0.2% | 0.2% |
| Asphalt, Brick, and Concrete | 0.1% | 0.1% | 0.1% | 0.1% | Other Bulky Items | 0.0% | 0.0% | 0.0% | 0.0% |
| Carpet & Carpet Padding | 0.3% | 0.2% | 0.0% | 0.1% | Remainder Inorganics | 1.0% | 0.3% | 0.8% | 0.3% |
| Drywall/Gypsum Board | 0.2% | 0.2% | 0.1% | 0.1% | Dirt/Fines | 1.7% | 0.2% | 2.1% | 0.2% |
| Clean Dimensional Wood | 0.0% | 0.0% | 0.2% | 0.2% | Wet Cell Batteries | 0.0% | 0.0% | 0.0% | 0.0% |
| Plywood/Other Eng. Wood | 0.3% | 0.3% | 0.4% | 0.2% | Paint | 0.1% | 0.1% | 0.0% | 0.0% |
| Wood- Painted, Treated, Stain | 1.1% | 0.5% | 0.6% | 0.2% | Diapers & Sanitary Products | 4.4% | 0.9% | 4.8% | 0.7% |
| Other/Residual C&D | 1.2% | 0.7% | 1.4% | 0.5% | All Other Uncat Waste | 1.6% | 0.4% | 1.1% | 0.3% |
| | | | | | **Total** | **100%** | | **100%** | |
| | | | | | ***Total Samples*** | ***75*** | | ***76*** | |
| Single Stream Recoverable | 17.8% | 1.6% | 17.2% | 1.1% | Potential for Diversion | 13.5% | 1.8% | 17.6% | 1.4% |
| Compostable | 28.0% | 1.8% | 32.7% | 1.5% | Specialty Disposal | 0.5% | 0.8% | 0.5% | 0.4% |
| Landfill | 37.0% | 1.7% | 35.9% | 1.3% | | | | | |

### 2.4.3 REGIONAL MSW COMPOSITION

As a final step, composition results are compared by SCDES region. It should be noted that this study was not initially designed with the intention of capturing a sufficient number of samples to differentiate regional composition in a statistically robust manner. Regional composition comparisons are shown for reference, and the reader is advised that they should not draw strong conclusions from regional results, and that the aggregated composition will nearly always be of greater utility for them. Figure 2-14 compares MSW composition for each SCDES region by material group, and Figure 2-15 provides regional comparisons by management pathway. It is observed that composition ranges broadly overlap with one another across SCDES regions. MOEs are not shown, but it is observed that the confidence intervals broadly overlap with one another across SCDES regions, such that apparent differences in material group or management pathway compositions are broadly not statistically significant.

Figure 2-14 Regional MSW Comparison by Material Group

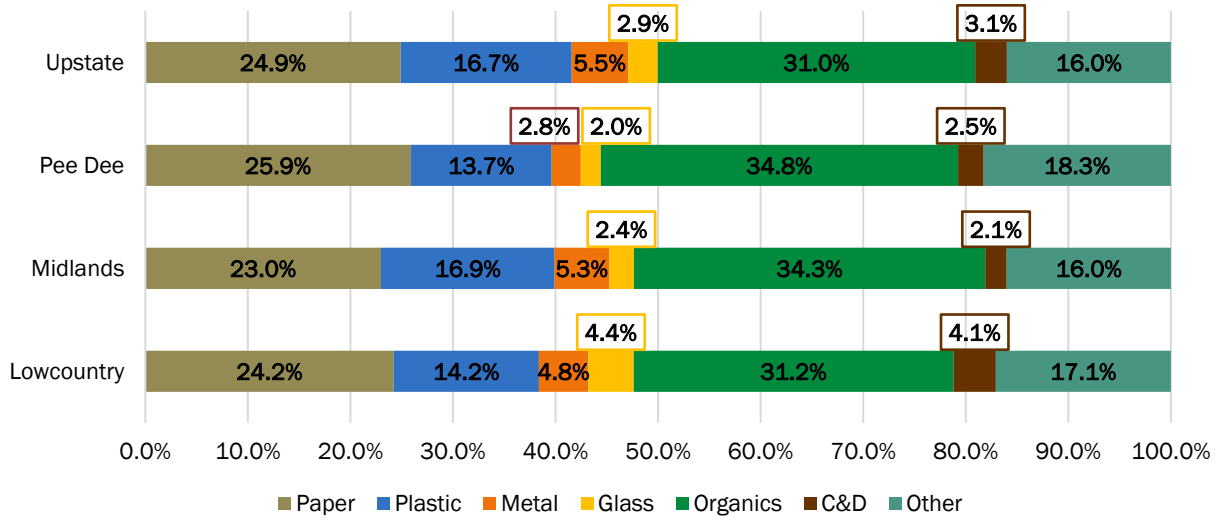
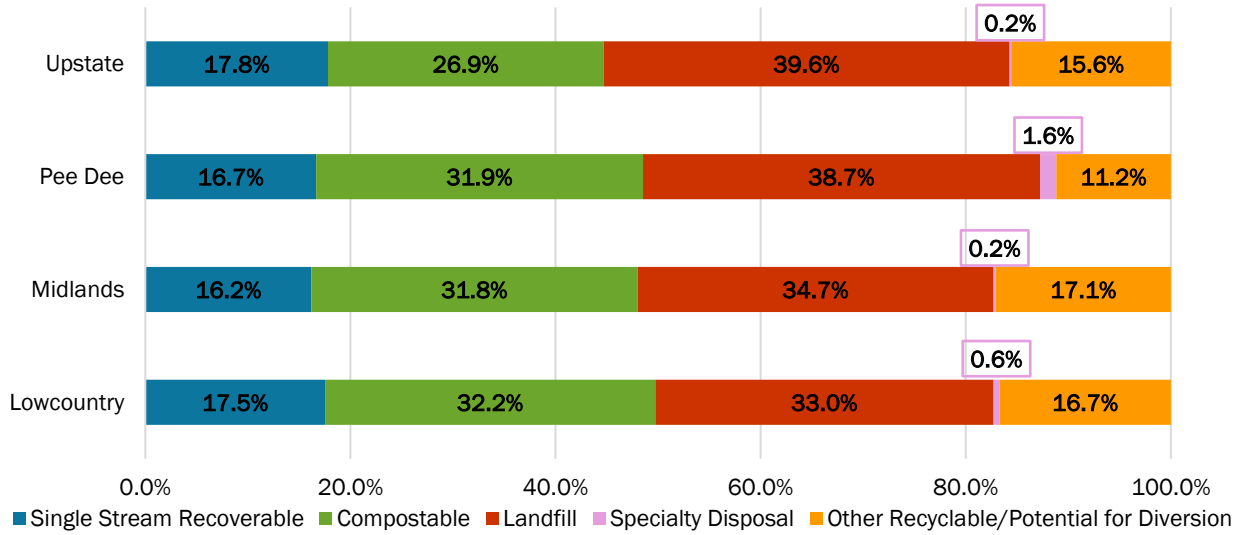



Figure 2-15 Regional MSW Comparison by Management Pathway



# 3. C&D/BULKY WASTE RESULTS

This section estimates the composition of disposed C&D/bulky waste in South Carolina. Weighted aggregate results are shown first, followed by comparisons of seasonal results and SCDES regions. As discussed in Section 1 of this report, there was no reliable basis to estimate the total quantity of C&D debris disposed in South Carolina. For this reason, results are presented only in terms of percent by weight.

## 3.1 AGGREGATE C&D/BULKY WASTE COMPOSITION

Figure 3-1 shows the composition of C&D using the same material groups as MSW. Predictably, C&D materials make up the majority of disposed material. This view is helpful to contrast C&D composition with MSW composition but does not inform readers about the various materials in C&D debris.

Figure 3-1 Aggregate C&D Composition by Material Groups

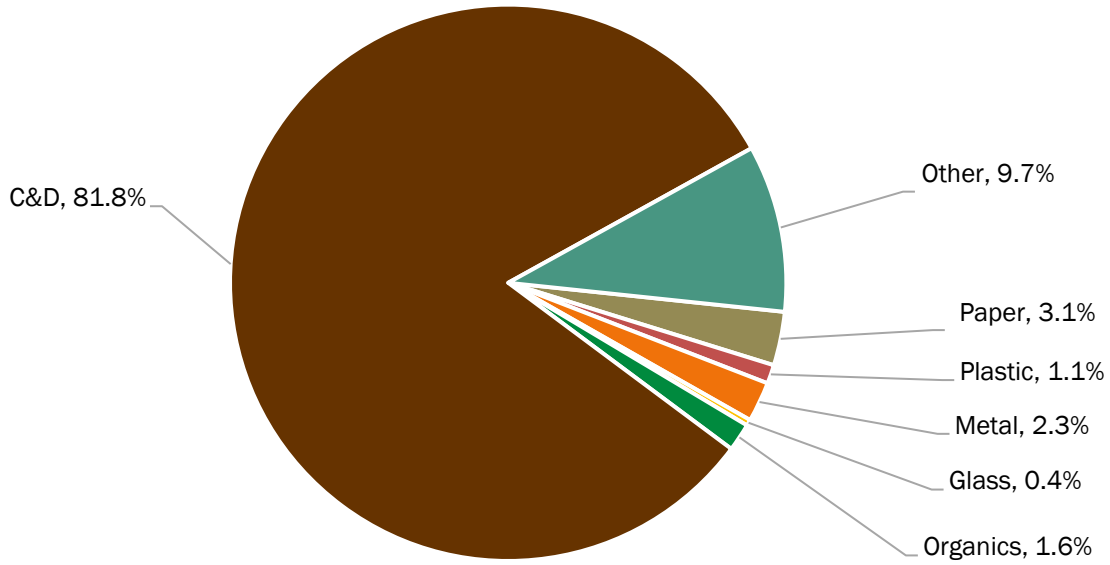



Figure 3-2 recasts statewide C&D composition aggregated into a more logical set of material groups. This figure better conveys the mix of C&D debris categories such as wood, inert materials, gypsum wallboard, and roofing shingles.

Figure 3-2 Recast Aggregate C&D Composition

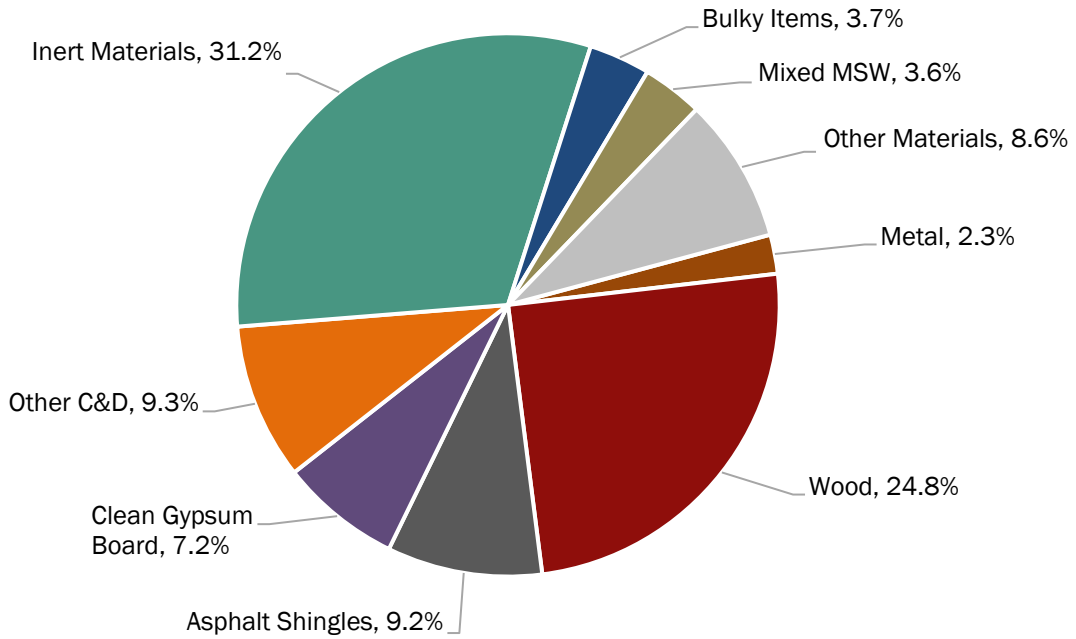



Figure 3-3 shows this same aggregate C&D composition dataset by management pathway. Materials within the Other Recyclable/Potential for Diversion management pathway account for the majority of characterized C&D/bulky waste by weight.

Figure 3-3 Aggregate C&D Composition by Management Pathway

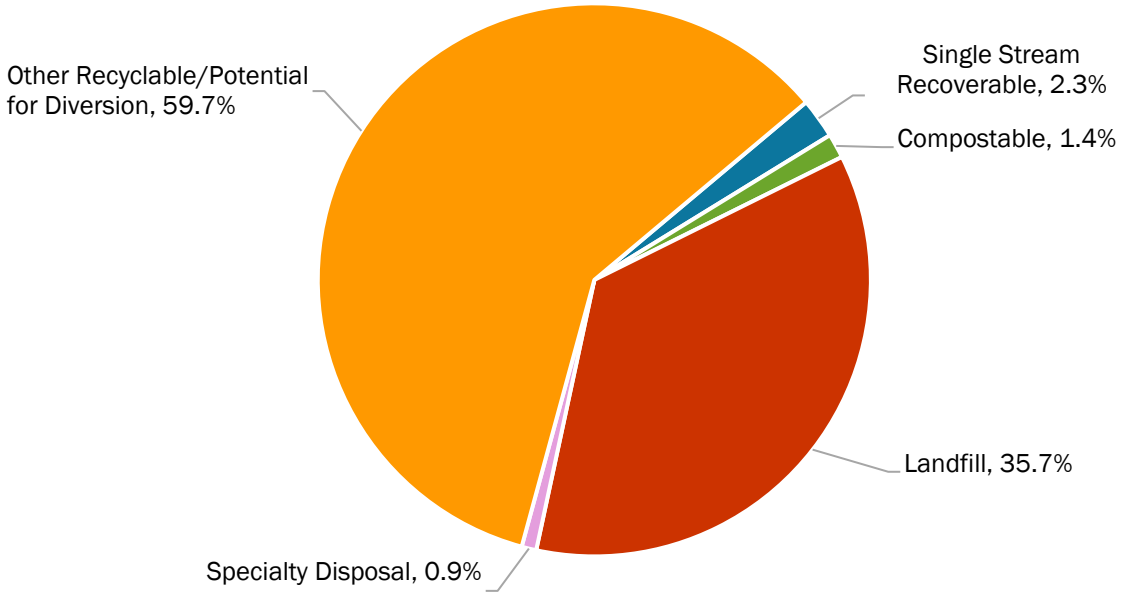


Figure 3-4 shows the ten most commonly found material categories by weight in the aggregate C&D stream. The most prevalent materials are quite dense and commonly generated across construction, renovation, and demolition projects.

**Figure 3-4 Most Prevalent Material Categories in C&D Stream**

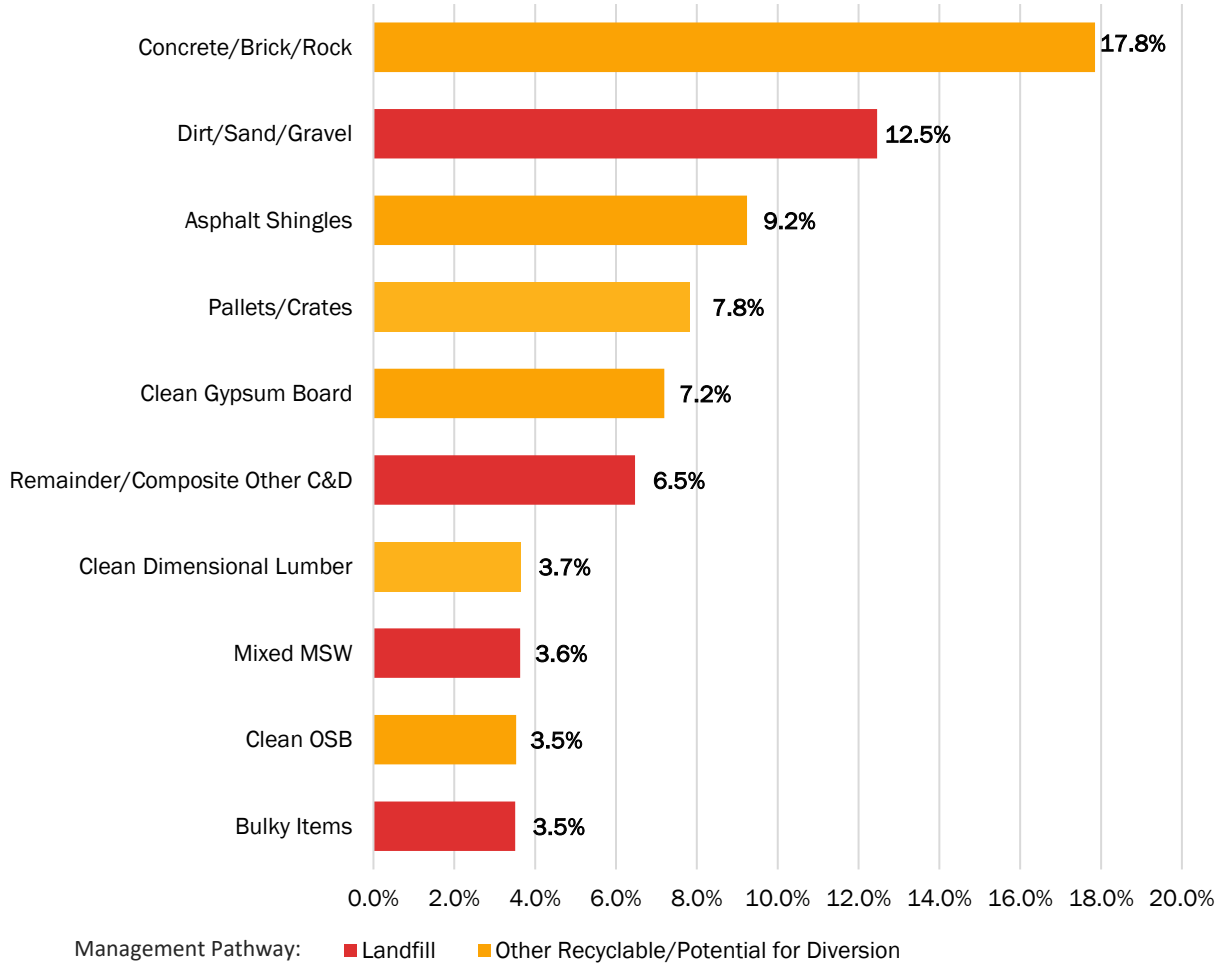


Table 3-1 provides the detailed statistical profile of C&D/bulky waste based on the loads intercepted for this study.

**Table 3-1 Detailed Aggregate C&D/Bulky Waste Composition**

| Material Category | Mean | MOE | Material Category | Mean | MOE |
|---|---|---|---|---|---|
| **Metal** | **2.3%** | **1.4%** | **Mixed MSW** | **3.6%** | **1.0%** |
| HVAC Ducting | 0.2% | 0.8% | Mixed MSW | 3.6% | 1.0% |
| Non-Ferrous Metal | 0.4% | 0.3% | **Bulky Items** | **3.7%** | **1.5%** |
| Other Ferrous Metal | 1.8% | 1.1% | Appliances/White Goods | 0.1% | 0.1% |
| **Wood** | **24.8%** | **3.4%** | Bulky Items | 3.5% | 1.5% |
| Clean OSB | 3.5% | 1.1% | **Other Materials** | **8.6%** | **2.2%** |
| Clean Dimensional Lumber | 3.7% | 1.0% | OCC/Kraft | 2.3% | 1.2% |
| Other Clean Engineered Wood | 1.3% | 0.9% | Remainder/Composite Paper | 0.8% | 0.5% |
| Plywood | 1.3% | 0.4% | Clean Recoverable Film | 0.2% | 0.2% |
| Painted/Stained Wood | 3.5% | 1.0% | HDPE Buckets | 0.1% | 0.1% |
| Treated Wood | 1.3% | 0.6% | Remainder/Composite Plastic | 0.7% | 0.4% |
| Pallets/Crates | 7.8% | 2.8% | All Glass | 0.4% | 0.5% |
| Wood Furniture | 2.4% | 1.1% | Batteries - Lead Acid | 0.0% | 0.0% |
| **Asphalt Shingles** | **9.2%** | **2.6%** | Electronics | 0.0% | 0.2% |
| Asphalt Shingles | 9.2% | 2.6% | Items with CRTs | 0.0% | 0.1% |
| **Clean Gypsum Board** | **7.2%** | **1.8%** | Tires | 1.6% | 0.6% |
| Clean Gypsum Board | 7.2% | 1.8% | Other Hazardous Waste | 0.0% | 0.0% |
| **Inert Materials** | **31.2%** | **1.6%** | Paint | 0.8% | 0.6% |
| Asphalt Paving | 0.9% | 0.6% | Vehicle and Equipment Fluids | 0.0% | 0.0% |
| Concrete/Brick/Rock | 17.8% | 2.2% | Yard Waste | 1.4% | 1.4% |
| Dirt/Sand/Gravel | 12.5% | 2.1% | Remainder/Composite Organics | 0.2% | 0.2% |
| **Other C&D** | **9.3%** | **3.4%** | | | |
| Carpet/Padding | 1.5% | 0.9% | | | |
| Ceiling Tiles | 0.0% | 0.0% | | | |
| Insulation | 1.3% | 1.1% | **Total** | **100.0%** | |
| Remainder/Composite C&D | 6.5% | 1.8% | ***Total Samples*** | ***285*** | |
| Single Stream Recoverable | 2.3% | 0.8% | Potential for Diversion | 59.7% | 3.1% |
| Compostable | 1.4% | 1.3% | Specialty Disposal | 0.9% | 0.1% |
| Landfill | 35.7% | 2.9% | | | |

It was beyond the scope of this study to obtain a sufficient number of C&D samples to compare composition between seasons or between SCDES regions. Seasonal and regional comparisons were considered in the QA/QC process. Because this study was designed to obtain statewide representation and not to differentiate seasonal or regional composition, the reader is cautioned not to draw strong conclusions about seasonal and regional differences.

# 4. CONCLUSIONS

Consistent with its mandate, this inaugural Statewide Waste Characterization Study was successful in developing and executing a methodologically defensible and repeatable characterization of South Carolina's MSW and C&D/bulky waste which are two of the state's largest contributors to landfill disposal. The disposed waste profiles contained in this report should inform the development of South Carolina's upcoming Statewide Waste Management Plan (SWMP) update and establish a baseline for future characterization efforts.

This section illustrates some basic applications of the results of this study to evaluate the benefits of improved recycling, and comments on noteworthy observations about the state's waste stream that may warrant further consideration in the SWMP update.

## 4.1 SINGLE-STREAM CAPTURE RATES

This study determined that an estimated 17.1 percent of all disposed MSW by weight was comprised of materials capable of being recycled through a traditional single stream recycling system, or almost 613,000 tons per year. Using results from this study along with statewide reported tonnages of recycled materials from the SCDES 2024 report, it is possible to calculate statewide capture rates. A capture rate differs from a recycling rate, as shown in the definitions below:

- **Recycling Rate:** The percentage of all waste generated and collected that is ultimately diverted through recycling collection programs. Further, recycling rates tend to be defined differently by different states and jurisdictions, and it can be difficult to compare recycling rates.
- **Capture Rate:** Sometimes called a recovery rate, this rate identifies the percentage of a targeted recyclable material that is properly collected through local recycling programs (and hence "captured" in the recycling program).

Table 4-1 shows the resulting capture rate of single-stream recoverable commodities. Some categories are necessarily combined to compare result sets. Corrugated cardboard is, by far, the most highly captured commodity with a recycling rate above 50 percent. All other commodity groups show recycling rates under ten percent.

Table 4-1 Statewide Recycling Rate of Single-Stream Recyclables (2024)

| Material Category | Reported Recycled Tons | Estimated Disposed Tons | Total Tons | Capture Rate |
|---|---|---|---|---|
| Corrugated Cardboard | 208,856 | 173,633 | 382,489 | 54.6% |
| All Other Recyclable Paper | 22,170 | 203,867 | 226,037 | 9.8% |
| Aluminum Cans | 1,867 | 24,539 | 26,406 | 7.1% |
| Steel Cans | 942 | 31,547 | 32,489 | 2.9% |
| Recyclable Glass | 7,038 | 75,347 | 82,384 | 8.5% |
| #1 PET, #2 HDPE & #5 PP | 7,192 | 103,795 | 110,987 | 6.5% |

State reported recycled tonnage data received from MRF operators is likely reported based on the sale of processed, baled commodities. This suggests that the above capture rates are slightly understated as recyclables processing after collection does result in some yield loss.

## 4.2 ECONOMIC AND ENVIRONMENTAL IMPACT OF DISPOSAL

Each single stream recoverable material category has a unique commodity value on the secondary materials market, meaning that there is a dual economic benefit to recovery of these materials: reduced disposal cost and profit from the sale of processed materials. On average, South Carolina landfills charged gate rates of about $43.18 per ton in 2025.[12] Applying this average rate for all 613,000 tons of traditional single stream recyclables disposed results in the payment of over $27.1 million dollars in disposal fees each year to discard recoverable recyclable materials.

Similarly, discarding these recyclables misses the opportunity to realize their value. Table 4-2 shows the value per ton of recyclables disposed in South Carolina landfills by commodity. Composition results indicate that, in the aggregate, a ton of disposed MSW contains $25.62 of single stream recoverable commodities. This suggests that nearly $91.6 million in revenues from the sale of recyclable commodities is lost annually.

**Table 4-2 Estimated Value of Recyclables Disposed in MSW (2024)**

| Material Category | Percent of Disposed MSW Tons | Total Annual Disposed Tons [1] | $/Ton [2] | Value per Given Ton of MSW | Total Value |
|---|---|---|---|---|---|
| Corrugated Cardboard | 4.9% | 173,633 | $57.50 | $2.79 | $9,983,889 |
| Mixed Recyclable Paper | 5.7% | 203,867 | $27.50 | $1.57 | $5,606,339 |
| Aluminum Cans | 0.7% | 24,539 | $1,600.00 | $10.98 | $39,262,297 |
| Steel Cans | 0.9% | 31,547 | $160.00 | $1.41 | $5,047,485 |
| Brown Glass Bottles | 0.5% | 17,596 | $27.50 | $0.14 | $483,896 |
| Clear Glass Bottles | 1.2% | 41,113 | $32.50 | $0.37 | $1,336,178 |
| Green Glass Bottles | 0.5% | 16,637 | $10.00 | $0.05 | $166,372 |
| PET #1 Bottles | 1.2% | 42,323 | $175.00 | $2.07 | $7,406,564 |
| HDPE #2 Natural Containers | 0.5% | 18,190 | $990.00 | $5.04 | $18,008,574 |
| HDPE #2 Colored Containers | 0.6% | 22,149 | $50.00 | $0.31 | $1,107,439 |
| PP #5 Containers | 0.6% | 21,133 | $150.00 | $0.89 | $3,169,885 |
| Single Stream Recoverable | 17.1% | 612,727 | $149.46 | $25.62 | $91,578,919 |

[1] Based on MSW composition estimated by this study and South Carolina reported MSW disposal tonnage for calendar year 2024.

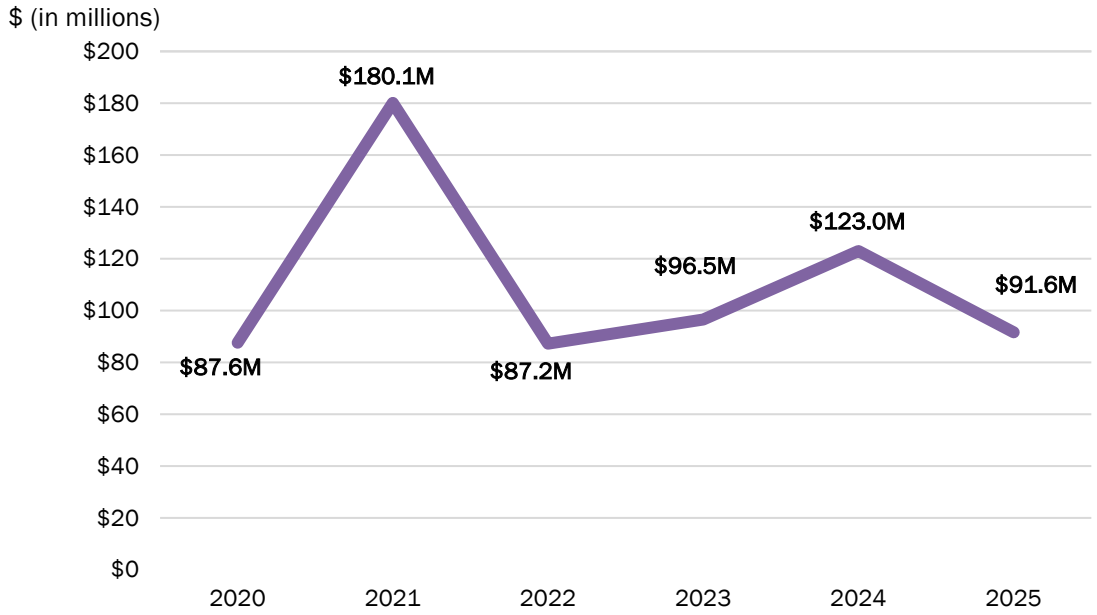
[2] Source: recyclingmarkets.net, November 25, 2025, Southeast Region.

The values in Table 4-2 reflect a point in time, however, the values of recyclable commodities fluctuate over time. Figure 4-1 back-calculates the value of disposed single stream recoverable material within MSW using average secondary market values for the last five years.[13] While perfect recovery of single stream recoverable commodities is merely aspirational, the opportunity for recovery of single stream recyclables is significant and has held true in high and low markets over the past five years.

[12] Source: EREF Tip Fee Report 2023 – Southeast Region

[13] This calculation normalizes MSW composition and annual tonnage.

Figure 4-1 Value of Disposed Recyclables within MSW




The results of this study can also be applied to estimate the emissions reduction potential for divertible commodities, using a WARM analysis. WARM is a lifecycle analysis model developed by the US EPA to estimate reductions in emissions derived from recovering materials rather than disposing of them in a landfill. Table 4-3 projects potential reductions in emissions for over 1.3 million tons of recyclables and compostables found to be disposed in landfills.

Table 4-3 Emissions Reduction Potential from Recyclables Disposed in MSW (2024)

| Material Components [1] | Tons Recycled/ Composted [2] | Emissions Reduced ($MTCO_2E$) [3] |
|---|---|---|
| **Recyclable Paper** | **377,500** | **1,216,137** |
| Corrugated Cardboard | 173,633 | 528,280 |
| Mixed Recyclable Paper | 203,867 | 687,857 |
| **Recyclable Containers** | **235,227** | **398,543** |
| Aluminum Cans | 24,539 | 224,473 |
| Steel Cans | 31,547 | 58,435 |
| Glass Bottles | 75,347 | 22,329 |
| PET | 42,323 | 44,692 |
| HDPE | 40,339 | 31,412 |
| PP | 21,133 | 17,202 |
| **Compostables** | **707,211** | **318,200** |
| Food Waste (Loose) | 637,784 | 329,033 |
| Yard Trimmings and Prunings [4] | 69,427 | -10,833 |
| **Total** | **1,319,938** | **1,932,881** |

[1] Certain material categories used in this WCS were combined to align with the material categories available in WARM. For example, HDPE shown here includes #2 HDPE Natural Containers and #2 HDPE Colored Containers.

[2] Based on MSW composition estimated by this study and South Carolina reported MSW disposal tonnage for calendar year 2024. Assumes the materials would be recycled or composted instead of disposed.

[3] U.S. EPA Waste Reduction Model, Version 16; South Atlantic region, landfill emissions scenarios assume landfill gas recovery in place and methane is recovered for energy.

[4] The WARM model generates negative emissions reductions (i.e., emissions increases) for yard waste because it emits small amounts of methane and nitrous oxide during composting, while landfilled yard trimmings generate little methane. The WARM model also underestimates soil carbon benefits from compost.

As shown in the table, this calculation suggests that over 1.9 million metric tons equivalent of carbon dioxide ($MTCO_2E$) could have been avoided had these disposed materials been recycled or composted. This level of emissions reduction is equivalent to removing emissions from 410,378 passenger vehicles or conserving 217,495,291 gallons of gasoline each year.

## 4.3 CONCLUSIONS

Of all MSW disposed in South Carolina landfills each year, this study estimates that over 67 percent is made up of materials that can be recycled, composted, potentially diverted, or otherwise diverted from landfill disposal. This combined 2.4 million tons represents a tremendous opportunity for SCDES and its collaborators to improve the performance of its materials management systems, capturing additional secondary commodities value, reducing statewide $CO_2$ emissions, and expanding research efforts to continue making decisions and setting targets supported by the data.

MSW Consultants offers the following observations about South Carolina's disposed MSW:

- **Significant single stream recyclables in residential MSW –** Over 16 percent of the residential MSW stream is made up of single stream recyclables: materials that are readily accepted, collected, and processed through a typical curbside collection recycling program. Fifty-three percent of those residential recyclables are recyclable paper (corrugated cardboard and mixed recyclable paper), valued annually at $5.6 million. The remaining 47 percent is recyclable containers made of aluminum, steel, glass, and plastic. Disposed recyclable containers in residential MSW are valued annually at $41 million.
- **Higher OCC and recyclable paper in commercial MSW –** Commercial MSW contains slightly more recyclables in its MSW stream, at 17.8 percent of MSW by weight. This increase is driven entirely by corrugated cardboard and mixed recyclable paper, at 67 percent of commercial recyclables. This totals to $10.1 million per year, $6.8 million of which is made up by corrugated cardboard, which was nearly twice as prominent in commercial MSW than it was in residential MSW. Recyclable containers make up 33 percent of commercial recyclables and are valued at $35.2 million. The high value and ease of recovery of corrugated cardboard makes this an appealing option for future initiatives to increase recycling from the business sector.
- **Food waste prevalence –** Food waste (combined loose and packaged) was far and away the most prevalent material, and compostable paper is the second most prevalent. This finding held true for both the residential and commercial sector, across each season, and in each SCDES region.
- **Food donation is an unmeasured pathway –** Packaged food waste was defined as "discarded food still in its retail packaging. Examples include packaged bakery items, prepared frozen food in its freezer box, full cans of food, and individually wrapped snacks," and was found to be 8.4 percent of the MSW waste stream. It was categorized under the landfill management pathway as it is unsuitable for composting due to the presence of the packaging which is often not separated.[14] Although it was not possible to assess eligibility for donation, it is very likely that at least some of the food in this category could have been donated or rescued for consumption by people or animals.
- **Effective yard waste ban –** South Carolina has banned yard waste from collection and disposal in MSW. There are uniformly low fractions of yard trimmings in disposed MSW, suggesting that the disposal ban is effective.
- **Problematic organics –** Over four percent of the organics material group was classified as remainder (or unidentified) organic materials. Although not measured precisely, anecdotally this category includes difficult-to-manage organics such as pet wastes and kitty litter. Further, disposable diapers and sanitary products, which have a significant organic fraction, were significant in disposed MSW.
- **Textiles for diversion –** Across the recycling industry, textiles are emerging as a candidate for more aggressive landfill diversion, and the results of this study only support this focus. Textiles of all types (clothing and non-clothing) may have remaining life for reuse, and if current textile circularity efforts are successful, there may be better markets to recycle unusable textiles on a more widespread basis.
- **Electronic waste ban –** South Carolina has banned electronics and televisions from MSW disposal since 2011. Although this study did not include a separate e-waste category, there were comparatively

[14]Unopened food packaging is often not separated during sorting work as the packaging is often a very small portion of the combined weight and can often take too long to open or separate from the food material itself, especially in the case of jarred or canned goods.

few electronics found in the sort. E-waste is included in all other uncategorized waste (along with ceramics, water filters, caulk tubes and other miscellaneous items) and the total incidence of all of these items was only 1.4 percent.

- **Observed differences between seasonal MSW results –** No major seasonal differences were observed in comparing seasonal MSW results. Other statewide waste composition studies have found that there tends to be an increase in paper packaging in the fall run up to the holiday season, but this difference was only observed in mixed recyclable paper and not corrugated cardboard.

The reported C&D composition for South Carolina also warrants discussion. In the opinion of MSW Consultants, the reported results are based on a minimum level of load surveying and ideally more widespread data collection will be possible with future updates. For this reason, readers are cautioned not to overanalyze C&D composition but rather focus on the major findings that follow:

- **High-weight C&D samples and their impact on C&D composition –** There is inherent error in the visual survey methodology for C&D loads. In particular, some items are very dense and their volume-to-weight conversion has a higher than average impact on weight-based C&D composition. To illustrate this effect, the concrete/brick/rock material category was identified in 13.7 percent of surveyed loads yet makes up 17.8 percent of the total C&D/bulky waste stream by weight, and dirt/sand/gravel material category was only found in 7.7 percent of samples but made up 12.5 percent of the C&D/bulky waste stream by weight. While it is believed the statewide composition reported in this study is reasonable, expanded future research may better validate the incidence of these materials.
- **Divertible C&D materials –** Of the 59.7 percent of C&D/bulky waste belonging to the other recyclable/potential for diversion management pathway, the largest contributor was potentially divertible wood categories, which made up 20.1 percent of the total waste stream, followed by concrete/brick/rock at 17.8 percent of total weight.
- **Diverting wood –** Not surprisingly, almost one quarter of the C&D stream was found to be some type of wood. Clean wood is highly recoverable, and many other coated and engineered wood types can potentially be used for boiler fuel.
- **Low incidence of asphalt shingles –** Asphalt shingles were found to be less than 10 percent of the C&D stream. Although C&D composition data is more limited compared to MSW composition, this appears to be lower than the typical incidence of shingles. It is not clear whether there are just more outlets for shingle recycling in South Carolina, or if the sampling of inbound C&D loads somehow underrepresented roofing jobs and shingle disposal. The disposition of asphalt shingles may require further research.

## 4.4 RECOMMENDATIONS

**Update waste characterization data –** This study provides a detailed snapshot of MSW and C&D/bulky waste composition in 2025, establishing a baseline for future study updates. Such time series data is highly informative because the waste stream is constantly changing due to both macro-level and state or region-specific factors. Many states have established research cycles of five to seven years, depending on their sustainable materials management policies and planning objectives. SCDES should consider updating this baseline WCS on a regular basis to measure trends and review the efficacy of its waste management programs.

**Consider expanding Class 2 reporting requirements –** Current Reporting requirements in South Carolina mandate that Class 3 solid waste facilities report detailed breakdowns of inbound waste by type, (MSW, C&D, ash, etc.) but Class 2 facilities are exempt from reporting in this same level of detail. This current

arrangement makes it impossible to effectively estimate annual tonnages for C&D/bulky waste materials. If SCDES wishes to estimate these tonnages in the future, Class 2 landfills will need to report tonnages broken down by waste type.

**Incorporate analysis of imported wastes** – South Carolina already imports wastes from distant regions, in some cases via rail hauling from the Northeast. In the experience of MSW Consultants, this importation is likely to only increase over time and may become a more pressing issue. For this reason, it may be helpful to have a better understanding of the quantity and composition of imported wastes compared to wastes generated in South Carolina. Are these imported wastes effectively sorted and free of recyclable materials? Or are there many recoverable constituents that have been damaged beyond recovery in the loading and transporting to South Carolina, which should arguably have been recovered by the generating entity?

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# APPENDIX A

County and SCDES Region 2024 Reported Tonnages

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| SCDES Region | Population | Class 3 MSW | | Class 3 C&D | | Aggregate Class 3 Tons | Aggregate Class 2 Tons | SCDES Region % of MSW | SCDES Region % of Class 2 |
|---|---|---|---|---|---|---|---|---|---|
| Lowcountry | 1,256,284 | 879,091 | | 36,474 | | 2,083,484 | 988,212 | 24.6% | 26.0% |
| Midlands | 1,546,886 | 906,055 | | 3,781 | | 1,416,528 | 1,291,326 | 25.3% | 34.0% |
| Pee Dee | 979,748 | 633,014 | | 30,190 | | 2,711,647 | 643,421 | 17.7% | 16.9% |
| Upstate | 1,590,636 | 1,156,271 | | 91,070 | | 2,518,074 | 879,807 | 32.3% | 23.1% |
| **Total** | **5,373,554** | **3,574,431** | | **161,514** | | **8,729,733** | **3,802,766** | **100.0%** | **100.0%** |

| County/State | Population | Class 3 MSW | Ash | C&D | Industrial | Tires | NtrlD strDb rs | Other | Aggregate Class 3 Tons | Class 2 Aggregate Class 2 Tons | Class 1 Tons | Incin-erated Wastes | SC Disposed TSW* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lowcountry Region** | | | | | | | | | | | | | |
| Allendale | 7,369 | 2,755 | - | - | - | - | - | 3,530 | 6,285 | 4,148 | - | - | 10,433 |
| Bamberg | 12,973 | 10,339 | - | - | - | - | - | 482 | 10,821 | 8,590 | - | - | 19,411 |
| Beaufort | 198,979 | 152,652 | - | 766 | 107 | - | - | 12,983 | 166,508 | 99,312 | - | 14,764 | 280,584 |
| Berkeley | 255,217 | 140,419 | 357,850 | 5,172 | 87,084 | - | - | 222,900 | 813,425 | 268,050 | 14,761 | - | 1,096,236 |
| Calhoun | 14,186 | 8,164 | - | 14 | 43,969 | - | - | - | 52,147 | 3,129 | - | - | 55,276 |
| Charleston | 424,367 | 346,192 | 20 | 507 | 7 | - | - | 170,950 | 517,676 | 389,853 | - | - | 907,529 |
| Colleton | 38,874 | 22,952 | - | 17 | 55,946 | - | - | 133 | 79,048 | 22,325 | - | - | 101,373 |
| Dorchester | 169,833 | 74,083 | - | 28,037 | 46,274 | - | - | 41,372 | 189,766 | 59,555 | - | - | 249,321 |
| Hampton | 18,122 | 11,758 | - | 21 | - | - | - | 10,044 | 21,823 | 4,210 | - | - | 26,033 |
| Jasper | 33,544 | 30,486 | - | 1,075 | - | - | - | 17,158 | 48,719 | 97,750 | - | - | 146,469 |
| Orangeburg | 82,820 | 79,291 | 43,784 | 865 | 12,722 | - | - | 40,604 | 177,266 | 31,290 | - | - | 208,556 |
| **LC Subtotal** | **1,256,284** | **879,091** | **401,654** | **36,474** | **246,109** | **-** | **-** | **520,156** | **2,083,484** | **988,212** | **14,761** | **14,764** | **3,101,221** |
| **Midlands Region** | | | | | | | | | | | | | |
| Aiken | 177,130 | 92,671 | - | 21 | 4,360 | 18,375 | - | 29,299 | 144,726 | 288,542 | 9,613 | - | 442,881 |
| Barnwell | 20,447 | 14,517 | - | - | - | - | - | 4,815 | 19,332 | 23,995 | - | - | 43,327 |
| Chester | 32,226 | 22,975 | 1,364 | - | 17,338 | - | - | 3 | 41,680 | 20,814 | 240 | - | 62,734 |
| Edgefield | 27,607 | 21,724 | - | - | 23 | 6,005 | - | 103 | 27,855 | 6,781 | 1,101 | - | 35,737 |
| Fairfield | 20,422 | 18,320 | - | - | 30,613 | - | - | 21,722 | 70,655 | 124 | - | - | 70,779 |
| Kershaw | 69,905 | 36,728 | - | 244 | 1,666 | - | - | 9,295 | 47,933 | 35,611 | - | - | 83,544 |
| Lancaster | 108,215 | 31,480 | - | 281 | 7 | - | - | 504 | 32,272 | 33,119 | 2,004 | - | 67,395 |
| Lexington | 309,528 | 195,388 | 119 | 153 | 98,647 | - | - | 2,627 | 296,934 | 293,469 | 4,780 | - | 595,183 |
| Newberry | 38,825 | 42,158 | - | 147 | 20,166 | - | - | 92 | 62,563 | 12,628 | 253 | - | 75,444 |
| Richland | 425,138 | 290,586 | 90,472 | 2,919 | 112,451 | - | - | 5,589 | 502,017 | 426,057 | 188 | - | 928,262 |
| Saluda | 19,123 | 14,772 | - | - | 24,509 | - | - | 2,362 | 41,643 | 465 | 111 | - | 42,219 |
| York | 298,320 | 124,736 | 429 | 16 | 3,730 | - | - | 7 | 128,918 | 149,721 | 6,090 | - | 284,729 |
| **ML Subtotal** | **1,546,886** | **906,055** | **92,384** | **3,781** | **313,510** | **24,380** | **-** | **76,418** | **1,416,528** | **1,291,326** | **24,380** | **-** | **2,732,234** |
| **Pee Dee Region** | | | | | | | | | | | | | |
| Chesterfield | 44,031 | 4,480 | - | 11 | 11 | - | - | 1,471 | 5,973 | 33,506 | - | - | 39,479 |
| Clarendon | 31,004 | 14,560 | - | - | - | - | - | 11,091 | 25,651 | 17,848 | - | - | 43,499 |
| Darlington | 62,416 | 34,091 | 94 | 48 | 24,835 | - | - | 92,036 | 151,104 | 21,337 | - | - | 172,441 |
| Dillon | 27,698 | 21,098 | - | - | - | - | - | 3,448 | 24,546 | 21,466 | - | - | 46,012 |
| Florence | 137,214 | 112,958 | - | 128 | 146 | - | - | 13,091 | 126,323 | 133,731 | - | - | 260,054 |
| Georgetown | 65,731 | 39,806 | 1,764,919 | 28,746 | 2,660 | - | - | 11,861 | 1,847,992 | 39,282 | - | - | 1,887,274 |
| Horry | 397,478 | 303,792 | - | - | 23 | - | - | 584 | 304,399 | 286,126 | - | - | 590,525 |
| Lee | 15,967 | 8,827 | - | 1,093 | 20,889 | - | - | 75,419 | 106,228 | 38 | - | - | 106,266 |
| Marion | 28,508 | 10,686 | - | - | 20 | - | - | 87 | 10,793 | 38,630 | - | - | 49,423 |
| Marlboro | 25,704 | 5,779 | - | 14 | - | - | - | 37 | 5,830 | 1,836 | - | - | 7,666 |
| McCormick | 9,941 | 4,210 | - | - | - | - | - | 294 | 4,504 | 1,310 | - | - | 5,814 |
| Sumter | 104,165 | 62,728 | - | 39 | 6,443 | - | - | 15,309 | 84,519 | 40,443 | - | - | 124,962 |
| Williamsburg | 29,891 | 9,999 | - | 111 | 1 | - | - | 3,674 | 13,785 | 7,868 | - | - | 21,653 |
| **PD Subtotal** | **979,748** | **633,014** | **1,765,013** | **30,190** | **55,028** | **-** | **-** | **228,402** | **2,711,647** | **643,421** | **-** | **-** | **3,355,068** |
| **Upstate Region** | | | | | | | | | | | | | |
| Abbeville | 24,434 | 12,583 | - | 5 | 2,298 | - | - | 26 | 14,912 | 10,924 | - | - | 25,836 |
| Anderson | 213,076 | 113,834 | 917,767 | 8,240 | 16,716 | - | - | 19,999 | 1,076,556 | 142,436 | 104 | - | 1,219,096 |
| Cherokee | 56,714 | 39,138 | - | 120 | 4,571 | - | - | 53 | 43,882 | 16,466 | - | - | 60,348 |
| Greenville | 558,036 | 519,019 | 23 | 46,287 | 71,730 | - | - | 17,845 | 654,904 | 388,906 | 67 | - | 1,043,877 |
| Greenwood | 69,460 | 74,598 | - | 32,119 | 1,453 | - | - | 17,100 | 125,270 | 10,915 | - | - | 136,185 |
| Laurens | 68,873 | 19,832 | - | 629 | 8,568 | - | - | 59 | 29,088 | 13,322 | 30 | - | 42,440 |
| Oconee | 81,221 | 1,692 | - | - | 3,915 | - | - | 1,414 | 7,021 | 46,738 | 995 | - | 54,754 |
| Pickens | 135,495 | 58,386 | - | 769 | 1,159 | - | - | 1,120 | 61,434 | 17,721 | - | - | 79,155 |
| Spartanburg | 356,698 | 308,772 | - | 1,736 | 147,677 | - | - | 32,796 | 490,981 | 232,331 | 1,888 | - | 725,200 |
| Union | 26,629 | 8,417 | - | 1,165 | 4,442 | - | - | 2 | 14,026 | 48 | 1,607 | - | 15,681 |
| **US Subtotal** | **1,590,636** | **1,156,271** | **917,790** | **91,070** | **262,529** | **-** | **-** | **90,414** | **2,518,074** | **879,807** | **4,691** | **-** | **3,402,572** |
| **SC TOTAL** | **5,373,554** | **3,574,431** | **3,176,841** | **161,515** | **877,176** | **24,380** | **-** | **915,390** | **8,729,733** | **3,802,766** | **43,832** | **14,764** | **12,591,095** |
| **Out-of-State Imported** | | | | | | | | | | | | | |
| Georgia | | 57,081 | - | 11 | 2,852 | - | - | 732 | 60,676 | N/A | | | N/A |
| Massachusetts | | 104,063 | - | - | - | - | - | - | 104,063 | N/A | | | N/A |
| North Carolina | | 169,732 | - | 68 | 26,911 | - | - | 778 | 197,489 | N/A | | | N/A |
| New York | | 208,999 | - | - | - | - | - | - | 208,999 | N/A | | | N/A |
| Tennessee & Florida | | - | - | - | 299 | - | - | - | 299 | N/A | | | N/A |
| **OUT-OF-STATE TOTAL** | | **539,875** | **-** | **78** | **30,063** | **-** | **-** | **1,510** | **571,526** | **160,260** | **-** | **-** | **731,786** |
| **TOTAL BY WASTE STREAM** | | **4,114,306** | **3,176,841** | **161,593** | **907,239** | **24,380** | **-** | **916,900** | **9,301,259** | **3,963,026** | **43,832** | **14,764** | **13,322,881** |

Note: SC Disposed TSW does not include SCDES reported exported wastes, which are included in SCDES TSW reporting totals.

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# APPENDIX B

MSW Material Categories and Definitions

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| # | Material Category Name | Material Category Definition |
|---|---|---|
| 1 | Corrugated Cardboard | Corrugated boxes or paper bags made from Kraft paper. Uncoated Corrugated Cardboard has a wavy center layer and is sandwiched between the two outer layers and does not have any wax coating on the inside or outside. Examples include entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This type 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. |
| 2 | Mixed Recyclable Paper | Chipboard, Paperboard, high grade office paper, magazines, catalogues, notebook paper, phone books, junk mail and other mixed recyclable papers. |
| 3 | Compostable Paper | Low grade paper that is not capable of being recycled, as well as food contaminated paper. Examples include paper towels, uncoated paper plates or food service ware, napkins and tissues. |
| 4 | Remainder Paper | Items made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture, and that do not fit into another category. Examples include waxed papers and waxed cardboard, plastic coated corrugated cardboard, coated paper food service cups/plates/bowls, cellulose insulation, blueprints, sepia, foil-lined fast-food wrappers, ice cream cartons, freezer food packaging, carbon paper, self-adhesive notes, photographs, and other multi-material containers such as foil or plastic-lined canisters and cartons. Examples include chips, nuts, “pop ‘n bake” bread and cookies, and frozen juice. |
| 5 | Polycoated/Aseptic Containers | Laminated high quality paper cartons such as those used to store drinks without refrigeration. Examples include juice, teas, rice milk, soy milk, and dairy products |
| 6 | PET #1 Bottles | Clear or colored PET bottles with a narrow kneck which it bear the number “1” 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. |
| 7 | PET #1 Non-Bottle | PET non-bottle containers such as thermoform clamshells, to-go containers/cups and produce trays. |
| 8 | HDPE #2 Natural Containers | Natural HDPE bottles and jugs, which are somewhat translucent, having no added pigment. When marked for identification, it bears the number “2” in the triangular recycling symbol and may also bear the letters “HDPE.” |
| 9 | HDPE #2 Colored Containers | Pigmented HDPE bottles and jugs, which are completely opaque as a result of their manufacturing process and application. When marked for identification, it bears the number “2” in the triangular recycling symbol and may also bear the letters “HDPE.” |
| 10 | Other HDPE #2 | Non-Bottle, Non-Jug containers or items which bear the number "2" in the triangular recycling symbol, frequently marked "HDPE". |
| 11 | PP #5 Containers | Plastic containers and packaging made from PP. Examples include some margarine, yogurt, fast food beverage cups, and to-go containers. |
| 12 | #3, #4, #6, #7 Containers | Containers made of less desireable or less common resin types. Includes take-out containers. Does not include expanded polystyrene (styrofoam). |
| 13 | Other PP #5 | Containers and items made from #5 PP (Polypropylene) resin. Commonly seen in dairy tubs, such as butter, sour cream, etc. or certain take-out containers. |
| 14 | Other Rigid Plastic | Other rigid plastic items or products which are not included in the above categories. Includes all expanded polystyrene. |
| 15 | Retail Plastic Bags | All plastic bags used to carry groceries and other items purchased at retail stores. |
| 16 | Industrial Film | Plastic filmed used in industrial or agricultural applications. |
| 17 | Garbage Bags | Film bags made specifically to store garbage. Note that bags containing garbage that were once retail bags should be classified as retail bags once the garbage has been emptied out of them. |
| 18 | Other Film | Other film materials and items which are not defined in the above categories. Includes chip bags, candy wrappers, aluminized film, etc. |
| 19 | Remainder/Composite Plastic | plastic that cannot be put in any other type or subtype. This type includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, non-EPS foam packing materials and coolers, plastic strapping, new plastic laminate (e.g., Formica), vinyl, linoleum, plastic lumber, imitation ceramics, handles and knobs, plant pots, some kitchen ware, toys, plastic string (as used for hay bales), and CD’s. |

| # | Material Category Name | Material Category Definition |
|---|---|---|
| 20 | Bulky Plastic | Plastic objects other than disposable package items. These items are usually made to last for a few months up to many years. These include 5-gallon pails, large buckets holding kitty litter and bulk water cooler containers, and the plastics used in children's toys (unless with an embedded battery), furniture, plastic landscape ties; plastic railroad ties, mop buckets, sporting goods, etc. |
| 21 | Aluminum Cans | Aluminum drink cans for soda, beer, water, or other beverages. Will also include includes aluminum food cans such as those for tuna or cat food. Empty aerosols will also be included here. |
| 22 | Steel Cans | Steel cans most commonly used for non-perishable foods. |
| 23 | Other Ferrous Metal | Any 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, window/door security bars, appliances, and scrap ferrous items and galvanized items such as nails and flashing |
| 24 | Other Non-Ferrous Metal | 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. |
| 25 | Appliances | "White Goods" and other appliances, |
| 26 | Brown Glass Bottles | Glass bottles and jars made with brown glass. May be for food products or beverages. |
| 27 | Clear Glass Bottles | Glass bottles and jars made with clear glass. May be for food products or beverages. |
| 28 | Green Glass Bottles | Glass bottles and jars made with green glass. May be for food products or beverages. |
| 29 | Remainder/Composite Glass | All non-container glass, excluding ceramics. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. |
| 30 | Mixed Cullet | Broken pieces of glass under 1/2" in size. |
| 31 | Food Waste (Packaged) | Discarded food still in its retail packaging. Examples include packaged bakery items, prepared frozen food in its freezer box, full cans of food, and individually wrapped snacks. |
| 32 | Food Waste (Loose) | Food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food. This type includes material from industrial, commercial, or residential sources. Examples include discarded meat scraps, dairy products, eggshells, fruit or vegetable peels, and other food items from homes, stores and restaurants. This type includes apple pomace and other processed residues or material from canneries, breweries, wineries or other industrial sources. |
| 33 | Fats, Cooking Oils, and Grease | Olive oil, seed oils, fats, greases, and other similar products used in cooking. |
| 34 | Yard Trimmings and Prunings | Leaves, grass, shrub, tree, and other plant prunings and trimmings that measure less than one foot in diameter, and leaves and grass. |
| 35 | Remainder 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, hemp rope, hair, cigarette butts, full vacuum bags, and sawdust. |
| 36 | Asphalt, Brick, and Concrete (A | Bricks and concrete from the construction or demolition of buildings or structures. |
| 37 | Carpet & Carpet Padding | Flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Carpet Padding means plastic, foam, felt, or other material used under carpet to provide insulation and padding. |
| 38 | Drywall/Gypsum Board | Drywall or gypsum board such as that used for constructing walls and ceilings |
| 39 | Clean Dimensional Wood | Wood that has not been painted, stained or treated for moisture resistance. This category excludes plywood and fiberboard. |
| 40 | Plywood and Other Engineered | A type of engineered wood, similar to particle board, made by compressing layers of wood strands with adhesives. |
| 41 | Wood - Painted, Treated, Stain | Any wood derived from the construction or demolition of buildings or structures that is not "clean wood." Examples included painted, stained, or pressure treated wood. |
| 42 | Other/Residual C&D | All materials derived from the construction or demolition of buildings or structures that does not fit into another category. Examples include carpet and padding, wiring, and bathroom and kitchen fixtures. Does not include carpet and padding (see below). |
| 43 | Textiles/Leather Products | Clothing, fabrics, curtains, blankets, stuffed animals, and other cloth material. Also includes leather prodcuts and accessories such as belts, purses, gloves, etc. |
| 44 | Mattresses | All sizes and types of mattresses, box springs, etc. Includes innerspring, foam, and other types of mattresses. |
| 45 | Rubber Materials | Any vehicle tire or other item made of rubber. |

| # | Material Category Name | Material Category Definition |
|---|---|---|
| 46 | Lithium/Ion Batteries | Dry-cell rechargeable batteries that use a lithium-based chemistry. |
| 47 | Other Batteries | Single-use everyday batteries such as AAA, AA, C, D-cells and 9-volts. |
| 48 | Sharps/Medical Waste | Medical waste including sharps, medical tubing, medical products contaminated with blood or other bodily fluids such as gauze. |
| 49 | Other Hazardous Waste | All materials typically accepted at a household hazardous waste collection event and not included in other categories. Examples include vehicle automotive fluids, poisons, fertilizers, pesticides, corrosives, flammables, pressurized cylinders, aerosols containing hazardous substances, and solvents. |
| 50 | Furniture | Chairs, Tables, cabinets, and other furniture articles found in a home or office setting. |
| 51 | Other Bulky Items | Large hard to handle items which are not defined separately. |
| 52 | Remainder Inorganics | Other inorganic materials which are not definted separately. Includes lotions, soaps, cleaning products, dryer sheets, cat litter, etc. |
| 53 | Dirt/Fines | Remaining "Supermix" or 1/2" minus fines that cannot be allocated to other categories, |
| 54 | Wet Cell Batteries | Lead Acid Batteries. Most commonly used in automobiles, but are also popularly used for recreational vehicles such as boats, motorcycles, etc. or for mobility scooters. |
| 55 | Paint | House paint and primers, stains, sealers, and clear coatings (e.g. shellac and varnish) but excludes aerosols (spray cans), solvents, etc. Includes non-empty spray paint cans. |
| 56 | Diapers & Sanitary Products | Both baby diapers and adult diapers (cloth and paper/plastic) and sanitary pads and tampons. |
| 57 | All Other Waste Not Elsewhere | Any other items or materials which do not fit into the above categories |

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# APPENDIX C

Construction and Demolition/Bulky Waste Material Categories and Definitions

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Appendix C - Construction and Demolition/Bulky Waste Material Categories and Definitions

| # | Material Category Name | Material Category Definition |
|---|---|---|
| 1 | OCC/Kraft | Corrugated boxes or paper bags made from Kraft paper. Uncoated Corrugated Cardboard has a wavy center layer and is sandwiched between the two outer layers. Examples include entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons.This 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. |
| 2 | Remainder/Composite Other Paper | All other paper or majority paper items, products, packaging that do not fit in the above category. |
| 3 | Clean Recoverable Film | Large film for commercial uses such as stretch/shrink wrap for pallets and agricultural film. Typically PE film (shrink wrap), but maybe woven film (tarps). |
| 4 | HDPE Buckets | Rigid plastic buckets made of high-density polyethylene (#2) |
| 5 | Remainder/Composite Other Plastic | Plastic that cannot be put into any other category. Examples include plastic piping, strapping, and string, siding, non-commercial/contaminated film, auto parts, etc. |
| 6 | HVAC Ducting | Sheet metal ducting used for heating/ventilation/ air conditioning systems. May include galvanized steel or aluminum ductwork. |
| 7 | Non-Ferrous Metal | Any metal item that is not magnetic. These items may be stainless steel, copper, brass, bronze, lead, zinc, or other materials. Examples include copper wire & brass pipe. |
| 8 | Other Ferrous Metal | Any other iron or steel that is magnetic. Examples include empty or dry paint cans, structural steel beams, boilers, metal pipes & other scrap ferrous items. Includes galvanized items such as nails & flashing. |
| 9 | All Glass | Glass typically related to construction/demolition activities including flat glass products, and glass products combined with other materials like windows. |
| 10 | Appliances/White Goods | Washing machines, washers, dryers, refridgerators, water heaters and other large appliances. |
| 11 | Batteries - Lead Acid | Lead Acid batteries such as car batteries, motorcycle batteries, and those commonly used in boats, mobility scooters, and recreational vehicles. |
| 12 | Electronics | E-Waste including printers, computers, equipment, cell phones, non-CRT televisions, and other consumer electronics. |
| 13 | Items with CRTs | Cathode Ray Tube televisions and monitors. |
| 14 | Tires | Rubber tires for cars, trucks, bicycles, and other vehicles and equipment. |
| 15 | Other Hazardous Waste | Chemical-based cleaning, agricultural or other products, medical waste and other HHW. |
| 16 | Paint | Oil and latex-based paints and stains. |
| 17 | Vehicle and Equipment Fluids | Engine oil, hydraulic fluids, transmission fluids, and other vehicle fluids, lubricants, fuels, etc. |
| 18 | Yard Waste | Leaves, grass, shrubs, brush, stumps and other plant prunings & trimmings. |
| 19 | Remainder/Composite Other Organics | Other Organics materials that do not fit any other category. |
| 20 | Clean OSB | Oriented Strand Board that has not been painted, treated, or stained. |
| 21 | Other Clean Engineered Wood | Non-OSB and Non-Plywood engineered wood (such as Chipboad and Particleboard) which has not been painted, treated, or stained. |
| 22 | Plywood | Clean plywood that has not been painted, stained, or treated. |
| 23 | Painted/Stained Wood | Engineered or dimensional wood materials that have had paint or stain applied. |
| 24 | Treated Wood | Engineered or dimensional wood materials that have been treated with fire retardant, pesticide or another preservative. |

| # | Material Category Name | Material Category Definition |
|---|---|---|
| 25 | Pallets/Crates | Clean wood pallets (whole and broken), crates, pieces of crates, and other packaging lumber and panel board. |
| 26 | Wood Furniture | Furniture made primarily of wood or wood composites, including tables, chairs, desks, dressers, and cabinets. |
| 27 | Asphalt Paving | Asphalt Pavement |
| 28 | Asphalt Shingles | Asphalt roofing shingles such as those used on a house or shed. |
| 29 | Carpet/Padding | Flooring application 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 & padding. |
| 30 | Ceiling Tiles | Acoustic or decorative ceiling panels, often mineral fiber or gypsum-based, used in building interiors. |
| 31 | Clean Dimensional Lumber | Lumber that has not been painted, stained or treated |
| 32 | Clean Gypsum Board | Drywall or Gypsum board generated from demolition or manufacturing. |
| 33 | Concrete/Brick/Rock | Bricks, concrete, and rock from construction or demolition of buildings & structures. |
| 34 | Dirt/Sand/Gravel | Soil, fine earth, gravel, and sand. |
| 35 | Insulation | Thermal or acoustic insulating materials, such as fiberglass batts, rigid foam board, spray foam, or mineral wool. |
| 36 | Remainder/Composite Other C&D | Other construction and demolition materials that do not fit into any other category. |
| 37 | Mixed MSW | Bagged, commingled, or unidentifiable wastes plus miscellaneous residuals that do not fit into any other defined category. |
| 38 | Bulky Items | Large hard-to-handle items that are not defined separately. Examples include all sizes and types of furniture (excluding predominantly wood furniture) mattresses, and base components, large household toys and housewares. |


STEAWAY
4-625-3535


11875 High Tech Avenue, Ste. 150 | Orlando, FL 32817
mswconsultants.com | 800.679.9220