City of Tacoma

2023 WASTE CHARACTERIZATION STUDY

PREPARED BY CASCADIA CONSULTING GROUP, INC.

NOVEMBER 2024

CASCADIA CONSULTING GROUP

CITY OF Tacoma

Contents

List of Figures

List of Tables

Executive Summary

Objectives

In 2023, the City of Tacoma Solid Waste Management Division ("City") commissioned Cascadia Consulting Group ("Cascadia") to conduct a waste characterization study of Tacoma's four primary waste streams: disposed waste, commingled recycling, organics, and construction and demolition (C&D) debris. Results from this study will enable the City to track progress toward its waste reduction and diversion goals and to identify additional diversion opportunities.

The objective of this study was to obtain statistically reliable data on the composition and quantity of material in each waste stream. To provide more detailed and accurate composition results, each stream was divided into substreams depending on the source ("generator") of material and how it was collected (Table 1). Composition results were then used to identify recoverable and contaminant materials in each generator substream and to calculate the proportion of recyclable materials successfully recycled.

Table 1. Characterized Substreams

Generator	Material Stream
Single-family	• Disposed waste • Commingled recycling
Multifamily	• Disposed waste • Commingled recycling
Overall Commercial	• Disposed waste
Commercial – public schools	• Disposed waste
Commercial – restaurants, grocery stores, private schools, and other commercial	• Organics
Commercial – select large venues	• Disposed waste • Commingled recycling
Self-haul	• Disposed waste
C&D	• C&D debris

Methodology

Cascadia and the City of Tacoma collaborated to set sample targets for each of the substreams characterized in this study. Cascadia then followed the methodology described below to collect, sort, and analyze samples.

Step 1. Sample Collection

From November 2023 to April 2024, Cascadia collected representative samples from each substream. Samples from single-family, multifamily, and commercial organics substreams were collected curbside and delivered to the Tacoma Recovery and Transfer Station (TRTC) for sorting. Samples from commercial public schools and large venues, self-haul, and C&D debris substreams were collected as loads arrived at the TRTC.

Step 2. Sample Sorting

Cascadia sorted samples into 53 unique material types, using either a hand-sort or visual characterization procedure. Single-family, multifamily, and commercial samples were hand sorted and self-haul and C&D samples were visually characterized. Cascadia converted visual estimates to weights using material-specific density factors.

Step 3. Data Analysis

Cascadia used sample weights from Step 2 to generate composition estimates for each substream. Composition estimates were applied to tonnage data, when available, to estimate material quantities. Composition results for the overall commercial disposed waste substream were modeled based on composition estimates from recent studies of disposed waste in the City of Seattle and King County.

To identify potential contaminants, the City classified materials into six recoverability groups that consider the potential methods of recovery available to each generator, as follows:

- Curbside recyclable
- Residential drop-off recyclable
- Compostable
- Recoverable C&D and wood
- Potentially recoverable
- Non-recoverable

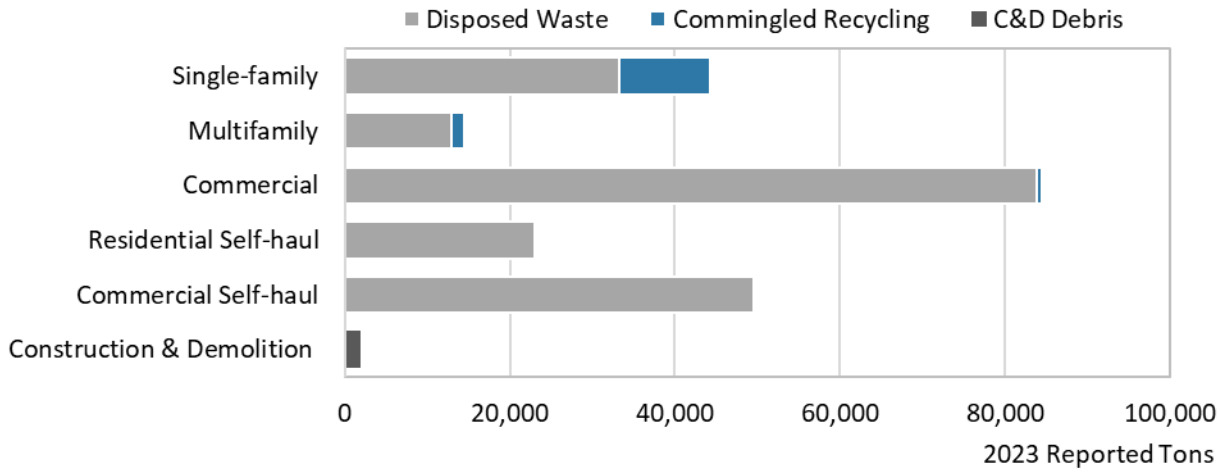
Key Findings

In 2023, the City of Tacoma reported 217,774 tons of material in its disposed waste, commingled recycling, and C&D debris streams.

- Single-family residents generated 20% (44,357 tons).
- Multifamily residents generated 7% (14,418 tons).

- Commercial businesses generated 39% (84,507 tons).[1]
- Self-haul customers (residential and commercial) generated 33% (72,648 tons).
- C&D contractors generated 1% (1,844 tons).

Figure 1. Estimated 2023 Tons by Generator and Stream



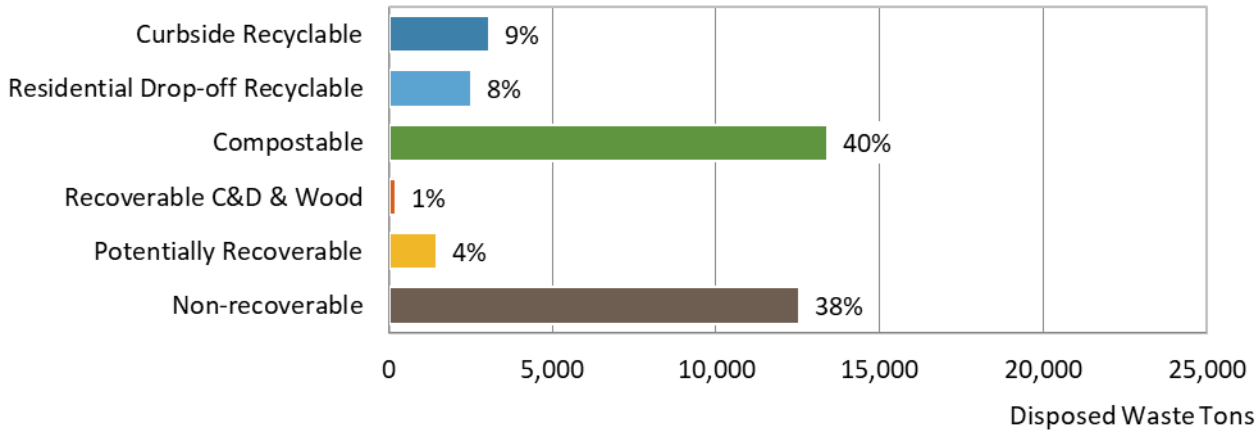
Single-family Residential

In 2023, single-family residents discarded 33,222 tons of material in the disposed waste stream and diverted 11,135 tons of material into commingled recycling.

- Overall, 57% (18,992 tons) of disposed waste was recyclable (curbside or residential drop-off) or compostable (Figure 2). Compostable materials accounted for 40% (13,397 tons).
- Organics, including non-compostable organics, was the most prevalent material class in disposed waste, accounting for over half (53% or 17,468 tons) of the substream.
- Contaminant materials that are not accepted in commingled recycling accounted for 29% (3,205 tons) of the commingled recycling substream.
- The capture rate for single-family curbside recyclables was 72%. Capture rates were highest for recyclable paper materials (80%) and lowest for recyclable plastic materials (50%).

[1] Total annual tonnage does not include commercial commingled recycling that is collected on the open market and not reported to the City. Open-market haulers collect the majority of commercial commingled recycling in Tacoma.

Figure 2. Disposed Waste by Recoverability Group: Single-family

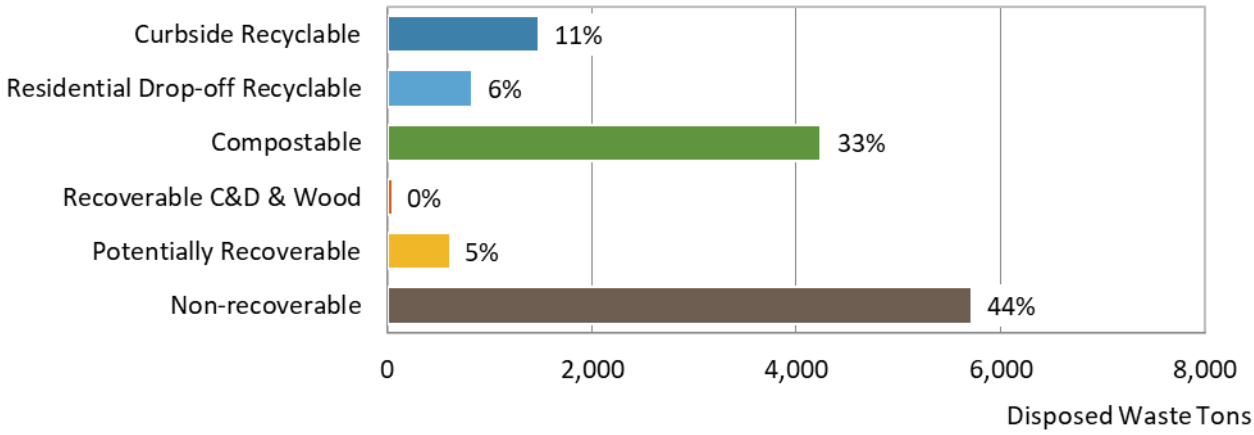


Multifamily Residential

In 2023, multifamily residents discarded 12,924 tons of material in the disposed waste stream and diverted 1,494 tons of material into commingled recycling.

- Overall, 50% (6,550 tons) of multifamily disposed waste was recyclable (curbside or residential drop-off) or compostable (Figure 3). Compostable materials accounted for 33% (4,243 tons).
- Organics, including non-compostable organics, was the most prevalent material class, accounting for nearly half (47% or 6,114 tons) of the substream.
- Contaminant materials that are not accepted in commingled recycling accounted for 28% (411 tons) of the commingled recycling substream.
- The capture rate for multifamily curbside recyclables was 42%. Capture rates were highest for recyclable paper materials (56%) and lowest for recyclable plastic materials (17%).

Figure 3. Disposed Waste by Recoverability Group: Multifamily

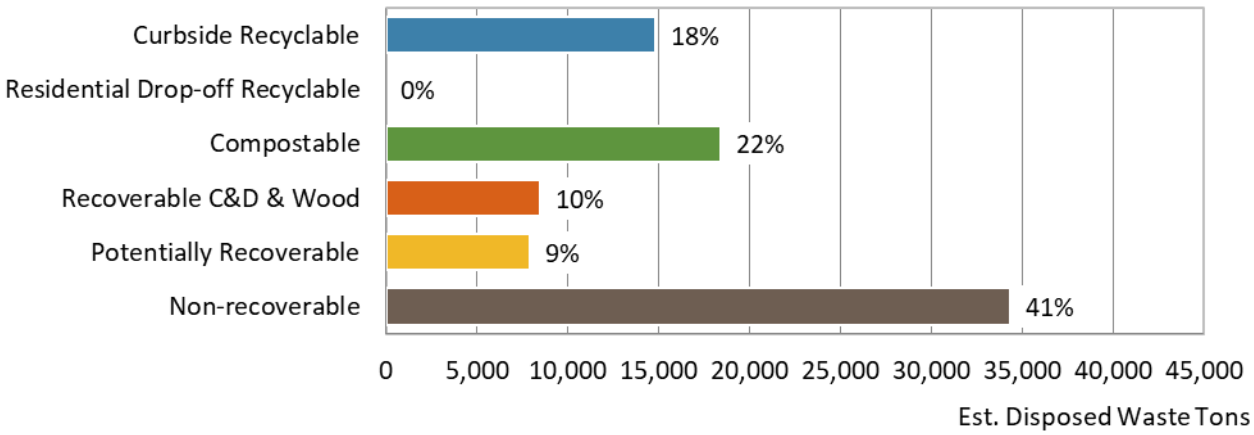


Modeled Commercial Disposed Waste

In 2023, commercial businesses discarded 83,964 tons of material in the disposed waste stream.

- Overall, 18% (14,799 tons) of disposed waste was curbside recyclable and 22% (18,420 tons) was compostable (Figure 4).
- Organics, including non-compostable organics, was the most prevalent material class in disposed waste, accounting for nearly half (43% or 35,888 tons) of the substream.

Figure 4. Modeled Disposed Waste by Recoverability Group: Commercial Overall



Commercial Organics

Cascadia characterized material in the organics stream for the following commercial sectors: restaurants, grocery stores, private schools, and other commercial (including religious organizations, event spaces, government buildings, and assisted living facilities).

- Accepted compostable materials accounted for 86.2%-99.5% of the material in the organics stream across all sectors (Figure 5). Nearly all of this material was food scraps.
- Potentially compostable materials, including compostable wood, paper, and plastics, that are not currently accepted in Tacoma's organics stream accounted for 0.0%-2.1% of each substream.
- Other contaminants accounted for 13.4% of the private school organics substream.

Figure 5. Organics Key Materials: Select Commercial Sectors

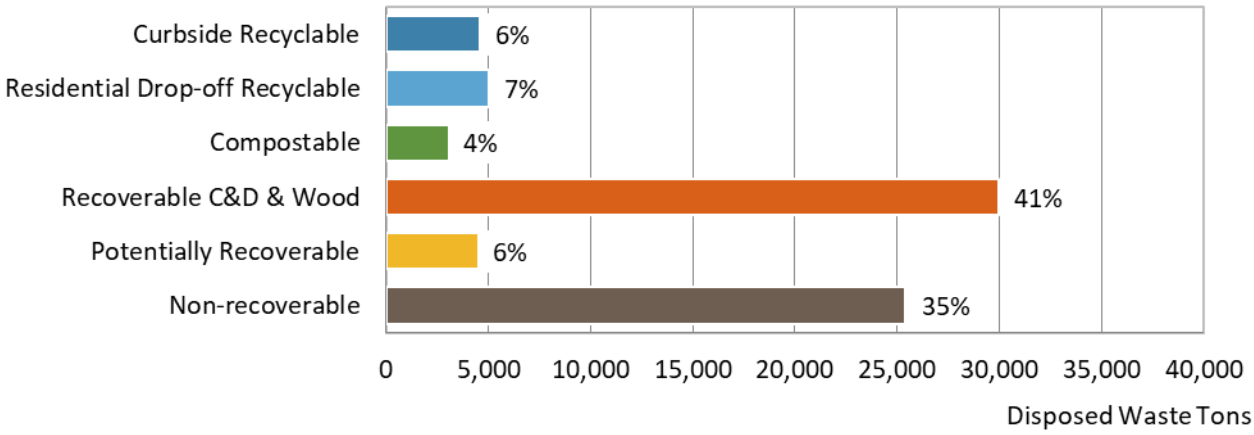
	Restaurants	Grocery Stores	Private Schools	Other Commercial
Food Scraps	95.1%	99.2%	86.2%	95.0%
Leaves & Yard Debris	2.0%	0.3%	0.0%	2.7%
Potentially Compostable Wood	0.0%	0.0%	0.0%	0.0%
Potentially Compostable Paper	2.1%	0.2%	0.3%	0.4%
Potentially Compostable Plastic	0.0%	0.0%	0.0%	0.0%
Other Contaminants	0.9%	0.3%	13.4%	1.9%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Self-haul Disposed Waste

Self-haul customers delivered 72,648 tons of material for disposal in 2023.

- Overall, 65% (47,217 tons) of self-haul disposed waste was recoverable or potentially recoverable (Figure 6).
- Recoverable C&D and wood materials accounted for 41% (29,960 tons). These materials can be reused, repurposed, or recycled.
- For residential customers, recoverable C&D and wood materials were the most prevalent, accounting for 57% (13,240 tons) of the residential self-haul disposed waste substream.
- For commercial customers, non-recoverable materials were the most prevalent, accounting for 39% (19,351 tons) of the commercial self-haul disposed waste substream.

Figure 6. Self-haul Disposed Waste by Recoverability Group: Overall

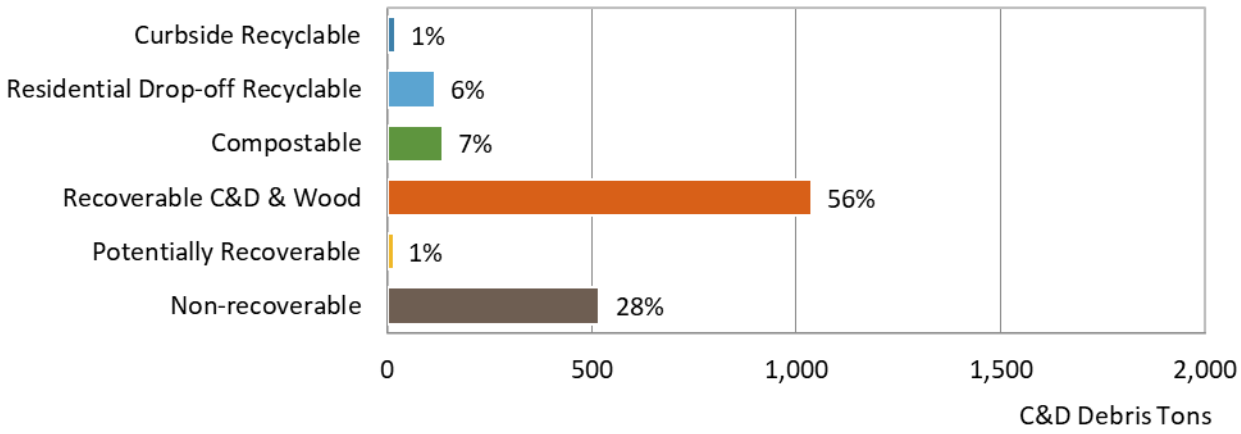


Construction and Demolition

C&D generators disposed of 1,844 tons of material in the C&D debris stream in 2023.

- Overall, 71% (1,325 tons) of C&D debris was recoverable or potentially recoverable (Figure 7).
- Recoverable C&D and wood materials accounted for 56% (1,037 tons). These materials can be reused, repurposed, or recycled.

Figure 7. C&D Debris by Recoverability Group: Overall



1. Introduction and Objectives

The City of Tacoma Solid Waste Management Division ("City") provides curbside disposed waste, commingled recycling, and/or organics collection service to 57,173 residential and 5,313 commercial customer accounts. The City also manages waste disposal and recovery for material self-hauled to the Tacoma Recycling and Transfer Center (TRTC) and generated at construction and demolition (C&D) sites.

The City commissioned Cascadia Consulting Group ("Cascadia") to conduct a waste characterization study of Tacoma's waste streams. The 2023 study aims to provide updated composition data for Tacoma's disposed waste and C&D debris streams, as well as to characterize the single-family and multifamily commingled recycling and commercial organics substreams, which were not sampled in 2009 or 2015. The study will also set baseline capture rates for recyclable materials to inform the City's solid waste planning by identifying additional recycling and other diversion opportunities.

The remainder of this report contains the following:

- A summary of the study methodology
- Composition findings for single-family, multifamily, commercial, self-haul, and C&D generators
- Appendices with additional results and more detailed methodology, as follows:
  - Composition findings for large venue generators (Appendix A)
  - Detailed composition results for all generators and streams (Appendix B)
  - Material type definitions and recoverability groups (Appendix C)
  - A detailed study design (Appendix D)
  - Waste composition calculations (Appendix E)

2. Summary of Methodology

This section describes the material streams and generators that were evaluated for the City of Tacoma. This section also describes Cascadia's three-step approach to characterizing each substream:

- **Step 1: Collect samples** directly from generators and from commercial haulers.
- **Step 2: Sort samples** using hand-sort and visual characterization methods.
- **Step 3: Analyze data** to generate composition estimates for each substream.

Appendix D provides more detail on the study methodology and Appendix E provides an explanation of the calculations used in data analysis.

Study Parameters

This study characterized material in the disposed waste, commingled recycling, organics, and C&D debris streams, as defined below. The four streams are distinguished by their composition characteristics, collection method, and whether material is sent for further processing or directly to a landfill.

- **Disposed waste** is material that will be sent to a landfill without any additional processing to remove materials with value.
- **Commingled recycling** is typical dry good material that is normally hauled to a facility that specializes in removing the recoverable materials. It is placed in a container by the generator and collected by the City on a regular, contracted schedule. At Tacoma Dome, the commingled recycling stream accepts cardboard only.
- **Organics** is food waste material placed in a container by a commercial generator. This material is diverted from disposal and is typically serviced with residential yard waste collection routes.
- **C&D debris** is waste material transported by the City to a third-party processor in unscheduled or on-call roll-off loads that service construction and demolition sites.

To provide more detailed and accurate composition results, each stream was divided into substreams depending on the source (or "generator") of material and how it was collected and delivered to the TRTC. Each generator, as well as specific groups within each generator, is defined below.

- **Single-family** generators are residential properties with a single dwelling or with fewer than three (two or less) dwelling units. Each dwelling unit typically has its own set of waste and diversion bins.

- **Multifamily** generators are residential properties with three or more dwelling units. Waste and recycling bins are shared among many dwelling units.
- **Commercial** generators are non-residential properties including businesses, industries (e.g., factories, farms), institutions (e.g., correctional facilities, hospitals, churches), and governments (e.g., highways, parks). The specific sectors evaluated for this study are public schools, restaurants, grocery stores, private schools, other commercial sectors, and large venues.
- **Self-haul** generators are residents, businesses, or institutions that generate waste and haul it directly to a transfer station. Self-haul generators do not have permits to operate as waste haulers.
  - **Residential self-haul** material is hauled by a resident to a transfer station.[2]
  - **Commercial self-haul** material is hauled by a business or institution to a transfer station. Disposed waste from public schools is self-hauled but classified as commercial for this study. [3]
- **C&D** generators are construction and demolition sites.

In this study, results are organized by generator rather than by stream. For example, results for the single-family disposed waste and single-family commingled recycling substreams are reported together. Table 2 lists the substreams sampled for this study.

Table 2. Characterized Substreams

Generator	Material Stream
Single-family	• Disposed waste • Commingled recycling
Multifamily	• Disposed waste • Commingled recycling
Overall Commercial	• Disposed waste
Commercial – public schools	• Disposed waste
Commercial – restaurants, grocery stores, private schools, and other commercial	• Organics
Commercial – select large venues	• Disposed waste • Commingled recycling
Self-haul	• Disposed waste

[2] Some residential self-haul samples included material generated at a residential property but hauled by a business (e.g., a contractor or junk hauler) to a transfer station.
[3] None of the commercial self-haul samples included material generated at a residential property but hauled by a business (e.g., a contractor or junk hauler). Materials from a home office (even if hauled by a resident) were considered commercial samples.

Generator	Material Stream
C&D	• C&D debris

Sampling Schedule and Targets

Cascadia collected samples from each substream during two field work seasons:

- Fall: November-December 2023
- Spring: April 2024

To obtain reliable composition estimates, Cascadia set sample targets that accounted for known variation in each substream and evenly divided samples between seasons. Table 3 shows the number of samples collected and sorted for each substream. Substreams without samples (e.g., commercial commingled recycling or self-haul organics) were outside the scope of this study. To characterize the overall commercial disposed waste substream, Cascadia modeled Tacoma's material composition estimates based on recent regional studies instead of collecting and sorting samples in the field. See Step 3. Data Analysis for more details on the modeling process.

Table 3. Sample Counts by Generator and Stream

	Sorted Samples				
	Disposed Waste	**Commingled Recycling**	**Organics**	**C&D Debris**	**Total**
Single-family	**97**	**94**	**-**	**-**	**191**
Multifamily	**40**	**36**	**-**	**-**	**76**
Commercial		-			
Public schools	10	-	-	-	**10**
Restaurants	-	-	10	-	**10**
Grocery stores	-	-	13	-	**13**
Private schools	-	-	6	-	**6**
Other commercial	-	-	9	-	**9**
Large venues	8	3	-	-	**11**
Self-haul	**133**	**-**	**-**	**-**	**133**
Residential	77	-	-	-	**77**
Commercial	56	-	-	-	**56**
Construction & Demolition	**-**	**-**	**-**	**28**	**28**

Step 1. Sample Collection

The following sections describe what constitutes a sample and how samples were collected for each substream. No samples were collected for the overall commercial disposed waste substream, which was modeled using previously collected composition data from neighboring jurisdictions.

Single-family

Cascadia randomly selected sampling routes from the City's complete list of single-family collection routes and randomly selected addresses from each selected route. The City reviewed the final list of addresses to ensure that collection was feasible and that communities were equitably represented.

The City collected both the disposed waste and the commingled recycling set-outs at each selected household, including bagged material next to either set-out. If a household only had one set-out, the City collected that container and recorded a sample weight of zero for the other set-out. If a household had no set-outs or if one or both set-outs had already been serviced, the City did not collect any containers from that household. Instead, the City collected containers from the next house along the route with a set-out.

The City delivered collected containers to the TRTC for sorting. Each set-out was considered one sample, regardless of how much material was present.

Multifamily

Cascadia randomly selected properties from the City's complete list of multifamily properties and worked with the City to determine an appropriate sampling schedule.

The City collected one disposed waste container and one commingled recycling container from each selected property. If a property had more than one container for each stream, the City selected the container with the most material for sampling. If necessary, they collected multiple containers to meet the sample targets. If the composition of material in each container was substantially different, the City collected multiple containers to be combined and mixed prior to sampling. If a property only had containers for one stream, the City collected material from those containers and recorded the sample weight for the other stream as zero.

The City delivered collected containers to the TRTC for sampling and sorting. Cascadia worked with facility personnel to select a random 200-250-pound sample of disposed waste and a random 125-pound sample of commingled recycling from the containers from each property.

Commercial

PUBLIC SCHOOLS

Tacoma Public Schools delivers one or two loads of disposed waste to the TRTC each day. On each day of field work, scale house personnel directed the first vehicle to arrive from Tacoma Public Schools to a designated area of the tipping floor for sample collection. Cascadia worked with facility personnel to select a random 200-pound sample from the selected load.

RESTAURANTS, GROCERY STORES, PRIVATE SCHOOLS, AND OTHER COMMERCIAL

On each day of field work, Cascadia randomly selected businesses for sampling from the City's list of eligible businesses that receive City-contracted organics collection service that day. Cascadia

assigned each business to one of the three priority generator types identified by the City (restaurants, grocery stores, or private schools) or a fourth mixed generator type (other commercial). Other commercial generators included religious organizations, event spaces, government buildings, and assisted living facilities. The City then collected enough organics carts to meet the 200-250-pound sample target for each business and delivered the carts to the TRTC for sorting.

LARGE VENUES

Cascadia characterized material from the disposed waste and commingled recycling streams from Cheney Stadium and the disposed waste and cardboard recycling streams from Tacoma Dome. The City collected one container per stream from each venue and delivered the containers to the TRTC for sampling and sorting. Cascadia worked with facility personnel to select a random 200-pound sample from each of the disposed waste and commingled recycling containers. For the cardboard recycling stream from Tacoma Dome, the entire load was considered one sample.

Self-haul

Scale house personnel at the TRTC used a pre-determined sampling interval (*n*) to select self-haul vehicles delivering disposed waste from residential and commercial properties. Cascadia calculated this interval for each sampling day by dividing the expected number of arriving vehicles by the number of allocated samples on that day. Scale house personnel then interviewed drivers about the source of their load and selected every "n^{th}" residential and every "n^{th}" commercial vehicle delivering self-haul disposed waste for sampling. This systematic sampling method provided a way to select random loads while meeting pre-specified sampling targets.

Selected self-haul vehicles were directed to a designated area of the tipping floor for sample collection. The entire load from each selected vehicle was considered one sample.

Construction & Demolition

Unscheduled residential C&D loads and regularly scheduled commercial C&D loads are typically hauled to a third-party facility for processing. On each day of field work, Cascadia worked with the City to identify and redirect unscheduled residential C&D loads, if any, to the TRTC for sample collection until the daily sample target was met. The City also redirected regularly scheduled commercial C&D loads to the TRTC until the daily sample target was met.

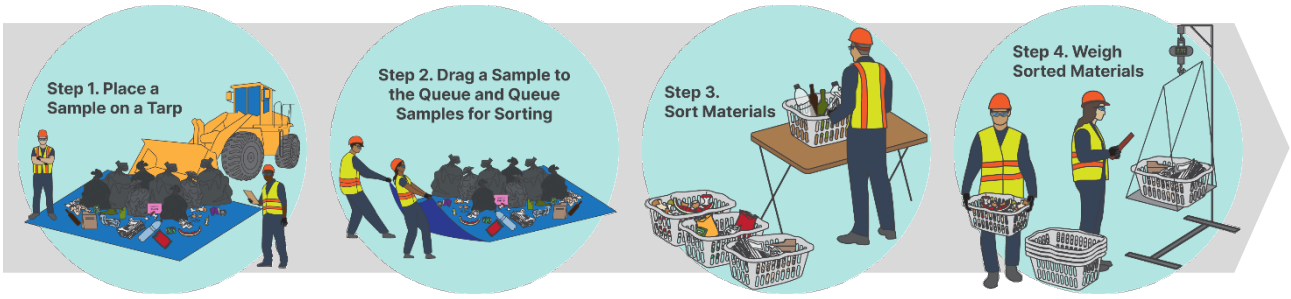
Upon arrival, C&D vehicles were directed to a designated area of the tipping floor for sample collection. The entire load from each C&D vehicle was considered one sample.

Step 2. Sample Sorting

Hand Sort

Cascadia characterized samples from the single-family, multifamily, and commercial substreams using a hand sort procedure, except for the Tacoma Dome cardboard recycling substream. Hand sorting is the preferred method for substreams with well-mixed or homogenous material. The sort team hand-sorted each sample into 53 unique material types (defined in Appendix C). The sort team recorded the weight for each sorted material type into OSCAR, a customized database, and reviewed the data for errors before exporting it to Excel for analysis (Figure 8).

Figure 8. Hand-sort Procedure



Visual Sort

Cascadia characterized samples from the self-haul, C&D, and Tacoma Dome cardboard recycling substreams using a visual sort procedure. Visual sorting is the preferred method for substreams with bulky materials that are typically concentrated in one area of a load and for substreams containing highly variable and heterogenous material types. Selecting a small subset of material for hand sorting would not capture the true material composition in these substreams.

A trained visual estimator on the sort team first measured the total volume and weight of waste in each sample before it was tipped. Once the sample was tipped, the estimator recorded the percentage of the total sample volume corresponding to each of the six material classes (paper, plastic, glass, metal, organics, and other materials) into OSCAR. Next, they recorded the percent volume of each material type within each material class. The estimator reviewed the data for entry errors before converting the percent volumes into weights using material-specific density factors. Appendix D describes the visual sort procedure in greater detail.

Step 3. Data Analysis

Cascadia used two different approaches to calculate material composition estimates depending on the substream.

Sampled Substreams

STEP 1. CALCULATE COMPOSITION ESTIMATES

For substreams that were sampled in the field (all substreams except commercial disposed waste), Cascadia calculated estimates by aggregating individual sample data using a weighted average procedure. Zero-weight samples from single-family and multifamily households that only had one set-out were not included in composition estimates. Calculations for the weighted averages were based on tonnage data from the City of Tacoma. Appendix E describes the composition calculations and weighting factors in greater detail.

STEP 2. APPLY ESTIMATES TO TONNAGE DATA

Next, Cascadia applied composition estimates to available annual tonnage data to estimate annual quantities for each material type in each substream. The City provided 2023 annual tonnage data for overall residential, commercial, self-haul, and C&D generators.[4] Cascadia used population estimates, household counts, and average household size to split the residential tonnage into single-family and multifamily tons and to estimate the multifamily tons collected along commercial routes.

Organics tonnage data were not available for this study.

Overall Commercial Disposed Waste

STEP 1. MODEL COMPOSITION ESTIMATES

Cascadia modeled the composition of the overall commercial disposed waste substream based on recent commercial composition study data from the City of Seattle and King County.[5, 6] These two studies were selected because of their recency, robust number of samples, and geographic proximity to Tacoma. Cascadia did not collect or sort any commercial disposed waste samples from Tacoma for this study, other than those for the public schools and large venue substreams.

---

[4] Self-haul tons were allocated to residential or commercial generators based on payment method (cash or account), while self-haul samples were allocated by interviewing self-haul customers about the source of their load. Some customers with commercial accounts delivering material from residential properties (e.g., contractors or landscapers) were therefore classified as residential and composition results from "residential" self-haul samples were applied to "commercial" self-haul tons. These samples were a minority and do not substantially impact the overall compositions.

[5] Seattle Public Utilities, *City of Seattle 2022 Commercial Garbage Stream Composition Study*, 2022. www.seattle.gov/documents/Departments/SPU/Documents/Reports/SolidWaste/2022-CommercialWasteStreamCompositionStudy.pdf

[6] King County Solid Waste Monitoring Program, *2022 King County Waste Characterization Report and Customer Survey Report*, 2022. https://your.kingcounty.gov/dnrp/library/solid-waste/Solid-waste-planning-monitoring/Solid-waste-monitoring/waste-characterization-study-2022.pdf

To model the commercial disposal stream, Cascadia first aligned the current study list with those used for the City of Seattle and King County studies. Material types that were not individually defined across all studies were combined with another appropriate material type. This was only the case for a few materials, including:

- Cleaners and other household products (combined with other household hazardous waste)
- Motor oil/fuels (combined with other household hazardous waste)
- Bathroom waste (combined with other residuals)

STEP 2. APPLY MODELED ESTIMATES TO TONNAGE DATA

Next, Cascadia combined Tacoma's current study results for public school and large venue disposed waste substreams based on estimated tons for individual material types. Cascadia then combined the composition findings from City of Seattle and King County into a composition to represent the remaining commercial disposed waste tons. The tons were then all combined to estimate an overall composition for Tacoma's commercial generators.

3. Findings

Interpreting Results

This section presents the overall structure and format of the composition results, along with detailed information about how numbers are reported in the study.

How Study Findings are Presented

Composition results are grouped by generator and are presented in four formats:

1. An overview of **composition by material class** is presented as a bar chart.
2. An overview of **composition by recoverability group** is presented as a bar chart.
3. **Top most prevalent** recoverable or contaminant material types are presented in a table.
4. **Detailed composition and quantity estimates** for all 53 material types are presented in a table.

For single-family and multifamily generators, commingled recycling capture rates are also presented as a bar chart and in a condensed composition table. **Recycling capture rates** are defined as follows:

Capture rate = tons of curbside recyclable material in the commingled recycling stream divided by tons of curbside recyclable material in the commingled recycling and disposed waste streams

For restaurants, grocery stores, private schools, and other commercial sectors, only composition estimates are presented. Additionally, material types are grouped into six key material groups instead of the six primary classes to highlight materials that are more prevalent in the organics stream. This includes potentially compostable materials that are not currently accepted in Tacoma's organics stream.

Appendix A contains composition results for the two large venues, Cheney Stadium and Tacoma Dome. Appendix B contains detailed composition results for all substreams, including commercial organics sectors. Appendix C contains material type definitions, organics key material groups, and recoverability group assignments.

RECOVERABILITY GROUPINGS

To identify potential contaminants, material types are classified into six recoverability groups that consider the availability and potential methods of recovery. These assignments reflect recovery programs available in Tacoma in 2023 and vary slightly depending on generator. See Appendix C for all assignments.

- **Curbside Recyclable:** Materials that are currently accepted in residential curbside and multifamily recycling programs in Tacoma or that are recycled through commercial collection programs (e.g., corrugated cardboard, aluminum cans).
- **Residential Drop-off Recyclable:** Materials that are currently accepted for residential recycling at the TRTC (e.g., clean plastic film, ferrous metals) and/or at City-managed drop-off stations throughout Tacoma for residential generators (e.g., glass containers). Both single-family and multifamily residents can drop off materials through these programs. This recoverability group does not apply to commercial generators.
- **Compostable:** Materials that are currently accepted in residential curbside and multifamily food and yard waste programs in Tacoma, composted through commercial collection programs, or accepted for collection at the TRTC (e.g., food scraps, leaves and yard debris).
- **Recoverable C&D and Wood:** Construction and demolition materials that can be reused, repurposed, or recycled at dedicated C&D processing facilities (e.g., dimensional lumber and engineered wood).
- **Potentially Recoverable:** Materials that can be diverted from landfill through safe disposal, specialty recycling programs, or other reuse programs designed for waste products (e.g., e-waste, fluorescent light tubes). Markets exist for these specialty recycling and reuse programs but are either not well developed or are not currently utilized.
- **Non-recoverable:** Materials that are not readily recyclable or compostable or that face other market, technology, or programmatic barriers (e.g., bathroom waste).

The **contamination rate** for each substream can be calculated by adding together the composition estimates for materials that are not accepted in the substream, based on their recoverability group. For example, the contamination rate for the commingled recycling stream is the sum of the composition estimates for residential drop-off recyclable, compostable, recoverable C&D and wood, potentially recoverable, and non-recoverable materials. Only curbside recyclable materials are accepted in commingled recycling.

Reported Numbers and Rounding

Each detailed composition table presents the overall estimated percent composition of each recoverability group, material class, and material type by weight, including the 90% confidence interval for each. Cascadia calculated the composition and confidence intervals according to the study's composition calculations and statistical procedures.

Composition tables also present estimated tons of each material type. This was calculated by applying estimated composition percentages to the estimated total tons of material in each substream, based on City-provided tons. All weight estimates report units of tons per year unless otherwise noted.

To keep the composition tables and figures readable, estimated tonnages are rounded to the nearest ton, and estimated percentages are rounded to the nearest percent or tenth of a percent.

Percentages less than 0.05% are shown as 0.0%. True zeros in tables are displayed as a dash ("–"). Each number in the text uses the same rounding as the number in the figure or table being referenced. Due to this rounding, the tonnages presented in the report, when added together, may not exactly match the subtotals and totals shown. Similarly, the percentages, when added together, may not exactly match the totals shown. Each number reported in the text is accurate and has been rounded at the end of data analysis, after performing all calculations with more precise values. As such, using the rounded percentages to calculate tonnages or sums may yield results that differ from the numbers shown in the report.

2023 Waste Quantities

In 2023, the City of Tacoma reported 217,774 tons of material in its disposed waste, commingled recycling, and C&D debris streams. Single-family residents generated 20% (44,357 tons) of this material, multifamily residents generated 7% (14,418 tons), commercial businesses generated 39% (84,507 tons), self-haul customers generated 33% (72,648 tons), and C&D contractors generated 1% (1,844 tons; Figure 9).

Total annual tonnage does not include commercial commingled recycling that is collected on the open market and not reported to the City. Open-market haulers collect the majority of commercial commingled recycling in Tacoma.

Figure 9. Estimated 2023 Tons by Generator and Stream

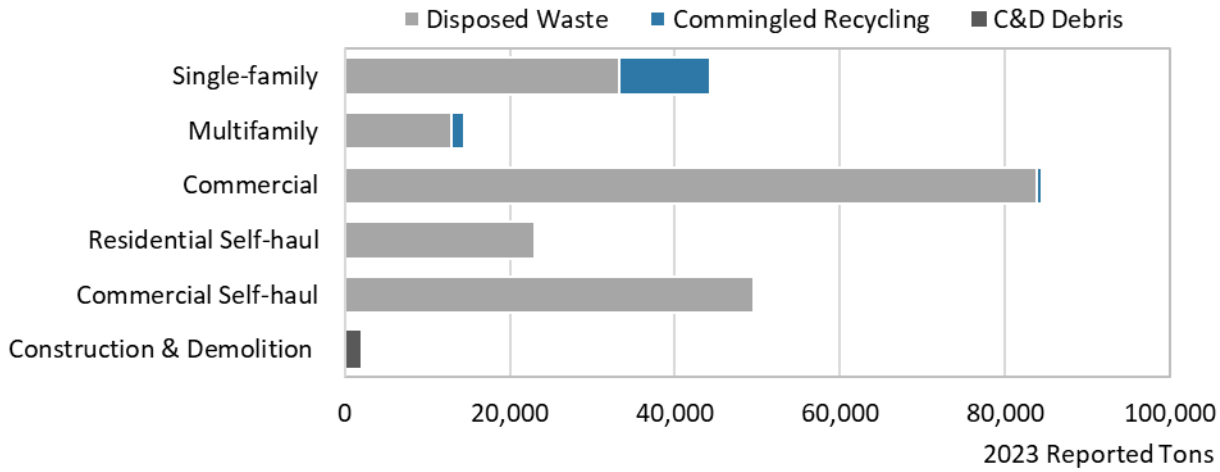


Table 4 compares disposed waste tons by generator for 2015, when the City conducted its most recent waste characterization study, and 2023.

Table 4. Comparison of 2015 and 2023 Disposed Waste Tons

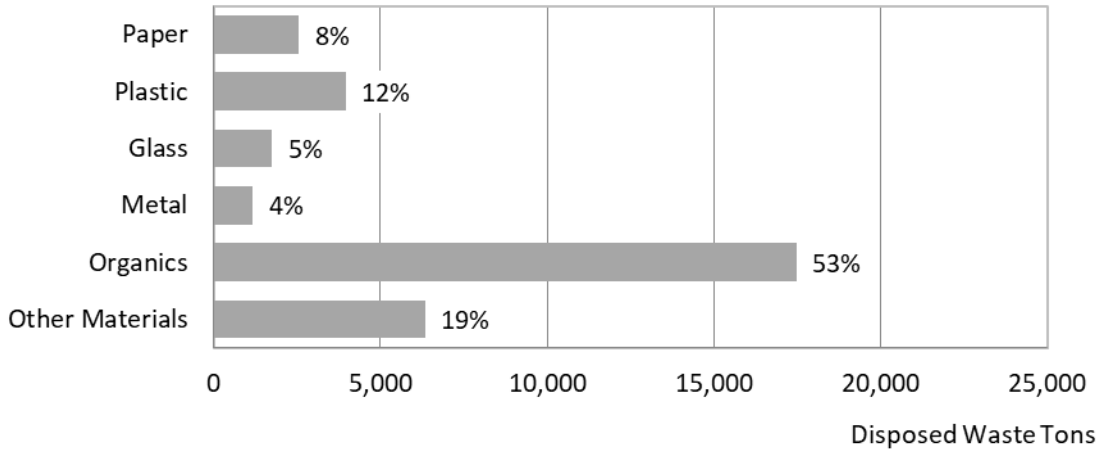
	Tonnage		Percent of Total	
	2015	2023	2015	2023
Single-family	35,169	33,222	26%	16%
Multifamily	11,456	12,924	8%	6%
Commercial	60,647	83,964	44%	41%
Self-haul Residential	12,564	23,034	9%	11%
Self-haul Commercial	17,540	49,614	13%	24%
Total	**137,376**	**202,757**	**100%**	**100%**

Single-family Residential Findings

Disposed Waste

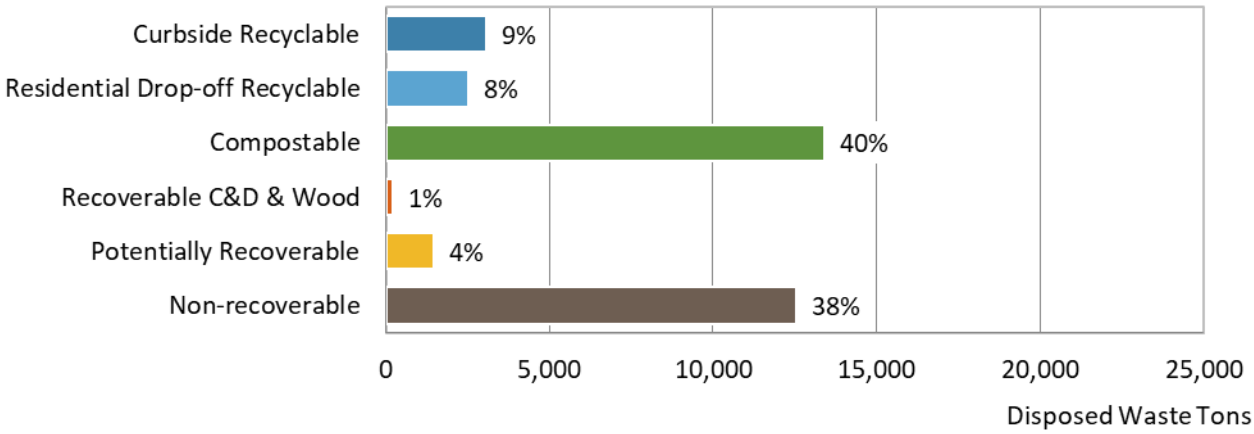
In 2023, single-family residents discarded 33,222 tons of material in the disposed waste stream. Organics was the most prevalent material class, accounting for over half (53% or 17,468 tons) of the substream (Figure 10). Other materials (19% or 6,336 tons) and plastic (12% or 3,951 tons) were the next most prevalent material classes.

Figure 10. Disposed Waste by Material Class: Single-family



Overall, 57% (18,992 tons) of single-family disposed waste was recyclable (curbside or residential drop-off) or compostable (Figure 11). Curbside recyclable materials accounted for 9% (3,067 tons), residential drop-off recyclable materials accounted for 8% (2,258 tons), and compostable materials accounted for 40% (13,397 tons) of the substream. Recoverable C&D and wood accounted for 1% (228 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 4% (1,464 tons).

Figure 11. Disposed Waste by Recoverability Group: Single-family



Curbside recyclable and compostable materials accounted for 49.6% (16,464 tons) of the single-family disposal substream (Table 5). Food scraps (39.9% or 13,261 tons) was the most prevalent compostable material type and mixed recyclable fibers (3.3% or 1,104 tons) was the most prevalent curbside recyclable material type.

Table 5. Disposed Waste Most Prevalent Curbside Recoverable Material Types: Single-family

Material	Est. %	+ / -	Est. Tons
Food Scraps	39.9%	3.6%	13,261
Mixed Recyclable Fibers	3.3%	0.8%	1,104
#1 PET Containers	1.9%	0.2%	642
Corrugated Cardboard	1.2%	0.3%	392
#5 PP Containers	1.0%	0.1%	348
Tin/Steel Cans	0.7%	0.2%	227
Aluminum Cans	0.6%	0.2%	199
Leaves & Yard Debris	0.4%	0.3%	136
#2 HDPE Containers - Pigmented	0.3%	0.1%	114
#2 HDPE Containers - Natural	0.1%	0.0%	40
Total for Top Recoverable Materials	**49.6%**		**16,464**
All Other Recoverable Materials	**0.0%**		**-**
All Other Materials	**50.4%**		**16,758**
Total Annual Tons	**100.0%**		**33,222**

Percentages for material types may not total 100% due to rounding.

Food scraps (39.9% or 13,261 tons) was also the most prevalent material type overall in the single-family disposed waste substream (Table 6). Other residuals (9.9% or 3,291 tons) was the most prevalent non-recoverable material type.

Table 6. Disposed Waste Detailed Composition Results: Single-family

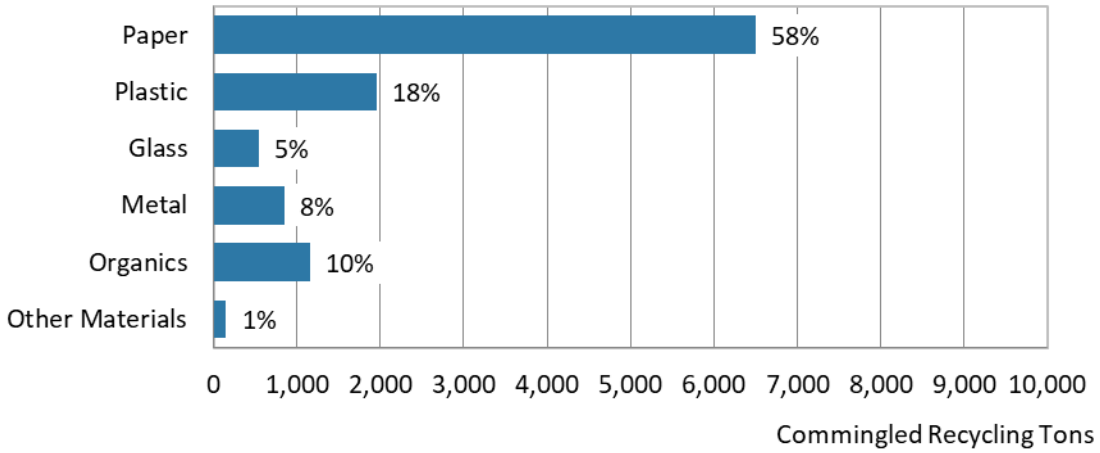
Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**9.2%**	**1.0%**	**3,067**	**Recoverable C&D & Wood**	**0.7%**	**0.6%**	**228**
Residential Drop-off Recyclable	**7.6%**	**1.7%**	**2,528**	**Potentially Recoverable**	**4.4%**	**0.9%**	**1,464**
Compostable	**40.3%**	**3.6%**	**13,397**	**Non-recoverable**	**37.7%**	**3.4%**	**12,537**
Paper	**7.7%**	**1.0%**	**2,556**	**Organics**	**52.6%**	**3.7%**	**17,468**
Corrugated Cardboard	1.2%	0.3%	392	Food Scraps	39.9%	3.6%	13,261
Mixed Recyclable Fibers	3.3%	0.8%	1,104	Leaves & Yard Debris	0.4%	0.3%	136
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	0.2%	0.1%	63
Polycoated & Lined Containers	2.2%	0.4%	731	Roofing & Siding Wood	0.0%	0.0%	1
Non-recoverable Composite Paper	1.0%	0.3%	329	Carpet	-	-	-
Plastic	**11.9%**	**1.3%**	**3,951**	Tires	-	-	-
#1 PET Containers	1.9%	0.2%	642	Textiles & Shoes	2.3%	0.6%	764
#2 HDPE Containers - Natural	0.1%	0.0%	40	Food-soiled & Compostable Paper	7.1%	0.9%	2,369
#2 HDPE Containers - Pigmented	0.3%	0.1%	114	Treated Wood	0.0%	0.0%	1
#5 PP Containers	1.0%	0.1%	348	Other Wood	0.1%	0.1%	20
#3-7 Plastics (excluding #5)	0.3%	0.0%	84	Other Non-recoverable/Composite Organics	2.6%	1.3%	853
Clean Plastic Film	1.7%	0.4%	575	**Other Materials**	**19.1%**	**3.8%**	**6,336**
#6 Expanded Polystyrene	0.6%	0.1%	198	Construction & Demolition (non-wood)	0.5%	0.6%	164
#7 Potentially Compostable Plastic	0.0%	0.0%	6	E-waste	0.5%	0.3%	160
Non-recoverable Plastic Film	2.2%	0.2%	718	Vehicle Batteries	-	-	-
Disposal Bags	2.0%	1.2%	654	Household Batteries - Rechargeable	0.0%	0.0%	2
Potentially Compostable Disposal Bags	0.0%	0.0%	5	Household Batteries - Alkaline or Other	0.1%	0.1%	40
Non-recoverable/Composite Plastics	1.7%	0.3%	566	Fluorescent Light Tubes	0.0%	0.0%	3
Metal	**3.5%**	**1.0%**	**1,167**	Oil-based Paint	-	-	-
Aluminum Cans	0.6%	0.2%	199	Cleaners & Other Household Products	0.1%	0.0%	25
Tin/Steel Cans	0.7%	0.2%	227	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.2%	0.1%	57	Other Household Hazardous Waste	0.5%	0.2%	171
Ferrous Metals	0.6%	0.7%	209	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.0%	12	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.9%	0.4%	300	Bathroom Waste	7.0%	1.9%	2,313
Other Aluminum	0.5%	0.1%	164	Mixed Furniture	-	-	-
Glass	**5.2%**	**1.6%**	**1,743**	Nondistinct Fines	0.5%	0.2%	167
Glass Containers	4.8%	1.4%	1,591	Other Residuals	9.9%	2.9%	3,291
Non-recoverable/Composite Glass	0.5%	0.3%	152				
Sample Count	***97***			**Total**	**100%**		**33,222**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commingled Recycling

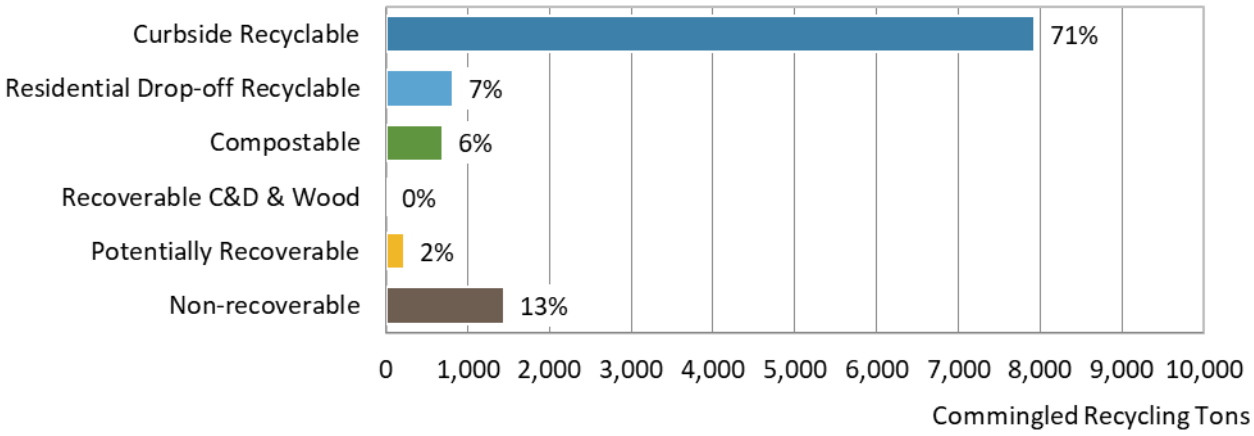
In 2023, single-family residents diverted 11,135 tons of material into the commingled recycling stream. Paper was the most prevalent material class, accounting for over half (58% or 6,498 tons) of the substream (Figure 12). Plastic (18% or 1,950 tons) and organics (10% or 1,151 tons) were the next most prevalent material classes.

Figure 12. Commingled Recycling by Material Class: Single-family



Nearly three-quarters (71% or 7,930 tons) of single-family commingled recycling was curbside recyclable (Figure 13). Residential drop-off recyclables, including clean plastic film and glass containers, accounted for 7% (822 tons) of the substream. Compostable materials accounted for 6% (702 tons), recoverable C&D and wood accounted for less than 1% (7 tons), and potentially recoverable materials accounted for 2% (231 tons). Non-recoverable materials accounted for 13% (1,443 tons).

Figure 13. Commingled Recycling by Recoverability Group: Single-family



Contaminant materials that are not accepted in commingled recycling accounted for 28.8% (3,205 tons) of the single-family commingled recycling substream (Table 7). Glass containers (4.4% or 486 tons) was the most prevalent residential drop-off recyclable material type, food scraps (6.1% or 680 tons) was the most prevalent compostable material type, and non-recoverable/composite metals (1.0% or 111 tons) was the most prevalent potentially recoverable material type. Food-soiled and compostable paper (2.7% or 301 tons) was the most prevalent non-recoverable material type.

Table 7. Commingled Recycling Most Prevalent Contaminant Material Types: Single-family

Material	Est. %	+ / -	Est. Tons
Food Scraps	6.1%	3.1%	680
Glass Containers	4.4%	2.3%	486
Food-soiled & Compostable Paper	2.7%	0.7%	301
Non-recoverable/Composite Plastics	2.6%	2.6%	293
Polycoated & Lined Containers	2.2%	0.4%	242
Clean Plastic Film	2.0%	0.5%	218
Non-recoverable Plastic Film	1.4%	0.4%	160
Non-recoverable/Composite Metals	1.0%	0.8%	111
Non-recoverable Composite Paper	0.9%	0.3%	97
Textiles & Shoes	0.7%	0.4%	76
Total for Top Contaminant Materials	**23.9%**		**2,664**
All Other Contaminant Materials	**4.9%**		**541**
All Other Materials	**71.2%**		**7,930**
Total Annual Tons	**100.0%**		**11,135**

Percentages for material types may not total 100% due to rounding.

Corrugated cardboard (33.2% or 3,701 tons) was the most prevalent curbside recyclable material and the most prevalent material type overall in the single-family commingled recycling substream (Table 8).

Table 8. Commingled Recycling Detailed Composition Results: Single-family

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**71.2%**	**6.5%**	**7,930**	**Recoverable C&D & Wood**	**0.1%**	**0.1%**	**7**
Residential Drop-off Recyclable	**7.4%**	**2.4%**	**822**	**Potentially Recoverable**	**2.1%**	**1.0%**	**231**
Compostable	**6.3%**	**3.1%**	**702**	**Non-recoverable**	**13.0%**	**3.2%**	**1,443**
Paper	**58.4%**	**6.3%**	**6,498**	**Organics**	**10.3%**	**4.0%**	**1,151**
Corrugated Cardboard	33.2%	5.7%	3,701	Food Scraps	6.1%	3.1%	680
Mixed Recyclable Fibers	22.1%	4.0%	2,458	Leaves & Yard Debris	0.2%	0.2%	22
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	0.1%	0.1%	7
Polycoated & Lined Containers	2.2%	0.4%	242	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	0.9%	0.3%	97	Carpet	-	-	-
Plastic	**17.5%**	**2.7%**	**1,950**	Tires	-	-	-
#1 PET Containers	6.8%	1.0%	757	Textiles & Shoes	0.7%	0.4%	76
#2 HDPE Containers - Natural	1.0%	0.2%	111	Food-soiled & Compostable Paper	2.7%	0.7%	301
#2 HDPE Containers - Pigmented	1.1%	0.3%	124	Treated Wood	-	-	-
#5 PP Containers	1.3%	0.3%	150	Other Wood	-	-	-
#3-7 Plastics (excluding #5)	0.3%	0.2%	37	Other Non-recoverable/Composite Organics	0.6%	0.2%	64
Clean Plastic Film	2.0%	0.5%	218	**Other Materials**	**1.3%**	**0.6%**	**149**
#6 Expanded Polystyrene	0.5%	0.2%	54	Construction & Demolition (non-wood)	-	-	-
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	0.2%	0.3%	24
Non-recoverable Plastic Film	1.4%	0.4%	160	Vehicle Batteries	-	-	-
Disposal Bags	0.4%	0.2%	44	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%	1	Household Batteries - Alkaline or Other	0.0%	0.0%	3
Non-recoverable/Composite Plastics	2.6%	2.6%	293	Fluorescent Light Tubes	-	-	-
Metal	**7.6%**	**1.3%**	**846**	Oil-based Paint	-	-	-
Aluminum Cans	3.5%	0.9%	386	Cleaners & Other Household Products	0.0%	0.0%	1
Tin/Steel Cans	2.2%	0.5%	243	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.1%	0.1%	13	Other Household Hazardous Waste	0.1%	0.1%	15
Ferrous Metals	0.6%	0.5%	67	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.0%	1	Mattresses	-	-	-
Non-recoverable/Composite Metals	1.0%	0.8%	111	Bathroom Waste	0.5%	0.3%	51
Other Aluminum	0.2%	0.1%	24	Mixed Furniture	-	-	-
Glass	**4.9%**	**2.4%**	**542**	Nondistinct Fines	0.2%	0.2%	26
Glass Containers	4.4%	2.3%	486	Other Residuals	0.3%	0.3%	29
Non-recoverable/Composite Glass	0.5%	0.6%	56				
Sample Count	***94***			**Total**	**100%**		**11,135**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commingled Recycling Capture Rate

The capture rate for single-family curbside recyclables was 72% (Figure 14). This means that of all the curbside recyclables that single-family residents placed in the disposed waste and commingled recycling streams, 72% (7,930 tons) were correctly sorted into commingled recycling.

Capture rates were highest for recyclable paper materials (80%) and lowest for recyclable plastic materials (50%).

Figure 14. Commingled Recycling Capture Rates by Material Class: Single-family

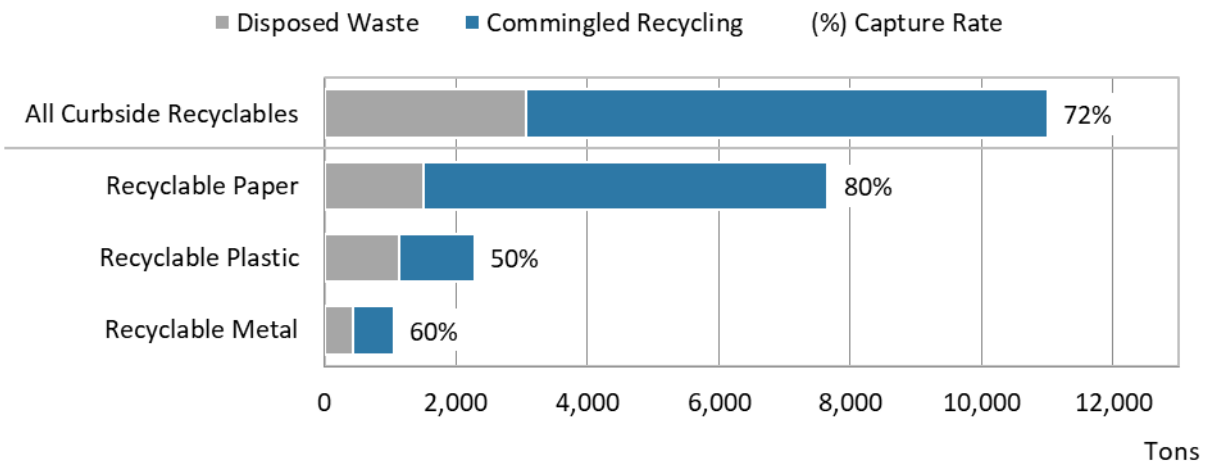


Table 9 presents capture rates for individual curbside recyclable material types for single-family generators. Corrugated cardboard had the highest capture rate (90%) and #5 PP containers had the lowest (30%).

Table 9. Commingled Recycling Capture Rates: Single-family

Material	Disposed Waste Est. %	Disposed Waste + / -	Disposed Waste Est. Tons	Commingled Recycling Est. %	Commingled Recycling + / -	Commingled Recycling Est. Tons	Capture Rate
Curbside Recyclable	**9.2%**	**1.0%**	**3,067**	**71.2%**	**6.5%**	**7,930**	**72%**
Residential Drop-off Recyclable	**7.6%**	**1.7%**	**2,528**	**7.4%**	**2.4%**	**822**	
Compostable	**40.3%**	**3.6%**	**13,397**	**6.3%**	**3.1%**	**702**	
Recoverable C&D & Wood	**0.7%**	**0.6%**	**228**	**0.1%**	**0.1%**	**7**	
Potentially Recoverable	**4.4%**	**0.9%**	**1,464**	**2.1%**	**1.0%**	**231**	
Non-recoverable	**37.7%**	**3.4%**	**12,537**	**13.0%**	**3.2%**	**1,443**	
Paper	**7.7%**	**1.0%**	**2,556**	**58.4%**	**6.3%**	**6,498**	
Corrugated Cardboard	1.2%	0.3%	392	33.2%	5.7%	3,701	90%
Mixed Recyclable Fibers	3.3%	0.8%	1,104	22.1%	4.0%	2,458	69%
Plastic	**11.9%**	**1.3%**	**3,951**	**17.5%**	**2.7%**	**1,950**	
#1 PET Containers	1.9%	0.2%	642	6.8%	1.0%	757	54%
#2 HDPE Containers - Natural	0.1%	0.0%	40	1.0%	0.2%	111	73%
#2 HDPE Containers - Pigmented	0.3%	0.1%	114	1.1%	0.3%	124	52%
#5 PP Containers	1.0%	0.1%	348	1.3%	0.3%	150	30%
Metal	**3.5%**	**1.0%**	**1,167**	**7.6%**	**1.3%**	**846**	
Aluminum Cans	0.6%	0.2%	199	3.5%	0.9%	386	66%
Tin/Steel Cans	0.7%	0.2%	227	2.2%	0.5%	243	52%
Glass	**5.2%**	**1.6%**	**1,743**	**4.9%**	**2.4%**	**542**	
Organics	**52.6%**	**3.7%**	**17,468**	**10.3%**	**4.0%**	**1,151**	
Other Materials	**19.1%**	**3.8%**	**6,336**	**1.3%**	**0.6%**	**149**	
Total	**100%**		**33,222**	**100%**		**11,135**	
Sample Count	*97*			*94*			

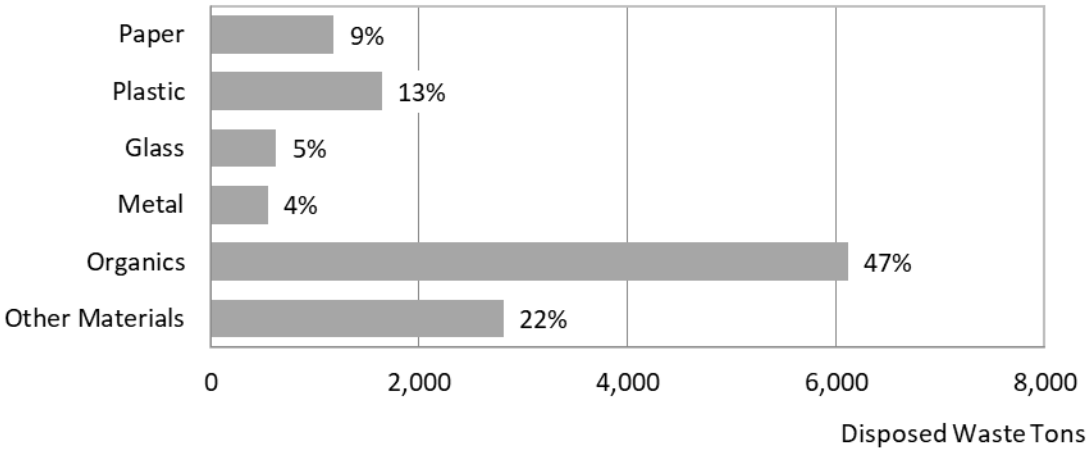
Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Multifamily Residential Findings

Disposed Waste

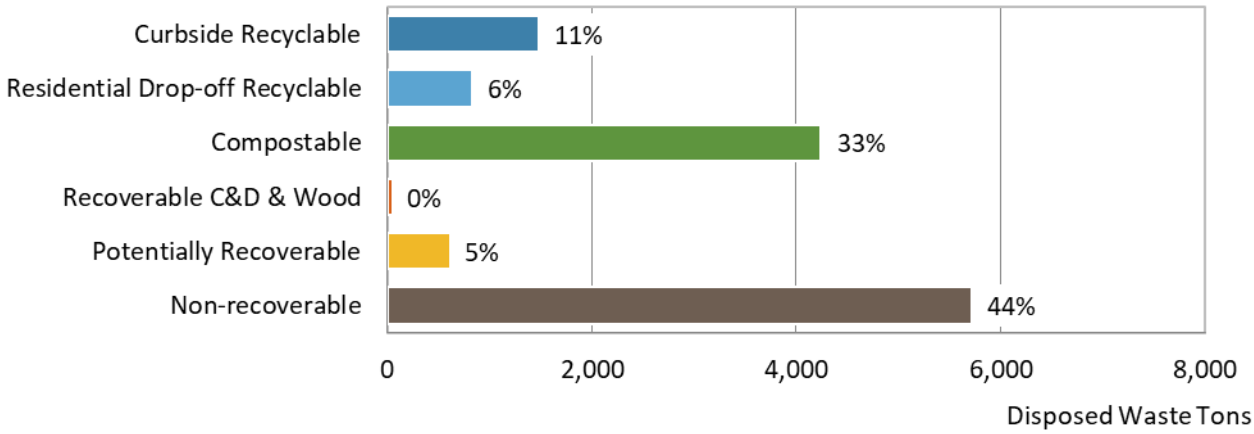
In 2023, multifamily residents discarded 12,924 tons of material in the disposed waste stream. Organics was the most prevalent material class, accounting for nearly half (47% or 6,114 tons) of the substream (Figure 15). Other materials (22% or 2,809 tons) and plastic (13% or 1,647 tons) were the next most prevalent material classes.

Figure 15. Disposed Waste by Material Class: Multifamily



Overall, 50% (6,550 tons) of multifamily disposed waste was recyclable (curbside or residential drop-off) or compostable (Figure 16). Curbside recyclable materials accounted for 11% (1,475 tons), residential drop-off recyclable materials accounted for 6% (832 tons), and compostable materials accounted for 33% (4,243 tons) of the substream. Recoverable C&D and wood accounted for less than 1% (49 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 5% (612 tons).

Figure 16. Disposed Waste by Recoverability Group: Multifamily



Curbside recyclable and compostable materials accounted for 44.2% (5,718 tons) of the multifamily disposal substream (Table 10). Food scraps (30.3% or 3,915 tons) was the most prevalent compostable material type and mixed recyclable fibers (3.5% or 457 tons) was the most prevalent curbside recyclable material type.

Table 10. Disposed Waste Most Prevalent Curbside Recoverable Material Types: Multifamily

Material	Est. %	+ / -	Est. Tons
Food Scraps	30.3%	2.7%	3,915
Mixed Recyclable Fibers	3.5%	0.4%	457
Leaves & Yard Debris	2.5%	1.8%	327
#1 PET Containers	2.5%	0.3%	324
Corrugated Cardboard	1.9%	0.4%	244
#5 PP Containers	1.2%	0.1%	159
Aluminum Cans	0.9%	0.2%	118
Tin/Steel Cans	0.7%	0.1%	93
#2 HDPE Containers - Pigmented	0.4%	0.1%	51
#2 HDPE Containers - Natural	0.2%	0.1%	30
Total for Top Recoverable Materials	**44.2%**		**5,718**
All Other Recoverable Materials	**0.0%**		**-**
All Other Materials	**55.8%**		**7,205**
Total Annual Tons	**100.0%**		**12,924**

Percentages for material types may not total 100% due to rounding.

Food scraps (30.3% or 3,915 tons) was also the most prevalent material type overall in the multifamily disposed waste substream (Table 11). Bathroom waste (10.2% or 1,318 tons) was the most prevalent non-recoverable material type.

Table 11. Disposed Waste Detailed Composition Results: Multifamily

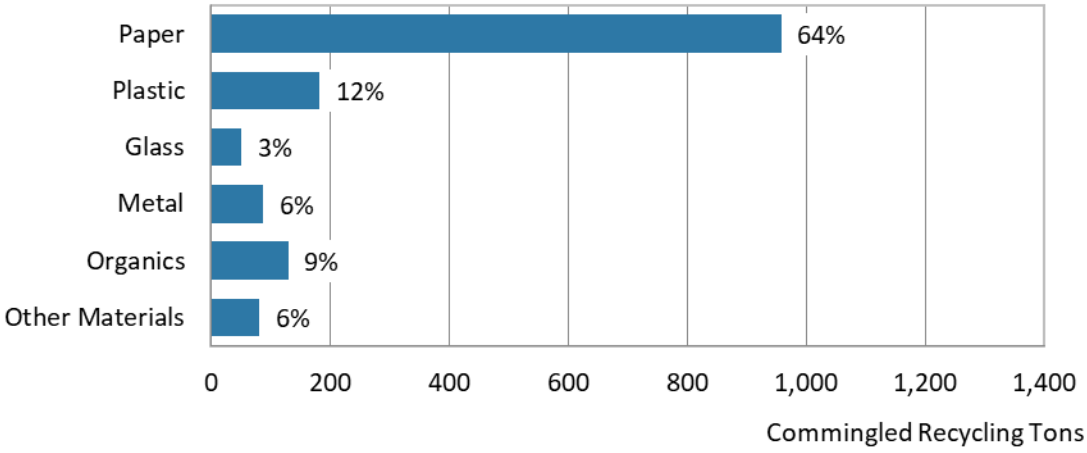
Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**11.4%**	**1.1%**	**1,475**	**Recoverable C&D & Wood**	**0.4%**	**0.3%**	**49**
Residential Drop-off Recyclable	**6.4%**	**0.8%**	**832**	**Potentially Recoverable**	**4.7%**	**1.3%**	**612**
Compostable	**32.8%**	**3.2%**	**4,243**	**Non-recoverable**	**44.2%**	**3.3%**	**5,713**
Paper	**9.1%**	**0.9%**	**1,182**	**Organics**	**47.3%**	**3.0%**	**6,114**
Corrugated Cardboard	1.9%	0.4%	244	Food Scraps	30.3%	2.7%	3,915
Mixed Recyclable Fibers	3.5%	0.4%	457	Leaves & Yard Debris	2.5%	1.8%	327
Waxed Corrugated Cardboard	0.1%	0.1%	12	Dimensional Lumber & Engineered Wood	0.2%	0.2%	21
Polycoated & Lined Containers	2.1%	0.4%	274	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	1.5%	0.4%	196	Carpet	-	-	-
Plastic	**12.7%**	**0.8%**	**1,647**	Tires	-	-	-
#1 PET Containers	2.5%	0.3%	324	Textiles & Shoes	2.4%	0.9%	308
#2 HDPE Containers - Natural	0.2%	0.1%	30	Food-soiled & Compostable Paper	6.3%	0.9%	813
#2 HDPE Containers - Pigmented	0.4%	0.1%	51	Treated Wood	0.0%	0.0%	3
#5 PP Containers	1.2%	0.1%	159	Other Wood	0.6%	0.5%	74
#3-7 Plastics (excluding #5)	0.2%	0.0%	21	Other Non-recoverable/Composite Organics	5.1%	1.6%	653
Clean Plastic Film	1.5%	0.2%	190	**Other Materials**	**21.7%**	**3.1%**	**2,809**
#6 Expanded Polystyrene	0.4%	0.1%	54	Construction & Demolition (non-wood)	0.2%	0.3%	28
#7 Potentially Compostable Plastic	0.0%	0.0%	3	E-waste	0.2%	0.2%	30
Non-recoverable Plastic Film	2.2%	0.2%	289	Vehicle Batteries	-	-	-
Disposal Bags	1.2%	0.2%	159	Household Batteries - Rechargeable	0.0%	0.0%	2
Potentially Compostable Disposal Bags	0.0%	0.0%	1	Household Batteries - Alkaline or Other	0.1%	0.0%	7
Non-recoverable/Composite Plastics	2.8%	0.7%	366	Fluorescent Light Tubes	-	-	-
Metal	**4.2%**	**0.8%**	**549**	Oil-based Paint	-	-	-
Aluminum Cans	0.9%	0.2%	118	Cleaners & Other Household Products	0.2%	0.3%	27
Tin/Steel Cans	0.7%	0.1%	93	Motor Oil/Fuels	0.0%	0.0%	2
Empty Aerosol Cans	0.1%	0.0%	18	Other Household Hazardous Waste	0.5%	0.3%	64
Ferrous Metals	0.7%	0.3%	90	Latex Paint	0.0%	0.1%	5
Other Non-ferrous Metals	0.1%	0.1%	7	Mattresses	-	-	-
Non-recoverable/Composite Metals	1.3%	0.6%	174	Bathroom Waste	10.2%	2.7%	1,318
Other Aluminum	0.4%	0.2%	49	Mixed Furniture	0.1%	0.2%	16
Glass	**4.8%**	**1.1%**	**623**	Nondistinct Fines	0.6%	0.6%	79
Glass Containers	3.9%	0.7%	506	Other Residuals	9.5%	3.2%	1,234
Non-recoverable/Composite Glass	0.9%	0.8%	117				
Sample Count	***40***			**Total**	**100%**		**12,924**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commingled Recycling

In 2023, multifamily residents diverted 1,494 tons of material into the commingled recycling stream. Paper was the most prevalent material class, accounting for nearly two-thirds (64% or 959 tons) of the substream (Figure 17). Plastic (12% or 183 tons) and organics (9% or 130 tons) were the next most prevalent material classes.

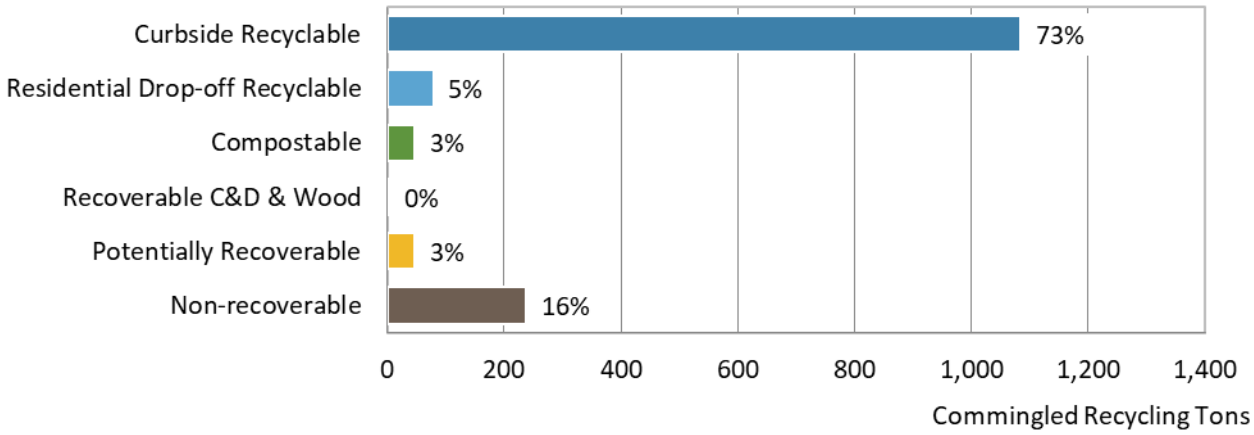
Figure 17. Commingled Recycling by Material Class: Multifamily



Nearly three-quarters (73% or 1,083 tons) of multifamily commingled recycling was curbside recyclable (Figure 18). Residential drop-off recyclables, including clean plastic film and glass containers, accounted for 5% (78 tons) of the substream.[7] Compostable materials accounted for 3% (47 tons), recoverable C&D and wood accounted for less than 1% (2 tons), and potentially recoverable materials accounted for 3% (47 tons). Non-recoverable materials accounted for 16% (236 tons).

[7] Glass containers can be collected in glass-on-side curbside recycling for multifamily customers who subscribe to large container collection on commercial routes.

Figure 18. Commingled Recycling by Recoverability Group: Multifamily



Contaminant materials that are not accepted in commingled recycling accounted for 27.5% (411 tons) of the multifamily commingled recycling substream (Table 12). Glass containers (3.1% or 46 tons) was the most prevalent residential drop-off recyclable material type, food scraps (3.1% or 46 tons) was the most prevalent compostable material type, and textiles and shoes (2.1% or 31 tons) was the most prevalent potentially recoverable material type. Bathroom waste (2.6% or 39 tons) was the most prevalent non-recoverable material type.

Table 12. Commingled Recycling Most Prevalent Contaminant Material Types: Multifamily[8]

Material	Est. %	+ / -	Est. Tons
Food Scraps	3.1%	1.3%	46
Glass Containers	3.1%	1.2%	46
Bathroom Waste	2.6%	2.0%	39
Polycoated & Lined Containers	2.5%	0.7%	37
Food-soiled & Compostable Paper	2.5%	0.8%	37
Non-recoverable/Composite Plastics	2.2%	1.6%	33
Other Residuals	2.1%	2.2%	31
Textiles & Shoes	2.1%	1.5%	31
Non-recoverable Composite Paper	1.4%	0.5%	20
Ferrous Metals	1.0%	1.0%	15
Total for Top Contaminant Materials	**22.4%**		**335**
All Other Contaminant Materials	**5.1%**		**76**
All Other Materials	**72.5%**		**1,083**
Total Annual Tons	**100.0%**		**1,494**

Percentages for material types may not total 100% due to rounding.

[8] Glass containers can be collected in glass-on-side curbside recycling for multifamily customers who subscribe to large container collection on commercial routes.

Corrugated cardboard (39.9% or 596 tons) was the most prevalent curbside recyclable material and the most prevalent material type overall in the multifamily commingled recycling substream (Table 13).

Table 13. Commingled Recycling Detailed Composition Results: Multifamily

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**72.5%**	**10.0%**	**1,083**	**Recoverable C&D & Wood**	**0.2%**	**0.3%**	**2**
Residential Drop-off Recyclable	**5.2%**	**1.5%**	**78**	**Potentially Recoverable**	**3.1%**	**2.1%**	**47**
Compostable	**3.1%**	**1.3%**	**47**	**Non-recoverable**	**15.8%**	**6.8%**	**236**
Paper	**64.2%**	**9.4%**	**959**	**Organics**	**8.7%**	**3.3%**	**130**
Corrugated Cardboard	39.9%	9.3%	596	Food Scraps	3.1%	1.3%	46
Mixed Recyclable Fibers	20.4%	5.2%	305	Leaves & Yard Debris	0.0%	0.0%	0
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	-	-	-
Polycoated & Lined Containers	2.5%	0.7%	37	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	1.4%	0.5%	20	Carpet	-	-	-
Plastic	**12.3%**	**2.5%**	**183**	Tires	-	-	-
#1 PET Containers	5.0%	1.2%	74	Textiles & Shoes	2.1%	1.5%	31
#2 HDPE Containers - Natural	1.2%	0.4%	18	Food-soiled & Compostable Paper	2.5%	0.8%	37
#2 HDPE Containers - Pigmented	1.0%	0.3%	15	Treated Wood	-	-	-
#5 PP Containers	0.8%	0.2%	11	Other Wood	0.2%	0.1%	3
#3-7 Plastics (excluding #5)	0.2%	0.1%	2	Other Non-recoverable/Composite Organics	0.9%	0.5%	13
Clean Plastic Film	1.0%	0.3%	14	**Other Materials**	**5.5%**	**4.6%**	**82**
#6 Expanded Polystyrene	0.3%	0.2%	4	Construction & Demolition (non-wood)	0.2%	0.3%	2
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.4%	0.4%	6
Non-recoverable Plastic Film	0.6%	0.2%	9	Vehicle Batteries	-	-	-
Disposal Bags	0.1%	0.1%	2	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.0%	0.0%	0
Non-recoverable/Composite Plastics	2.2%	1.6%	33	Fluorescent Light Tubes	-	-	-
Metal	**5.9%**	**1.6%**	**88**	Oil-based Paint	-	-	-
Aluminum Cans	2.9%	0.9%	43	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	1.4%	0.4%	21	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.0%	0.0%	0	Other Household Hazardous Waste	0.2%	0.2%	4
Ferrous Metals	1.0%	1.0%	15	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.1%	1	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.4%	0.5%	6	Bathroom Waste	2.6%	2.0%	39
Other Aluminum	0.2%	0.1%	2	Mixed Furniture	-	-	-
Glass	**3.4%**	**1.2%**	**51**	Nondistinct Fines	0.0%	0.0%	0
Glass Containers	3.1%	1.2%	46	Other Residuals	2.1%	2.2%	31
Non-recoverable/Composite Glass	0.3%	0.3%	5				
Sample Count	***36***			**Total**	**100%**		**1,494**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commingled Recycling Capture Rate

The capture rate for multifamily curbside recyclables was 42% (Figure 19). This means that of all the curbside recyclables that multifamily residents placed in the disposed waste and commingled recycling streams, 42% (1,083 tons) were correctly sorted into commingled recycling.

Capture rates were highest for recyclable paper materials (56%) and lowest for recyclable plastic materials (17%).

Figure 19. Commingled Recycling Capture Rates by Material Class: Multifamily

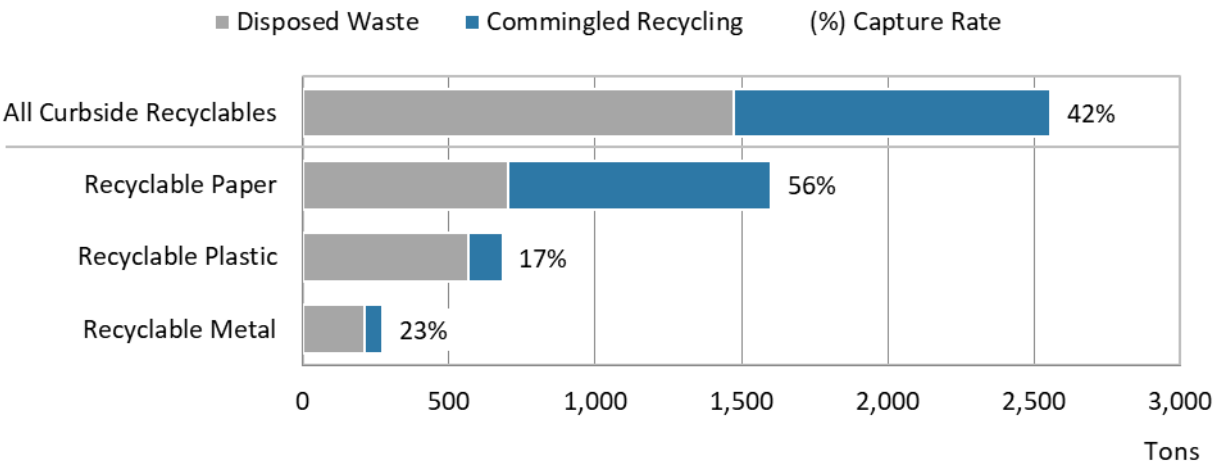


Table 14 presents capture rates for individual curbside recyclable material types for multifamily generators. Corrugated cardboard had the highest capture rate (71%) and #5 PP containers had the lowest (7%).

Table 14. Commingled Recycling Capture Rates: Multifamily

Material	Disposed Waste Est. %	Disposed Waste + / -	Disposed Waste Est. Tons	Commingled Recycling Est. %	Commingled Recycling + / -	Commingled Recycling Est. Tons	Capture Rate
Curbside Recyclable	**11.4%**	**1.1%**	**1,475**	**72.5%**	**10.0%**	**1,083**	**42%**
Residential Drop-off Recyclable	**6.4%**	**0.8%**	**832**	**5.2%**	**1.5%**	**78**	
Compostable	**32.8%**	**3.2%**	**4,243**	**3.1%**	**1.3%**	**47**	
Recoverable C&D & Wood	**0.4%**	**0.3%**	**49**	**0.2%**	**0.3%**	**2**	
Potentially Recoverable	**4.7%**	**1.3%**	**612**	**3.1%**	**2.1%**	**47**	
Non-recoverable	**44.2%**	**3.3%**	**5,713**	**15.8%**	**6.8%**	**236**	
Paper	**9.1%**	**0.9%**	**1,182**	**64.2%**	**9.4%**	**959**	
Corrugated Cardboard	1.9%	0.4%	244	39.9%	9.3%	596	71%
Mixed Recyclable Fibers	3.5%	0.4%	457	20.4%	5.2%	305	40%
Plastic	**12.7%**	**0.8%**	**1,647**	**12.3%**	**2.5%**	**183**	
#1 PET Containers	2.5%	0.3%	324	5.0%	1.2%	74	19%
#2 HDPE Containers - Natural	0.2%	0.1%	30	1.2%	0.4%	18	37%
#2 HDPE Containers - Pigmented	0.4%	0.1%	51	1.0%	0.3%	15	23%
#5 PP Containers	1.2%	0.1%	159	0.8%	0.2%	11	7%
Metal	**4.2%**	**0.8%**	**549**	**5.9%**	**1.6%**	**88**	
Aluminum Cans	0.9%	0.2%	118	2.9%	0.9%	43	27%
Tin/Steel Cans	0.7%	0.1%	93	1.4%	0.4%	21	18%
Glass	**4.8%**	**1.1%**	**623**	**3.4%**	**1.2%**	**51**	
Organics	**47.3%**	**3.0%**	**6,114**	**8.7%**	**3.3%**	**130**	
Other Materials	**21.7%**	**3.1%**	**2,809**	**5.5%**	**4.6%**	**82**	
Total	**100%**		**12,924**	**100%**		**1,494**	
Sample Count	*40*			*36*			

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

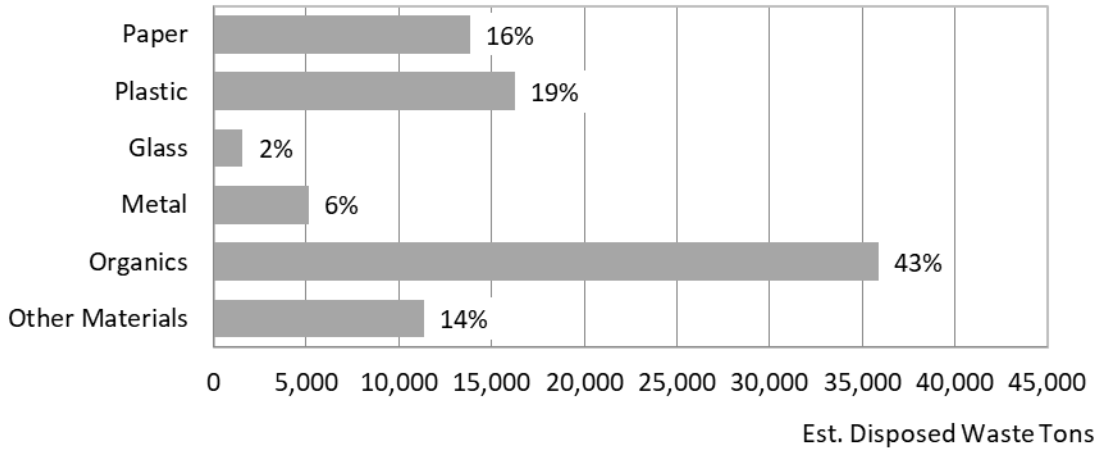
Commercial Findings

Commercial Disposed Waste Modeling Outcomes

This section presents modeled composition results for the overall commercial disposed waste substream. Composition estimates are based on recent published estimates for the City of Seattle and King County commercial disposed waste substreams, combined with estimates for Tacoma's public schools and large venues, as reported in this study.

In 2023, commercial businesses discarded 83,964 tons of material in the disposed waste stream. Organics was the most prevalent material class, accounting for 43% (35,888 tons) of the substream (Figure 20). Plastic (19% or 16,232 tons), paper (16% or 13,816 tons), and other materials (14% or 11,338 tons) were the next most prevalent material classes.

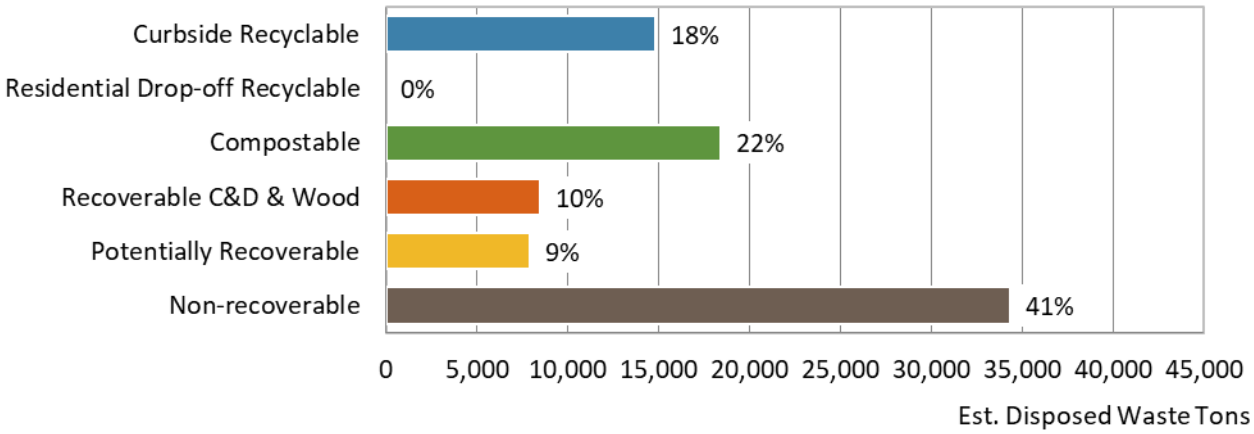
Figure 20. Modeled Disposed Waste by Material Class: Commercial Overall



Overall, 59% (49,617 tons) of commercial disposed waste was recoverable or potentially recoverable (Figure 21). Curbside recyclable materials accounted for 18% (14,799 tons) and compostable materials accounted for 22% (18,420 tons) of the substream. Recoverable C&D and wood accounted for 10% (8,483 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 9% (7,915 tons).

Drop-off recycling is not a recovery option for commercial customers.

Figure 21. Modeled Disposed Waste by Recoverability Group: Commercial Overall



Food scraps (19.7% or 16,507 tons) was the most prevalent recoverable material type and the most prevalent material type overall in the commercial disposed waste substream (Table 15). Food-soiled and compostable paper (7.3% or 6,140 tons) was the most prevalent non-recoverable material type.

Confidence intervals are not reported for this substream because individual sample weights were aggregated across studies. Several material types were combined to accommodate differences in material lists between the three studies used to model the commercial disposed waste composition (see Appendix C).

Table 15. Disposed Waste Modeled Detailed Composition Results: Commercial Overall

Material	Modeled Est. %	Modeled Est. Tons	Material	Modeled Est. %	Modeled Est. Tons
Curbside Recyclable	**17.6%**	**14,799**	**Recoverable C&D & Wood**	**10.1%**	**8,483**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**9.4%**	**7,915**
Compostable	**21.9%**	**18,420**	**Non-recoverable**	**40.9%**	**34,347**
Paper	**16.5%**	**13,816**	**Organics**	**42.7%**	**35,888**
Corrugated Cardboard	6.0%	5,063	Food Scraps	19.7%	16,507
Mixed Recyclable Fibers	5.7%	4,773	Leaves & Yard Debris	2.3%	1,914
Waxed Corrugated Cardboard	1.0%	825	Dimensional Lumber & Engineered Wood	7.3%	6,155
Polycoated & Lined Containers	0.9%	786	Roofing & Siding Wood	0.0%	28
Non-recoverable Composite Paper	2.8%	2,370	Carpet	0.6%	506
Plastic	**19.3%**	**16,232**	Tires	0.4%	317
#1 PET Containers	1.6%	1,343	Textiles & Shoes	3.2%	2,680
#2 HDPE Containers - Natural	0.6%	506	Food-soiled & Compostable Paper	7.3%	6,140
#2 HDPE Containers - Pigmented	0.6%	479	Treated Wood	0.3%	211
#5 PP Containers	1.1%	894	Other Wood	0.8%	693
#3-7 Plastics (excluding #5)	0.5%	415	Other Non-recoverable/Composite Organics	0.9%	738
Clean Plastic Film	2.5%	2,104	**Other Materials**	**13.5%**	**11,338**
#6 Expanded Polystyrene	1.0%	855	Construction & Demolition (non-wood)	2.7%	2,300
#7 Potentially Compostable Plastic	0.1%	82	E-waste	1.2%	978
Non-recoverable Plastic Film	5.6%	4,681	Vehicle Batteries	-	-
Disposal Bags	2.8%	2,336	Household Batteries - Rechargeable	0.0%	3
Potentially Compostable Disposal Bags	0.0%	37	Household Batteries - Alkaline or Other	0.0%	15
Non-recoverable/Composite Plastics	3.0%	2,499	Fluorescent Light Tubes	0.0%	3
Metal	**6.1%**	**5,111**	Oil-based Paint	0.0%	1
Aluminum Cans	0.4%	344	Other Household Hazardous Waste	1.7%	1,391
Tin/Steel Cans	0.3%	274	Latex Paint	0.1%	103
Empty Aerosol Cans	0.1%	71	Mattresses	0.1%	87
Ferrous Metals	2.5%	2,082	Mixed Furniture	1.4%	1,190
Other Non-ferrous Metals	0.1%	96	Nondistinct Fines	1.4%	1,179
Non-recoverable/Composite Metals	2.4%	2,021	Other Residuals	4.9%	4,088
Other Aluminum	0.3%	223			
Glass	**1.9%**	**1,579**			
Glass Containers	1.3%	1,122			
Non-recoverable/Composite Glass	0.5%	457			
			Total	**100%**	**83,964**

Percentages for material types may not total 100% due to rounding.

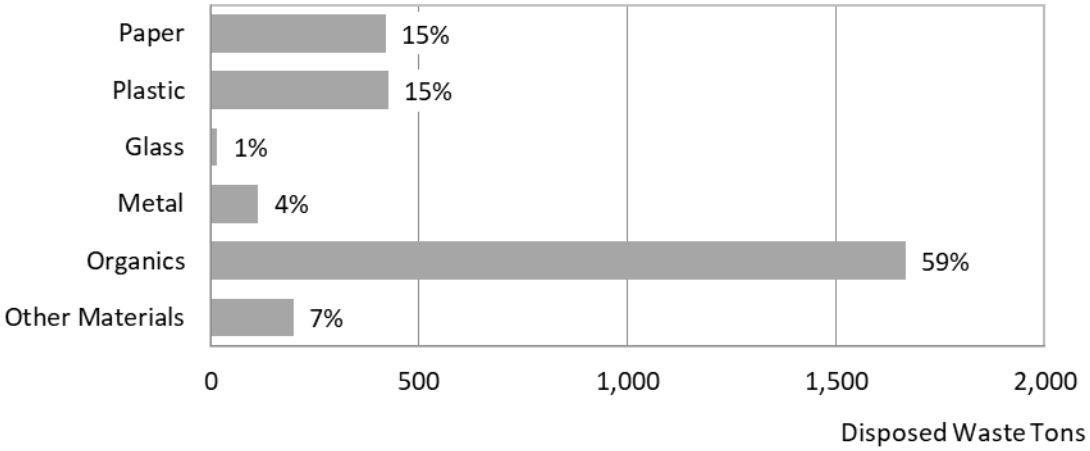
Select Commercial Sectors

DISPOSED WASTE

Public Schools

In 2023, public schools discarded 2,842 tons of material in the disposed waste stream. Organics was the most prevalent material class, accounting for over half (59% or 1,666 tons) of the substream (Figure 22). Plastic (15% or 427 tons) and paper (15% or 421 tons) were the next most prevalent material classes.

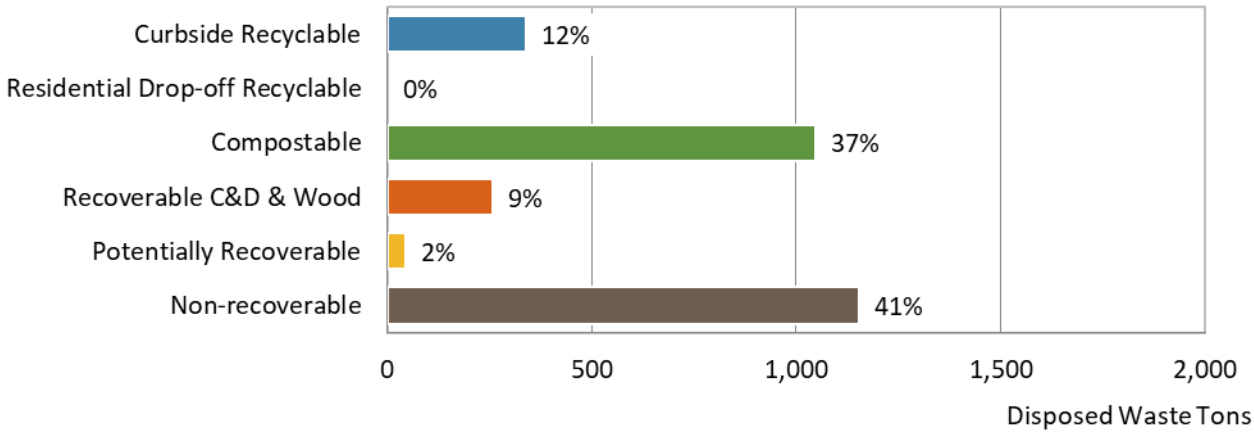
Figure 22. Disposed Waste by Material Class: Public Schools



Overall, 60% (1,689 tons) of public school disposed waste was recoverable or potentially recoverable (Figure 23). Curbside recyclable materials accounted for 12% (339 tons) and compostable materials accounted for 37% (1,047 tons) of the substream. Recoverable C&D and wood accounted for 9% (259 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 2% (44 tons).

Drop-off recycling is not a recovery option for commercial customers.

Figure 23. Disposed Waste by Recoverability Group: Public Schools



Materials that are recoverable for commercial generators accounted for 48.7% (1,386 tons) of the public school disposed waste substream (Table 16). This includes curbside recyclable and compostable materials.

Food scraps (35.9% or 1,019 tons) was the most prevalent compostable material type and the most prevalent material type overall. Mixed recyclable fibers (3.7% or 104 tons) was the most prevalent curbside recyclable material type.

Table 16. Disposed Waste Most Prevalent Recoverable Material Types: Public Schools

Material	Est. %	+ / -	Est. Tons
Food Scraps	35.9%	6.1%	1,019
Mixed Recyclable Fibers	3.7%	1.2%	104
Corrugated Cardboard	3.3%	1.8%	95
#5 PP Containers	1.4%	0.4%	40
#1 PET Containers	1.3%	0.4%	36
Tin/Steel Cans	1.2%	0.6%	34
Leaves & Yard Debris	1.0%	1.4%	28
Glass Containers	0.5%	0.5%	14
Aluminum Cans	0.3%	0.1%	9
#2 HDPE Containers - Natural	0.1%	0.0%	4
Total for Top Recoverable Materials	**48.6%**		**1,382**
All Other Recoverable Materials	**0.1%**		**4**
All Other Materials	**51.2%**		**1,456**
Total Annual Tons	**100.0%**		**2,842**

Percentages for material types may not total 100% due to rounding.

Food scraps (35.9% or 1,019 tons) was also the most prevalent material type overall in the public school disposed waste substream (Table 17). Food-soiled and compostable paper (11.2% or 319 tons) was the most prevalent non-recoverable material type.

Table 17. Disposed Waste Detailed Composition Results: Public Schools

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**11.9%**	**2.4%**	**339**	**Recoverable C&D & Wood**	**9.1%**	**12.1%**	**259**
Residential Drop-off Recyclable	**-**	**-**	**-**	**Potentially Recoverable**	**1.6%**	**0.4%**	**44**
Compostable	**36.8%**	**8.2%**	**1,047**	**Non-recoverable**	**40.6%**	**7.0%**	**1,153**
Paper	**14.8%**	**5.3%**	**421**	**Organics**	**58.6%**	**7.0%**	**1,666**
Corrugated Cardboard	3.3%	1.8%	95	Food Scraps	35.9%	6.1%	1,019
Mixed Recyclable Fibers	3.7%	1.2%	104	Leaves & Yard Debris	1.0%	1.4%	28
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	8.3%	11.2%	236
Polycoated & Lined Containers	4.0%	0.7%	114	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	3.8%	3.9%	108	Carpet	-	-	-
Plastic	**15.0%**	**3.1%**	**427**	Tires	-	-	-
#1 PET Containers	1.3%	0.4%	36	Textiles & Shoes	0.9%	0.5%	27
#2 HDPE Containers - Natural	0.1%	0.0%	4	Food-soiled & Compostable Paper	11.2%	3.1%	319
#2 HDPE Containers - Pigmented	0.1%	0.1%	4	Treated Wood	0.0%	0.0%	0
#5 PP Containers	1.4%	0.4%	40	Other Wood	0.0%	0.0%	1
#3-7 Plastics (excluding #5)	0.3%	0.1%	8	Other Non-recoverable/Composite Organics	1.3%	0.9%	37
Clean Plastic Film	0.8%	0.3%	23	**Other Materials**	**7.0%**	**2.3%**	**198**
#6 Expanded Polystyrene	0.1%	0.1%	4	Construction & Demolition (non-wood)	0.8%	0.9%	23
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.4%	0.2%	12
Non-recoverable Plastic Film	2.5%	0.6%	71	Vehicle Batteries	-	-	-
Disposal Bags	6.2%	1.1%	177	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.0%	0.0%	1
Non-recoverable/Composite Plastics	2.2%	1.4%	62	Fluorescent Light Tubes	0.1%	0.1%	2
Metal	**4.0%**	**3.3%**	**115**	Oil-based Paint	-	-	-
Aluminum Cans	0.3%	0.1%	9	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	1.2%	0.6%	34	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.0%	0.0%	1	Other Household Hazardous Waste	0.0%	0.0%	1
Ferrous Metals	0.8%	0.7%	23	Latex Paint	0.0%	0.1%	1
Other Non-ferrous Metals	1.4%	2.3%	41	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.1%	0.1%	3	Bathroom Waste	2.6%	1.3%	75
Other Aluminum	0.1%	0.1%	4	Mixed Furniture	-	-	-
Glass	**0.5%**	**0.5%**	**15**	Nondistinct Fines	1.8%	1.2%	52
Glass Containers	0.5%	0.5%	14	Other Residuals	1.2%	1.3%	33
Non-recoverable/Composite Glass	0.0%	0.0%	1				
Sample Count	***10***			**Total**	**100%**		**2,842**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

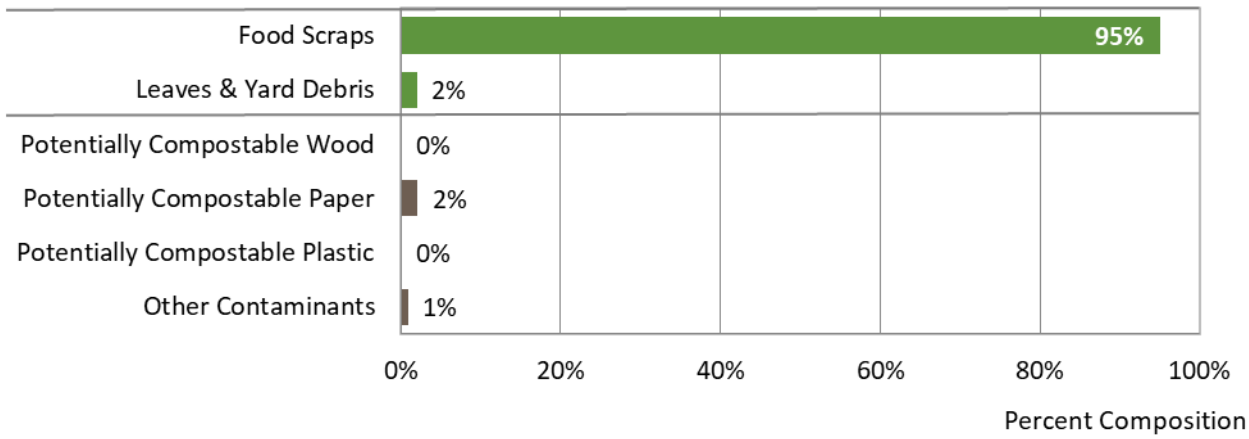
ORGANICS

This section describes organics composition results for four commercial sectors: restaurants, grocery stores, private schools, and other commercial sectors. No tons are reported for the organics stream.

Restaurants

Compostable materials accounted for 97% of the restaurant organics substream (Figure 24). Nearly all of this material was food scraps (95% of the substream overall). Potentially compostable materials that are not currently accepted in Tacoma's organics stream accounted for an additional 2% of the substream. Other contaminants accounted for 1% of the substream.

Figure 24. Organics Key Materials: Restaurants



Contaminant materials accounted for 3.0% of the restaurant organics substream (Table 18). Food-soiled and compostable paper (2.1%) was the most prevalent non-recoverable material type and mixed recyclable fibers (0.6%) was the most prevalent curbside recyclable material type. Most contaminants were present in very small quantities (less than 0.05%).

Table 18. Organics Most Prevalent Contaminant Material Types: Restaurants

Material	Est. %	+ / -
Food-soiled & Compostable Paper	2.1%	1.5%
Mixed Recyclable Fibers	0.6%	0.9%
Other Non-recoverable/Composite Organics	0.1%	0.1%
Clean Plastic Film	0.0%	0.1%
Textiles & Shoes	0.0%	0.0%
Ferrous Metals	0.0%	0.0%
#1 PET Containers	0.0%	0.0%
Non-recoverable/Composite Plastics	0.0%	0.0%
Non-recoverable Plastic Film	0.0%	0.0%
#5 PP Containers	0.0%	0.0%
Total for Top Contaminant Materials	**2.9%**	
All Other Contaminant Materials	**0.1%**	
All Other Materials	**97.1%**	
Total Annual Tons	**100.0%**	

Percentages for material types may not total 100% due to rounding.

Table 19 presents composition estimates for individual material types in the restaurant organics substream. Contaminant material types that were not observed are excluded from this table.

Table 19. Organics Waste Key Material Types: Restaurants

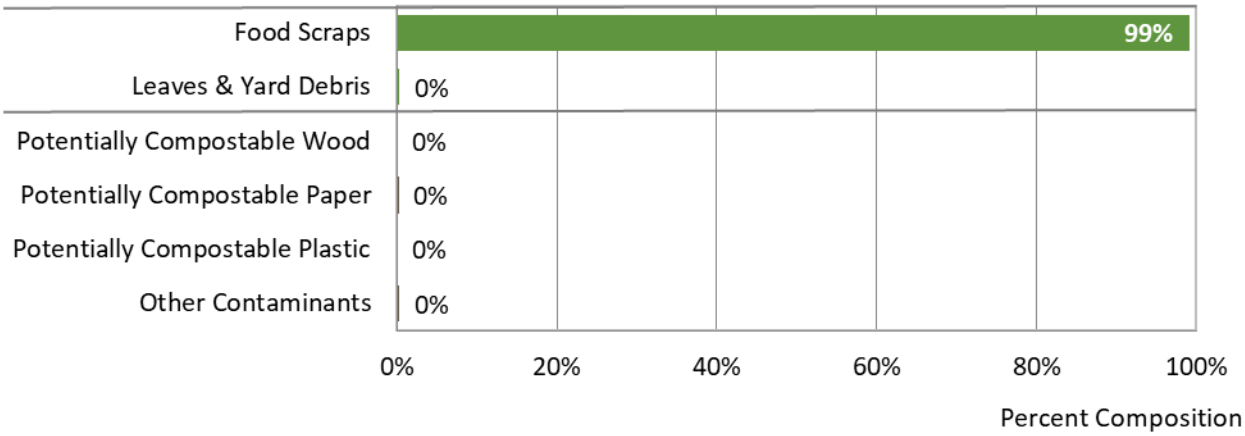
Material	Est. %	+ / -
Accepted Compostables	**97.1%**	
Food Scraps	95.1%	2.6%
Leaves & Yard Debris	2.0%	2.2%
Potentially Compostable Wood	**0.0%**	
Dimensional Lumber & Engineered Wood	-	-
Roofing & Siding Wood	-	-
Potentially Compostable Paper	**2.1%**	
Corrugated Cardboard	0.0%	0.0%
Waxed Corrugated Cardboard	-	-
Food-soiled & Compostable Paper	2.1%	1.5%
Potentially Compostable Plastic	**0.0%**	
#7 Potentially Compostable Plastic	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%
Other Contaminants	**0.9%**	
Mixed Recyclable Fibers	0.6%	0.9%
#1 PET Containers	0.0%	0.0%
#5 PP Containers	0.0%	0.0%
Textiles & Shoes	0.0%	0.0%
Polycoated & Lined Containers	0.0%	0.0%
Non-recoverable Composite Paper	0.0%	0.0%
Clean Plastic Film	0.0%	0.1%
#6 Expanded Polystyrene	0.0%	0.0%
Non-recoverable Plastic Film	0.0%	0.0%
Non-recoverable/Composite Plastics	0.0%	0.0%
Ferrous Metals	0.0%	0.0%
Other Non-recoverable/Composite Organics	0.1%	0.1%
Other Residuals	0.0%	0.0%
Total	**100%**	
Sample Count	*10*	

Confidence intervals calculated at the 90% confidence level.
Percentages may not total 100% due to rounding.

Grocery Stores

Compostable materials accounted for 99% of the grocery store organics substream (Figure 25). Nearly all this material was food scraps. Leaves and yard debris accounted for less than 1% of the substream overall. Potentially compostable materials that are not currently accepted in Tacoma's organics stream and other contaminants also accounted for less than 1% of the substream.

Figure 25. Organics Key Materials: Grocery Stores



Contaminant materials accounted for 0.5% of the grocery store organics substream (Table 20). Food-soiled and compostable paper (0.2%) was the most prevalent non-recoverable material type and mixed recyclable fibers (0.2%) was the most prevalent curbside recyclable material type. Most contaminants were present in very small quantities (less than 0.05%).

Table 20. Organics Most Prevalent Contaminant Material Types: Grocery Stores

Material	Est. %	+ / -
Food-soiled & Compostable Paper	0.2%	0.2%
Mixed Recyclable Fibers	0.2%	0.1%
Bathroom Waste	0.0%	0.1%
Disposal Bags	0.0%	0.0%
Corrugated Cardboard	0.0%	0.0%
Non-recoverable Composite Paper	0.0%	0.0%
Non-recoverable Plastic Film	0.0%	0.0%
Non-recoverable/Composite Plastics	0.0%	0.0%
Clean Plastic Film	0.0%	0.0%
Glass Containers	0.0%	0.0%
Total for Top Contaminant Materials	**0.5%**	
All Other Contaminant Materials	**0.0%**	
All Other Materials	**99.5%**	
Total Annual Tons	**100.0%**	

Percentages for material types may not total 100% due to rounding.

Table 21 presents composition estimates for individual material types in the grocery store organics substream. Contaminant material types that were not observed are excluded from this table.

Table 21. Organics Waste Key Material Types: Grocery Stores

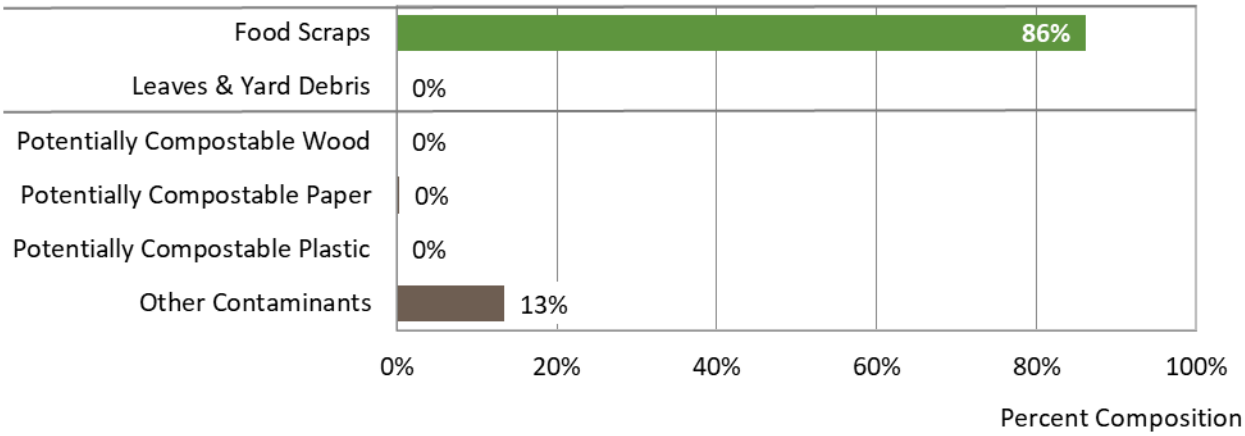
Material	Est. %	+ / -
Accepted Compostables	**99.5%**	
Food Scraps	99.2%	0.9%
Leaves & Yard Debris	0.3%	0.5%
Potentially Compostable Wood	**0.0%**	
Dimensional Lumber & Engineered Wood	-	-
Roofing & Siding Wood	-	-
Potentially Compostable Paper	**0.2%**	
Corrugated Cardboard	0.0%	0.0%
Waxed Corrugated Cardboard	-	-
Food-soiled & Compostable Paper	0.2%	0.2%
Potentially Compostable Plastic	**0.0%**	
#7 Potentially Compostable Plastic	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%
Other Contaminants	**0.3%**	
Mixed Recyclable Fibers	0.2%	0.1%
#1 PET Containers	0.0%	0.0%
Glass Containers	0.0%	0.0%
Non-recoverable Composite Paper	0.0%	0.0%
Clean Plastic Film	0.0%	0.0%
#6 Expanded Polystyrene	0.0%	0.0%
Non-recoverable Plastic Film	0.0%	0.0%
Disposal Bags	0.0%	0.0%
Non-recoverable/Composite Plastics	0.0%	0.0%
Ferrous Metals	0.0%	0.0%
Other Aluminum	0.0%	0.0%
Other Non-recoverable/Composite Organics	0.0%	0.0%
Bathroom Waste	0.0%	0.1%
Total	**100%**	
Sample Count	*13*	

Confidence intervals calculated at the 90% confidence level.
Percentages may not total 100% due to rounding.

Private Schools

Compostable materials accounted for 86% of the private school organics substream (Figure 26). All of this material was food scraps. Potentially compostable materials that are not currently accepted in Tacoma's organics stream accounted for less than 1% of the substream and other contaminants accounted for 13%.

Figure 26. Organics Key Materials: Private Schools



Contaminant materials accounted for 13.7% of the private school organics substream (Table 22). Nondistinct fines (13.0%) was the most prevalent non-recoverable material type and includes soil, sand, and dirt that primarily come from landscaping activities. One sample was almost entirely composed of nondistinct fines in the form of soil. Corrugated cardboard (0.1%) was the most prevalent curbside recyclable material type. Several contaminants were present in very small quantities (less than 0.05%).

Table 22. Organics Most Prevalent Contaminant Material Types: Private Schools

Material	Est. %	+ / -
Nondistinct Fines	13.0%	20.3%
Food-soiled & Compostable Paper	0.2%	0.3%
Other Residuals	0.1%	0.2%
Clean Plastic Film	0.1%	0.2%
Corrugated Cardboard	0.1%	0.1%
Non-recoverable/Composite Plastics	0.1%	0.1%
Non-recoverable Plastic Film	0.0%	0.0%
#1 PET Containers	0.0%	0.1%
#5 PP Containers	0.0%	0.0%
Other Non-recoverable/Composite Organics	0.0%	0.0%
Total for Top Contaminant Materials	**13.7%**	
All Other Contaminant Materials	**0.0%**	
All Other Materials	**86.2%**	
Total Annual Tons	**100.0%**	

Percentages for material types may not total 100% due to rounding.

Table 23 presents composition estimates for individual material types in the private school organics substream. Contaminant material types that were not observed are excluded from this table.

Table 23. Organics Waste Key Material Types: Private Schools

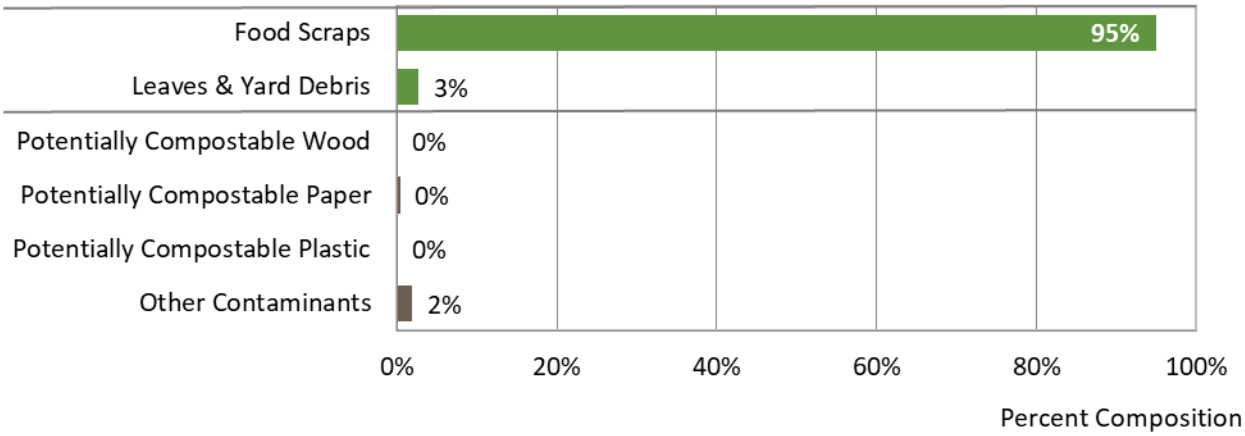
Material	Est. %	+ / -
Accepted Compostables	**86.2%**	
Food Scraps	86.2%	13.8%
Leaves & Yard Debris	-	-
Potentially Compostable Wood	**0.0%**	
Dimensional Lumber & Engineered Wood	-	-
Roofing & Siding Wood	-	-
Potentially Compostable Paper	**0.3%**	
Corrugated Cardboard	0.1%	0.1%
Waxed Corrugated Cardboard	-	-
Food-soiled & Compostable Paper	0.2%	0.3%
Potentially Compostable Plastic	**0.0%**	
#7 Potentially Compostable Plastic	-	-
Potentially Compostable Disposal Bags	-	-
Other Contaminants	**13.4%**	
Mixed Recyclable Fibers	0.0%	0.0%
#1 PET Containers	0.0%	0.1%
#5 PP Containers	0.0%	0.0%
Aluminum Cans	0.0%	0.0%
Textiles & Shoes	0.0%	0.0%
Polycoated & Lined Containers	0.0%	0.0%
Non-recoverable Composite Paper	0.0%	0.0%
#3-7 Plastics (excluding #5)	0.0%	0.0%
Clean Plastic Film	0.1%	0.2%
Non-recoverable Plastic Film	0.0%	0.0%
Non-recoverable/Composite Plastics	0.1%	0.1%
Other Non-recoverable/Composite Organics	0.0%	0.0%
Nondistinct Fines	13.0%	20.3%
Other Residuals	0.1%	0.2%
Total	**100%**	
Sample Count	*6*	

Confidence intervals calculated at the 90% confidence level.
Percentages may not total 100% due to rounding.

Other Commercial

Other commercial generators included religious organizations, event spaces, government buildings, and assisted living facilities. Compostable materials accounted for 98% of the other commercial organics substream (Figure 27). Nearly all of this material was food scraps (95% of the substream overall). Potentially compostable materials that are not currently accepted in Tacoma's organics stream accounted for less than 1% of the substream. Other contaminants accounted for 2% of the substream.

Figure 27. Organics Key Materials: Other Commercial



Contaminant materials accounted for 2.3% of the other commercial organics substream (Table 24). Mixed recyclable fibers (1.0%) was the most prevalent curbside recyclable material type and nondistinct fines (0.4%) was the most prevalent non-recoverable material type.

Table 24. Organics Most Prevalent Contaminant Material Types: Other Commercial

Material	Est. %	+ / -
Mixed Recyclable Fibers	1.0%	1.5%
Nondistinct Fines	0.4%	0.7%
Food-soiled & Compostable Paper	0.3%	0.3%
Non-recoverable Composite Paper	0.1%	0.2%
Disposal Bags	0.1%	0.2%
#5 PP Containers	0.1%	0.1%
Corrugated Cardboard	0.1%	0.1%
Aluminum Cans	0.1%	0.1%
Non-recoverable/Composite Plastics	0.1%	0.1%
Clean Plastic Film	0.0%	0.0%
Total for Top Contaminant Materials	**2.2%**	
All Other Contaminant Materials	**0.1%**	
All Other Materials	**97.7%**	
Total Annual Tons	**100.0%**	

Percentages for material types may not total 100% due to rounding.

Table 25 presents composition estimates for individual material types in the other commercial organics substream. Contaminant material types that were not observed are excluded from this table.

Table 25. Organics Waste Key Material Types: Other Commercial

Material	Est. %	+ / -
Accepted Compostables	**97.7%**	
Food Scraps	95.0%	5.1%
Leaves & Yard Debris	2.7%	3.6%
Potentially Compostable Wood	**0.0%**	
Dimensional Lumber & Engineered Wood	-	-
Roofing & Siding Wood	-	-
Potentially Compostable Paper	**0.4%**	
Corrugated Cardboard	0.1%	0.1%
Waxed Corrugated Cardboard	-	-
Food-soiled & Compostable Paper	0.3%	0.3%
Potentially Compostable Plastic	**0.0%**	
#7 Potentially Compostable Plastic	-	-
Potentially Compostable Disposal Bags	-	-
Other Contaminants	**1.9%**	
Mixed Recyclable Fibers	1.0%	1.5%
#1 PET Containers	0.0%	0.0%
#5 PP Containers	0.1%	0.1%
Aluminum Cans	0.1%	0.1%
Textiles & Shoes	0.0%	0.0%
Polycoated & Lined Containers	0.0%	0.0%
Non-recoverable Composite Paper	0.1%	0.2%
#3-7 Plastics (excluding #5)	0.0%	0.0%
Clean Plastic Film	0.0%	0.0%
#6 Expanded Polystyrene	0.0%	0.0%
Non-recoverable Plastic Film	0.0%	0.0%
Disposal Bags	0.1%	0.2%
Non-recoverable/Composite Plastics	0.1%	0.1%
Ferrous Metals	0.0%	0.0%
Other Non-recoverable/Composite Organics	0.0%	0.0%
Nondistinct Fines	0.4%	0.7%
Other Residuals	0.0%	0.0%
Total	**100%**	
Sample Count	*9*	

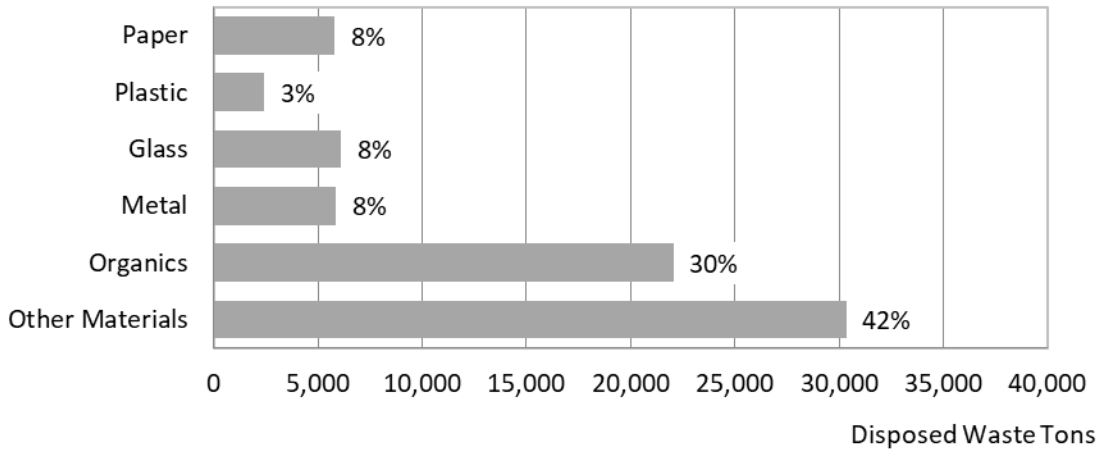
Confidence intervals calculated at the 90% confidence level.
Percentages may not total 100% due to rounding.

Self-haul Disposed Waste Findings

Overall Self-haul Disposed Waste

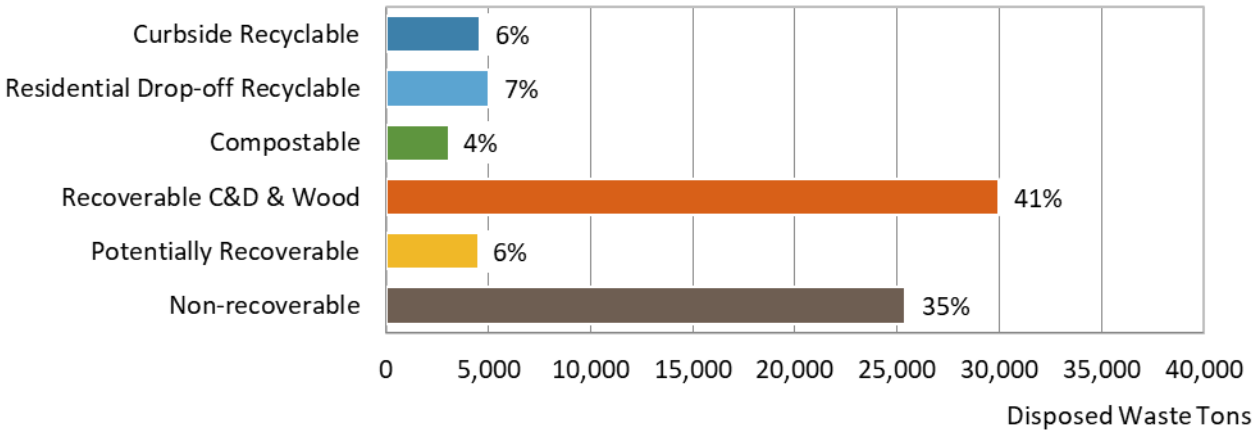
In 2023, self-haul customers delivered 72,648 tons of material for disposal. Other materials was the most prevalent material class, accounting for almost half (42% or 30,345 tons) of the substream (Figure 28). Organics (30% or 22,089 tons) was the next most prevalent material class.

Figure 28. Self-haul Disposed Waste by Material Class: Overall



Overall, 64% (47,217 tons) of self-haul disposed waste was recoverable or potentially recoverable (Figure 29). Curbside recyclable materials accounted for 6% (4,610 tons), residential drop-off recyclable materials accounted for 7% (5,060 tons), and compostable materials accounted for 4% (3,073 tons) of the substream. Recoverable C&D and wood accounted for 41% (29,960 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 6% (4,514 tons).

Figure 29. Self-haul Disposed Waste by Recoverability Group: Overall



Materials that are recoverable at the TRTC accounted for 23.8% (17,256 tons) of the self-haul disposed waste substream (Table 26). This includes curbside recyclable, residential drop-off recyclable, and potentially recyclable materials, along with leaves and yard debris.

Ferrous metals (5.0% or 3,663 tons) was the most prevalent residential drop-off recyclable material and the most prevalent recoverable material overall. Corrugated cardboard (4.4% or 3,180 tons) was the most prevalent curbside recyclable material type and textiles and shoes (2.2% or 1,572 tons) was the most prevalent potentially recoverable material type. Leaves and yard debris accounted for 4.2% (3,073 tons) of the overall self-haul disposed waste substream.

Table 26. Self-haul Disposed Waste Most Prevalent Recoverable Material Types: Overall

Material	Est. %	+ / -	Est. Tons
Ferrous Metals	5.0%	2.1%	3,663
Corrugated Cardboard	4.4%	1.9%	3,180
Leaves & Yard Debris	4.2%	2.6%	3,073
Textiles & Shoes	2.2%	1.4%	1,572
Non-recoverable/Composite Metals	1.4%	0.7%	1,032
Mixed Recyclable Fibers	1.4%	0.7%	981
E-waste	1.3%	0.6%	955
Other Non-ferrous Metals	0.9%	0.8%	618
Household Batteries - Alkaline or Other	0.5%	0.5%	377
Glass Containers	0.5%	0.2%	376
Total for Top Recoverable Materials	**21.8%**		**15,828**
All Other Recoverable Materials	**2.0%**		**1,428**
All Other Materials	**76.2%**		**55,392**
Total Annual Tons	**100.0%**		**72,648**

Percentages for material types may not total 100% due to rounding.

Construction and demolition (non-wood) (24.2% or 17,614 tons) was the most prevalent material type overall in the self-haul disposed waste substream (Table 27). Nondistinct fines (11.7% or 8,531 tons) was the most prevalent non-recoverable material type.

Table 27. Self-haul Disposed Waste Detailed Waste Composition Results: Overall

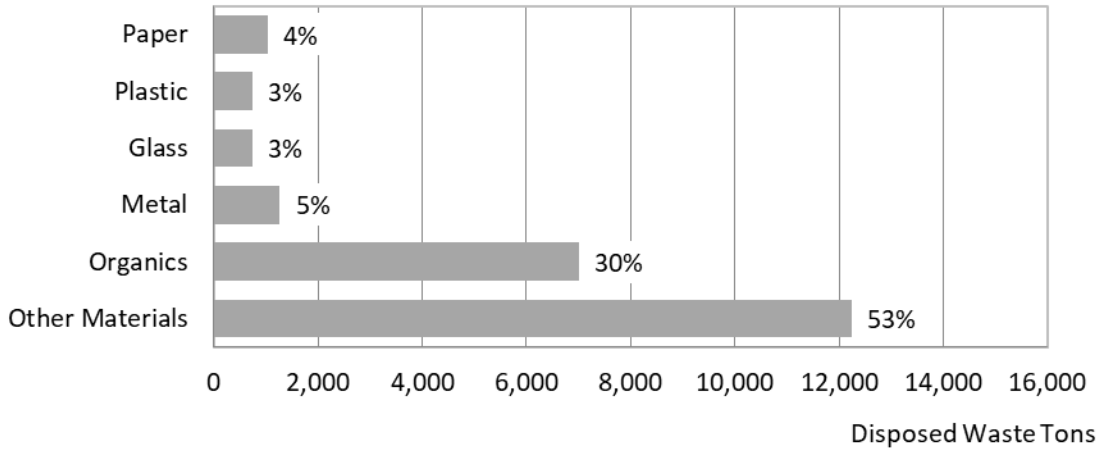
Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**6.3%**	**2.2%**	**4,610**	**Recoverable C&D & Wood**	**41.2%**	**9.2%**	**29,960**
Residential Drop-off Recyclable	**7.0%**	**2.4%**	**5,060**	**Potentially Recoverable**	**6.2%**	**2.1%**	**4,514**
Compostable	**4.2%**	**2.7%**	**3,073**	**Non-recoverable**	**35.0%**	**8.6%**	**25,432**
Paper	**8.0%**	**2.7%**	**5,805**	**Organics**	**30.4%**	**6.1%**	**22,089**
Corrugated Cardboard	4.4%	1.9%	3,180	Food Scraps	0.8%	0.5%	599
Mixed Recyclable Fibers	1.4%	0.7%	981	Leaves & Yard Debris	4.2%	2.6%	3,073
Waxed Corrugated Cardboard	0.2%	0.4%	175	Dimensional Lumber & Engineered Wood	15.7%	4.6%	11,425
Polycoated & Lined Containers	0.4%	0.2%	299	Roofing & Siding Wood	1.3%	0.9%	921
Non-recoverable Composite Paper	1.6%	0.9%	1,169	Carpet	0.1%	0.1%	44
Plastic	**3.3%**	**1.1%**	**2,427**	Tires	0.1%	0.1%	60
#1 PET Containers	0.2%	0.1%	130	Textiles & Shoes	2.2%	1.4%	1,572
#2 HDPE Containers - Natural	0.0%	0.0%	32	Food-soiled & Compostable Paper	0.5%	0.4%	329
#2 HDPE Containers - Pigmented	0.1%	0.0%	53	Treated Wood	1.4%	0.9%	996
#5 PP Containers	0.1%	0.1%	105	Other Wood	0.9%	0.8%	649
#3-7 Plastics (excluding #5)	0.2%	0.2%	158	Other Non-recoverable/Composite Organics	3.3%	1.6%	2,422
Clean Plastic Film	0.3%	0.1%	184	**Other Materials**	**41.8%**	**9.6%**	**30,345**
#6 Expanded Polystyrene	0.3%	0.2%	220	Construction & Demolition (non-wood)	24.2%	9.5%	17,614
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	1.3%	0.6%	955
Non-recoverable Plastic Film	0.1%	0.1%	98	Vehicle Batteries	-	-	-
Disposal Bags	0.2%	0.1%	110	Household Batteries - Rechargeable	0.1%	0.1%	42
Potentially Compostable Disposal Bags	0.0%	0.0%	0	Household Batteries - Alkaline or Other	0.5%	0.5%	377
Non-recoverable/Composite Plastics	1.8%	0.9%	1,335	Fluorescent Light Tubes	0.1%	0.2%	102
Metal	**8.1%**	**2.5%**	**5,873**	Oil-based Paint	0.0%	0.0%	5
Aluminum Cans	0.1%	0.0%	88	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.1%	0.0%	41	Motor Oil/Fuels	0.2%	0.3%	157
Empty Aerosol Cans	0.1%	0.1%	60	Other Household Hazardous Waste	0.2%	0.2%	168
Ferrous Metals	5.0%	2.1%	3,663	Latex Paint	0.0%	0.0%	11
Other Non-ferrous Metals	0.9%	0.8%	618	Mattresses	1.1%	1.1%	788
Non-recoverable/Composite Metals	1.4%	0.7%	1,032	Bathroom Waste	0.8%	0.7%	613
Other Aluminum	0.5%	0.4%	371	Mixed Furniture	0.9%	0.5%	665
Glass	**8.4%**	**6.5%**	**6,110**	Nondistinct Fines	11.7%	7.7%	8,531
Glass Containers	0.5%	0.2%	376	Other Residuals	0.4%	0.3%	316
Non-recoverable/Composite Glass	7.9%	6.5%	5,734				
Sample Count	***133***			**Total**	**100%**		**72,648**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Residential Self-haul Disposed Waste

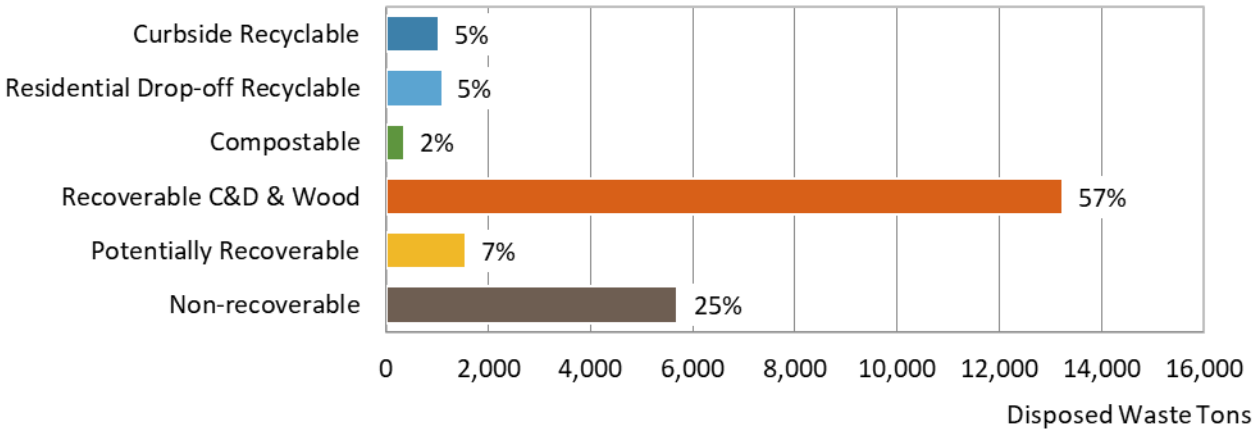
In 2023, self-haul residential customers delivered 23,034 tons of material for disposal. Other materials was the most prevalent material class, accounting for over half (53% or 12,247 tons) of the substream (Figure 30). Organics (30% or 7,016 tons) was the next most prevalent material class.

Figure 30. Self-haul Disposed Waste by Material Class: Residential



Overall, 76% (17,324 tons) of residential self-haul disposed waste was recoverable or potentially recoverable (Figure 31). Curbside recyclable materials accounted for 5% (1,050 tons), residential drop-off recyclable materials accounted for 5% (1,105 tons), and compostable materials accounted for 2% (364 tons) of the substream. Recoverable C&D and wood accounted for 57% (13,240 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 7% (1,565 tons).

Figure 31. Self-haul Disposed Waste by Recoverability Group: Residential



Materials that are recoverable at the TRTC accounted for 17.8% (4,084 tons) of the residential self-haul disposed waste substream (Table 28). This includes curbside recyclable, residential drop-off recyclable, and potentially recyclable materials, along with leaves and yard debris.

Ferrous metals (3.3% or 771 tons) was the most prevalent residential drop-off recyclable material and the most prevalent recoverable material overall. Corrugated cardboard (2.2% or 511 tons) was the most prevalent curbside recyclable material type and textiles and shoes (2.2% or 510 tons) was the most prevalent potentially recoverable material type. Leaves and yard debris accounted for 1.6% (364 tons) of the residential self-haul disposed waste substream.

Table 28. Self-haul Disposed Waste Most Prevalent Recoverable Material Types: Residential

Material	Est. %	+ / -	Est. Tons
Ferrous Metals	3.3%	1.1%	771
Corrugated Cardboard	2.2%	0.6%	511
Textiles & Shoes	2.2%	1.3%	510
Leaves & Yard Debris	1.6%	1.3%	364
Mixed Recyclable Fibers	1.6%	0.6%	358
E-waste	1.3%	1.1%	308
Non-recoverable/Composite Metals	1.3%	0.6%	302
Glass Containers	0.9%	0.6%	212
Motor Oil/Fuels	0.7%	1.0%	157
Other Household Hazardous Waste	0.4%	0.4%	94
Total for Top Recoverable Materials	**15.6%**		**3,587**
All Other Recoverable Materials	**2.2%**		**497**
All Other Materials	**82.3%**		**18,950**
Total Annual Tons	**100.0%**		**23,034**

Percentages for material types may not total 100% due to rounding.

Construction and demolition (non-wood) (39.9% or 9,181 tons) was the most prevalent material type overall in the residential self-haul disposed waste substream (Table 29). Nondistinct fines (6.2% or 1,424 tons) was the most prevalent non-recoverable material type.

Table 29. Self-haul Disposed Waste Detailed Waste Composition Results: Residential

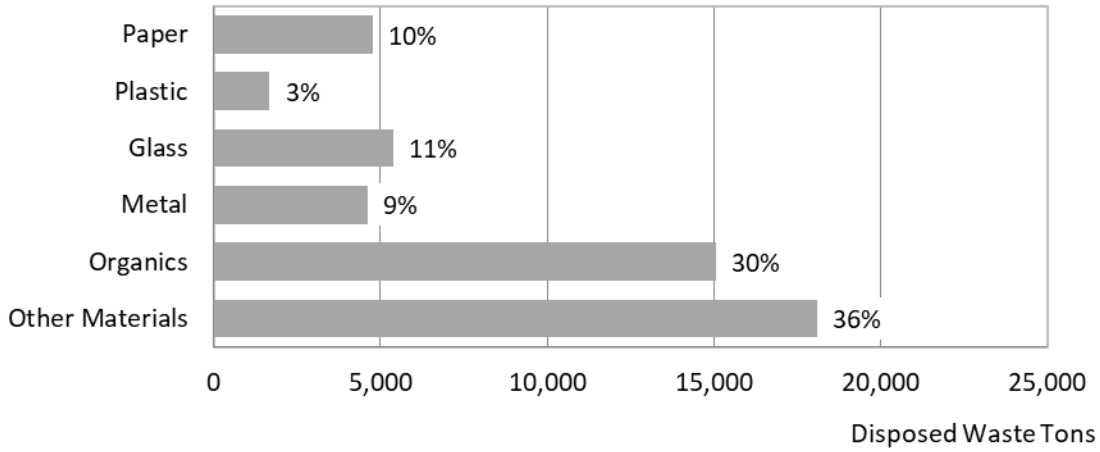
Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**4.6%**	**1.3%**	**1,050**	**Recoverable C&D & Wood**	**57.5%**	**9.7%**	**13,240**
Residential Drop-off Recyclable	**4.8%**	**1.3%**	**1,105**	**Potentially Recoverable**	**6.8%**	**2.5%**	**1,565**
Compostable	**1.6%**	**1.3%**	**364**	**Non-recoverable**	**24.8%**	**7.9%**	**5,710**
Paper	**4.5%**	**1.3%**	**1,031**	**Organics**	**30.5%**	**8.3%**	**7,016**
Corrugated Cardboard	2.2%	0.6%	511	Food Scraps	0.9%	0.5%	201
Mixed Recyclable Fibers	1.6%	0.6%	358	Leaves & Yard Debris	1.6%	1.3%	364
Waxed Corrugated Cardboard	0.0%	0.0%	6	Dimensional Lumber & Engineered Wood	14.3%	5.0%	3,304
Polycoated & Lined Containers	0.3%	0.3%	73	Roofing & Siding Wood	3.3%	2.5%	755
Non-recoverable Composite Paper	0.4%	0.2%	83	Carpet	0.2%	0.2%	44
Plastic	**3.2%**	**1.9%**	**743**	Tires	0.3%	0.3%	60
#1 PET Containers	0.2%	0.1%	48	Textiles & Shoes	2.2%	1.3%	510
#2 HDPE Containers - Natural	0.0%	0.0%	7	Food-soiled & Compostable Paper	1.0%	1.3%	232
#2 HDPE Containers - Pigmented	0.1%	0.0%	14	Treated Wood	2.4%	2.1%	555
#5 PP Containers	0.2%	0.1%	36	Other Wood	0.8%	0.6%	189
#3-7 Plastics (excluding #5)	0.3%	0.3%	61	Other Non-recoverable/Composite Organics	3.5%	2.4%	803
Clean Plastic Film	0.1%	0.0%	27	**Other Materials**	**53.2%**	**9.4%**	**12,247**
#6 Expanded Polystyrene	0.2%	0.1%	40	Construction & Demolition (non-wood)	39.9%	10.8%	9,181
#7 Potentially Compostable Plastic	-	-	-	E-waste	1.3%	1.1%	308
Non-recoverable Plastic Film	0.1%	0.1%	24	Vehicle Batteries	-	-	-
Disposal Bags	0.1%	0.0%	27	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.3%	0.5%	68
Non-recoverable/Composite Plastics	2.0%	1.7%	460	Fluorescent Light Tubes	0.1%	0.1%	16
Metal	**5.5%**	**1.4%**	**1,262**	Oil-based Paint	0.0%	0.0%	5
Aluminum Cans	0.2%	0.1%	40	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.2%	0.1%	37	Motor Oil/Fuels	0.7%	1.0%	157
Empty Aerosol Cans	0.0%	0.0%	8	Other Household Hazardous Waste	0.4%	0.4%	94
Ferrous Metals	3.3%	1.1%	771	Latex Paint	0.0%	0.1%	11
Other Non-ferrous Metals	0.1%	0.1%	26	Mattresses	1.4%	1.2%	321
Non-recoverable/Composite Metals	1.3%	0.6%	302	Bathroom Waste	1.2%	1.8%	273
Other Aluminum	0.3%	0.3%	78	Mixed Furniture	1.4%	1.3%	312
Glass	**3.2%**	**1.7%**	**735**	Nondistinct Fines	6.2%	4.5%	1,424
Glass Containers	0.9%	0.6%	212	Other Residuals	0.3%	0.2%	76
Non-recoverable/Composite Glass	2.3%	1.6%	523				
Sample Count	***77***			**Total**	**100%**		**23,034**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commercial Self-haul Disposed Waste

In 2023, self-haul commercial customers delivered 49,614 tons of material for disposal. Other materials was the most prevalent material class, accounting for over one-third (36% or 18,098 tons) of the substream (Figure 32). Organics (30% or 15,073 tons) was the next most prevalent material class.

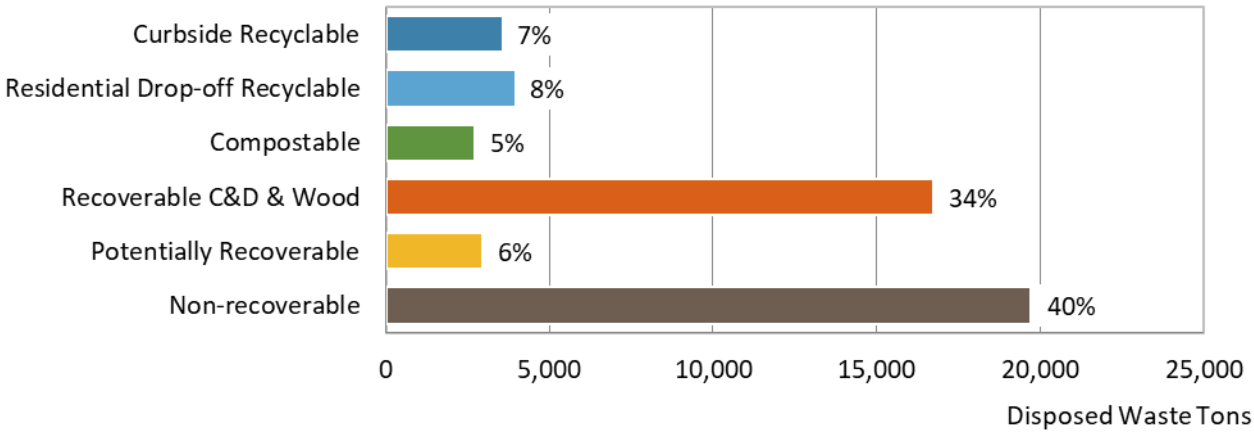
Figure 32. Self-haul Disposed Waste by Material Class: Commercial



Overall, 60% (29,892 tons) of commercial self-haul disposed waste was recoverable or potentially recoverable (Figure 33). Curbside recyclable materials accounted for 7% (3,560 tons), residential drop-off recyclable materials accounted for 8% (3,955 tons), and compostable materials accounted for 5% (2,709 tons) of the substream. Recoverable C&D and wood accounted for 34% (16,720 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 6% (2,948 tons).

Commercial self-haul customers are not eligible to use drop-off recycling options at the TRTC.

Figure 33. Self-haul Disposed Waste by Recoverability Group: Commercial



Materials that are recoverable at the TRTC accounted for 26.6% (13,172 tons) of the commercial self-haul disposed waste substream (Table 30). This includes curbside recyclable, residential drop-off recyclable, and potentially recyclable materials, along with leaves and yard debris.

Ferrous metals (5.8% or 2,893 tons) was the most prevalent residential drop-off recyclable material and the most prevalent recoverable material overall. Corrugated cardboard (5.4% or 2,669 tons) was the most prevalent curbside recyclable material and textiles and shoes (2.1% or 1,062 tons) was the most prevalent potentially recoverable material type. Leaves and yard debris accounted for 5.5% (2,709 tons) of the commercial self-haul disposed waste substream.

Table 30. Self-haul Disposed Waste Most Prevalent Recoverable Material Types: Commercial

Material	Est. %	+ / -	Est. Tons
Ferrous Metals	5.8%	3.1%	2,893
Leaves & Yard Debris	5.5%	3.8%	2,709
Corrugated Cardboard	5.4%	2.8%	2,669
Textiles & Shoes	2.1%	1.9%	1,062
Non-recoverable/Composite Metals	1.5%	1.0%	729
E-waste	1.3%	0.7%	648
Mixed Recyclable Fibers	1.3%	1.0%	623
Other Non-ferrous Metals	1.2%	1.2%	592
Household Batteries - Alkaline or Other	0.6%	0.8%	309
Glass Containers	0.3%	0.2%	164
Total for Top Recoverable Materials	**25.0%**		**12,398**
All Other Recoverable Materials	**1.6%**		**774**
All Other Materials	**73.5%**		**36,441**
Total Annual Tons	**100.0%**		**49,614**

Percentages for material types may not total 100% due to rounding.

Construction and demolition (non-wood) (17.0 % or 8,433 tons) was the most prevalent material type overall in the commercial self-haul disposed waste substream (Table 31). Nondistinct fines (14.3% or 7,107 tons) was the most prevalent non-recoverable material type.

Table 31. Self-haul Disposed Waste Detailed Waste Composition Results: Commercial[9]

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**7.2%**	**3.2%**	**3,560**	**Recoverable C&D & Wood**	**33.7%**	**12.7%**	**16,720**
Residential Drop-off Recyclable	**8.0%**	**3.5%**	**3,955**	**Potentially Recoverable**	**5.9%**	**2.8%**	**2,948**
Compostable	**5.5%**	**3.9%**	**2,709**	**Non-recoverable**	**39.8%**	**12.0%**	**19,722**
Paper	**9.6%**	**3.9%**	**4,773**	**Organics**	**30.4%**	**8.1%**	**15,073**
Corrugated Cardboard	5.4%	2.8%	2,669	Food Scraps	0.8%	0.7%	398
Mixed Recyclable Fibers	1.3%	1.0%	623	Leaves & Yard Debris	5.5%	3.8%	2,709
Waxed Corrugated Cardboard	0.3%	0.6%	169	Dimensional Lumber & Engineered Wood	16.4%	6.3%	8,120
Polycoated & Lined Containers	0.5%	0.3%	225	Roofing & Siding Wood	0.3%	0.5%	166
Non-recoverable Composite Paper	2.2%	1.3%	1,086	Carpet	-	-	-
Plastic	**3.4%**	**1.4%**	**1,684**	Tires	-	-	-
#1 PET Containers	0.2%	0.1%	82	Textiles & Shoes	2.1%	1.9%	1,062
#2 HDPE Containers - Natural	0.1%	0.0%	25	Food-soiled & Compostable Paper	0.2%	0.1%	97
#2 HDPE Containers - Pigmented	0.1%	0.1%	39	Treated Wood	0.9%	0.9%	442
#5 PP Containers	0.1%	0.1%	70	Other Wood	0.9%	1.1%	460
#3-7 Plastics (excluding #5)	0.2%	0.3%	97	Other Non-recoverable/Composite Organics	3.3%	2.1%	1,619
Clean Plastic Film	0.3%	0.1%	157	**Other Materials**	**36.5%**	**13.4%**	**18,098**
#6 Expanded Polystyrene	0.4%	0.3%	181	Construction & Demolition (non-wood)	17.0%	13.0%	8,433
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	1.3%	0.7%	648
Non-recoverable Plastic Film	0.1%	0.1%	74	Vehicle Batteries	-	-	-
Disposal Bags	0.2%	0.1%	83	Household Batteries - Rechargeable	0.1%	0.1%	42
Potentially Compostable Disposal Bags	0.0%	0.0%	0	Household Batteries - Alkaline or Other	0.6%	0.8%	309
Non-recoverable/Composite Plastics	1.8%	1.1%	875	Fluorescent Light Tubes	0.2%	0.3%	85
Metal	**9.3%**	**3.6%**	**4,611**	Oil-based Paint	-	-	-
Aluminum Cans	0.1%	0.0%	47	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.0%	0.0%	4	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.1%	0.1%	53	Other Household Hazardous Waste	0.1%	0.2%	74
Ferrous Metals	5.8%	3.1%	2,893	Latex Paint	-	-	-
Other Non-ferrous Metals	1.2%	1.2%	592	Mattresses	0.9%	1.5%	467
Non-recoverable/Composite Metals	1.5%	1.0%	729	Bathroom Waste	0.7%	0.7%	340
Other Aluminum	0.6%	0.6%	293	Mixed Furniture	0.7%	0.5%	354
Glass	**10.8%**	**9.5%**	**5,376**	Nondistinct Fines	14.3%	11.0%	7,107
Glass Containers	0.3%	0.2%	164	Other Residuals	0.5%	0.4%	240
Non-recoverable/Composite Glass	10.5%	9.5%	5,212				
Sample Count	***56***			**Total**	**100%**		**49,614**

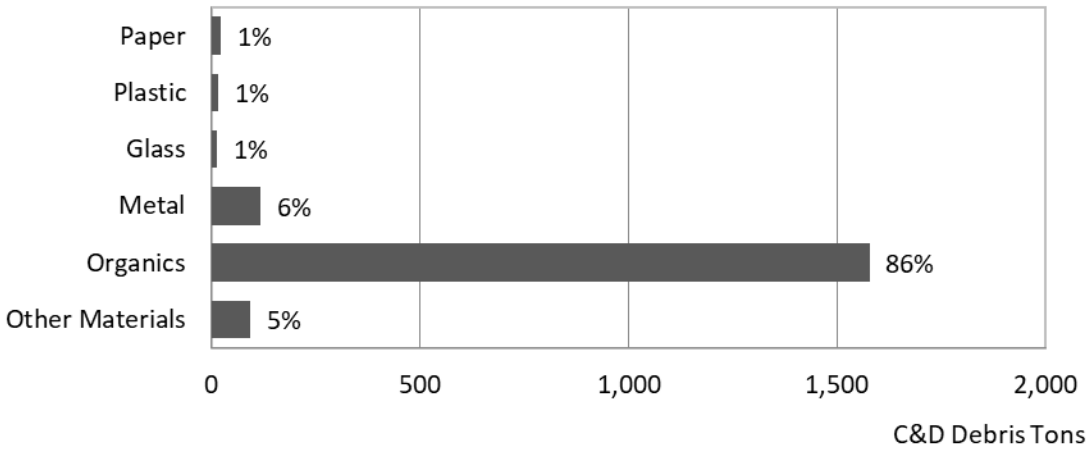
Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

[9] Food scraps are non-recoverable for the self-haul sector but compostable for single-family, multifamily, and commercial sectors.

Construction and Demolition Findings

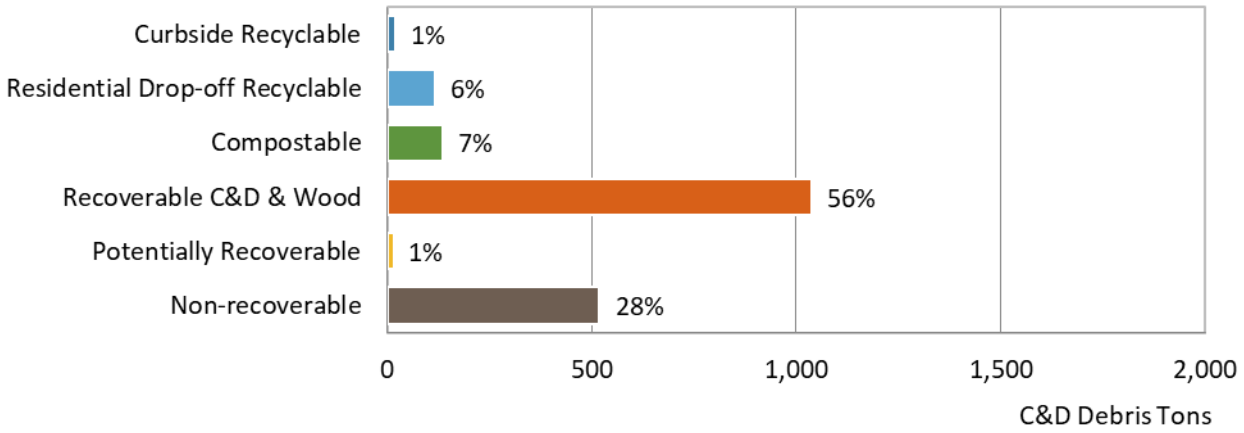
In 2023, C&D generators discarded 1,844 tons of material in the C&D debris stream. Organics was the most prevalent material class, accounting for 86% (1,580 tons) of the substream (Figure 34). Metal (6% or 118 tons) and other materials (5% or 93 tons) were the next most prevalent material classes.

Figure 34. C&D Debris by Material Class: Overall



Overall, 71% (1,325 tons) of C&D debris was recoverable or potentially recoverable (Figure 35). Curbside recyclable materials accounted for 1% (20 tons), residential drop-off recyclable materials accounted for 6% (117 tons), and compostable materials accounted for 7% (136 tons) of the substream. Recoverable C&D and wood accounted for 56% (1,037 tons) and potentially recoverable materials, which can be recovered through specialty programs, accounted for 1% (15 tons).

Figure 35. C&D Debris by Recoverability Group: Overall



Materials that are recoverable for C&D generators accounted for 57.3% (1,057 tons) of the C&D debris stream (Table 32). This includes curbside recyclable and recoverable C&D and wood materials.

Dimensional lumber and engineered wood (53.0% or 977 tons) was the most prevalent recoverable C&D and wood material and the most prevalent recoverable material overall. Corrugated cardboard (0.8% or 15 tons) was the most prevalent curbside recyclable material type.

Table 32. C&D Debris Most Prevalent Recoverable Material Types: Overall

Material	Est. %	+ / -	Est. Tons
Dimensional Lumber & Engineered Wood	53.0%	14.8%	977
Construction & Demolition (non-wood)	2.9%	2.1%	53
Corrugated Cardboard	0.8%	0.6%	15
Roofing & Siding Wood	0.4%	0.6%	6
Mixed Recyclable Fibers	0.1%	0.1%	2
Aluminum Cans	0.1%	0.0%	1
#2 HDPE Containers - Pigmented	0.0%	0.1%	1
#1 PET Containers	0.0%	0.0%	1
#5 PP Containers	0.0%	0.0%	0
Tin/Steel Cans	0.0%	0.0%	-
Total for Top Recoverable Materials	**57.3%**		**1,057**
All Other Recoverable Materials	**0.0%**		**-**
All Other Materials	**42.7%**		**787**
Total Annual Tons	**100.0%**		**1,844**

Percentages for material types may not total 100% due to rounding.

Dimensional lumber and engineered wood (53.0% or 977 tons) was also the most prevalent material type overall in the C&D debris stream (Table 33). Treated wood (19.3% or 356 tons) was the most prevalent non-recoverable material type.

Table 33. C&D Debris Detailed Waste Composition Results: Overall

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**1.1%**	**0.7%**	**20**	**Recoverable C&D & Wood**	**56.2%**	**15.3%**	**1,037**
Residential Drop-off Recyclable	**6.3%**	**6.7%**	**117**	**Potentially Recoverable**	**0.8%**	**0.6%**	**15**
Compostable	**7.4%**	**6.3%**	**136**	**Non-recoverable**	**28.1%**	**12.8%**	**519**
Paper	**1.2%**	**0.7%**	**22**	**Organics**	**85.7%**	**8.1%**	**1,580**
Corrugated Cardboard	0.8%	0.6%	15	Food Scraps	0.4%	0.3%	7
Mixed Recyclable Fibers	0.1%	0.1%	2	Leaves & Yard Debris	7.4%	6.1%	136
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	53.0%	14.8%	977
Polycoated & Lined Containers	0.0%	0.0%	0	Roofing & Siding Wood	0.4%	0.6%	6
Non-recoverable Composite Paper	0.2%	0.3%	4	Carpet	-	-	-
Plastic	**0.9%**	**0.6%**	**17**	Tires	0.3%	0.3%	5
#1 PET Containers	0.0%	0.0%	1	Textiles & Shoes	0.4%	0.4%	7
#2 HDPE Containers - Natural	-	-	-	Food-soiled & Compostable Paper	-	-	-
#2 HDPE Containers - Pigmented	0.0%	0.1%	1	Treated Wood	19.3%	14.8%	356
#5 PP Containers	0.0%	0.0%	0	Other Wood	0.7%	0.6%	13
#3-7 Plastics (excluding #5)	0.0%	0.0%	0	Other Non-recoverable/Composite Organics	3.9%	5.3%	73
Clean Plastic Film	0.1%	0.1%	3	**Other Materials**	**5.1%**	**3.1%**	**93**
#6 Expanded Polystyrene	0.1%	0.1%	1	Construction & Demolition (non-wood)	2.9%	2.1%	53
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.0%	0.1%	1
Non-recoverable Plastic Film	0.0%	0.0%	0	Vehicle Batteries	-	-	-
Disposal Bags	0.0%	0.0%	0	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	-	-	-
Non-recoverable/Composite Plastics	0.6%	0.7%	11	Fluorescent Light Tubes	-	-	-
Metal	**6.4%**	**6.7%**	**118**	Oil-based Paint	-	-	-
Aluminum Cans	0.1%	0.0%	1	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	-	-	-	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	-	-	-	Other Household Hazardous Waste	-	-	-
Ferrous Metals	5.7%	6.8%	104	Latex Paint	-	-	-
Other Non-ferrous Metals	0.5%	0.7%	9	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.1%	0.1%	3	Bathroom Waste	-	-	-
Other Aluminum	0.1%	0.1%	1	Mixed Furniture	0.4%	0.4%	7
Glass	**0.7%**	**0.6%**	**14**	Nondistinct Fines	1.8%	2.7%	33
Glass Containers	0.0%	0.0%	0	Other Residuals	0.0%	0.0%	0
Non-recoverable/Composite Glass	0.7%	0.6%	13				
Sample Count	***28***			**Total**	**100%**		**1,844**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Appendix A: Large Venue Composition Results

How Study Findings are Presented

This section presents the overall structure and format of the composition results for the two large venues sampled in this study, Cheney Stadium and Tacoma Dome.

Composition results are grouped by venue and stream and are presented in four formats:

1. An overview of **composition by material class** is presented as a bar chart.
2. An overview of **composition by recoverability group** is presented as a bar chart.
3. **Detailed composition and quantity estimates** for all 53 material types are presented in a table.
4. **Capture rates** are presented in a condensed composition table for commingled recycling (Cheney Stadium) and cardboard recycling (Tacoma Dome).

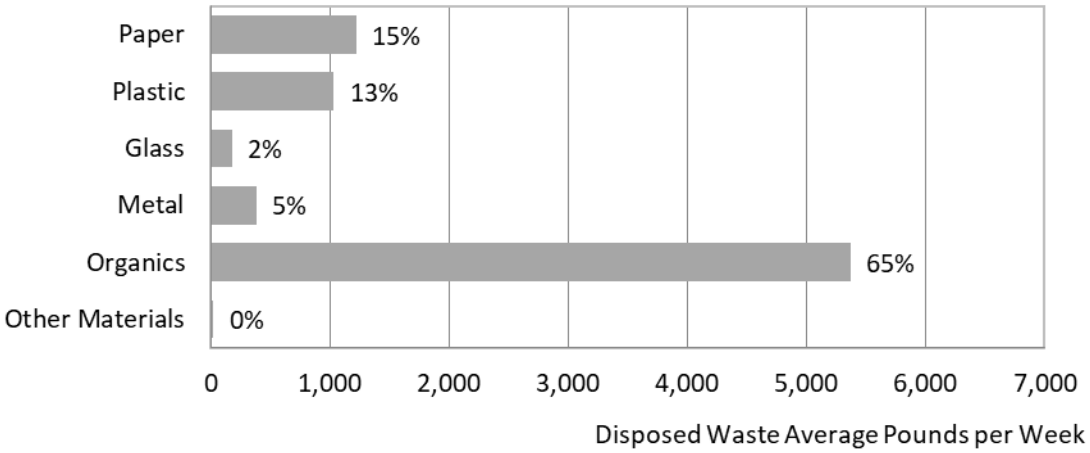
Composition estimates are reported as average pounds per week instead of annual tons to emphasize seasonal variation in material generation at large venues. Confidence intervals are not reported due to small sample sizes.

Cheney Stadium

Disposed Waste

Cheney Stadium generated approximately 8,209 pounds of disposed waste per week, on average. Organics was the most prevalent material class, accounting for 65% (5,369 average pounds per week) of the substream (Figure 36). Paper (15% or 1,221 average pounds per week) and plastic (13% or 1,036 average pounds per week) were the next most prevalent material classes.

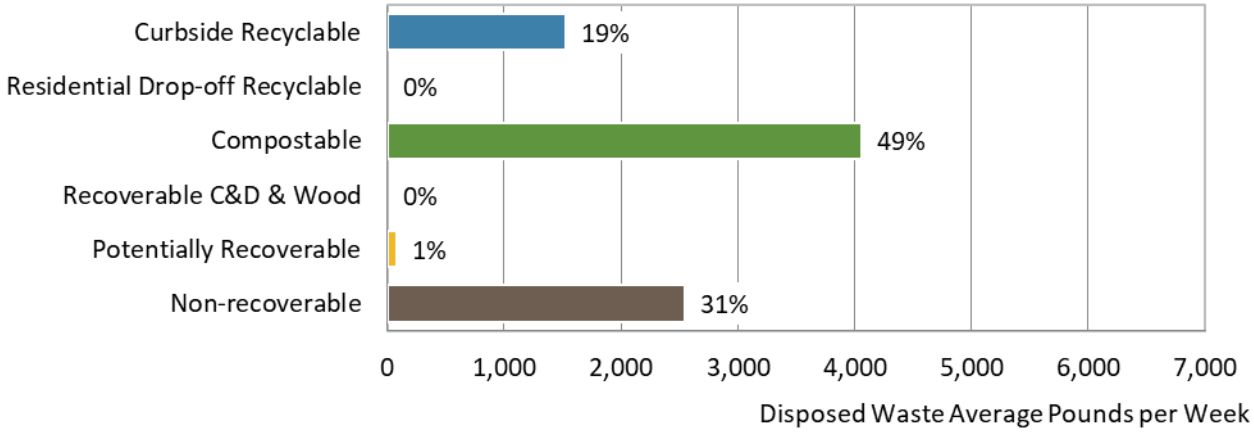
Figure 36. Disposed Waste by Material Class: Cheney Stadium



Overall, 69% (5,663 average pounds per week) of Cheney Stadium disposed waste was recoverable or potentially recoverable (Figure 37). Curbside recyclable materials accounted for 19% (1,525 average pounds per week) and compostable materials accounted for 49% (4,060 average pounds per week) of the substream. Potentially recoverable materials, which can be recovered through specialty programs, accounted for 1% (78 average pounds per week). There was no recoverable C&D and wood material in the substream.

Drop-off recycling is not a recovery option for commercial customers.

Figure 37. Disposed Waste by Recoverability Group: Cheney Stadium



Food scraps (49.5% or 4,060 average pounds per week) was the most prevalent material type overall in Cheney Stadium disposed waste (Table 34). Food-soiled and compostable paper (15.2% or 1,248 average pounds per week) was the most prevalent non-recoverable material type. Large venues have the option of contracting with private organics haulers that could recover some of these materials.

Table 34. Disposed Waste Detailed Waste Composition Results: Cheney Stadium

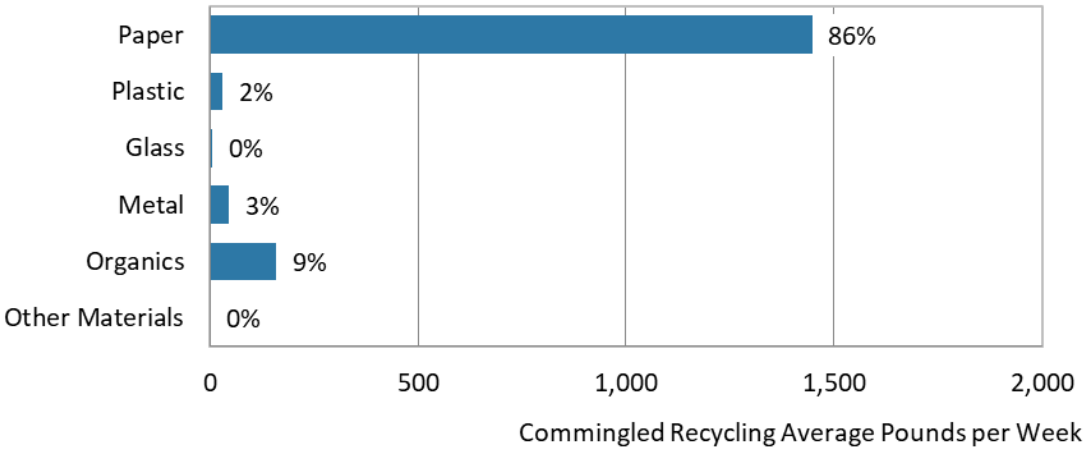
Material	Est. %	Avg. lbs/wk	Material	Est. %	Avg. lbs/wk
Curbside Recyclable	**18.6%**	**1,525**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**0.9%**	**78**
Compostable	**49.5%**	**4,060**	**Non-recoverable**	**31.0%**	**2,545**
Paper	**14.9%**	**1,221**	**Organics**	**65.4%**	**5,369**
Corrugated Cardboard	3.1%	253	Food Scraps	49.5%	4,060
Mixed Recyclable Fibers	6.9%	563	Leaves & Yard Debris	-	-
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	3.5%	284	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	1.5%	120	Carpet	-	-
Plastic	**12.6%**	**1,036**	Tires	-	-
#1 PET Containers	2.4%	199	Textiles & Shoes	0.1%	6
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	15.2%	1,248
#2 HDPE Containers - Pigmented	0.2%	14	Treated Wood	-	-
#5 PP Containers	1.2%	96	Other Wood	-	-
#3-7 Plastics (excluding #5)	0.3%	25	Other Non-recoverable/Composite Organics	0.7%	55
Clean Plastic Film	1.1%	87	**Other Materials**	**0.3%**	**23**
#6 Expanded Polystyrene	0.1%	10	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	0.8%	69	E-waste	0.0%	0
Non-recoverable Plastic Film	1.6%	135	Vehicle Batteries	-	-
Disposal Bags	4.0%	331	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	-	-	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	0.9%	70	Fluorescent Light Tubes	-	-
Metal	**4.7%**	**383**	Oil-based Paint	-	-
Aluminum Cans	2.7%	224	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	0.1%	5	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	0.9%	72	Bathroom Waste	0.3%	22
Other Aluminum	1.0%	82	Mixed Furniture	-	-
Glass	**2.2%**	**177**	Nondistinct Fines	-	-
Glass Containers	2.2%	177	Other Residuals	0.0%	1
Non-recoverable/Composite Glass	0.0%	1			
Sample Count	***4***		**Total**	**100%**	**8,209**

Percentages for material types may not total 100% due to rounding.

Commingled Recycling

Cheney Stadium generated approximately 1,690 pounds of commingled recycling per week, on average. Paper was the most prevalent material class, accounting for 86% (1,447 average pounds per week) of the substream (Figure 38). Organics (9% or 159 average pounds per week) was the next most prevalent material class.

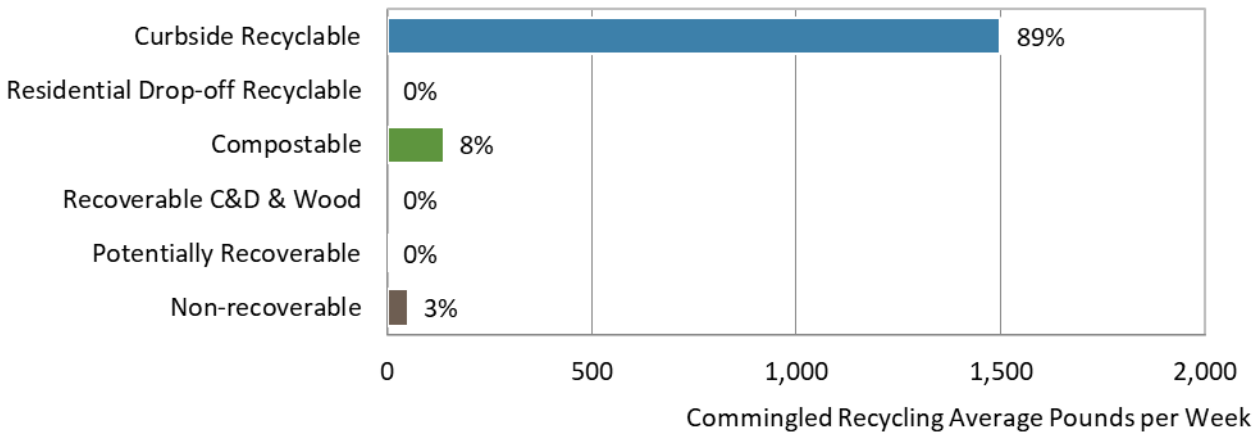
Figure 38. Commingled Recycling by Material Class: Cheney Stadium



Nearly all (89% or 1,499 average pounds per week) of Cheney Stadium commingled recycling was curbside recyclable (Figure 39). Compostable materials accounted for 8% (138 average pounds per week), potentially recoverable materials accounted for less than 1% (2 average pounds per week), and non-recoverable materials accounted for 3% (50 average pounds per week tons). There was no recoverable C&D and wood material in the substream.

Drop-off recycling is not a recovery option for commercial customers.

Figure 39. Commingled Recycling by Recoverability Group: Cheney Stadium



Mixed recyclable fibers (43.8% or 740 average pounds per week) was the most prevalent curbside recyclable material and the most prevalent material type overall in Cheney Stadium commingled recycling (Table 35). Corrugated cardboard (40.8% or 690 average pounds per week) was the next most prevalent material type overall.

Table 35. Commingled Recycling Detailed Waste Composition Results: Cheney Stadium

Material	Est. %	Avg. lbs/wk	Material	Est. %	Avg. lbs/wk
Curbside Recyclable	**88.7%**	**1,499**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**0.1%**	**2**
Compostable	**8.2%**	**138**	**Non-recoverable**	**3.0%**	**50**
Paper	**85.6%**	**1,447**	**Organics**	**9.4%**	**159**
Corrugated Cardboard	40.8%	690	Food Scraps	8.2%	138
Mixed Recyclable Fibers	43.8%	740	Leaves & Yard Debris	-	-
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	0.5%	8	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.5%	9	Carpet	-	-
Plastic	**1.8%**	**30**	Tires	-	-
#1 PET Containers	0.7%	12	Textiles & Shoes	-	-
#2 HDPE Containers - Natural	0.2%	4	Food-soiled & Compostable Paper	1.0%	18
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	0.1%	2	Other Wood	-	-
#3-7 Plastics (excluding #5)	0.0%	0	Other Non-recoverable/Composite Organics	0.2%	4
Clean Plastic Film	0.3%	5	**Other Materials**	**0.1%**	**1**
#6 Expanded Polystyrene	-	-	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	0.0%	1	E-waste	0.0%	0
Non-recoverable Plastic Film	0.2%	3	Vehicle Batteries	-	-
Disposal Bags	0.2%	3	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	-	-	Household Batteries - Alkaline or Other	0.0%	1
Non-recoverable/Composite Plastics	0.0%	0	Fluorescent Light Tubes	-	-
Metal	**2.7%**	**46**	Oil-based Paint	-	-
Aluminum Cans	2.6%	45	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	0.0%	0
Ferrous Metals	-	-	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	0.1%	2	Bathroom Waste	0.0%	0
Other Aluminum	0.0%	0	Mixed Furniture	-	-
Glass	**0.4%**	**6**	Nondistinct Fines	-	-
Glass Containers	0.4%	6	Other Residuals	-	-
Non-recoverable/Composite Glass	-	-			
Sample Count	***2***		**Total**	**100%**	**1,690**

Percentages for material types may not total 100% due to rounding.

Commingled Recycling Capture Rate

The capture rate for curbside recyclables at Cheney Stadium was 50% (Table 36). This means that of all the curbside recyclable material placed in the Cheney Stadium disposed waste and commingled recycling streams, 50% (1,499 average pounds per week) was correctly captured in commingled recycling.

Capture rates were highest for #2 HDPE containers - natural and lowest for #2 HDPE containers - pigmented, although these material types accounted for very small proportions of both streams. Capture rates for corrugated cardboard and mixed recyclable fibers, which were the two most prevalent curbside recyclable materials in both streams, were 73% and 57%, respectively.

Table 36. Commingled Recycling Capture Rates: Cheney Stadium

	Disposed Waste		Commingled Recycling		Capture
Material	**Est. %**	**Avg. lbs/wk**	**Est. %**	**Avg. lbs/wk**	**Rate**
Curbside Recyclable	**18.6%**	**1,525**	**88.7%**	**1,499**	**50%**
Residential Drop-off Recyclable	-	-	-	-	
Compostable	**49.5%**	**4,060**	**8.2%**	**138**	
Recoverable C&D & Wood	-	-	-	-	
Potentially Recoverable	**0.9%**	**78**	**0.1%**	**2**	
Non-recoverable	**31.0%**	**2,545**	**3.0%**	**50**	
Paper	**14.9%**	**1,221**	**85.6%**	**1,447**	
Corrugated Cardboard	3.1%	253	40.8%	690	73%
Mixed Recyclable Fibers	6.9%	563	43.8%	740	57%
Plastic	**12.6%**	**1,036**	**1.8%**	**30**	
#1 PET Containers	2.4%	199	0.7%	12	6%
#2 HDPE Containers - Natural	-	-	0.2%	4	100%
#2 HDPE Containers - Pigmented	0.2%	14	-	-	0%
Metal	**4.7%**	**383**	**2.7%**	**46**	
Aluminum Cans	2.7%	224	2.6%	45	17%
Tin/Steel Cans	-	-	-	-	
Glass	**2.2%**	**177**	**0.4%**	**6**	
Glass Containers	2.2%	177	0.4%	6	3%
Organics	**65.4%**	**5,369**	**9.4%**	**159**	
Other Materials	**0.3%**	**23**	**0.1%**	**1**	
Total	**100%**	**8,209**	**100%**	**1,690**	
Sample Count	*4*		*2*		

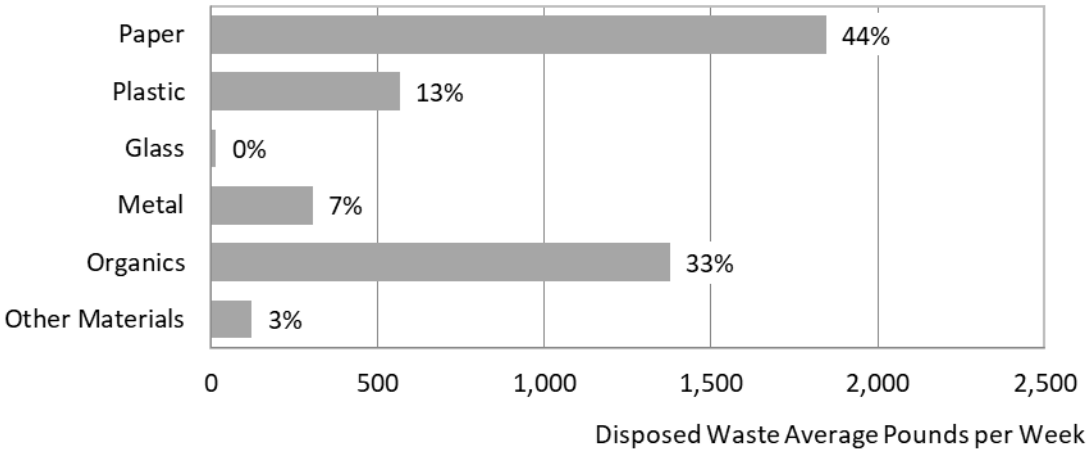
Percentages for material types may not total 100% due to rounding.

Tacoma Dome

Disposed Waste

Tacoma Dome generated approximately 4,235 pounds of disposed waste per week, on average. Paper was the most prevalent material class, accounting for 44% (1,845 average pounds per week) of the substream (Figure 40). Organics (33% or 1,377 average pounds per week) and plastic (13% or 567 average pounds per week) were the next most prevalent material classes.

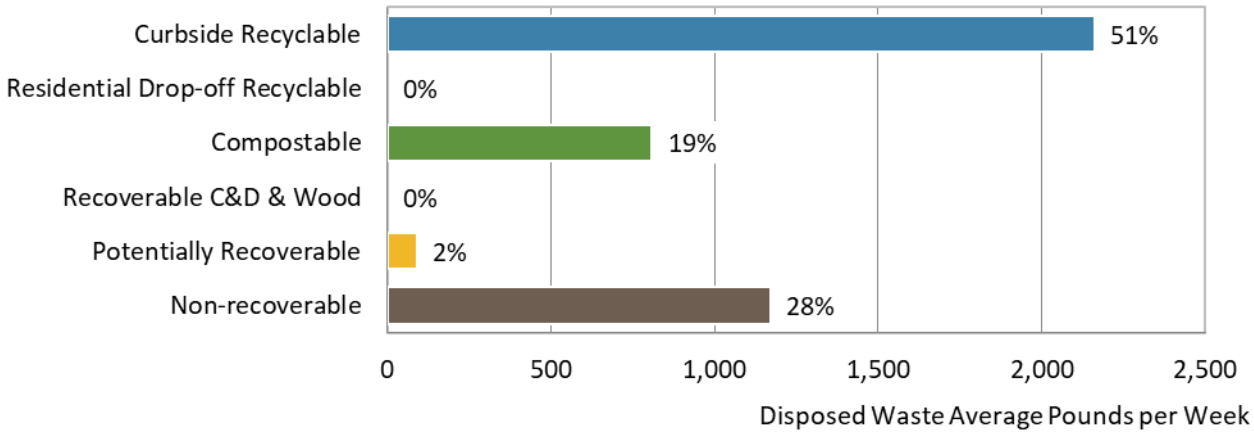
Figure 40. Disposed Waste by Material Class: Tacoma Dome



Overall, 72% (3,062 average pounds per week) of Tacoma Dome disposed waste was recoverable or potentially recoverable (Figure 41). Curbside recyclable materials accounted for 51% (2,162 average pounds per week) and compostable materials accounted for 19% (809 average pounds per week) of the substream. Potentially recoverable materials, which can be recovered through specialty programs, accounted for 2% (91 average pounds per week). There was no recoverable C&D and wood material in the substream.

Drop-off recycling is not a recovery option for commercial customers.

Figure 41. Disposed Waste by Recoverability Group: Tacoma Dome



Corrugated cardboard (38.5% or 1,628 average pounds per week) was the most prevalent material type overall in Tacoma Dome disposed waste, followed by food scraps (19.1% or 809 average pounds per week; Table 37). Other non-recoverable/composite organics (7.7% or 327 average pounds per week) was the most prevalent non-recoverable material type.

Large venues have the option of contracting with private organics haulers that could recover some of these materials.

Table 37. Disposed Waste Detailed Waste Composition Results: Tacoma Dome

Material	Est. %	Avg. lbs/wk	Material	Est. %	Avg. lbs/wk
Curbside Recyclable	**51.1%**	**2,162**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**2.2%**	**91**
Compostable	**19.1%**	**809**	**Non-recoverable**	**27.7%**	**1,172**
Paper	**43.6%**	**1,845**	**Organics**	**32.5%**	**1,377**
Corrugated Cardboard	38.5%	1,628	Food Scraps	19.1%	809
Mixed Recyclable Fibers	3.7%	155	Leaves & Yard Debris	-	-
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	1.1%	47	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.3%	14	Carpet	-	-
Plastic	**13.4%**	**567**	Tires	-	-
#1 PET Containers	3.1%	130	Textiles & Shoes	0.2%	9
#2 HDPE Containers - Natural	0.0%	1	Food-soiled & Compostable Paper	5.5%	231
#2 HDPE Containers - Pigmented	0.3%	12	Treated Wood	-	-
#5 PP Containers	0.3%	13	Other Wood	0.0%	1
#3-7 Plastics (excluding #5)	0.4%	15	Other Non-recoverable/Composite Organics	7.7%	327
Clean Plastic Film	3.6%	153	**Other Materials**	**2.9%**	**124**
#6 Expanded Polystyrene	0.0%	2	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	0.3%	14	E-waste	-	-
Non-recoverable Plastic Film	2.3%	96	Vehicle Batteries	-	-
Disposal Bags	2.2%	93	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	0.0%	2	Household Batteries - Alkaline or Other	0.0%	0
Non-recoverable/Composite Plastics	0.9%	38	Fluorescent Light Tubes	-	-
Metal	**7.2%**	**306**	Oil-based Paint	-	-
Aluminum Cans	4.9%	208	Cleaners & Other Household Products	-	-
Tin/Steel Cans	0.0%	0	Motor Oil/Fuels	-	-
Empty Aerosol Cans	0.0%	2	Other Household Hazardous Waste	0.0%	1
Ferrous Metals	0.1%	5	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	1.9%	82	Bathroom Waste	2.9%	122
Other Aluminum	0.2%	9	Mixed Furniture	-	-
Glass	**0.4%**	**16**	Nondistinct Fines	-	-
Glass Containers	0.4%	16	Other Residuals	0.0%	1
Non-recoverable/Composite Glass	-	-			
Sample Count	***4***		**Total**	**100%**	**4,235**

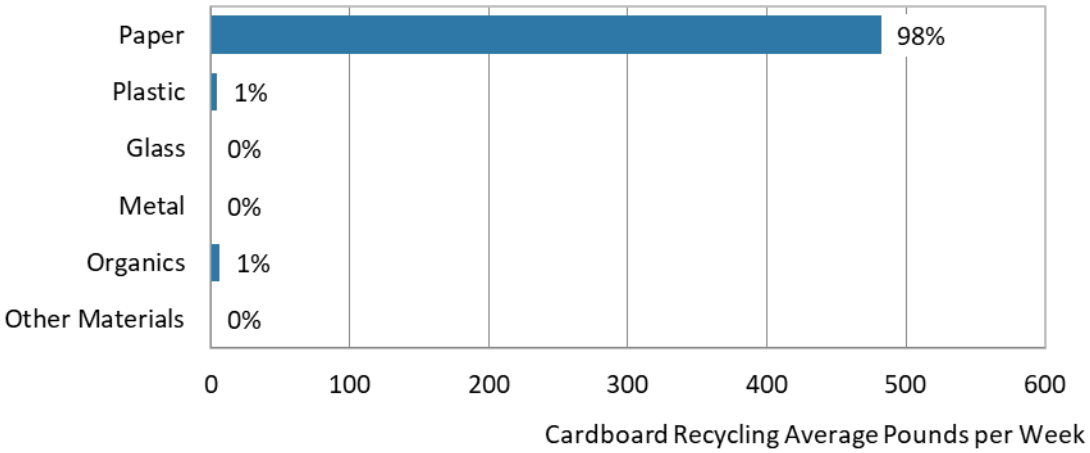
Percentages for material types may not total 100% due to rounding.

Cardboard Recycling

At Tacoma Dome, recycling collection was for cardboard only. Because only sample was characterized for this substream, results may not be representative of the full substream and should be interpreted with caution.

On average, Tacoma Dome generated approximately 493 pounds of cardboard recycling per week, on average. Paper was the most prevalent material class, accounting for 98% (482 average pounds per week) of the substream (Figure 42).

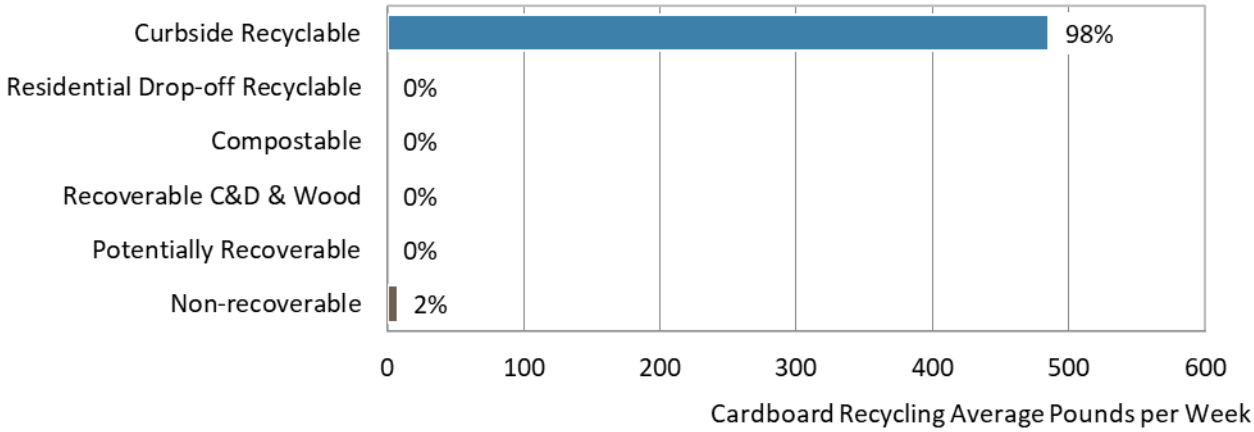
Figure 42. Cardboard Recycling by Material Class: Tacoma Dome



Nearly all (98% or 485 average pounds per week) of Tacoma Dome cardboard recycling was curbside recyclable (Figure 43). Non-recoverable materials accounted for 2% (8 average pounds per week) of the substream. There was no compostable, potentially recoverable, or recoverable C&D and wood material in the substream.

Drop-off recycling is not a recovery option for commercial customers.

Figure 43. Cardboard Recycling by Recoverability Group: Tacoma Dome



Corrugated cardboard (97.8% or 482 average pounds per week) was the most prevalent curbside recyclable material and the most prevalent material type overall in Tacoma Dome cardboard recycling (Table 38). #1 PET containers, clean plastic film, and food-soiled paper were the other material types observed in the substream.

Table 38. Cardboard Recycling Detailed Waste Composition Results: Tacoma Dome

Material	Est. %	Avg. lbs/wk	Material	Est. %	Avg. lbs/wk
Curbside Recyclable	**98.4%**	**485**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**-**	**-**
Compostable	**-**	**-**	**Non-recoverable**	**1.6%**	**8**
Paper	**97.8%**	**482**	**Organics**	**1.3%**	**7**
Corrugated Cardboard	97.8%	482	Food Scraps	-	-
Mixed Recyclable Fibers	-	-	Leaves & Yard Debris	-	-
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	-	-	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	-	-	Carpet	-	-
Plastic	**0.9%**	**4**	Tires	-	-
#1 PET Containers	0.7%	3	Textiles & Shoes	-	-
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	1.3%	7
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	-	-	Other Wood	-	-
#3-7 Plastics (excluding #5)	-	-	Other Non-recoverable/Composite Organics	-	-
Clean Plastic Film	0.2%	1	**Other Materials**	**-**	**-**
#6 Expanded Polystyrene	-	-	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	-	-	E-waste	-	-
Non-recoverable Plastic Film	-	-	Vehicle Batteries	-	-
Disposal Bags	-	-	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	-	-	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	-	-	Fluorescent Light Tubes	-	-
Metal	**-**	**-**	Oil-based Paint	-	-
Aluminum Cans	-	-	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	-	-	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	-	-	Bathroom Waste	-	-
Other Aluminum	-	-	Mixed Furniture	-	-
Glass	**-**	**-**	Nondistinct Fines	-	-
Glass Containers	-	-	Other Residuals	-	-
Non-recoverable/Composite Glass	-	-			
Sample Count	***1***		**Total**	**100%**	**493**

Percentages for material types may not total 100% due to rounding.

Cardboard and Commingled Recycling Capture Rates

The capture rate for curbside recyclables at Tacoma Dome was 18% (Table 39). This means that of all the curbside recyclable material placed in the Tacoma Dome disposed waste and cardboard recycling streams, 18% (485 average pounds per week) was successfully captured in cardboard recycling.

The majority of captured curbside recyclables was corrugated cardboard, although the capture rate for this material was still 23%. If Tacoma Dome diverted all of its corrugated cardboard into cardboard recycling, it could increase its curbside recyclables capture rate to a maximum of 88%. If Tacoma Dome offered recycling collection for materials other than corrugated cardboard, it could divert an additional 522 average pounds of curbside recyclable material per week and increase its capture rate to a maximum of 37%.

Table 39. Cardboard and Commingled Recycling Capture Rates: Tacoma Dome

	Disposed Waste		Cardboard Recycling		Capture
Material	**Est. %**	**Avg. lbs/wk**	**Est. %**	**Avg. lbs/wk**	**Rate**
Curbside Recyclable	**51.1%**	**2,162**	**98.4%**	**485**	**18%**
Residential Drop-off Recyclable	**-**	**-**	**-**	**-**	
Compostable	**19.1%**	**809**	**-**	**-**	
Recoverable C&D & Wood	**-**	**-**	**-**	**-**	
Potentially Recoverable	**2.2%**	**91**	**-**	**-**	
Non-recoverable	**27.7%**	**1,172**	**1.6%**	**8**	
Paper	**43.6%**	**1,845**	**97.8%**	**482**	
Corrugated Cardboard	38.5%	1,628	97.8%	482	23%
Mixed Recyclable Fibers	3.7%	155	-	-	0%
Plastic	**13.4%**	**567**	**0.9%**	**4**	
#1 PET Containers	3.1%	130	0.7%	3	2%
#2 HDPE Containers - Natural	0.0%	1	-	-	0%
#2 HDPE Containers - Pigmented	0.3%	12	-	-	0%
Metal	**7.2%**	**306**	**-**	**-**	
Aluminum Cans	4.9%	208	-	-	0%
Tin/Steel Cans	0.0%	0	-	-	0%
Glass	**0.4%**	**16**	**-**	**-**	
Glass Containers	0.4%	16	-	-	0%
Organics	**32.5%**	**1,377**	**1.3%**	**7**	
Other Materials	**2.9%**	**124**	**-**	**-**	
Total	**100%**	**4,235**	**100%**	**493**	
Sample Count	*4*		*1*		

Percentages for material types may not total 100% due to rounding.

Appendix B: Detailed Composition Results

This appendix contains full detailed composition tables for all substreams, except those for large venues which are reported in Appendix A.

An accessible version of the full analysis findings is attached in the PDF version of this document. To access, download this report as a PDF and open it in Adobe Acrobat. The Excel file is included as an Attachment. At the time of publication, Attachments in Adobe Acrobat can be found by navigating to the Menu and then selecting View, Show/Hide, Side panels, and Attachments. Double-click the workbook to open it in Excel.

Single-family Residential

Table 40. Disposed Waste Detailed Composition Results: Single-family

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**9.2%**	**1.0%**	**3,067**	**Recoverable C&D & Wood**	**0.7%**	**0.6%**	**228**
Residential Drop-off Recyclable	**7.6%**	**1.7%**	**2,528**	**Potentially Recoverable**	**4.4%**	**0.9%**	**1,464**
Compostable	**40.3%**	**3.6%**	**13,397**	**Non-recoverable**	**37.7%**	**3.4%**	**12,537**
Paper	**7.7%**	**1.0%**	**2,556**	**Organics**	**52.6%**	**3.7%**	**17,468**
Corrugated Cardboard	1.2%	0.3%	392	Food Scraps	39.9%	3.6%	13,261
Mixed Recyclable Fibers	3.3%	0.8%	1,104	Leaves & Yard Debris	0.4%	0.3%	136
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	0.2%	0.1%	63
Polycoated & Lined Containers	2.2%	0.4%	731	Roofing & Siding Wood	0.0%	0.0%	1
Non-recoverable Composite Paper	1.0%	0.3%	329	Carpet	-	-	-
Plastic	**11.9%**	**1.3%**	**3,951**	Tires	-	-	-
#1 PET Containers	1.9%	0.2%	642	Textiles & Shoes	2.3%	0.6%	764
#2 HDPE Containers - Natural	0.1%	0.0%	40	Food-soiled & Compostable Paper	7.1%	0.9%	2,369
#2 HDPE Containers - Pigmented	0.3%	0.1%	114	Treated Wood	0.0%	0.0%	1
#5 PP Containers	1.0%	0.1%	348	Other Wood	0.1%	0.1%	20
#3-7 Plastics (excluding #5)	0.3%	0.0%	84	Other Non-recoverable/Composite Organics	2.6%	1.3%	853
Clean Plastic Film	1.7%	0.4%	575	**Other Materials**	**19.1%**	**3.8%**	**6,336**
#6 Expanded Polystyrene	0.6%	0.1%	198	Construction & Demolition (non-wood)	0.5%	0.6%	164
#7 Potentially Compostable Plastic	0.0%	0.0%	6	E-waste	0.5%	0.3%	160
Non-recoverable Plastic Film	2.2%	0.2%	718	Vehicle Batteries	-	-	-
Disposal Bags	2.0%	1.2%	654	Household Batteries - Rechargeable	0.0%	0.0%	2
Potentially Compostable Disposal Bags	0.0%	0.0%	5	Household Batteries - Alkaline or Other	0.1%	0.1%	40
Non-recoverable/Composite Plastics	1.7%	0.3%	566	Fluorescent Light Tubes	0.0%	0.0%	3
Metal	**3.5%**	**1.0%**	**1,167**	Oil-based Paint	-	-	-
Aluminum Cans	0.6%	0.2%	199	Cleaners & Other Household Products	0.1%	0.0%	25
Tin/Steel Cans	0.7%	0.2%	227	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.2%	0.1%	57	Other Household Hazardous Waste	0.5%	0.2%	171
Ferrous Metals	0.6%	0.7%	209	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.0%	12	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.9%	0.4%	300	Bathroom Waste	7.0%	1.9%	2,313
Other Aluminum	0.5%	0.1%	164	Mixed Furniture	-	-	-
Glass	**5.2%**	**1.6%**	**1,743**	Nondistinct Fines	0.5%	0.2%	167
Glass Containers	4.8%	1.4%	1,591	Other Residuals	9.9%	2.9%	3,291
Non-recoverable/Composite Glass	0.5%	0.3%	152				
Sample Count	***97***			**Total**	**100%**		**33,222**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 41. Commingled Recycling Detailed Composition Results: Single-family

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**71.2%**	**6.5%**	**7,930**	**Recoverable C&D & Wood**	**0.1%**	**0.1%**	**7**
Residential Drop-off Recyclable	**7.4%**	**2.4%**	**822**	**Potentially Recoverable**	**2.1%**	**1.0%**	**231**
Compostable	**6.3%**	**3.1%**	**702**	**Non-recoverable**	**13.0%**	**3.2%**	**1,443**
Paper	**58.4%**	**6.3%**	**6,498**	**Organics**	**10.3%**	**4.0%**	**1,151**
Corrugated Cardboard	33.2%	5.7%	3,701	Food Scraps	6.1%	3.1%	680
Mixed Recyclable Fibers	22.1%	4.0%	2,458	Leaves & Yard Debris	0.2%	0.2%	22
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	0.1%	0.1%	7
Polycoated & Lined Containers	2.2%	0.4%	242	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	0.9%	0.3%	97	Carpet	-	-	-
Plastic	**17.5%**	**2.7%**	**1,950**	Tires	-	-	-
#1 PET Containers	6.8%	1.0%	757	Textiles & Shoes	0.7%	0.4%	76
#2 HDPE Containers - Natural	1.0%	0.2%	111	Food-soiled & Compostable Paper	2.7%	0.7%	301
#2 HDPE Containers - Pigmented	1.1%	0.3%	124	Treated Wood	-	-	-
#5 PP Containers	1.3%	0.3%	150	Other Wood	-	-	-
#3-7 Plastics (excluding #5)	0.3%	0.2%	37	Other Non-recoverable/Composite Organics	0.6%	0.2%	64
Clean Plastic Film	2.0%	0.5%	218	**Other Materials**	**1.3%**	**0.6%**	**149**
#6 Expanded Polystyrene	0.5%	0.2%	54	Construction & Demolition (non-wood)	-	-	-
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	0.2%	0.3%	24
Non-recoverable Plastic Film	1.4%	0.4%	160	Vehicle Batteries	-	-	-
Disposal Bags	0.4%	0.2%	44	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%	1	Household Batteries - Alkaline or Other	0.0%	0.0%	3
Non-recoverable/Composite Plastics	2.6%	2.6%	293	Fluorescent Light Tubes	-	-	-
Metal	**7.6%**	**1.3%**	**846**	Oil-based Paint	-	-	-
Aluminum Cans	3.5%	0.9%	386	Cleaners & Other Household Products	0.0%	0.0%	1
Tin/Steel Cans	2.2%	0.5%	243	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.1%	0.1%	13	Other Household Hazardous Waste	0.1%	0.1%	15
Ferrous Metals	0.6%	0.5%	67	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.0%	1	Mattresses	-	-	-
Non-recoverable/Composite Metals	1.0%	0.8%	111	Bathroom Waste	0.5%	0.3%	51
Other Aluminum	0.2%	0.1%	24	Mixed Furniture	-	-	-
Glass	**4.9%**	**2.4%**	**542**	Nondistinct Fines	0.2%	0.2%	26
Glass Containers	4.4%	2.3%	486	Other Residuals	0.3%	0.3%	29
Non-recoverable/Composite Glass	0.5%	0.6%	56				
Sample Count	***94***			**Total**	**100%**		**11,135**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Multifamily Residential

Table 42. Disposed Waste Detailed Composition Results: Multifamily

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**11.4%**	**1.1%**	**1,475**	**Recoverable C&D & Wood**	**0.4%**	**0.3%**	**49**
Residential Drop-off Recyclable	**6.4%**	**0.8%**	**832**	**Potentially Recoverable**	**4.7%**	**1.3%**	**612**
Compostable	**32.8%**	**3.2%**	**4,243**	**Non-recoverable**	**44.2%**	**3.3%**	**5,713**
Paper	**9.1%**	**0.9%**	**1,182**	**Organics**	**47.3%**	**3.0%**	**6,114**
Corrugated Cardboard	1.9%	0.4%	244	Food Scraps	30.3%	2.7%	3,915
Mixed Recyclable Fibers	3.5%	0.4%	457	Leaves & Yard Debris	2.5%	1.8%	327
Waxed Corrugated Cardboard	0.1%	0.1%	12	Dimensional Lumber & Engineered Wood	0.2%	0.2%	21
Polycoated & Lined Containers	2.1%	0.4%	274	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	1.5%	0.4%	196	Carpet	-	-	-
Plastic	**12.7%**	**0.8%**	**1,647**	Tires	-	-	-
#1 PET Containers	2.5%	0.3%	324	Textiles & Shoes	2.4%	0.9%	308
#2 HDPE Containers - Natural	0.2%	0.1%	30	Food-soiled & Compostable Paper	6.3%	0.9%	813
#2 HDPE Containers - Pigmented	0.4%	0.1%	51	Treated Wood	0.0%	0.0%	3
#5 PP Containers	1.2%	0.1%	159	Other Wood	0.6%	0.5%	74
#3-7 Plastics (excluding #5)	0.2%	0.0%	21	Other Non-recoverable/Composite Organics	5.1%	1.6%	653
Clean Plastic Film	1.5%	0.2%	190	**Other Materials**	**21.7%**	**3.1%**	**2,809**
#6 Expanded Polystyrene	0.4%	0.1%	54	Construction & Demolition (non-wood)	0.2%	0.3%	28
#7 Potentially Compostable Plastic	0.0%	0.0%	3	E-waste	0.2%	0.2%	30
Non-recoverable Plastic Film	2.2%	0.2%	289	Vehicle Batteries	-	-	-
Disposal Bags	1.2%	0.2%	159	Household Batteries - Rechargeable	0.0%	0.0%	2
Potentially Compostable Disposal Bags	0.0%	0.0%	1	Household Batteries - Alkaline or Other	0.1%	0.0%	7
Non-recoverable/Composite Plastics	2.8%	0.7%	366	Fluorescent Light Tubes	-	-	-
Metal	**4.2%**	**0.8%**	**549**	Oil-based Paint	-	-	-
Aluminum Cans	0.9%	0.2%	118	Cleaners & Other Household Products	0.2%	0.3%	27
Tin/Steel Cans	0.7%	0.1%	93	Motor Oil/Fuels	0.0%	0.0%	2
Empty Aerosol Cans	0.1%	0.0%	18	Other Household Hazardous Waste	0.5%	0.3%	64
Ferrous Metals	0.7%	0.3%	90	Latex Paint	0.0%	0.1%	5
Other Non-ferrous Metals	0.1%	0.1%	7	Mattresses	-	-	-
Non-recoverable/Composite Metals	1.3%	0.6%	174	Bathroom Waste	10.2%	2.7%	1,318
Other Aluminum	0.4%	0.2%	49	Mixed Furniture	0.1%	0.2%	16
Glass	**4.8%**	**1.1%**	**623**	Nondistinct Fines	0.6%	0.6%	79
Glass Containers	3.9%	0.7%	506	Other Residuals	9.5%	3.2%	1,234
Non-recoverable/Composite Glass	0.9%	0.8%	117				
Sample Count	***40***			**Total**	**100%**		**12,924**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 43. Commingled Recycling Detailed Composition Results: Multifamily

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**72.5%**	**10.0%**	**1,083**	**Recoverable C&D & Wood**	**0.2%**	**0.3%**	**2**
Residential Drop-off Recyclable	**5.2%**	**1.5%**	**78**	**Potentially Recoverable**	**3.1%**	**2.1%**	**47**
Compostable	**3.1%**	**1.3%**	**47**	**Non-recoverable**	**15.8%**	**6.8%**	**236**
Paper	**64.2%**	**9.4%**	**959**	**Organics**	**8.7%**	**3.3%**	**130**
Corrugated Cardboard	39.9%	9.3%	596	Food Scraps	3.1%	1.3%	46
Mixed Recyclable Fibers	20.4%	5.2%	305	Leaves & Yard Debris	0.0%	0.0%	0
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	-	-	-
Polycoated & Lined Containers	2.5%	0.7%	37	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	1.4%	0.5%	20	Carpet	-	-	-
Plastic	**12.3%**	**2.5%**	**183**	Tires	-	-	-
#1 PET Containers	5.0%	1.2%	74	Textiles & Shoes	2.1%	1.5%	31
#2 HDPE Containers - Natural	1.2%	0.4%	18	Food-soiled & Compostable Paper	2.5%	0.8%	37
#2 HDPE Containers - Pigmented	1.0%	0.3%	15	Treated Wood	-	-	-
#5 PP Containers	0.8%	0.2%	11	Other Wood	0.2%	0.1%	3
#3-7 Plastics (excluding #5)	0.2%	0.1%	2	Other Non-recoverable/Composite Organics	0.9%	0.5%	13
Clean Plastic Film	1.0%	0.3%	14	**Other Materials**	**5.5%**	**4.6%**	**82**
#6 Expanded Polystyrene	0.3%	0.2%	4	Construction & Demolition (non-wood)	0.2%	0.3%	2
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.4%	0.4%	6
Non-recoverable Plastic Film	0.6%	0.2%	9	Vehicle Batteries	-	-	-
Disposal Bags	0.1%	0.1%	2	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.0%	0.0%	0
Non-recoverable/Composite Plastics	2.2%	1.6%	33	Fluorescent Light Tubes	-	-	-
Metal	**5.9%**	**1.6%**	**88**	Oil-based Paint	-	-	-
Aluminum Cans	2.9%	0.9%	43	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	1.4%	0.4%	21	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.0%	0.0%	0	Other Household Hazardous Waste	0.2%	0.2%	4
Ferrous Metals	1.0%	1.0%	15	Latex Paint	-	-	-
Other Non-ferrous Metals	0.0%	0.1%	1	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.4%	0.5%	6	Bathroom Waste	2.6%	2.0%	39
Other Aluminum	0.2%	0.1%	2	Mixed Furniture	-	-	-
Glass	**3.4%**	**1.2%**	**51**	Nondistinct Fines	0.0%	0.0%	0
Glass Containers	3.1%	1.2%	46	Other Residuals	2.1%	2.2%	31
Non-recoverable/Composite Glass	0.3%	0.3%	5				
Sample Count	***36***			**Total**	**100%**		**1,494**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Commercial

Table 44. Disposed Waste Modeled Detailed Composition Results: Commercial Overall

Material	Modeled Est. %	Modeled Est. Tons	Material	Modeled Est. %	Modeled Est. Tons
Curbside Recyclable	**17.6%**	**14,799**	**Recoverable C&D & Wood**	**10.1%**	**8,483**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**9.4%**	**7,915**
Compostable	**21.9%**	**18,420**	**Non-recoverable**	**40.9%**	**34,347**
Paper	**16.5%**	**13,816**	**Organics**	**42.7%**	**35,888**
Corrugated Cardboard	6.0%	5,063	Food Scraps	19.7%	16,507
Mixed Recyclable Fibers	5.7%	4,773	Leaves & Yard Debris	2.3%	1,914
Waxed Corrugated Cardboard	1.0%	825	Dimensional Lumber & Engineered Wood	7.3%	6,155
Polycoated & Lined Containers	0.9%	786	Roofing & Siding Wood	0.0%	28
Non-recoverable Composite Paper	2.8%	2,370	Carpet	0.6%	506
Plastic	**19.3%**	**16,232**	Tires	0.4%	317
#1 PET Containers	1.6%	1,343	Textiles & Shoes	3.2%	2,680
#2 HDPE Containers - Natural	0.6%	506	Food-soiled & Compostable Paper	7.3%	6,140
#2 HDPE Containers - Pigmented	0.6%	479	Treated Wood	0.3%	211
#5 PP Containers	1.1%	894	Other Wood	0.8%	693
#3-7 Plastics (excluding #5)	0.5%	415	Other Non-recoverable/Composite Organics	0.9%	738
Clean Plastic Film	2.5%	2,104	**Other Materials**	**13.5%**	**11,338**
#6 Expanded Polystyrene	1.0%	855	Construction & Demolition (non-wood)	2.7%	2,300
#7 Potentially Compostable Plastic	0.1%	82	E-waste	1.2%	978
Non-recoverable Plastic Film	5.6%	4,681	Vehicle Batteries	-	-
Disposal Bags	2.8%	2,336	Household Batteries - Rechargeable	0.0%	3
Potentially Compostable Disposal Bags	0.0%	37	Household Batteries - Alkaline or Other	0.0%	15
Non-recoverable/Composite Plastics	3.0%	2,499	Fluorescent Light Tubes	0.0%	3
Metal	**6.1%**	**5,111**	Oil-based Paint	0.0%	1
Aluminum Cans	0.4%	344	Other Household Hazardous Waste	1.7%	1,391
Tin/Steel Cans	0.3%	274	Latex Paint	0.1%	103
Empty Aerosol Cans	0.1%	71	Mattresses	0.1%	87
Ferrous Metals	2.5%	2,082	Mixed Furniture	1.4%	1,190
Other Non-ferrous Metals	0.1%	96	Nondistinct Fines	1.4%	1,179
Non-recoverable/Composite Metals	2.4%	2,021	Other Residuals	4.9%	4,088
Other Aluminum	0.3%	223			
Glass	**1.9%**	**1,579**			
Glass Containers	1.3%	1,122			
Non-recoverable/Composite Glass	0.5%	457			
			Total	**100%**	**83,964**

Percentages for material types may not total 100% due to rounding.

Table 45. Disposed Waste Detailed Composition Results: Public Schools

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**11.9%**	**2.4%**	**339**	**Recoverable C&D & Wood**	**9.1%**	**12.1%**	**259**
Residential Drop-off Recyclable	**-**	**-**	**-**	**Potentially Recoverable**	**1.6%**	**0.4%**	**44**
Compostable	**36.8%**	**8.2%**	**1,047**	**Non-recoverable**	**40.6%**	**7.0%**	**1,153**
Paper	**14.8%**	**5.3%**	**421**	**Organics**	**58.6%**	**7.0%**	**1,666**
Corrugated Cardboard	3.3%	1.8%	95	Food Scraps	35.9%	6.1%	1,019
Mixed Recyclable Fibers	3.7%	1.2%	104	Leaves & Yard Debris	1.0%	1.4%	28
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	8.3%	11.2%	236
Polycoated & Lined Containers	4.0%	0.7%	114	Roofing & Siding Wood	-	-	-
Non-recoverable Composite Paper	3.8%	3.9%	108	Carpet	-	-	-
Plastic	**15.0%**	**3.1%**	**427**	Tires	-	-	-
#1 PET Containers	1.3%	0.4%	36	Textiles & Shoes	0.9%	0.5%	27
#2 HDPE Containers - Natural	0.1%	0.0%	4	Food-soiled & Compostable Paper	11.2%	3.1%	319
#2 HDPE Containers - Pigmented	0.1%	0.1%	4	Treated Wood	0.0%	0.0%	0
#5 PP Containers	1.4%	0.4%	40	Other Wood	0.0%	0.0%	1
#3-7 Plastics (excluding #5)	0.3%	0.1%	8	Other Non-recoverable/Composite Organics	1.3%	0.9%	37
Clean Plastic Film	0.8%	0.3%	23	**Other Materials**	**7.0%**	**2.3%**	**198**
#6 Expanded Polystyrene	0.1%	0.1%	4	Construction & Demolition (non-wood)	0.8%	0.9%	23
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.4%	0.2%	12
Non-recoverable Plastic Film	2.5%	0.6%	71	Vehicle Batteries	-	-	-
Disposal Bags	6.2%	1.1%	177	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.0%	0.0%	1
Non-recoverable/Composite Plastics	2.2%	1.4%	62	Fluorescent Light Tubes	0.1%	0.1%	2
Metal	**4.0%**	**3.3%**	**115**	Oil-based Paint	-	-	-
Aluminum Cans	0.3%	0.1%	9	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	1.2%	0.6%	34	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.0%	0.0%	1	Other Household Hazardous Waste	0.0%	0.0%	1
Ferrous Metals	0.8%	0.7%	23	Latex Paint	0.0%	0.1%	1
Other Non-ferrous Metals	1.4%	2.3%	41	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.1%	0.1%	3	Bathroom Waste	2.6%	1.3%	75
Other Aluminum	0.1%	0.1%	4	Mixed Furniture	-	-	-
Glass	**0.5%**	**0.5%**	**15**	Nondistinct Fines	1.8%	1.2%	52
Glass Containers	0.5%	0.5%	14	Other Residuals	1.2%	1.3%	33
Non-recoverable/Composite Glass	0.0%	0.0%	1				
Sample Count	***10***			**Total**	**100%**		**2,842**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 46. Organics Detailed Composition Results: Restaurants

Material	Est. %	+ / -	Material	Est. %	+ / -
Curbside Recyclable	**0.6%**	**0.9%**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**0.0%**	**0.0%**
Compostable	**97.1%**	**2.3%**	**Non-recoverable**	**2.3%**	**1.5%**
Paper	**0.6%**	**0.9%**	**Organics**	**99.2%**	**1.0%**
Corrugated Cardboard	0.0%	0.0%	Food Scraps	95.1%	2.6%
Mixed Recyclable Fibers	0.6%	0.9%	Leaves & Yard Debris	2.0%	2.2%
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	0.0%	0.0%	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.0%	0.0%	Carpet	-	-
Plastic	**0.1%**	**0.1%**	Tires	-	-
#1 PET Containers	0.0%	0.0%	Textiles & Shoes	0.0%	0.0%
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	2.1%	1.5%
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	0.0%	0.0%	Other Wood	-	-
#3-7 Plastics (excluding #5)	-	-	Other Non-recoverable/Composite Organics	0.1%	0.1%
Clean Plastic Film	0.0%	0.1%	**Other Materials**	**0.0%**	**0.0%**
#6 Expanded Polystyrene	0.0%	0.0%	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	-	-	E-waste	-	-
Non-recoverable Plastic Film	0.0%	0.0%	Vehicle Batteries	-	-
Disposal Bags	-	-	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	0.0%	0.0%	Fluorescent Light Tubes	-	-
Metal	**0.0%**	**0.0%**	Oil-based Paint	-	-
Aluminum Cans	-	-	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	0.0%	0.0%	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	-	-	Bathroom Waste	-	-
Other Aluminum	-	-	Mixed Furniture	-	-
Glass	**-**	**-**	Nondistinct Fines	-	-
Glass Containers	-	-	Other Residuals	0.0%	0.0%
Non-recoverable/Composite Glass	-	-			
Sample Count	***10***		**Total**	**100%**	

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 47. Organics Detailed Composition Results: Grocery Stores

Material	Est. %	+ / -	Material	Est. %	+ / -
Curbside Recyclable	**0.2%**	**0.1%**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**-**	**-**
Compostable	**99.5%**	**0.4%**	**Non-recoverable**	**0.3%**	**0.2%**
Paper	**0.2%**	**0.2%**	**Organics**	**99.6%**	**0.2%**
Corrugated Cardboard	0.0%	0.0%	Food Scraps	99.2%	0.9%
Mixed Recyclable Fibers	0.2%	0.1%	Leaves & Yard Debris	0.3%	0.5%
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	-	-	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.0%	0.0%	Carpet	-	-
Plastic	**0.1%**	**0.1%**	Tires	-	-
#1 PET Containers	0.0%	0.0%	Textiles & Shoes	-	-
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	0.2%	0.2%
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	-	-	Other Wood	-	-
#3-7 Plastics (excluding #5)	-	-	Other Non-recoverable/Composite Organics	0.0%	0.0%
Clean Plastic Film	0.0%	0.0%	**Other Materials**	**0.0%**	**0.1%**
#6 Expanded Polystyrene	0.0%	0.0%	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	-	-	E-waste	-	-
Non-recoverable Plastic Film	0.0%	0.0%	Vehicle Batteries	-	-
Disposal Bags	0.0%	0.0%	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	0.0%	0.0%	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	0.0%	0.0%	Fluorescent Light Tubes	-	-
Metal	**0.0%**	**0.0%**	Oil-based Paint	-	-
Aluminum Cans	-	-	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	0.0%	0.0%	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	-	-	Bathroom Waste	0.0%	0.1%
Other Aluminum	0.0%	0.0%	Mixed Furniture	-	-
Glass	**0.0%**	**0.0%**	Nondistinct Fines	-	-
Glass Containers	0.0%	0.0%	Other Residuals	-	-
Non-recoverable/Composite Glass	-	-			
Sample Count	***13***		**Total**	**100%**	

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 48. Organics Detailed Composition Results: Private Schools

Material	Est. %	+ / -	Material	Est. %	+ / -
Curbside Recyclable	**0.1%**	**0.3%**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**0.0%**	**0.0%**
Compostable	**86.2%**	**13.8%**	**Non-recoverable**	**13.6%**	**24.7%**
Paper	**0.1%**	**0.2%**	**Organics**	**86.5%**	**24.5%**
Corrugated Cardboard	0.1%	0.1%	Food Scraps	86.2%	13.8%
Mixed Recyclable Fibers	0.0%	0.0%	Leaves & Yard Debris	-	-
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	0.0%	0.0%	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.0%	0.0%	Carpet	-	-
Plastic	**0.2%**	**0.4%**	Tires	-	-
#1 PET Containers	0.0%	0.1%	Textiles & Shoes	0.0%	0.0%
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	0.2%	0.3%
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	0.0%	0.0%	Other Wood	-	-
#3-7 Plastics (excluding #5)	0.0%	0.0%	Other Non-recoverable/Composite Organics	0.0%	0.0%
Clean Plastic Film	0.1%	0.2%	**Other Materials**	**13.1%**	**20.5%**
#6 Expanded Polystyrene	-	-	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	-	-	E-waste	-	-
Non-recoverable Plastic Film	0.0%	0.0%	Vehicle Batteries	-	-
Disposal Bags	-	-	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	-	-	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	0.1%	0.1%	Fluorescent Light Tubes	-	-
Metal	**0.0%**	**0.0%**	Oil-based Paint	-	-
Aluminum Cans	0.0%	0.0%	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	-	-	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	-	-	Bathroom Waste	-	-
Other Aluminum	-	-	Mixed Furniture	-	-
Glass	**-**	**-**	Nondistinct Fines	13.0%	20.3%
Glass Containers	-	-	Other Residuals	0.1%	0.2%
Non-recoverable/Composite Glass	-	-			
Sample Count	***6***		**Total**	**100%**	

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 49. Organics Detailed Composition Results: Other Commercial

Material	Est. %	+ / -	Material	Est. %	+ / -
Curbside Recyclable	**1.2%**	**1.7%**	**Recoverable C&D & Wood**	**-**	**-**
Residential Drop-off Recyclable	**-**	**-**	**Potentially Recoverable**	**0.0%**	**0.0%**
Compostable	**97.7%**	**2.7%**	**Non-recoverable**	**1.1%**	**1.1%**
Paper	**1.2%**	**1.7%**	**Organics**	**98.0%**	**2.6%**
Corrugated Cardboard	0.1%	0.1%	Food Scraps	95.0%	5.1%
Mixed Recyclable Fibers	1.0%	1.5%	Leaves & Yard Debris	2.7%	3.6%
Waxed Corrugated Cardboard	-	-	Dimensional Lumber & Engineered Wood	-	-
Polycoated & Lined Containers	0.0%	0.0%	Roofing & Siding Wood	-	-
Non-recoverable Composite Paper	0.1%	0.2%	Carpet	-	-
Plastic	**0.3%**	**0.4%**	Tires	-	-
#1 PET Containers	0.0%	0.0%	Textiles & Shoes	0.0%	0.0%
#2 HDPE Containers - Natural	-	-	Food-soiled & Compostable Paper	0.3%	0.3%
#2 HDPE Containers - Pigmented	-	-	Treated Wood	-	-
#5 PP Containers	0.1%	0.1%	Other Wood	-	-
#3-7 Plastics (excluding #5)	0.0%	0.0%	Other Non-recoverable/Composite Organics	0.0%	0.0%
Clean Plastic Film	0.0%	0.0%	**Other Materials**	**0.4%**	**0.7%**
#6 Expanded Polystyrene	0.0%	0.0%	Construction & Demolition (non-wood)	-	-
#7 Potentially Compostable Plastic	-	-	E-waste	-	-
Non-recoverable Plastic Film	0.0%	0.0%	Vehicle Batteries	-	-
Disposal Bags	0.1%	0.2%	Household Batteries - Rechargeable	-	-
Potentially Compostable Disposal Bags	-	-	Household Batteries - Alkaline or Other	-	-
Non-recoverable/Composite Plastics	0.1%	0.1%	Fluorescent Light Tubes	-	-
Metal	**0.1%**	**0.1%**	Oil-based Paint	-	-
Aluminum Cans	0.1%	0.1%	Cleaners & Other Household Products	-	-
Tin/Steel Cans	-	-	Motor Oil/Fuels	-	-
Empty Aerosol Cans	-	-	Other Household Hazardous Waste	-	-
Ferrous Metals	0.0%	0.0%	Latex Paint	-	-
Other Non-ferrous Metals	-	-	Mattresses	-	-
Non-recoverable/Composite Metals	-	-	Bathroom Waste	-	-
Other Aluminum	-	-	Mixed Furniture	-	-
Glass	**-**	**-**	Nondistinct Fines	0.4%	0.7%
Glass Containers	-	-	Other Residuals	0.0%	0.0%
Non-recoverable/Composite Glass	-	-			
Sample Count	***9***		**Total**	**100%**	

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Self-haul

Table 50. Self-haul Disposed Waste Detailed Composition Results: Overall

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**6.3%**	**2.2%**	**4,610**	**Recoverable C&D & Wood**	**41.2%**	**9.2%**	**29,960**
Residential Drop-off Recyclable	**7.0%**	**2.4%**	**5,060**	**Potentially Recoverable**	**6.2%**	**2.1%**	**4,514**
Compostable	**4.2%**	**2.7%**	**3,073**	**Non-recoverable**	**35.0%**	**8.6%**	**25,432**
Paper	**8.0%**	**2.7%**	**5,805**	**Organics**	**30.4%**	**6.1%**	**22,089**
Corrugated Cardboard	4.4%	1.9%	3,180	Food Scraps	0.8%	0.5%	599
Mixed Recyclable Fibers	1.4%	0.7%	981	Leaves & Yard Debris	4.2%	2.6%	3,073
Waxed Corrugated Cardboard	0.2%	0.4%	175	Dimensional Lumber & Engineered Wood	15.7%	4.6%	11,425
Polycoated & Lined Containers	0.4%	0.2%	299	Roofing & Siding Wood	1.3%	0.9%	921
Non-recoverable Composite Paper	1.6%	0.9%	1,169	Carpet	0.1%	0.1%	44
Plastic	**3.3%**	**1.1%**	**2,427**	Tires	0.1%	0.1%	60
#1 PET Containers	0.2%	0.1%	130	Textiles & Shoes	2.2%	1.4%	1,572
#2 HDPE Containers - Natural	0.0%	0.0%	32	Food-soiled & Compostable Paper	0.5%	0.4%	329
#2 HDPE Containers - Pigmented	0.1%	0.0%	53	Treated Wood	1.4%	0.9%	996
#5 PP Containers	0.1%	0.1%	105	Other Wood	0.9%	0.8%	649
#3-7 Plastics (excluding #5)	0.2%	0.2%	158	Other Non-recoverable/Composite Organics	3.3%	1.6%	2,422
Clean Plastic Film	0.3%	0.1%	184	**Other Materials**	**41.8%**	**9.6%**	**30,345**
#6 Expanded Polystyrene	0.3%	0.2%	220	Construction & Demolition (non-wood)	24.2%	9.5%	17,614
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	1.3%	0.6%	955
Non-recoverable Plastic Film	0.1%	0.1%	98	Vehicle Batteries	-	-	-
Disposal Bags	0.2%	0.1%	110	Household Batteries - Rechargeable	0.1%	0.1%	42
Potentially Compostable Disposal Bags	0.0%	0.0%	0	Household Batteries - Alkaline or Other	0.5%	0.5%	377
Non-recoverable/Composite Plastics	1.8%	0.9%	1,335	Fluorescent Light Tubes	0.1%	0.2%	102
Metal	**8.1%**	**2.5%**	**5,873**	Oil-based Paint	0.0%	0.0%	5
Aluminum Cans	0.1%	0.0%	88	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.1%	0.0%	41	Motor Oil/Fuels	0.2%	0.3%	157
Empty Aerosol Cans	0.1%	0.1%	60	Other Household Hazardous Waste	0.2%	0.2%	168
Ferrous Metals	5.0%	2.1%	3,663	Latex Paint	0.0%	0.0%	11
Other Non-ferrous Metals	0.9%	0.8%	618	Mattresses	1.1%	1.1%	788
Non-recoverable/Composite Metals	1.4%	0.7%	1,032	Bathroom Waste	0.8%	0.7%	613
Other Aluminum	0.5%	0.4%	371	Mixed Furniture	0.9%	0.5%	665
Glass	**8.4%**	**6.5%**	**6,110**	Nondistinct Fines	11.7%	7.7%	8,531
Glass Containers	0.5%	0.2%	376	Other Residuals	0.4%	0.3%	316
Non-recoverable/Composite Glass	7.9%	6.5%	5,734				
Sample Count	***133***			**Total**	**100%**		**72,648**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 51. Self-haul Disposed Waste Detailed Composition Results: Residential

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**4.6%**	**1.3%**	**1,050**	**Recoverable C&D & Wood**	**57.5%**	**9.7%**	**13,240**
Residential Drop-off Recyclable	**4.8%**	**1.3%**	**1,105**	**Potentially Recoverable**	**6.8%**	**2.5%**	**1,565**
Compostable	**1.6%**	**1.3%**	**364**	**Non-recoverable**	**24.8%**	**7.9%**	**5,710**
Paper	**4.5%**	**1.3%**	**1,031**	**Organics**	**30.5%**	**8.3%**	**7,016**
Corrugated Cardboard	2.2%	0.6%	511	Food Scraps	0.9%	0.5%	201
Mixed Recyclable Fibers	1.6%	0.6%	358	Leaves & Yard Debris	1.6%	1.3%	364
Waxed Corrugated Cardboard	0.0%	0.0%	6	Dimensional Lumber & Engineered Wood	14.3%	5.0%	3,304
Polycoated & Lined Containers	0.3%	0.3%	73	Roofing & Siding Wood	3.3%	2.5%	755
Non-recoverable Composite Paper	0.4%	0.2%	83	Carpet	0.2%	0.2%	44
Plastic	**3.2%**	**1.9%**	**743**	Tires	0.3%	0.3%	60
#1 PET Containers	0.2%	0.1%	48	Textiles & Shoes	2.2%	1.3%	510
#2 HDPE Containers - Natural	0.0%	0.0%	7	Food-soiled & Compostable Paper	1.0%	1.3%	232
#2 HDPE Containers - Pigmented	0.1%	0.0%	14	Treated Wood	2.4%	2.1%	555
#5 PP Containers	0.2%	0.1%	36	Other Wood	0.8%	0.6%	189
#3-7 Plastics (excluding #5)	0.3%	0.3%	61	Other Non-recoverable/Composite Organics	3.5%	2.4%	803
Clean Plastic Film	0.1%	0.0%	27	**Other Materials**	**53.2%**	**9.4%**	**12,247**
#6 Expanded Polystyrene	0.2%	0.1%	40	Construction & Demolition (non-wood)	39.9%	10.8%	9,181
#7 Potentially Compostable Plastic	-	-	-	E-waste	1.3%	1.1%	308
Non-recoverable Plastic Film	0.1%	0.1%	24	Vehicle Batteries	-	-	-
Disposal Bags	0.1%	0.0%	27	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	0.3%	0.5%	68
Non-recoverable/Composite Plastics	2.0%	1.7%	460	Fluorescent Light Tubes	0.1%	0.1%	16
Metal	**5.5%**	**1.4%**	**1,262**	Oil-based Paint	0.0%	0.0%	5
Aluminum Cans	0.2%	0.1%	40	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.2%	0.1%	37	Motor Oil/Fuels	0.7%	1.0%	157
Empty Aerosol Cans	0.0%	0.0%	8	Other Household Hazardous Waste	0.4%	0.4%	94
Ferrous Metals	3.3%	1.1%	771	Latex Paint	0.0%	0.1%	11
Other Non-ferrous Metals	0.1%	0.1%	26	Mattresses	1.4%	1.2%	321
Non-recoverable/Composite Metals	1.3%	0.6%	302	Bathroom Waste	1.2%	1.8%	273
Other Aluminum	0.3%	0.3%	78	Mixed Furniture	1.4%	1.3%	312
Glass	**3.2%**	**1.7%**	**735**	Nondistinct Fines	6.2%	4.5%	1,424
Glass Containers	0.9%	0.6%	212	Other Residuals	0.3%	0.2%	76
Non-recoverable/Composite Glass	2.3%	1.6%	523				
Sample Count	***77***			**Total**	**100%**		**23,034**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Table 52. Self-haul Disposed Waste Detailed Composition Results: Commercial

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**7.2%**	**3.2%**	**3,560**	**Recoverable C&D & Wood**	**33.7%**	**12.7%**	**16,720**
Residential Drop-off Recyclable	**8.0%**	**3.5%**	**3,955**	**Potentially Recoverable**	**5.9%**	**2.8%**	**2,948**
Compostable	**5.5%**	**3.9%**	**2,709**	**Non-recoverable**	**39.8%**	**12.0%**	**19,722**
Paper	**9.6%**	**3.9%**	**4,773**	**Organics**	**30.4%**	**8.1%**	**15,073**
Corrugated Cardboard	5.4%	2.8%	2,669	Food Scraps	0.8%	0.7%	398
Mixed Recyclable Fibers	1.3%	1.0%	623	Leaves & Yard Debris	5.5%	3.8%	2,709
Waxed Corrugated Cardboard	0.3%	0.6%	169	Dimensional Lumber & Engineered Wood	16.4%	6.3%	8,120
Polycoated & Lined Containers	0.5%	0.3%	225	Roofing & Siding Wood	0.3%	0.5%	166
Non-recoverable Composite Paper	2.2%	1.3%	1,086	Carpet	-	-	-
Plastic	**3.4%**	**1.4%**	**1,684**	Tires	-	-	-
#1 PET Containers	0.2%	0.1%	82	Textiles & Shoes	2.1%	1.9%	1,062
#2 HDPE Containers - Natural	0.1%	0.0%	25	Food-soiled & Compostable Paper	0.2%	0.1%	97
#2 HDPE Containers - Pigmented	0.1%	0.1%	39	Treated Wood	0.9%	0.9%	442
#5 PP Containers	0.1%	0.1%	70	Other Wood	0.9%	1.1%	460
#3-7 Plastics (excluding #5)	0.2%	0.3%	97	Other Non-recoverable/Composite Organics	3.3%	2.1%	1,619
Clean Plastic Film	0.3%	0.1%	157	**Other Materials**	**36.5%**	**13.4%**	**18,098**
#6 Expanded Polystyrene	0.4%	0.3%	181	Construction & Demolition (non-wood)	17.0%	13.0%	8,433
#7 Potentially Compostable Plastic	0.0%	0.0%	1	E-waste	1.3%	0.7%	648
Non-recoverable Plastic Film	0.1%	0.1%	74	Vehicle Batteries	-	-	-
Disposal Bags	0.2%	0.1%	83	Household Batteries - Rechargeable	0.1%	0.1%	42
Potentially Compostable Disposal Bags	0.0%	0.0%	0	Household Batteries - Alkaline or Other	0.6%	0.8%	309
Non-recoverable/Composite Plastics	1.8%	1.1%	875	Fluorescent Light Tubes	0.2%	0.3%	85
Metal	**9.3%**	**3.6%**	**4,611**	Oil-based Paint	-	-	-
Aluminum Cans	0.1%	0.0%	47	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	0.0%	0.0%	4	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	0.1%	0.1%	53	Other Household Hazardous Waste	0.1%	0.2%	74
Ferrous Metals	5.8%	3.1%	2,893	Latex Paint	-	-	-
Other Non-ferrous Metals	1.2%	1.2%	592	Mattresses	0.9%	1.5%	467
Non-recoverable/Composite Metals	1.5%	1.0%	729	Bathroom Waste	0.7%	0.7%	340
Other Aluminum	0.6%	0.6%	293	Mixed Furniture	0.7%	0.5%	354
Glass	**10.8%**	**9.5%**	**5,376**	Nondistinct Fines	14.3%	11.0%	7,107
Glass Containers	0.3%	0.2%	164	Other Residuals	0.5%	0.4%	240
Non-recoverable/Composite Glass	10.5%	9.5%	5,212				
Sample Count	***56***			**Total**	**100%**		**49,614**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Construction and Demolition

Table 53. C&D Debris Detailed Composition Results: Overall

Material	Est. %	+ / -	Est. Tons	Material	Est. %	+ / -	Est. Tons
Curbside Recyclable	**1.1%**	**0.7%**	**20**	**Recoverable C&D & Wood**	**56.2%**	**15.3%**	**1,037**
Residential Drop-off Recyclable	**6.3%**	**6.7%**	**117**	**Potentially Recoverable**	**0.8%**	**0.6%**	**15**
Compostable	**7.4%**	**6.3%**	**136**	**Non-recoverable**	**28.1%**	**12.8%**	**519**
Paper	**1.2%**	**0.7%**	**22**	**Organics**	**85.7%**	**8.1%**	**1,580**
Corrugated Cardboard	0.8%	0.6%	15	Food Scraps	0.4%	0.3%	7
Mixed Recyclable Fibers	0.1%	0.1%	2	Leaves & Yard Debris	7.4%	6.1%	136
Waxed Corrugated Cardboard	-	-	-	Dimensional Lumber & Engineered Wood	53.0%	14.8%	977
Polycoated & Lined Containers	0.0%	0.0%	0	Roofing & Siding Wood	0.4%	0.6%	6
Non-recoverable Composite Paper	0.2%	0.3%	4	Carpet	-	-	-
Plastic	**0.9%**	**0.6%**	**17**	Tires	0.3%	0.3%	5
#1 PET Containers	0.0%	0.0%	1	Textiles & Shoes	0.4%	0.4%	7
#2 HDPE Containers - Natural	-	-	-	Food-soiled & Compostable Paper	-	-	-
#2 HDPE Containers - Pigmented	0.0%	0.1%	1	Treated Wood	19.3%	14.8%	356
#5 PP Containers	0.0%	0.0%	0	Other Wood	0.7%	0.6%	13
#3-7 Plastics (excluding #5)	0.0%	0.0%	0	Other Non-recoverable/Composite Organics	3.9%	5.3%	73
Clean Plastic Film	0.1%	0.1%	3	**Other Materials**	**5.1%**	**3.1%**	**93**
#6 Expanded Polystyrene	0.1%	0.1%	1	Construction & Demolition (non-wood)	2.9%	2.1%	53
#7 Potentially Compostable Plastic	0.0%	0.0%	0	E-waste	0.0%	0.1%	1
Non-recoverable Plastic Film	0.0%	0.0%	0	Vehicle Batteries	-	-	-
Disposal Bags	0.0%	0.0%	0	Household Batteries - Rechargeable	-	-	-
Potentially Compostable Disposal Bags	-	-	-	Household Batteries - Alkaline or Other	-	-	-
Non-recoverable/Composite Plastics	0.6%	0.7%	11	Fluorescent Light Tubes	-	-	-
Metal	**6.4%**	**6.7%**	**118**	Oil-based Paint	-	-	-
Aluminum Cans	0.1%	0.0%	1	Cleaners & Other Household Products	-	-	-
Tin/Steel Cans	-	-	-	Motor Oil/Fuels	-	-	-
Empty Aerosol Cans	-	-	-	Other Household Hazardous Waste	-	-	-
Ferrous Metals	5.7%	6.8%	104	Latex Paint	-	-	-
Other Non-ferrous Metals	0.5%	0.7%	9	Mattresses	-	-	-
Non-recoverable/Composite Metals	0.1%	0.1%	3	Bathroom Waste	-	-	-
Other Aluminum	0.1%	0.1%	1	Mixed Furniture	0.4%	0.4%	7
Glass	**0.7%**	**0.6%**	**14**	Nondistinct Fines	1.8%	2.7%	33
Glass Containers	0.0%	0.0%	0	Other Residuals	0.0%	0.0%	0
Non-recoverable/Composite Glass	0.7%	0.6%	13				
Sample Count	***28***			**Total**	**100%**		**1,844**

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.

Appendix C: Definitions of Material Types

Material Definitions

Cascadia sorted samples into 53 material types, which are listed and defined in Table 54. Materials were grouped into one of six material classes: paper, plastic, metal, glass, organics, and other materials.

For the modeled overall commercial disposed waste stream, several material types were combined to align with material lists from the City of Seattle and King County:

- Cleaners and other household products is combined with other household hazardous waste
- Motor oil/fuels is combined with other household hazardous waste
- Bathroom waste is combined with other residuals

Table 54. Material Types and Definitions by Material Class

Material Class	Material Type	Definition
Paper	Corrugated Cardboard	Kraft linerboard, containerboard cartons, ClimaCell/other kraft or plant-based packaging/envelopes that say to recycle like a box, and shipping boxes with corrugated paper medium (unwaxed). This category also includes Kraft (brown) paper bags. Excludes waxed and plastic-coated cardboard, solid boxboard, and bags that are not pure unbleached Kraft.
Paper	Mixed Recyclable Fibers	Mixed recyclable papers, including white ledger, white office paper, newspaper, junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, clean paper cups (not lined with plastic), and paperback books.
Paper	Waxed Corrugated Cardboard	Kraft linerboard, containerboard, cartons, and other boxes with wax coating. Examples include commercial produce boxes.
Paper	Polycoated & Lined Containers	Includes items such as empty milk cartons, broth, fast food paper cups, clean plastic-lined to-go food containers, frozen food boxes, and juice boxes when they are clean/empty. This includes all gable tops, aseptic containers, and corrugated (multi-layered) cardboard that is lined with polyethylene to prevent it from getting soggy. Clean means less than a spoonful of contamination inside a container (original contamination). Contamination on the exterior of the packaging (cross-contamination) is acceptable.
Paper	Non-recoverable Composite Paper	Mixed paper that is soiled and/or mixed with other materials. For example, hardback books, furnace air filters, manila

Material Class	Material Type	Definition
		envelopes with bubble wrap attached, or soiled polycoat containers.
Plastic	#2 HDPE Containers - Natural	Milk jugs, yogurt, margarine tubs, and any packaging jar or tub bearing the #2, with an opaque, white, see-through color. Lids and caps are left attached to containers when feasible.
Plastic	#2 HDPE Containers - Pigmented	Laundry containers, yogurt, margarine tubs, and any packaging jar or tub bearing the #2 with a solid, not see-through color.
Plastic	#5 PP Containers	Plastic bottles, tubs, jars, cups, and other containers made of polypropylene (“PP” or #5).
Plastic	#1 PET Containers	Polyethylene terephthalate bottles bearing the #1, such as carbonated drink bottles and water bottles. Plastic non-bottle packaging bearing the #1, including oven-ready meal trays and other packaging. Also includes blow molded jars bearing the #1, such as those commonly used for peanut butter. Lids and caps are left attached to containers when feasible.
Plastic	#3-7 Plastics (excluding #5)	All other plastics not included in categories above. May be labeled PVC (#3), low-density polyethylene ("LDPE" or #4), polystyrene (“PS”, #6), or non-compostable #7. Does not include expanded polystyrene (Styrofoam).
Plastic	Clean Plastic Film	Plastic grocery “t-shirt” and retail bags; bread and produce bags; newspaper bags; napkin, towel, tissue, diaper overwrap; bottled water case wrap; dry cleaner film bags; case and stretch wrap; plastic air pillows; food storage (“Ziploc”) bags; all other film packaging that is potentially recyclable.
Plastic	#6 Expanded Polystyrene	(Styrofoam) Expanded polystyrene (#6) foodservice containers and packaging materials. Examples include clamshells, trays, cups, and packaging blocks.
Plastic	#7 Potentially Compostable Plastic	Any compostable plastic made from corn, potato, sugarcane, or any other compostable resin. Includes all cutlery and utensils, cups, to-go containers, straws, lids, etc. Does not include film.
Plastic	Non-recoverable Plastic Film	Includes all other types of plastic film that are not one of the above film materials such as chip bags and candy wrappers.
Plastic	Disposal Bags	All bags used to contain and transport waste from generation point to disposal site. Includes garbage bags, bags for recycling (clear or blue), and non-compostable bags used to contain compost.
Plastic	Potentially Compostable Disposal Bags	Includes compostable plastic items, such as film “plastic” bags made of materials such as corn starch or soy designed to compost (e.g., BioBag, EcoSafe).

Material Class	Material Type	Definition
Plastic	Non-recoverable/Composite Plastics	Includes all other types of plastic that are not one of the above materials, items that are too small to be properly identified (< 2 inches), and composites of multiple plastics and plastics mixed with other materials. Includes items like toothbrushes, toys, straws, cutlery, and latex/nitrile gloves.
Glass	Glass Containers	Includes any color of glass bottles for carbonated drinks, liquor, wine, juice, beer, etc. Also includes other glass containers that can be recycled like food bottles, jars, and containers.
Glass	Non-recoverable/Composite Glass	Other types of glass products and scrap that do not fit into the above materials, including incandescent light bulbs, glassware, oven-safe baking dishes such as Pyrex, and non-C&D fiberglass.
Metal	Aluminum Cans	Aluminum cans containing soda, carbonated juice, seltzer, tea, sparkling water, beer, hard cider, energy drinks, and all other aluminum cans (e.g., cat food containers).
Metal	Tin/Steel Cans	Includes tinned steel food and pet food cans.
Metal	Empty Aerosol Cans	Empty, mixed material/metal aerosol cans.
Metal	Ferrous Metals	All ferrous metals such as metal tools, iron, and steel (including stainless steel). This category includes scrap iron, metal caps/lids, and steel to which a magnet adheres.
Metal	Other Non-ferrous Metals	Non-ferrous metals such as copper, lead, tin (except cans), brass, zinc, and other metal materials not derived from iron to which a magnet will not adhere. Does not include aluminum.
Metal	Non-recoverable/Composite Metals	Items made of a mixture of ferrous and non-ferrous or a mixture of metal and non-metallic materials (if these are primarily metal). Examples include small appliances, motors, Christmas lights, and insulated wire. Also includes soiled aluminum (e.g., an aluminum tray that was used to bake lasagna).
Metal	Other Aluminum	Clean aluminum products other than cans. Includes aluminum metal caps, clean aluminum foil and aluminum pie plates and baking trays.
Organics	Food Scraps	Any food waste including fruit, vegetables, meat, bones, coffee grounds, eggshells, cheese, etc. Beverages or other liquids including the container when the container weight is not appreciable compared to the liquid (or food) inside.
Organics	Leaves & Yard Debris	Any yard/garden waste that has not been treated and has the potential to be composted, including pumpkins.
Organics	Dimensional Lumber & Engineered Wood	Both clean and painted wood commonly used in construction for framing and related uses, including 2 x 4's, 2 x 6's, and sheets of plywood, strand board, and particle board. Includes pallets and crates.

Material Class	Material Type	Definition
Organics	Roofing & Siding Wood	Painted or unpainted wood from demolition or construction waste that is commonly used for siding or roofing of buildings. This category includes only wood products, such as cedar shingles or shakes.
Organics	Carpet	Non-synthetic fibers bonded to some type of backing material.
Organics	Tires	Whole tires from automobiles, trucks, motorcycles, and other vehicles.
Organics	Textiles & Shoes	Clothing, rags, and accessories made of non-synthetic textiles such as wool or cotton. Examples include pants, shirts, fabric purses, bed sheets, towels, and shoes.
Organics	Food-soiled & Compostable Paper	This includes coffee filters, tea bags, greasy napkins, dirty pizza boxes, paper egg cartons and other similar items that have the potential to be composted.
Organics	Treated Wood	Wood treated with preservatives such as creosote, including dimension lumber. This category may also include some treated plywood, strand board, chemically treated wood, and other wood.
Organics	Other Wood	Other types of wood including wood products that do not fit into the above categories, including all-wood furniture.
Organics	Other Non-recoverable/Composite Organics	Other organic materials that do not easily fit into the above materials. Examples include synthetic textiles (rayon, polyester, etc.), synthetic carpet, hair, dryer lint, cigarette butts, sneakers (with mostly synthetic uppers), wooden chopsticks, meat tray pads and candles.
Other Materials	Construction & Demolition (non-wood)	Construction, demolition, or land clearing waste, such as concrete, plaster, rocks, gravel, bricks, toilets, asphalt shingles, gypsum wallboard, non-wood roofing materials, and insulation of various types (including foam, fiberglass etc.).
Other Materials	E-waste	Includes computer equipment, phones, radios, chargers, and televisions. Also includes any battery-powered devices.
Other Materials	Vehicle Batteries	Car, motorcycle, and other lead-acid batteries used for motorized vehicles.
Other Materials	Household Batteries - Rechargeable	Batteries of various sizes and types, as commonly used in households, that are rechargeable.
Other Materials	Household Batteries - Alkaline or Other	Batteries of various sizes and types, as commonly used in households, that are not rechargeable.
Other Materials	Fluorescent Light Tubes	Fluorescent tube lighting.
Other Materials	Oil-based Paint	Solvent-based paints, varnishes, and similar products.
Other Materials	Cleaners & Other Household Products	Hazardous cleaning products such as pesticides and herbicides, cleaners and corrosives, solvents and thinners, adhesives and glues.

Material Class	Material Type	Definition
Other Materials	Motor Oil/Fuels	Gasoline and fuel oil.
Other Materials	Other Household Hazardous Waste	Includes other hazardous materials not listed in other categories including industrial chemicals, medical waste, sharps, and light bulbs (other than incandescent and florescent light tubes).
Other Materials	Latex Paint	Water-based paints and similar products.
Other Materials	Mattresses	Mattresses made of mixed materials and in any condition.
Other Materials	Bathroom Waste	Diapers, wipes, feminine products, Listerine and other bathroom waste. Bagged bathroom waste will not be opened and sorted.
Other Materials	Mixed Furniture	Furniture made of mixed materials and in any condition. (For all-wood furniture, see Other Wood.)
Other Materials	Nondistinct Fines	Soil, sand, dirt, ash, and similar nondistinct materials.
Other Materials	Other Residuals	Any item not described above, such as pet waste, coals, fireworks, ceramics, silicone, and nondistinct materials. Includes shredded paper.

Organics Key Material Groups

Materials in the organics stream were organized into six key material groups, summarized in Appendix C. These groups differentiate between materials that are currently accepted in the organics stream ("accepted compostables"), those that could be accepted in future ("potentially compostable"), and those that cannot be composted ("other contaminants").

Table 55. Organics Key Material Groups

Organics Key Material Group	Included Material Types
Accepted Compostables	• Food Scraps • Leaves & Yard Debris
Potentially Compostable Wood	• Dimensional Lumber & Engineered Wood • Roofing & Siding Wood
Potentially Compostable Paper	• Corrugated Cardboard • Waxed Corrugated Cardboard • Food-soiled & Compostable Paper
Potentially Compostable Plastic	• #7 Potentially Compostable Plastic • Potentially Compostable Disposal Bags

Organics Key Material Group	Included Material Types
Other Contaminants	• All other material types

Recoverability Group Assignments

Materials were also classified according to their recoverability to identify additional diversion opportunities (Table 56). Solid Waste Management Division staff assigned each material type to one of six recoverability groups that consider the availability and method of recovery, based on programs available in Tacoma in 2023.

Recoverability assignments depend on the waste generator. Differences include:

- Drop-off recycling is not available to commercial customers, including public schools, large venues, and commercial organics customers. Materials that are classified as residential drop-off recycling for non-commercial customers are classified as curbside recyclable (e.g., glass containers) or non-recoverable (e.g., empty aerosol cans) for commercial customers.
- The material type food scraps is compostable for all generators except self-haul. It is categorized as non-recoverable for self-haul generators.

Recoverability assignments for public schools and large venues align with those for the overall commercial sector. These institutions are eligible for commercial curbside commingled recycling services, meaning that materials that are curbside recyclable for commercial businesses are also curbside recyclable for these generators.

The material type glass containers is classified as residential recyclable drop-off for multifamily streams, but it is also curbside recyclable for multifamily customers who are serviced on commercial collection routes.

Table 56. Material Types by Recoverability Group

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
Corrugated Cardboard	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
Mixed Recyclable Fibers	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
Waxed Corrugated Cardboard	Non-recoverable	Non-recoverable	Non-recoverable
Polycoated & Lined Containers	Non-recoverable	Non-recoverable	Non-recoverable
Non-recoverable Composite Paper	Non-recoverable	Non-recoverable	Non-recoverable
#2 HDPE Containers - Natural	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
#2 HDPE Containers - Pigmented	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
#5 PP Containers	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
#1 PET Containers	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
#3-7 Plastics (excluding #5)	Residential Drop-off Recyclable	Non-recoverable	Residential Drop-off Recyclable
Clean Plastic Film	Residential Drop-off Recyclable	Non-recoverable	Residential Drop-off Recyclable
#6 Expanded Polystyrene	Non-recoverable	Non-recoverable	Non-recoverable

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
#7 Potentially Compostable Plastic	Non-recoverable	Non-recoverable	Non-recoverable
Non-recoverable Plastic Film	Non-recoverable	Non-recoverable	Non-recoverable
Disposal Bags	Non-recoverable	Non-recoverable	Non-recoverable
Potentially Compostable Disposal Bags	Non-recoverable	Non-recoverable	Non-recoverable
Non-recoverable/Composite Plastics	Non-recoverable	Non-recoverable	Non-recoverable
Glass Containers	Residential Drop-off Recyclable	Curbside Recyclable	Residential Drop-off Recyclable
Non-recoverable/Composite Glass	Non-recoverable	Non-recoverable	Non-recoverable
Aluminum Cans	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
Tin/Steel Cans	Curbside Recyclable	Curbside Recyclable	Curbside Recyclable
Empty Aerosol Cans	Residential Drop-off Recyclable	Non-recoverable	Residential Drop-off Recyclable

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
Ferrous Metals	Residential Drop-off Recyclable	Non-recoverable	Residential Drop-off Recyclable
Other Non-ferrous Metals	Residential Drop-off Recyclable	Non-recoverable	Residential Drop-off Recyclable
Non-recoverable/Composite Metals	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Other Aluminum	Non-recoverable	Non-recoverable	Non-recoverable
Food Scraps	Compostable	Compostable	Non-recoverable
Leaves & Yard Debris	Compostable	Compostable	Compostable
Dimensional Lumber & Engineered Wood	Recoverable C&D & Wood	Recoverable C&D & Wood	Recoverable C&D & Wood
Roofing & Siding Wood	Recoverable C&D & Wood	Recoverable C&D & Wood	Recoverable C&D & Wood
Carpet	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Tires	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Textiles & Shoes	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
Food-soiled & Compostable Paper	Non-recoverable	Non-recoverable	Non-recoverable
Treated Wood	Non-recoverable	Non-recoverable	Non-recoverable
Other Wood	Non-recoverable	Non-recoverable	Non-recoverable
Other Non-recoverable/Composite Organics	Non-recoverable	Non-recoverable	Non-recoverable
Construction & Demolition (non-wood)	Recoverable C&D & Wood	Recoverable C&D & Wood	Recoverable C&D & Wood
E-waste	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Vehicle Batteries	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Household Batteries - Rechargeable	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Household Batteries - Alkaline or Other	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Fluorescent Light Tubes	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Oil-based Paint	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable

Material Type	Residential Recoverability Group	Commercial Recoverability Group	Self-haul and C&D Recoverability Group
Cleaners & Other Household Products	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Motor Oil/Fuels	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Other Household Hazardous Waste	Potentially Recoverable	Potentially Recoverable	Potentially Recoverable
Latex Paint	Non-recoverable	Non-recoverable	Non-recoverable
Mattresses	Non-recoverable	Non-recoverable	Non-recoverable
Bathroom Waste	Non-recoverable	Non-recoverable	Non-recoverable
Mixed Furniture	Non-recoverable	Non-recoverable	Non-recoverable
Nondistinct Fines	Non-recoverable	Non-recoverable	Non-recoverable
Other Residuals	Non-recoverable	Non-recoverable	Non-recoverable

Appendix D: Study Design for Field Work

This section presents the original study design for the 2023 waste characterization study.

Differences from Original Study Design

During field work, Cascadia adjusted several elements of the study design to accommodate field conditions and to better address study goals. These adjustments included changes to the sampling plan and how composition results are reported.

Sampling Plan Changes

For some substreams, fewer loads were available for sampling than anticipated, resulting in lower sample counts than initially planned. For example, Cascadia planned to collect samples from 60 C&D loads, but only 28 loads were available for sampling during field work.

Cascadia initially planned to sample approximately equal numbers of multifamily samples from properties with carts, typically smaller properties (e.g., those with 3-10 units), and properties with large containers and dumpsters, typically larger properties (e.g., multistory apartment complexes). However, there were more cart samples available and as a result, complexes with large container or dumpster service are underrepresented in the overall multifamily disposed waste and commingled recycling compositions.

Cascadia initially planned to calculate separate compositions for C&D debris generated at residential versus commercial properties. Debris from residential properties tends to be associated with home renovations and may include bulky items like furniture and appliances as well as household waste. However, too few loads of residential C&D debris arrived for sampling during the study period to calculate a robust residential composition. This means the overall composition provided in the main report is based primarily on C&D debris generated at commercial properties, which accounts for most of the material in the C&D debris stream.

During the second season of field work, the City provided additional disposed waste and commingled recycling samples from two large commercial venues, Cheney Stadium and Tacoma Dome.

Reporting Differences

Since the first field work season followed Halloween, the original study design included pumpkins as a 54th material type. Pumpkins are heavy and bulky and can dominate individual samples, skewing composition estimates. During this study, pumpkins were observed infrequently and accounted for a small proportion of each sample where they were present, so this material type was merged with leaves and yard debris for reporting.

In the report, composition results for the public school disposed waste substream are grouped with results for other commercial generators rather than self-haul generators. While Tacoma Public Schools self-hauls its disposed waste to TRTC, the substream aligns more closely with commercial generators whose waste is collected by contracted haulers.

Overview and Objectives

To obtain data about the composition of solid waste, the City of Tacoma ("City") hired Cascadia Consulting Group ("Cascadia") to characterize certain waste streams generated within Tacoma in 2023-2024. The findings from this study are intended to provide details about the quantities and types of municipal solid waste, residential recycling, and commercial organics. The results of this study will inform solid waste planning by identifying recycling and other diversion opportunities. The objectives of this study can be organized into the following four Primary Tasks:

- Task 1. Municipal Waste Stream Composition Study
- Task 2. Residential Commingled Recycling Composition Study
- Task 3. Commercial Organics Composition Study
- Task 4. Multifamily Recycling Composition Study

Cascadia will work in tandem with City staff to finalize the design of each study and complete the accompanying field work. Cascadia will provide overall project planning and coordination, training to City staff, and staff for sample sorting crews. The City will provide sample collection teams for the residential and commercial sectors. All sample sorting will take place at the Tacoma Recovery and Transfer Station (TRTC) at 3510 S Mullen St, Tacoma, WA 98409.

This document includes protocols for completing this study with a representative and unbiased sampling approach. It also describes the protocol for route and load selection, sampling, and data analysis. Finally, this document also includes example field forms and the health and safety plan for conducting field work.

Terms and Definitions

WASTE SECTORS

- **Single-family** generators are residential properties with a single dwelling or a residential property with fewer than three (two or less) dwelling units. Each dwelling unit typically has its own set of waste and diversion bins.

- **Multifamily** generators are residential properties with three or more dwelling units. Waste and recycling bins are shared among many dwelling units.

- **Commercial** generators are non-residential properties including businesses, industries (e.g., factories, farms), institutions (e.g., correctional facilities, hospitals, churches), and governments (e.g., highways, parks).

- **Self-haul** generators are residents, businesses, or institutions that generate waste and haul it directly to a transfer station. Self-haul customers do not have permits to operate as waste haulers.
  - **Residential self-haul** material is generated at a single-family or multifamily property and hauled by a resident or businesses (e.g., a contractor or junk hauler) to a transfer station.
  - **Commercial self-haul** material is generated by a business or institution and hauled by the same entity to a transfer station.
  - **Public school self-haul** material is generated and hauled by the Tacoma School District from K-12 public schools.
- **C&D generators** are construction and demolition sites.

WASTE STREAMS

- **Disposed waste** is material that will be sent to a landfill without any processing to remove materials with value.
- **Commingled recycling** is typical dry good material that is normally hauled to a facility that specializes in removing the recoverable materials. It is placed in a container by the generator and collected by the City on a regular, contracted schedule.
- **Organics** is food waste material placed in a container by a commercial generator. This material is diverted from disposal and is typically serviced with residential yard waste collection routes.
- **C&D debris** is waste material transported by the City to a third-party processor in unscheduled or on-call roll-off loads that service construction and demolition sites.

ADDITIONAL DEFINITIONS

- A **set-out** is a disposed waste or commingled recycling service container placed on the curb/alley for pick up by the City.
- A **single-family sample** consists of all material in one waste stream set out for collection from a household. Each household may have as many as two samples (one sample each of disposed waste and commingled recycling) or as few as one (a household that only has a disposed waste set-out, for example).
- A **multifamily sample** consists of 200-250 pounds of material collected from multifamily disposed waste containers or up to 125 pounds of material collected from multifamily commingled recycling containers. Each multifamily property may have as many as two samples (one sample each of disposed waste and commingled recycling) or as few as one (a property that only has a disposed waste set-out, for example).
- A **commercial organics sample** consists of 200-250 pounds sample of material collected from businesses.

- A **public school sample** consists of 200-250 pounds of disposed waste that the Tacoma Public Schools self-hauls to the TRTC.
- A **self-haul sample** consists of all material in the load delivered by the selected customer. An entire load will constitute each sample and will be visually characterized.
- A **C&D sample** consists of all material collected in a roll-off at a construction-demolition site and hauled by the City. An entire load will constitute each sample and will be visually characterized.

Field Work Schedule

Data collection will occur over two seasons (Fall 2023 and Spring 2024). During season one, sample collection and sorting will be divided among sectors and occur over two separate weeks, Monday through Friday.

Table 57. Proposed Field Work Schedule

Generators	Season One	Season Two
Single-family, multifamily, commercial, public schools	Nov 13-17, 2023	Apr 8 – 12, 2024
Self-haul, C&D	Dec 11-15, 2023	Apr 15 – 19, 2024

Sample Allocations

This section describes the proposed sample allocations by stream.

Single-family

This study includes sampling disposed waste and commingled recycling from single-family households. Both streams will be collected from each randomly pre-selected household. If a selected household has only a recycling set-out, the household will be recorded as having a zero-weight disposed waste sample. If a selected household has only a disposed waste set-out, they will be recorded as having a zero-weight recycling sample.

This approach will assign equal probability of being sampled to households both participating and not participating in material diversion. This, in turn, will help to avoid overestimating the quantity of material diversion. Containers that were placed on the curb and already serviced before sample collection occurred do not count as a zero weight sample (if one or more containers have already been serviced, the household is not eligible for sampling).

The City will collect and Cascadia will sort all disposed waste and recycling generated by 50 households per season, for a total of up to 200 waste and recycling samples. A summary of the single-family sample allocation is included in Table 58.

Table 58. Single-family Sample Allocation

Season	Sampled Households
Fall	50
Spring	50
Task Total	**100**

Multifamily

This study includes disposed waste and recycling from pre-selected multifamily properties. Both streams will be collected from each selected property (where available). If a selected property has only a recycling set-out, they will be recorded as having a zero-weight disposed waste sample. If a selected property has only a disposed waste set-out, they will be recorded as having a zero-weight recycling sample.

The City will collect and Cascadia will sort samples from 20 multifamily properties in each of two seasons. A summary of the multifamily sample allocation is included in Table 59.

Table 59. Multifamily Sample Allocation

Season	Sampled Properties
Fall	20
Spring	20
Task Total	**40**

Commercial Organics

The City will collect organics containers from up to 20 businesses that separate their food waste each season, for a total of 40 commercial organics samples. Organics samples will be divided as evenly as possible between four subsectors: schools, restaurants, grocery stores, and mixed/other (Table 60).

Table 60. Commercial Organics Sample Allocation

Sector	Fall	Spring	Total
Schools	5	5	10
Restaurants	5	5	10
Grocery Stores	5	5	10
Mixed/Other	5	5	10
Task Total	**20**	**20**	**40**

Cascadia will model commercial disposed waste composition; no samples will be collected for this stream.

Self-haul

The Cascadia team will randomly select and visually sort 110 samples of self-haul disposed waste. Of those samples, Cascadia will allocate 60 samples to the residential sector, 40 samples to the commercial sector, and 10 samples to public schools (Table 61).

Table 61. Self-haul Sample Allocation

Sector	Fall	Spring	Total
Residential	30	30	60
Commercial	20	20	40
Schools	5	5	10
Task Total	**55**	**55**	**110**

Construction and Demolition

Cascadia will collect and visually sort up to 30 samples of C&D debris each season for a total of up to 60 C&D samples. If enough C&D loads are available, Cascadia will allocate the C&D samples as follows: 20 residential C&D loads and 40 commercial C&D loads (including commercial roll-off loads; Table 62). In the case that residential C&D loads are not available, Cascadia will collect additional commercial C&D loads or additional self-haul loads to make up for missed samples and to meet the overall sample allocations.

Table 62. C&D Sample Allocation

Sector	Fall	Spring	Total
Residential	10	10	20
Commercial	20	20	40
Task Total	**30**	**30**	**60**

Train Staff

Before field work begins, Cascadia will train the City's sample collection teams (the Single-family [SF] Collection Crew and the Multifamily [MF] Collection Crew) and Cascadia's Sort Crew to implement Cascadia's characterization methods and protocols. Cascadia's Sort Crew will review the material types and definitions and sorting protocols and receive a briefing about logistics and safety regulations at the TRTC by the Sort Crew Lead.

Cascadia also will train Tacoma scale house personnel in vehicle selection and survey procedures required to identify and direct selected self-haul and C&D loads to Cascadia's Sort Crew at the TRTC.

Training will also cover Cascadia's Health and Safety Plan, which is updated whenever new safety information, products, or regulations that apply to a project become available. In addition, the Sort

Crew Lead will continually be responsible for implementing and maintaining safe working practices in their work areas.

Selecting and Collecting Samples

This section details the protocols for selecting routes and sample collection.

Select Routes for Sampling

SINGLE-FAMILY

The City and Cascadia will collaborate to select single-family routes for sampling. The City will provide Cascadia with a complete list of single-family routes in Tacoma, from which Cascadia will randomly select sample routes. From those routes, Cascadia will randomly select addresses for sampling. The City will then review the list of selected routes and addresses for feasibility and make desired adjustments to ensure equitable representation of communities.

MULTIFAMILY

Prior to field work, the City will randomly select properties from the complete list of multifamily properties. Working in coordination, the City and Cascadia will determine the site visit day for each selected property and develop a schedule that is crafted around pickup days to ensure that enough material is on site to obtain a sample from the disposed waste and commingled recycling containers.

COMMERCIAL

The City identified three high priority commercial generator types (schools, restaurants, and grocery stores) and Cascadia classified the 61 commercial organics accounts into one of the three priority generator types or a fourth mixed/other generator type. For each day of field work, Cascadia will randomly select businesses with service that day.

Sample Collection

SINGLE-FAMILY

Obtaining Samples of Disposed Waste and Commingled Recycling

Prior to field work, Cascadia will randomly select specific addresses of households for sampling. A team of City staff will be responsible for single-family sample collection. Prior to the start of each field day, the SF Collection Crew will receive the list of addresses, sample placards, and data collection sheets.

The SF Collection Team will coordinate with the collection team to not collect material from the pre-selected households for sampling or begin collecting material from the selected route at least 30 minutes before the City collection truck begins collection each morning. This ensures that the

field crew will be sufficiently ahead of the hauler to prevent any disruptions to collection operations while allowing residents the maximum amount of time to set out their carts for collection.

When the SF Collection Crew arrives at the pre-selected household, if the household has set out at least one stream (disposed waste or commingled recycling), their entire set-out will be collected as a sample. However, if there are no set-outs at the selected household, the crew will sample from the next neighboring house along the route with material set out.

Once a household is selected for sampling, all the material from a single stream, including bagged material set next to the cart, constitutes a sample. Each household may have as many as two samples (one sample from each stream) or as few as one (a household that only has a disposed waste set-out, for example). Each container, plus bagged material set next to the cart, will be picked up by the SF Collection Crew and replaced with empty carts. Each sample will be labeled separately with a sample placard pre-printed with a unique ID number associated with the selected household and the stream (disposed waste or commingled recycling). The SF Collection Crew will keep bagged material with their paired containers to prevent cross-contamination between samples. Each day, after the SF Collection Team collects samples from 10 households, they will transport the samples to the TRTC for sorting. Containers selected for sampling will be replaced with empty containers.

Equipment

Cascadia recommends bringing the following items to each single-family property in the study when sampling and sorting waste (Table 63). The City may choose to bring safety gear that aligns with their City procedures.

Table 63. Single-family Sample Collection Equipment

SAMPLE COLLECTION	SAFETY GEAR
Box truck	Hard hats (1 per person)
Route list	Safety vests (1 per person)
Sample placards	Safety glasses (1 per person)
Plastic barrels, bins, or toters for loose material	Dust masks (1 per person per day)
Digital camera	Puncture-resistant gloves (1 per person)
Clipboards	Glove liners (1 per person per day)
Duct tape	Steel-toed boots
Sharpie pen	Safety/medical kit
	Sunblock
	Cooler with drinks

MULTIFAMILY

Sample collection from each multifamily site includes two components: a) collection of information required to quantify the amount of material generated by multifamily residences; and b) obtaining sample material to characterize the composition of that material. The MF Collection

Team will collect samples Monday through Friday and deliver them to the Sort Crew on the same day each sample is collected.

Obtaining Samples of Disposed Waste and Commingled Recycling

In addition to collecting information to quantify disposed waste and recycling generation at each site, the MF Collection Crew will obtain container(s) of the material to deliver to the TRTC for sorting. The procedure for selecting these samples is described below.

- **Select container for sampling.** If a site has more than one container per stream, the MF Collection Crew will select the containers with the most disposed waste and commingled recycling material for sampling. In some cases, they may need to select multiple containers to meet the target weight. If substantial differences exist in the composition of the materials in the various containers at a single site, the MF Collection Crew will take multiple containers which will be combined into one representative sample. Containers selected for sampling will be replaced with empty containers.

- **Label and transport the container**. The MF Collection Crew will secure a sample placard to every selected container as well as accompanying loose material and transport the selected container(s) to the TRTC. At the TRTC, the MF Collection Crew will ensure material in dumpsters is tipped onto the floor so that it can be easily accessed by the Sort Crew. The MF Collection Crew will collect the net weight of the material upon exiting the scale house.

- **Extract a sample**. The Sort Crew will randomly choose a portion of material from each selected container to sample. The Sort Crew will ensure that each disposed waste sample weighs up to 200-250 pounds and each commingled recycling sample weighs at least 125 pounds. If the material generated by a single property and delivered to the Sort Crew weighs less than the target weight, all the material will be considered a sample and will be sorted.

Equipment

Cascadia recommends bringing the following items to each multifamily property in the study when sampling and sorting waste (Table 64).

Table 64. Multifamily Sample Collection Equipment

SET-UP	SAFETY GEAR	TOOLS
Cargo van or trailer	Safety vests (1 per person)	Digital cameras
Address list	Puncture resistant gloves (1 per person)	Clipboards
Plastic barrels, bins, or toters for loose material	Glove liners (1 per person per day)	Measuring tape
Field forms and writing utensil	Steel-toed boots	Marking paint
	Safety/medical kit	Stapler
	Hand wipes/sanitizer	

COMMERCIAL ORGANICS

Prior to field work, Cascadia will randomly select businesses for sampling. A team of City staff will be responsible for commercial organics sample collection. Prior to the start of each field day, the City Collection Crew will receive the list of addresses and sample placards.

The City will visit each pre-selected business and pick up as many organics cart(s) as necessary to make up a single 200-250 pound sample from each address. The City will then transport the organics carts to the TRTC for sorting. Containers selected for sampling will be replaced with empty containers.

SELF-HAUL

Scale house personnel will assist with systematically selecting self-haul loads for sampling, and direct selected vehicles to the Sort Crew. Cascadia will provide the scale house personnel with a vehicle selection sheet and instruct them on how to select the self-haul vehicles for sampling. The scale house personnel will also be asked to place a sample placard (provided by Cascadia) on that vehicle's windshield and direct the driver to the Sort Crew's location in the TRTC. Tacoma Public Schools self-hauls their waste to the TRTC daily and will be included on the vehicle selection sheet.

The entire load from selected self-haul loads (except public school loads) will be considered one sample. A self-haul public school load will be 200-250 pounds.

CONSTRUCTION AND DEMOLITION

Unscheduled residential C&D loads and regular scheduled C&D loads are typically hauled to a third party processor (Recovery One). On the morning of each sampling day, Cascadia staff will work with the City to identify and redirect unscheduled/on-call residential roll-off loads (if any). The City will re-direct regular scheduled commercial C&D loads to the TRTC for sampling until daily sample quotas are met.

The entire load from each selected C&D vehicle will be considered one sample.

Sorting Samples

Residential and Commercial

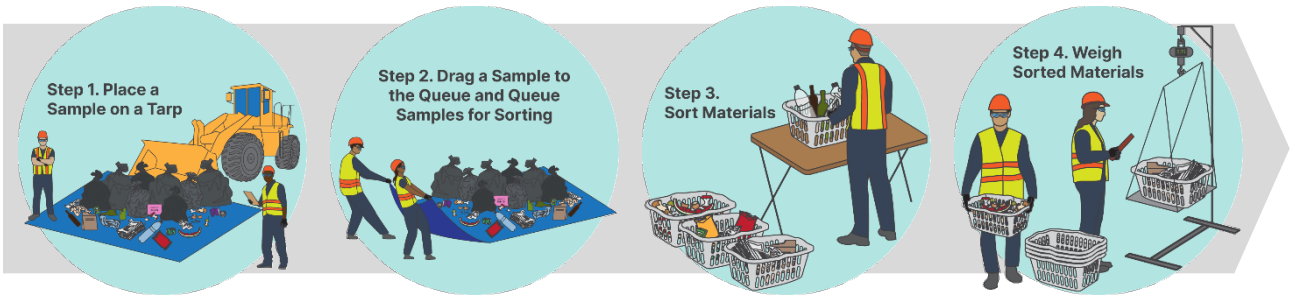
The Cascadia Sort Crew will hand sort residential (single-family and multifamily), commercial (organics), and self-haul (public school) samples at the TRTC. The City will provide a covered area for sorting large enough to accommodate incoming residential samples. The Sort Crew will sort, weigh, and record each sample separately. The hand-sorting protocol follows the steps listed below (Figure 44).

- **Sort the sample.** The Sort Crew will sort samples by material types into plastic bins. The material definitions are included in Appendix C. The Sort Crew members typically specialize in groups of materials, such as papers or plastics, and focus on sorting those materials for the

duration of the study to ensure accuracy and consistency. For material that is difficult to sort due to adhesion, wetness, or partial decomposition, the Sort Crew will make their best judgement to categorize the material. If it is practical to separate joined materials (such as a zip lock bag with metal screws in it), the Sort Crew will do so.

- **Quality check the sample.** The Sort Crew Lead will monitor the homogeneity of the sorted materials as they accumulate in the bins, rejecting materials that are improperly classified. Open bins allow the Sort Crew Lead to see the material at all times.
- **Weigh and record data**. After each sample has been completely sorted, the Sort Crew Lead will weigh the material in each type and verify the purity of each material type as it is weighed. The Sort Crew Lead will then store the weights in a custom, cloud-based data entry application.
- **Clean sorting site.** The Sort Crew will thoroughly clean the sorting area at the end of each day.

Figure 44. Hand-sort Protocol



Self-haul and Construction and Demolition

The Sort Crew will visually sort self-haul (residential and commercial) and C&D samples. Visual characterizations produce more accurate findings than hand-sorting when samples are large and bulky. This approach is preferable to hand sorting for the following reasons:

- Loads are often "chunky;" in other words, they often consist of large pieces or large amounts of one material concentrated in one area of the load. Hand-sorting of 200-250-pound samples does not capture this variability of composition within individual loads. Visual characterization of the entire load accounts for all the materials that are present in significant amounts.
- The composition variability from one load to another in these waste streams is very high. Therefore, to obtain high-quality data, it is necessary to characterize relatively more samples. Our visual characterization method allows us to characterize far more loads than could be done through hand-sorting.

The visual characterization method follows the eight steps described below (Figure 45).

1. **Collect information about the load.** At the sampling area, the Sort Crew Lead will record key information, including the net weight and jurisdiction of origin for each self-hauled and C&D load.

2. **Measure load volume**. The Sort Crew Lead will use a tape measure to obtain the length, width, and height of the load while it is still in the vehicle and record it on the data sheet.
3. **Photograph the sample.** Using a digital camera, the Sort Crew Lead will take a photograph after each sample is tipped. The sample placard that identifies each sample will be positioned so it is visible in each photograph.
4. **Note which material classes are present.** The Sort Crew Lead will walk entirely around the load and indicate on the visual characterization form which major material classes are present in the load.
5. **Estimate composition by volume for each major material class.** Beginning with the largest major material class present by volume, the Sort Crew Lead will estimate the volumetric percentage of the material class and record it on the form. An example of a material class is paper. This process will be repeated for the next largest material class, and so forth, until the volume percentage of every material class has been estimated. The Sort Crew Lead will then calculate the sum of material percentages for this step, ensuring that the total is 100%.
6. **Estimate composition by volume for each specific material component.** The Sort Crew Lead will consider each material class separately and estimate the percentage of each class that is made up of each specific material type. For example, corrugated cardboard is a specific material type within the material class of paper. While considering only the paper materials class, the Sort Crew Lead will estimate the volume percentage of paper materials that is composed of corrugated cardboard. They will then do the same for every other individual material type within the paper material class (such as mixed recyclable fibers and non-recoverable composite paper). The total percentages for all of the material types must equal 100%. This process is repeated for the other material classes, with all the material types in each material class totaling 100%.
7. **Check and reconcile percentage data.** The Sort Crew Lead will then ensure that the percentage estimates for the major material classes add up to 100%. Also, the percentage estimates for the specific material components within each major class must total 100%.
8. **Convert volume estimates to weight estimates.** This step is done at Cascadia's offices after field work is completed. Data from the visual characterization forms is entered into OSCAR, a proprietary customized database, and accepted density conversion factors will be used to develop estimates of the weight of each material component in each load.

Figure 45. Visual Characterization

Data Management and Analysis

Data Entry and QA/QC

At the conclusion of field work, the Data Manager will perform dual inspection of the entered data as well as any handwritten material weight tally sheets. Anomalies or inconsistencies will be investigated and resolved, as appropriate.

Data Analysis

Cascadia will analyze the characterization data using standard statistical procedures and provide estimates of mean composition and the 90% confidence interval. The formulae to calculate the composition estimates will be the same used in the 2015 Tacoma Waste Characterization Study.

Cascadia will rely on the City to provide the annual tonnage information for each substream.

Example Field Forms

Figure 46. Example Visual Characterization Form

Tacoma WSC 2023 Visual Characterization Form

Stream (circle one) Self Haul C&D

Measurements (inches **Height** | **Width**

Date: _____ **Length**

Substream: Res Com

Sample ID:

Step 3: Photograph the sample — Photo Taken: ☐

Step 4: Identify and record all material classes (in bold) that appear in the load.

Step 5: Estimate composition of load by volume for each material class (in bold).

Step 6: For each material class, estimate composition by volume of each material type

Step 7: Make sure material class estimates AND material type estimates EACH total 100%

☐ **Metal:** _____%

	Aluminum cans
	Other Aluminum
	Tin Cans
	Empty Aerosol Cans
	Ferrous Metals
	Other Non-ferrous metals
	Non-recoverable/Composite Metals
%	***Subtotal (must equal 100%)***

☐ **Paper:** _____%

	Corrugated Cardboard/Kraft Paper
	Waxed Corrugated Cardboard
	Mixed Recyclable Fibers
	Clean Polycoated and Lined Containers
	Other Non-recoverable Composite Paper
%	***Subtotal (must equal 100%)***

☐ **Plastic:** _____%

	#1 PET Containers
	#2 HDPE Containers - Natural
	#2 HDPE Containers - Color
	#5 PP
	#3-7 (excluding #5) Plastics
	#6 Expanded Polystyrene
	#7 Potentially Compostable Plastic
	Clean Plastic Film
	Non-recoverable Plastic Film
	Disposal Bags
	Potentially Compostable Disposal Bags
	Non-recoverable/Composite Plastics
%	***Subtotal (must equal 100%)***

☐ **Glass:** _____%

	Recyclable Glass
	Non-recoverable/Composite Glass
%	***Subtotal (must equal 100%)***

Grand Total:_____%

(Must equal 100%)

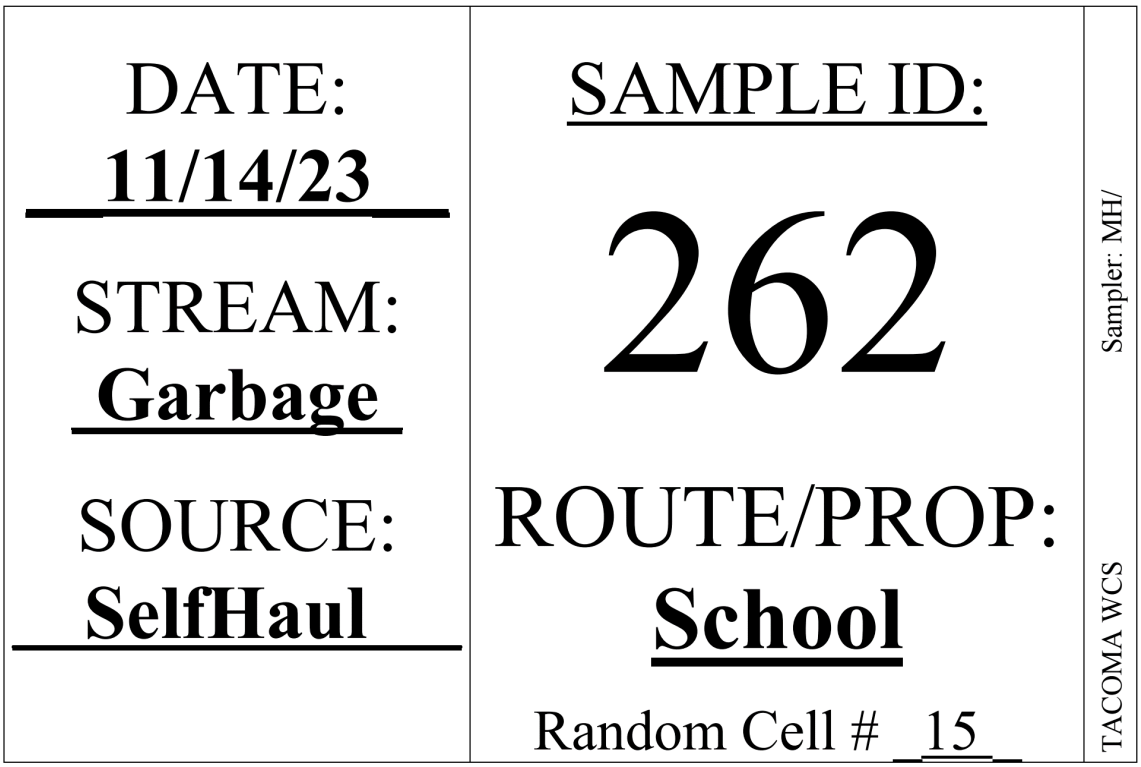
☐ **Organics:** _____%

	Food Scraps
	Pumpkins
	Food-soiled and Compostable Paper
	Leaves and Yard Debris
	Dimensional Lumber/Engineered Wood
	Treated Wood
	Roofing and Siding Wood
	Other Wood
	Carpet
	Tires
	Textiles and Shoes
	Other Non-recoverable/Composite Organics
%	***Subtotal (must equal 100%)***

☐ **Other Materials:** _____%

	E-waste
	Vehicle Batteries
	Household Batteries, Rechargeable
	Household Batteries, Alkaline & Other
	Florescent Light Tubes
	Paint, Oil-based
	Paint, Latex
	Cleaners and Other Household Products
	Motor Oil/Fuels
	Other Household Hazardous Waste
	Bathroom Waste and Personal Hygiene Products
	Construction and Demolition (non-wood)
	Furniture
	Mattresses
	Nondistinct Fines
	Other Residuals
%	***Subtotal (must equal 100%)***

Figure 47. Example Sample Placard



Health and Safety Plan

Our seven-part Health and Safety Plan is detailed below:

RESPONSIBILITY

Managers and supervisors are responsible for implementing and maintaining safe working practices in their work areas and for answering worker questions about the Health and Safety Plan. A copy of this Health and Safety Plan is provided to all employees.

The Health and Safety Plan is not a static plan. As conditions and situations arise, this Health and Safety Plan will be updated and augmented in accordance with OSHA and MSHA standards.

COMPLIANCE

All workers, including managers and supervisors, comply with safe and healthful work practices. Our goal is to ensure that all workers understand and comply with these practices. To accomplish this, our procedures include informing workers of the provisions of our program, evaluating the on-going safety performance of all workers, and providing additional training to workers whose safety performance may be deficient.

The employees of Cascadia often perform their duties as guests of many facilities. The procedures described in our program do not supersede the requirements which may already be in place at these facilities. Instead, this plan is designed to augment and work in conjunction with any site safety plans already existing at these facilities. We follow all host facility safety requirements which are more stringent than our own. Our safety procedures often exceed those of our host. Workers must follow our procedures, whether or not the host facility has any such requirements.

COMMUNICATION

We are committed to providing a safe work environment for all of our workers. All managers and supervisors communicate with all workers about occupational safety and health in a form readily understandable by all workers. Workers are encouraged to inform their managers and supervisors about workplace hazards without fear of reprisal. If the safety of the entire team could be in jeopardy, or if anything is discovered that could cause injury or is unsafe, workers are advised to tell their manager or supervisor immediately.

We routinely communicate with and instruct employees verbally about general safe work practices and hazards particular to each employee's job assignment. Our communication system includes these elements:

- New worker orientation, including discussion of safety and health policies and procedures,
- Worker training in the specific protocols of our field procedures,
- Scheduled and “tailgate” safety meetings,
- Posted or distributed safety information, and
- Periodic review of our Health and Safety Program.

The Safety Officer ensures that all field personnel have read, and understood, the master copy of this Health and Safety Plan document, and that all workers have received orientation and training on the safety protocols to be followed in conducting our work

The Safety Officer delegates daily on-site responsibilities to the Supervisor in charge of the work. Each Supervisor has the duties and responsibilities to:

- Ensure that the procedures in this document are followed for the day's work,
- Be familiar with local emergency services, and maintain a list of emergency phone numbers,
- Conduct "tailgate" health and safety meetings to notify workers of any changes in safety protocol,
- Inspect personal protective equipment and to ensure proper use of such equipment,
- Monitor on-site hazards and the early health warning signs (e.g., heat stress/stroke, dehydration, or fatigue) of site personnel, and
- Stop unsafe operations, and to summon emergency services when needed.

Nearly every day we work, the team is at a different facility. The supervisor will brief workers on health and safety protocols of the host site. This will include emergency evacuation and rally point information, to ensure that, if an emergency occurs, all workers will adhere to site-specific evacuation and management procedures.

HAZARD ASSESSMENT

We assess possible work hazards, and the procedures to work safely around them, when:

- We initially established our Health and Safety protocols,
- New substances, processes, procedures or equipment which present potential new hazards are introduced into our workplace,
- New, previously unidentified hazards are recognized,
- Workplace conditions warrant an assessment, and
- When occupational injuries and illnesses occur.

Each day, Supervisors are to identify and evaluate workplace hazards which may be present at each work site. We routinely encounter the same day-to-day risks when we conduct our work. Yet, every facility is different and may present its own particular hazards. These are possible hazards that may occur during the field work:

Physical Hazards

- Cuts and punctures
- Lifting
- Slipping and falling
- Heat stress and fatigue
- Traffic or heavy equipment movement
- Noise exposure

- Animal and/or insect bites
- Airborne contaminants such as dust and windblown debris

Chemical and Biological Hazards

- Liquid spills from containers
- Household and hazardous chemicals
- Household hazardous wastes
- Medical wastes
- Blood/body fluid contaminated items
- Hypodermic needles

Due to the nature of waste composition sampling, exposures to airborne pathogens and subcutaneous introduction of pathogens are possible. Because of this, all employees will be given the opportunity to be vaccinated with tetanus and Hepatitis B vaccines. Any employee that forfeits having the vaccine will do so in writing.

ACCIDENT/EXPOSURES INVESTIGATION

Procedures for investigating workplace accidents and hazardous substance exposures include:

- Interviewing injured workers and witnesses,
- Examining the workplace for factors associated with the accident/exposure,
- Determining the cause of the accident/exposure,
- Taking corrective action to prevent the accident/exposure from reoccurring, and
- Recording the findings and actions taken.

HAZARD CORRECTION

Timely corrective action will be taken to remedy an unsafe condition, practice or procedure. When an imminent hazard exists that cannot be immediately abated without endangering employee(s) and/or property, we will remove all exposed workers from the area.

TRAINING AND INSTRUCTION

All workers, including managers and supervisors, shall have training and instruction on general and job-specific safety and health practices. Training and instruction is provided:

- To all new workers,
- To all workers given new job assignments for which training has not previously provided,
- Whenever new substances, processes, procedures or equipment are introduced to the workplace and represent a new safety or health hazard,
- Whenever employees are made aware of a new or previously unrecognized hazard,
- To supervisors to familiarize them with the hazards to which workers may be exposed, and
- To all workers regarding hazards specific to each employee's job assignment.

We provide for workers the proper safety equipment for performance of duties associated with waste sampling. These items include:

- Coveralls or protective outer wear (optional),
- Rubber gloves and liners (required),
- Lower back support apparatus (optional),
- Hearing protection (optional/based on site requirements),
- Safety glasses (optional/based on site requirements),
- Reflective safety vests (required),
- Hard hats and liners (required), and
- Knee pads (optional).

During the conduct of field work, the personal health and safety guidelines below are to be followed:

- Workers should be in good physical condition, maintain a current tetanus booster and Hepatitis B shot, and not be over-sensitive to odors and dust. All workers must be able to communicate in English and be able to read warning signs/labels.
- Workers should routinely check personal protective equipment and work clothing for proper fit and condition and replace or repair defective items immediately.
- Workers must look at what they are picking up or sorting, as seeing the material first is the most effective way to prevent cuts and punctures. Workers must use one of the small rakes or shovels to move material around for sorting.
- Workers must lift properly and ask for assistance when lifting heavy or bulky items and be particularly careful when tired or fatigued.
- Workers must be on the lookout for slipping and tripping hazards.
- Workers should not attempt to identify unknown chemical substances in unlabeled containers.
- Workers must wash hands and face before eating or drinking and must smoke only in designated areas.
- Workers should consume plenty of fluids on hot days and watch for signs of heat-related illness.
- Workers should know the surroundings and alert to the possibility of unexpected hazards.
- Workers must alert the Supervisor if feeling ill, overly fatigued, or injured. Even minor cuts and injuries must be treated immediately.

Appendix E: Waste Composition Calculations

Converting Volumes to Weights

The composition calculations rely on the availability of individual material weights for each sample. For self-haul, C&D, and Tacoma Dome cardboard recycling samples, Cascadia converted volume estimates to weights using industry-standard waste density conversion factors.

Using the volume-to-weight conversion factors and the volume estimates obtained during the characterization of visual samples, individual material weights were calculated using the following formula:[10]

$$c = m \times s \times v \times d$$

where:

- *m* = percentage estimate of the material, as a portion of material class (e.g., the extent to which corrugated cardboard constitutes all of the paper in the sample)
- *s* = percentage estimate of the material class, as a portion of all of the material in the sample (e.g., the extent to which paper constitutes all of the material in the sample)
- *v* = total volume of the sample (in cubic yards)
- *d* = density conversion of the material (in pounds/cubic yard)
- *c* = the total weight of the specific material in the sample

Each material weight was than scaled so that the sum of all material weights equaled the actual total sample weight (or net weight of the load).

Calculating Waste Composition

Waste composition estimates are calculated using a method that gives equal weighting or "importance" to each sample within a given stratum. Confidence intervals (error ranges) are calculated based on assumptions of normality in the composition estimates.

In the descriptions of calculation methods, these variables are used frequently:

- *i* denotes an individual sample;
- *j* denotes the material type;
- c_j is the weight of the material type *j* in a sample;
- *w* is the weight of an entire sample;

[10] For more detail, please refer to Chapter 6 "Ratio, Regression and Difference Estimation" of *Elementary Survey Sampling* by R.L. Scheaffer, W. Mendenhall, and L. Ott (PWS Publishers, 1986).

- r_j is the composition estimate for material *j* (*r* stands for *ratio*);
- *s* denotes a particular stream or substream of the waste stream; and
- *n* denotes the number of samples in the particular group being analyzed at that step.

Estimating Composition

For a given stratum (that is, for the samples belonging to the same stream from the same area), the composition estimate denoted by r_j represents the ratio of the component's weight to the total weight of all the samples in the stratum. This estimate is derived by summing each component's weight across all of the selected samples belonging to a given stratum and dividing by the sum of the total weight of waste for all of the samples in that stratum, as shown in the following equation:

$$r_j = \frac{\sum_i c_{ij}}{\sum_i w_i}$$

where:

- *c* = weight of particular component;
- *w* = sum of all component weights;
- for *i* = 1 to *n*, where *n* = number of selected samples; and
- for *j* = 1 to *m*, where *m* = number of components.

For example, the following simplified scenario involves three samples. For the purposes of this example, only the weights of the component food scraps are shown.

Measurement	Sample 1	Sample 2	Sample 3
Weight (*c*) of food scraps (in lbs.)	5	3	4
Total sample weight (*w*) (in lbs.)	80	70	90

$$r_{\text{food scraps}} = \sum \frac{5+3+4}{80+70+90} = 0.05$$

To find the composition estimate for the component food scraps, the weights for that material are added for all selected samples and divided by the total sample weights of those samples. The resulting composition is 0.05, or 5%. In other words, 5% of the sampled material, by weight, is food scraps. This finding is then projected onto the stratum being examined in this step of the analysis.

Confidence Intervals

The confidence interval for this estimate is derived in two steps. First, the variance around the estimate is calculated, accounting for the fact that the ratio included two random variables (the

component and total sample weights). The variance of the ratio estimator equation follows:[11]

$$\mathrm{Var}(r_j) \approx \left(\frac{1}{n}\right)\left(\frac{1}{\bar{w}^2}\right)\left(\frac{\sum_i \left(c_{ij} - r_j w_j\right)^2}{n-1}\right)$$

where:

$$\bar{w} = \frac{\sum_i w_i}{n}$$

Second, precision levels at the 90% confidence level are calculated for a component's mean:

$$r_j \pm \left(z\sqrt{\mathrm{Var}(r_j)}\right)$$

where z = the value of the z-statistic (1.645) corresponding to a 90% confidence level.

Weighted Averages

Composition results for strata were then combined, using a weighted averaging method, to estimate the composition of larger portions of the material stream. For example, the residential and commercial self-haul substreams were combined to estimate the composition for Tacoma's overall self-haul disposed waste substream. The relative tonnages associated with each stratum served as the weighting factors. The calculation was performed as follows:

$$O_j = (p_1 * r_{j1}) + (p_2 * r_{j2}) + (p_3 * r_{j3}) + \cdots$$

where:

- p = the proportion of tonnage contributed by the noted sample group
- r = ratio of material weight to total waste weight in the noted sample group
- for j = 1 to m, where m = number of material types.

For example, the above equation is illustrated here using three sectors.

Measurement	Sector 1	Sector 2	Sector 3
Ratio (*r*) of food scraps	5%	10%	10%
Tonnage	25,000	100,000	50,000
Proportion of tonnage (*p*)	14.3%	57.1%	28.6%

[11] For more information regarding this equation, refer to *Sampling Techniques*, 3rd Edition by William G. Cochran (John Wiley & Sons, Inc., 1977).

To estimate the larger portions of the material stream, the composition results for the three sectors are combined as follows.

$$O_{\text{food scraps}} = (0.143 * 0.05) + (0.571 * 0.10) + (0.286 * 0.10) = 0.093 = 9.3\%$$

Therefore, 9.3% of this examined portion of the material stream is food scraps.

The variance of the weighted average is calculated as:

$$\text{Var}(O_j) = \left({p_1}^2 * Var(r_{j1})\right) + \left({p_2}^2 * Var(r_{j2})\right) + \left({p_3}^2 * Var(r_{j3})\right) + \cdots$$