



DATE: September 13, 2018
TO: Programs & Administration Committee
Planning Committee/Recycling Board
FROM: Tom Padia, Deputy Director
BY: Meghan Starkey, Senior Management Analyst
SUBJECT: Waste Characterization Study 2017-18

SUMMARY

A waste characterization study is a valuable snapshot in time of the materials that comprise our waste stream, and can contribute to priority setting by highlighting the largest components of the landfill. It also provides high-level measurement of progress towards goals by comparing current results to previous studies. It’s important to note that the study only shows *what* and *how much* is in the waste stream, but not necessarily *why*.

The waste characterization study uses industry-standard sampling techniques and statistical analysis to estimate the composition of the waste stream and tonnages by material type and generating sector.

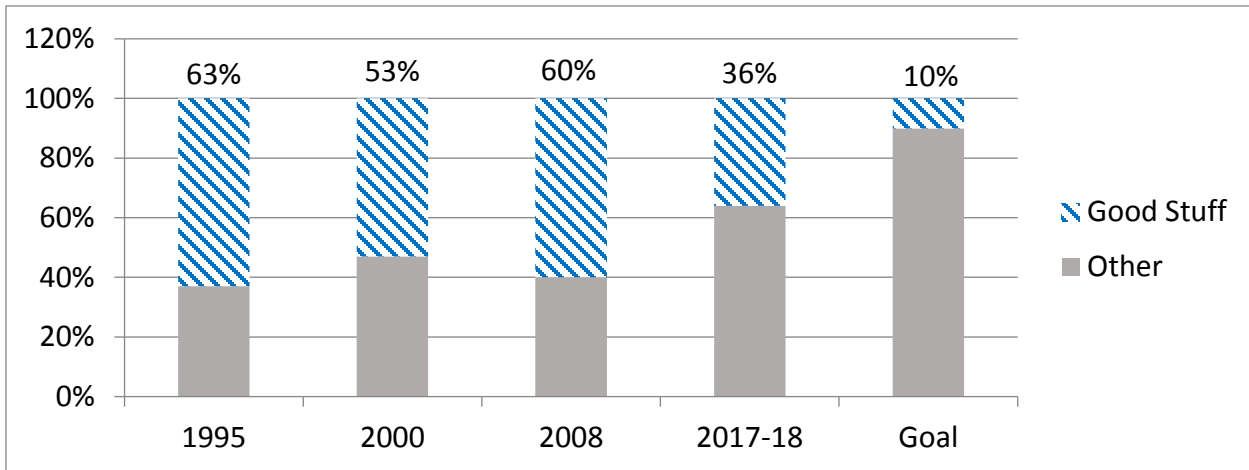
DISCUSSION

Countywide Results

The 2008 Waste Characterization Study (2008 Study) found that “good stuff” – readily recyclable materials such as cardboard, plastic, metal, glass bottles and cans, food and food-soiled paper, as well as untreated lumber, gypsum board, and crushable inerts – comprised 60% of the waste stream. The 2017-18 Waste Characterization Study (2017-18 Study) found that “good stuff” comprised 36% of the waste stream, meaning that we are over halfway towards our aspirational goal. The figure on the next page shows the decrease over time in the proportion of readily recyclable materials (represented with diagonal stripes), with the 10% goal represented in the last bar. Visually, a decrease in size of the striped segment and a corresponding increase in the size of the solid segment indicates progress towards goals.

When looking more closely at specific materials, compostable organics (food, food soiled paper and plant debris) show the greatest decreases in overall composition and tonnages, while simultaneously remaining the greatest proportion of readily recoverable materials. Dry recyclables such as paper, bottles and cans have decreased as a proportion of total materials, although less steeply than organics. Readily recyclable construction and demolition debris (untreated wood, crushable inerts, and gypsum board) have decreased as a percent of the whole. (See Table 1 in the Executive Summary for more detail.)

“Good Stuff” in Garbage over Time



The table below shows the countywide total tons of materials by sectors. The study was conducted on a countywide basis only, as all previous studies showed no significant statistical difference between the county as a whole and individual jurisdictions, therefore not justifying the significant extra cost for sampling.

Countywide Tonnages by Material Type Across All Sectors

Waste Stream	Other	Plant Debris	Food Scraps	Food Soiled Paper	Recyclable	Total
Single Family	144,600	1,500	33,800	37,000	14,200	231,000
Multi-Family	66,700	1,000	10,600	16,300	8,500	103,000
Commercial	97,300	4,600	41,800	18,200	33,200	195,000
Roll-Off	143,000	4,400	9,400	900	9,300	167,000
Self-Haul	280,900	7,600	1,800	100	5,700	296,000
MRF Residuals	40,800	200	200	2,300	12,300	55,800
Countywide Total	773,300	19,300	97,600	74,900	83,100	1,047,800

Analysis by Sector

Reporting results by sector is important for targets and program design, since materials are handled very differently depending on how they are collected and delivered for processing, and different programmatic approaches are required to capture materials for diversion.

Residential

Both single family and multifamily sectors demonstrated significant progress towards countywide goals. Changes in food scraps and plant debris are the main drivers of overall decrease in “good stuff” and the corresponding increase in “Other.” (See Tables 1 and 2 in the Executive Summary for residential composition and tonnages.)

Commercial

When comparing progress over time in the commercial sector, results are mixed. There are significant *increases* in proportion and tonnages for cardboard, plastic bottles and containers, plastic bags, and clean dimensional lumber. Significant *decreases* in proportion and tonnages were found for recyclable paper, steel food/beverage containers, yard waste, food, food soiled paper. Total tonnage has also dropped remarkably over time as well. (For more detail, see Table 3 in the Executive Summary that follows.)

Roll Off and Self Haul

In the roll off sector, large and significant decreases in proportion and tons are found for many material types, as seen in Table 4 of the Executive Summary. Particularly noticeable is the large drop off in plant debris. The agency's yard debris ban was enacted in 2009. Treated wood waste shows another remarkable decline. The self-haul sector similarly sees drops in these materials (see Table 5 in the Executive Summary). Yard waste in this sector in the 2017-18 Study is 30% of the tons disposed in 2008 Study, and less than 10% of the tons disposed in 1995.

The 2017-18 Study sampled Material Recovery Facility (MRF) residuals for the first time, since StopWaste staff believe this is an important and growing segment of the waste stream. Table 6 in the Executive Summary shows the MRF residual composition by major material classification.

Conclusions

There are several significant conclusions that can be made with confidence based on the data contained in the study. Most importantly, progress towards goals is significant and real.

Other conclusions include:

- Organic materials are by far the main drivers of change across all sectors.
- Residential sectors show significant decreases in all curbside recyclables materials, especially food.
- Commercial results show mixed results for progress, with both increases and decreases in dry recyclable materials, and decreases in food, food soiled paper and plant debris.
- Roll off and self-haul sectors show very remarkable declines in both tonnages and composition of recyclable materials.

In terms of informing priority setting going forward, these results need to be understood in the context of current challenges such as the implementation of SB 1383 (Short Lived Climate Pollutant Act) and National Sword. Given the maturity of diversion programs, continued progress is more likely to require focusing upstream. In addition, contamination in recycling and organics recycling streams can compromise the quality of materials, thereby negatively impacting markets and undermining the programs' overall success.

While the results of the 2017-18 Study do show significant progress, it also illuminates both significant opportunities and challenges for the future.

The full study may be found at: [2017-18-Waste-Characterization-Study.pdf](#)

RECOMMENDATION

This item is for information only.

Attachment: Waste Characterization Study 2017-18 Executive Summary

This page intentionally left blank

Alameda County 2017-18 Waste Characterization Study

StopWaste
1537 Webster Street
Oakland, CA 94612

01217129.00 | September 5, 2018

SCS ENGINEERS

7041 Koll Center Parkway, #135
Pleasanton, CA 94566
707-546-9461

StopWaste is a public agency governed by the Alameda County Waste Management Authority, the Alameda County Source Reduction and Recycling Board, and the Energy Council.

1.0 EXECUTIVE SUMMARY

StopWaste conducts periodic waste characterization studies to understand better the types and quantities of materials disposed of in Alameda County. Using sampling techniques, this study measured the composition of the waste stream by generating sector and material type. This study provides a valuable snapshot in time of the materials that comprise our waste stream and can contribute to priority setting and evaluation of progress towards goals. The study was designed to be comparable with previous countywide waste characterization studies conducted in 2008, 2000, 1995, and 1990 to facilitate tracking of waste disposal trends.

1.1 RESULTS

Data gathered from StopWaste's Benchmark Study and fieldwork were summarized to develop waste composition estimates for each waste sector and the overall countywide waste stream. Waste compositions were compared to the 2008 waste characterization study conducted for Alameda County as well as the 2015 CalRecycle Statewide Waste Characterization Study.

1.1.1 Single Family Residential Waste

The composition of single family residential waste is presented in **Table 1**. The relative proportions and annual tons of recyclable and compostable materials have decreased significantly since 2008. Food Soiled Paper represents a greater proportion of single family residential waste in Alameda County than statewide; however, the proportion of Recyclable materials, Plant Debris, and Food Scraps are significantly lower than statewide.

Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gypsum board (which were sampled in Commercial, Roll off and Self-Haul waste) are included in the "Other" material for residential and countywide tables. There's a longer, clearer explanation in the main portion fo the study.

Table 1. 2017-18 Single Family Residential Waste Composition

Material Components	Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits	
				Lower	Upper
Recyclable	14,200	6.1%	12.3%	5.7%	6.5%
Plant Debris	1,500	0.6%	5.1%	0.5%	0.8%
Food Scraps	33,800	14.6%	21.5%	13.9%	15.3%
Food Soiled Paper	37,000	16.0%	20.3%	15.4%	16.7%
Other *	144,600	62.6%	28.6%	61.7%	63.5%
TOTAL	231,000	100.0%			

Note: Waste composition based on sorting refuse in 2,605 carts.

* Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gypsum board are included as "Other."

1.1.2 Multi-Family Residential Waste

The composition of multi-family residential waste is presented in **Table 2**. The relative proportion and annual tonnage of recyclable and compostable materials have decreased significantly since 2008. Food Soiled Paper represents a greater proportion of multi-family residential waste in Alameda County than statewide; however, the proportion of Recyclable materials, Plant Debris, and Food Scraps are significantly lower than statewide.

Table 2. 2017-18 Multi-Family Residential Waste Composition

Material Components	Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits	
				Lower	Upper
Recyclable	8,500	8.3%	11.4%	7.2%	9.4%
Plant Debris	1,000	0.9%	5.8%	0.4%	1.5%
Food Scraps	10,600	10.3%	14.1%	8.9%	11.7%
Food Soiled Paper	16,300	15.8%	16.4%	14.2%	17.4%
Other *	66,700	64.7%	21.3%	62.6%	66.8%
TOTAL	103,000	100.0%			

Note: Waste composition based on sorting refuse in 2,605 carts.

* Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gypsum board are included as "Other."

1.1.3 Commercial Waste

The composition of commercial waste is presented in **Table 3**. The symbols indicate significant differences between the current 2017-18 study and both the the 2008 study and the 2015 CalRecycle Statewide Waste Characterization Study. A "+" indicates a significant increase and a "-" indicates a significant decrease in the material compared to the 2008 study. A ">" indicates a significant increase and a "<" indicates a significant decrease compared to the statewide study.

Table 3. 2017-18 Commercial Waste Composition

Material Components	Annual Tonnage		Mean Composition	Standard Deviation	90% Confidence Limits	
					Lower	Upper
Paper	19,800		10.1%	0.0%	7.6%	9.3%
Uncoated Corrugated Cardboard / Kraft Paper	7,300	+	3.7%	0.0%	3.8%	3.3%
Recyclable Paper (no food/liquid contamination)	12,500	-	6.4%	0.0%	6.1%	5.7%
Plastic	14,600		7.5%	0.0%	5.1%	6.9%
Bottle and Plastic Container	8,600	+	4.4%	0.0%	2.9%	4.1%
Plastic Bags	4,400	+	2.3%	0.0%	3.1%	1.9%
Other Film	1,600	-	0.8%	0.0%	2.5%	0.5%
Glass	3,100		1.6%	0.0%	1.8%	1.4%
Recyclable Glass Bottles/Containers						
Metal	6,000		3.1%	0.0%	4.1%	2.6%
Aluminum Cans	700		0.3%	0.0%	1.3%	0.2%
Steel Food/Beverage Containers	1,100	-	0.6%	0.0%	0.8%	0.5%
Other Non-Ferrous	1,800	+	0.9%	0.0%	2.8%	0.6%
Other Ferrous	2,400	-	1.2%	0.0%	2.9%	0.9%
Compostable Organics	64,500		33.1%	0.0%	21.0%	30.8%
Yard Waste	4,600	-	2.3%	0.0%	5.5%	1.7%
Food Waste	41,800	-	21.4%	0.0%	20.3%	19.2%
Compostable Paper	18,200	-	9.3%	0.0%	8.0%	8.4%
Compostable Organics - Wood	12,900		6.6%	0.0%	13.4%	5.2%
Clean Dimensional Lumber	6,600		3.4%	0.0%	8.8%	2.4%
Clean Engineered Wood	5,900	+	3.0%	0.0%	8.6%	2.1%
Pallets	500	-	0.3%	0.0%	2.4%	0.0%
Textiles/Other	8,100		4.1%	0.0%	5.3%	3.6%
Textiles/Leather	7,400		3.8%	0.0%	5.2%	3.2%
Carpet	700	-	0.3%	0.0%	1.4%	0.2%
Inerts	8,100		4.1%	0.0%	7.8%	3.3%
Crushable Inerts	5,200		2.7%	0.0%	6.1%	2.0%
Gypsum Boards	1,200		0.6%	0.0%	3.4%	0.3%
Treated Wood Waste	1,600	-	0.8%	0.0%	4.0%	0.4%
Electronics	2,900		1.5%	0.0%	4.4%	1.0%
Brown Goods / White Goods	2,000	+	1.0%	0.0%	4.3%	0.5%
Computer Related Electronics	400		0.2%	0.0%	1.0%	0.1%
Other Small Consumer	400		0.2%	0.0%	0.5%	0.2%
HHW	900		0.4%	0.0%	2.8%	0.1%
Paints/Adhesives & Vehicle/Equipment Fluids	100	-	0.1%	0.0%	0.1%	0.0%
Universal Hazardous Waste	300		0.2%	0.0%	2.4%	-0.1%
Medical Waste	400		0.2%	0.0%	1.3%	0.1%
Other Hazardous Waste	<100		0.0%	0.0%	0.1%	0.0%
Special	800		0.4%	0.0%	2.3%	0.1%
Tires						
Other	53,500	+	27.4%	0.0%	15.1%	25.8%
TOTAL	195,000		100.0%			

Note: Waste composition based on 250 samples.

Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study

Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study

- Indicates a significant decrease from the 2008 study

+ Indicates a significant increase from the 2008 study

< Indicates a significant decrease from the 2015 CalRecycle Statewide Waste Characterization Study

> Indicates a significant increase from the 2015 CalRecycle Statewide Waste Characterization Study

1.1.4 Roll Off Containers

The composition of roll off container waste is presented in **Table 4**. The symbols indicate significant differences between the current 2017-18 study and the the 2008. A “+” indicates a significant increase and a “-“ indicates a significant decrease in the material compared to the 2008 study. Waste disposed in roll-off containers was not characterized as a separate sector in the CalRecycle Statewide Waste Characterization Study in 2015; therefore, there are no comparisons to statewide results.

Table 4. 2017-18 Roll Off Container Waste Composition

Material Components	Annual	Mean	Standard	90% Confidence Limits	
	Tonnage	Composition	Deviation	Lower	Upper
Paper	8,700	5.2%	9.4%	4.3%	6.2%
Uncoated Corrugated Cardboard / Kraft Paper	3,200 -	1.9% -	4.7%	1.5%	2.4%
Recyclable Paper (no food/liquid contamination)	5,500 -	3.3% -	7.5%	2.6%	4.1%
Plastic	400	0.2%	1.1%	0.1%	0.3%
Bottle and Plastic Container	100 -	<0.1% -	0.3%	<0.1%	0.1%
Plastic Bags	<100 -	<0.1% -	0.1%	<0.1%	<0.1%
Other Film	200 -	0.1% -	0.9%	<0.1%	0.2%
Glass	400 -	0.2% -	1.2%	<0.1%	0.3%
Recyclable Glass Bottles/Containers					
Metal	1,400	0.8%	3.3%	0.5%	1.1%
Aluminum Cans	<100 -	<0.1% -	0.1%	<0.1%	<0.1%
Steel Food/Beverage Containers	<100 -	<0.1% -	0.2%	<0.1%	<0.1%
Other Non-Ferrous	400	0.2%	1.2%	<0.1%	0.3%
Other Ferrous	900 -	0.5% -	3.1%	0.2%	0.9%
Compostable Organics	14,700	8.8%	18.3%	7.0%	10.6%
Yard Waste	4,400 -	2.6% -	12.4%	1.4%	3.8%
Food Waste	9,400 -	5.7% -	13.4%	4.3%	7.0%
Compostable Paper	900 -	0.5% -	1.3%	0.4%	0.6%
Compostable Organics - Wood	10,300	6.1%	17.1%	4.4%	7.9%
Clean Dimensional Lumber	3,500	2.1%	8.6%	1.2%	2.9%
Clean Engineered Wood	2,400	1.4%	7.4%	0.7%	2.2%
Pallets	4,400	2.6% -	13.2%	1.3%	3.9%
Textiles/Other	1,900	1.1%	8.1%	0.3%	1.9%
Textiles/Leather	1,000 -	0.6% -	6.1%	<0.1%	1.2%
Carpet	1,000	0.6%	5.4%	<0.1%	1.1%
Inerts	11,800	7.0%	19.8%	5.1%	9.0%
Crushable Inerts	6,100	3.7%	13.6%	2.3%	5.0%
Gypsum Boards	3,100	1.8%	11.0%	0.7%	2.9%
Treated Wood Waste	2,600 -	1.5% -	10.0%	0.6%	2.5%
Electronics	200	0.1%	2.0%	<0.1%	0.3%
Brown Goods / White Goods	200 -	0.1%	2.0%	<0.1%	0.3%
Computer Related Electronics	<100	<0.1%	0.3%	<0.1%	<0.1%
Other Small Consumer	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
HHW	<100	<0.1%	<0.1%	<0.1%	<0.1%
Paints/Adhesives & Vehicle/Equipment Fluids	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Universal Hazardous Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Medical Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Other Hazardous Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Special	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Tires					
Other	Materials not specified above				
TOTAL	167,000	100.0%			

Note: Waste composition based on 274 visually characterized waste loads

Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study

Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study

- Indicates a significant decrease from the 2008 study

+ Indicates a significant increase from the 2008 study

1.1.5 Self Haul Waste

The composition of self haul waste is presented in **Table 5**. The symbols indicate significant differences between the current 2017-18 study and both the the 2008 study and the 2015 CalRecycle Statewide Waste Characterization Study. A “+” indicates a significant increase and a “-” indicates a significant decrease in the material compared to the 2008 study. A “>” indicates a significant increase and a “<” indicates a significant decrease compared to the statewide study.

Table 5. 2017-18 Self Haul Waste Composition

Material Components	Annual	Mean	Standard	90% Confidence Limits	
	Tonnage	Composition	Deviation	Lower	Upper
Paper	5,300	1.8%	6.5%	1.3%	2.3%
Uncoated Corrugated Cardboard / Kraft Paper	3,100 -	1.0% -	4.4%	0.7%	1.4%
Recyclable Paper (no food/liquid contamination)	2,200 -	0.7% -	4.2%	0.4%	1.1%
Plastic	400	0.1%	1.0%	<0.1%	0.2%
Bottle and Plastic Container	200 -	<0.1% -	0.5%	<0.1%	<0.1%
Plastic Bags	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Other Film	200 -	<0.1% -	0.9%	<0.1%	0.1%
Glass	100 -	<0.1% -	< 0.6%	<0.1%	<0.1%
Recyclable Glass Bottles/Containers					
Metal	3,200	1.1%	6.7%	0.6%	1.6%
Aluminum Cans	<100	<0.1%	0.2%	<0.1%	<0.1%
Steel Food/Beverage Containers	<100	<0.1%	< 0.2%	<0.1%	<0.1%
Other Non-Ferrous	500 -	0.2% -	1.0%	<0.1%	0.2%
Other Ferrous	2,600 -	0.9% -	6.6%	0.4%	1.4%
Compostable Organics	9,500	3.2%	17.9%	1.8%	4.6%
Yard Waste	7,600 -	2.6% -	< 16.0%	1.3%	3.8%
Food Waste	1,800 -	0.6% -	8.2%	<0.1%	1.2%
Compostable Paper	100 -	<0.1% -	< 0.7%	<0.1%	<0.1%
Compostable Organics - Wood	17,100	5.8%	17.4%	4.5%	7.1%
Clean Dimensional Lumber	10,600	3.6%	15.4%	2.4%	4.7%
Clean Engineered Wood	3,000	1.0%	< 6.5%	0.5%	1.5%
Pallets	3,600	1.2%	5.4%	0.8%	1.6%
Textiles/Other	10,000	3.4%	15.7%	2.2%	4.6%
Textiles/Leather	1,900 -	0.6% -	< 3.3%	0.4%	0.9%
Carpet	8,000	2.7%	15.5%	1.5%	3.9%
Inerts	52,500	17.7%	25.7%	15.8%	19.7%
Crushable Inerts	27,500	9.3%	18.3%	7.9%	10.7%
Gypsum Boards	12,600	4.3%	14.5%	3.2%	5.4%
Treated Wood Waste	12,400 -	4.2% -	12.7%	3.2%	5.2%
Electronics	300	0.1%	1.0%	<0.1%	0.2%
Brown Goods / White Goods	200 -	<0.1% -	0.7%	<0.1%	0.1%
Computer Related Electronics	<100	<0.1%	< 0.3%	<0.1%	<0.1%
Other Small Consumer	100 -	<0.1% -	0.6%	<0.1%	<0.1%
HHW	<100	<0.1%	0.4%	<0.1%	<0.1%
Paints/Adhesives & Vehicle/Equipment Fluids	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Universal Hazardous Waste	<100	<0.1%	0.4%	<0.1%	<0.1%
Medical Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Other Hazardous Waste	<100 -	<0.1% -	0.2%	<0.1%	<0.1%
Special	Tires	<100	<0.1%	0.2%	<0.1%
Other	Materials not specified above	197,500 +	66.7% + >	33.9%	64.1%
TOTAL	296,000	100.0%			

Note: Waste composition based on 463 visually characterized waste loads

Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study

Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study

- Indicates a significant decrease from the 2008 study

+ Indicates a significant increase from the 2008 study

< Indicates a significant decrease from the 2015 CalRecycle Statewide Waste Characterization Study

> Indicates a significant increase from the 2015 CalRecycle Statewide Waste Characterization Study

1.1.6 MRF Residuals

The composition of MRF Residuals from both C&D and MSW (collected as garbage or single stream recyclables) is presented in **Table 6**.

Table 6. 2017-18 MRF Residuals Composition

Material Components	Annual Tonnage	Mean Composition
Paper	7,280	13.0%
Uncoated Corrugated Cardboard / Kraft Paper	3,070	5.5%
Recyclable Paper (no food/liquid contamination)	4,200	7.5%
Plastic	5,780	10.4%
Bottle and Plastic Container	4,580	8.2%
Plastic Bags	830	1.5%
Other Film	370	0.7%
Glass	110	0.2%
Recyclable Glass Bottles/Containers		
Metal	750	1.3%
Aluminum Cans	150	0.3%
Steel Food/Beverage Containers	150	0.3%
Other Non-Ferrous	250	0.5%
Other Ferrous	190	0.3%
Compostable Organics	2,740	4.9%
Yard Waste	200	0.4%
Food Waste	210	0.4%
Compostable Paper	2,330	4.2%
Compostable Organics - Wood	3,240	5.8%
Clean Dimensional Lumber	2,330	4.2%
Clean Engineered Wood	910	1.6%
Pallets	<100	<0.1%
Textiles/Other	2,560	4.6%
Textiles/Leather	1,660	3.0%
Carpet	900	1.6%
Inerts	5,050	9.0%
Crushable Inerts	1,370	2.5%
Gypsum Boards	120	0.2%
Treated Wood Waste	3,550	6.4%
Electronics	360	0.6%
Brown Goods / White Goods	130	0.2%
Computer Related Electronics	<100	0.1%
Other Small Consumer	160	0.3%
HHW	<100	<0.1%
Paints/Adhesives & Vehicle/Equipment Fluids	<100	<0.1%
Universal Hazardous Waste	<100	<0.1%
Medical Waste	<100	<0.1%
Other Hazardous Waste	<100	<0.1%
Special	<100	<0.1%
Tires		
Other	27,940	50.1%
Materials not specified above		
TOTAL	55,800	100.0%

Note: Compositions based on sorting over 16,000 pounds of sampled materials.

1.1.7 Countywide

By design, the Benchmark Study limited the number of material types for sampled residential waste (both from single family and multi-family sources) to five classifications, which are described below. In contrast, field activities for this study targeted waste from the commercial, roll off, self haul, and MRF sectors and sorted waste samples into 30 material types. To combine waste compositions from the six waste sectors into a countywide waste composition, the material types from the field-sampled waste sectors were condensed to match the five material classifications of the Benchmark Study as follows:

- **Recyclable**- materials that can be recycled through curbside collection services including uncoated corrugated cardboard/Kraft paper, recyclable paper (without food contamination), plastic bottles and containers, glass bottles and containers, aluminum cans, and steel food/beverage containers.
- **Plant Debris** – plant material including leaves, grass, plants, pruning, trimmings, branches, and stumps.
- **Food Scraps** – food including meat, fruit, and egg shells, etc. and containerized liquids.
- **Food Soiled Paper** – paper contaminated with food/wax/moisture, waxed corrugated cardboard, napkins, pizza boxes, paper towels, fast food wrappers, egg cartons, paper plant pots, take-out food containers, paper plates, tissues, and newspaper with pet waste.
- **Other** – Primarily garbage, but also includes other materials, some of which could be diverted from landfill disposal, including plastic bags, other ferrous and non-ferrous metal, clean wood, textiles, leather, carpet, crushable inerts (e.g., stone, rock, cement, tile, etc), electronics, HHW, and tires. Also includes materials such as other plastic film, treated wood, polystyrene, etc.

Table 7 presents the countywide waste composition as well as the contributing waste sector compositions.

Table 7. Detailed 2017-18 Countywide Composition

Waste Sector	Recyclable	Plant Debris	Food Scraps	Food Soiled Paper	Other	Total
Single-Family Residential	6.1%	0.6%	14.6%	16.0%	62.6%	37.4%
Multi-Family Residential	8.3%	0.9%	10.3%	15.8%	64.7%	35.3%
Commercial	17.0%	2.3%	21.4%	9.3%	49.9%	50.1%
Roll-Off	5.6%	2.6%	5.7%	0.5%	85.6%	14.4%
Self-Haul	1.9%	2.6%	0.6%	0.0%	94.9%	5.1%
MRF Residuals	22.0%	0.4%	0.4%	4.2%	73.1%	26.9%
Countywide	7.9%	1.8%	9.3%	7.1%	73.8%	26.2%

Figure 1 presents the countywide waste composition graphically.

Figure 1. 2017-18 Countywide Waste Composition

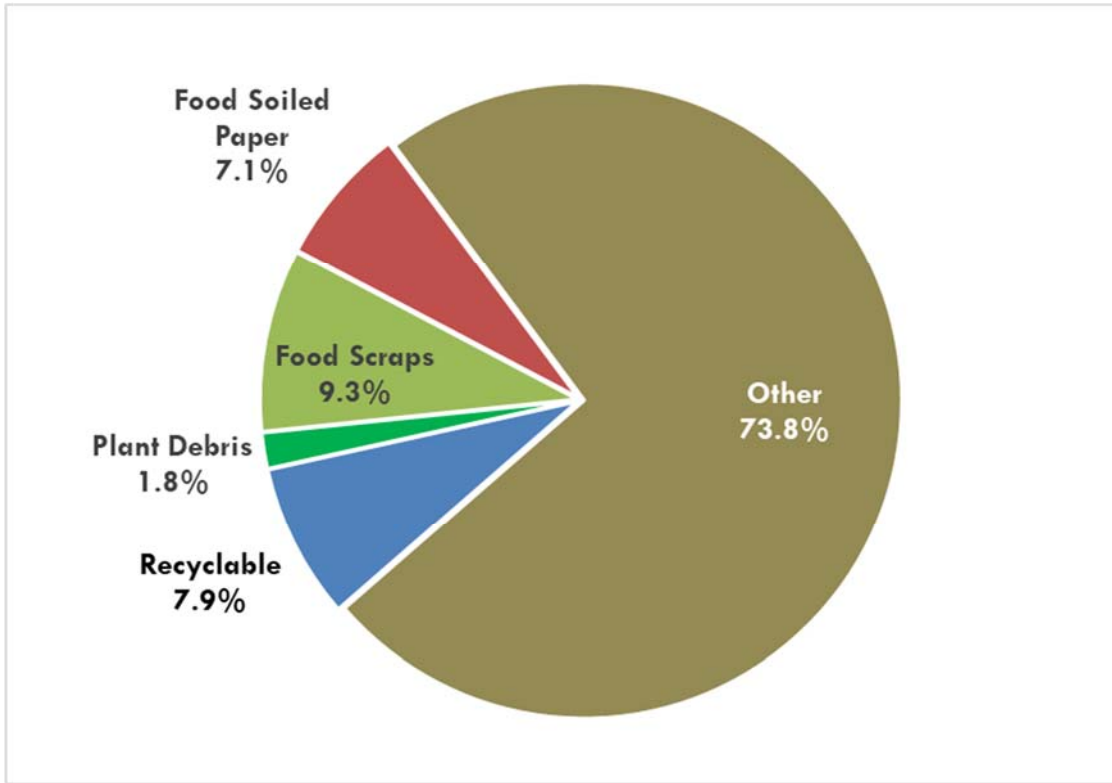


Table 8 presents the annual tonnage of waste by sector and Benchmark Study classification.

Table 8. 2017-18 Waste Quantity by Sector

Waste Stream	Recyclable	Plant Debris	Food Scraps	Food Soiled Paper	Other	Total
Single-Family Residential	14,200	1,500	33,800	37,000	144,600	231,000
Multi-Family Residential	8,500	1,000	10,600	16,300	66,700	103,000
Commercial	33,200	4,600	41,800	18,200	97,300	195,000
Roll-Off	9,300	4,400	9,400	900	143,000	167,000
Self-Haul	5,700	7,600	1,800	100	280,900	296,000
MRF Residuals	12,300	200	200	2,300	40,800	55,800
Countywide Total	83,100	19,300	97,600	74,900	773,300	1,047,800

1.2 STUDY DESIGN

Multiple sources of information were used to estimate the annual waste quantity disposed within Alameda County by sector, which included the 2016 and 2017 Jurisdiction Quarterly Tonnages Reports and communication with each franchised hauler operating in Alameda County. Similar to the 2000 and 2008 waste characterization studies, this study classified waste generated and disposed of in Alameda County as originating from the following sectors: 1) Single Family Residential, 2) Multi-Family Residential, 3) Commercial, 4) Roll-Off Containers, 5) Self Haul. Unlike the previous studies, this study added a sixth sector, MRF Residuals.

As shown in **Table 9**, the annual quantity of waste disposed for each sector has a decreasing trend since 1990. Self Haul waste is the only sector that increased, albeit slightly, since 2008.

Table 9. Reported In-County Waste Disposal Quantities

Waste Sector	1990	1995	2000	2008	2017-18
Single-Family Residential	499,150	333,030	332,700	275,080	231,000
Multi-Family Residential	*	112,090	122,870	132,080	103,000
Commercial	666,300	264,530	354,400	237,320	195,000
Roll-Off	264,500	339,250	406,470	273,420	167,000
Self-Haul	428,550	465,560	336,240	269,210	296,000
MRF Residuals	NA	NA	NA	NA	55,800
Total Countywide	1,858,500	1,514,460	1,552,680	1,187,110	1,047,800

Note: Multi-family residential waste quantities included in commercial quantities for 1990. MRF Residuals not quantified 1990 through 2008.

A variety of data was utilized and collected to estimate the types and quantities of materials disposed of as garbage for each of the waste sectors. Data from StopWaste's benchmark services (year-round waste characterization of individual carts and dumpsters located at single family residences and multi-family properties) was used to characterize residential waste. Field sampling and sorting activities were used to characterize waste disposed of by the commercial, roll off, self haul, and MRF residuals sectors.

Residential waste was characterized into five material types: recyclable (through curbside collection programs), plant debris, food scraps, food soiled paper, and other (primarily garbage but also including other materials separately classified in the remaining sectors). Commercial, roll off, self haul, and MRF residuals were characterized into 11 material classifications and 30 material types.

1.3 FIELD METHODS

Fieldwork was completed at six host facilities (two landfills and four transfer stations) over two seasons. Season One fieldwork was conducted in August and September 2017; Season Two was conducted in January and February 2018. Manual sorting was used to characterize commercial waste samples and MRF residuals. Visual characterization of entire waste loads was used to characterize roll off containers and self haul waste.

Table 10 summarizes the characterization method, number of samples, and number of material types into which the samples were sorted.

Table 10. Summary of Waste Characterization Methods and Number of Samples By Waste Sector

Waste Sector	Characterization Method	Number of Samples	Number of Material Types
Single Family Residential	Data from Benchmark Services	2,605 carts	5
Multi-Family Residential	Data from Benchmark Services	665 carts/dumpsters	5
Commercial	Manual (Hand Sorting)	250 samples	30
Roll Off Containers	Visual Characterization	274 waste loads	30
Self Haul	Visual Characterization	463 waste loads	30
MRF Residuals	Manual (Hand Sorting)	16,000 pounds	30