Recycling Waste Characterization Study

Monterey Regional Waste Management District
14201 Del Monte Blvd.
Monterey County, CA 93933-1670

Attn: David Ramirez, P.E.

SCS ENGINEERS

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3843 Brickway Blvd., Ste. 208
Santa Rosa, CA 95403
707-546-9461

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Exhibits

1.0 INTRODUCTION

The Monterey Regional Waste Management District (MRWMD) retained SCS Engineers (SCS) to conduct physical characterizations of the commercial and residential single-stream recycling (SSR) materials hauled by GreenWaste Recovery, Monterey Disposal, Waste Management, Republic Services, City of Watsonville Public Works, and Recology. The project's goals are to understand the types of recyclable materials present, their relative presence, and the level of non-recyclable materials (referred to herein as "contamination" or "residual materials") delivered to the MRWMD Material Recovery Facility (MRF) by each of the franchised haulers for each of the municipalities they service. This characterization provides data to inform stakeholders of the composition and contamination rates of the SSR. It will also inform outreach staff regarding the contaminants to be targeted for behavior change and outreach efforts.

Exhibit 1.   Haulers and the Municipalities they Serve

Hauler	Municipality Served
Greenwaste Recovery	Marina
	Sand City
	Del Rey Oaks
	Seaside
	Carmel by the Sea
	Pebble Beach
	Pacific Grove
Monterey Disposal	City of Monterey
Waste Management	Unincorporated Monterey County
	King City
Republic Services	Salinas
City of Watsonville Public Works Department	Watsonville
Recology	San Benito County

2.0 METHODS

This section summarizes methods used to characterize the recycling stream generated from the cities of Marina, Sand City, Del Rey Oaks, Seaside, Carmel by the Sea, Pebble Beach, Pacific Grove, Monterey, King City, Salinas, and Watsonville, and portions of both San Benito County, and Unincorporated Monterey County, Sampling and sorting activities for the study took place during the months of July and August, 2019. Characterization activities involved manually sorting single stream recycling samples into 25 pre-determined material categories over four consecutive weeks. Data were recorded on the Manual Data Sorting Form for each sample, presented in Exhibit 2. Examples for each of the material types are included on the Sorting Form.

2.1 SELECTING THE SAMPLES TO BE SORTED

Efforts were made to minimize sampling bias or other impacts consistent with good practice in such sampling programs. To this end, field sampling was coordinated to avoid holidays and other out of the ordinary events. SCS reviewed average monthly quantities of recyclables delivered to MRWMD by hauler and by municipality to estimate the number of samples required. Using data from the recycling composition study completed in 2018, SCS estimated the number of samples needed from each municipality to estimate the composition of materials delivered with accuracy and precision.

The SCS Sampling and Sorting Supervisor communicated with the scale house to direct the targeted load to the sorting location. Once at the sorting location, SCS interviewed the truck driver to screen out atypical loads, and to briefly to assess the "representativeness" of each load, the point of origin, and other information. Once the targeted recyclables collection vehicle was deemed suitable for sampling and sorting, the SCS field staff professional directed the driver to a pre-arranged area at the MRF for load discharge. The pile was divided into an imaginary eight-section grid and a sample of materials weighing approximately 150 pounds was extracted from a randomly selected section of the discharged load. This sample was then transported to the sorting area.

2.2 CHARACTERIZATION PROCEDURES

2.2.1 Manual Characterization Procedures

SCS provided two Sampling and Sorting Supervisors and four contracted sorters to manually sort each of the samples. The manual recycling characterization procedure is based on ASTM procedure D 5231-92 and consistent with California statutory requirements contained in Public Resources Code 41030, et. seq. and regulatory requirements of CalRecycle for performing recycling characterization studies. The sample was placed on a sorting table and separated by hand into the pre-determined material types as listed in **Exhibit 2**.

Separated materials were placed in containers and weighed and recorded. Members of the sorting crew were assigned material categories on which to focus. The recycling samples were sorted until no more than a small amount of homogeneous fine material ("Refuse") remained, which was determined by the SCS Sampling and Sorting Field Supervisor. The overall goal was to sort each sample directly into the material categories in order to reduce the amount of indistinguishable fines or miscellaneous categories.

For each sample, the SCS Sampling and Sorting Field Supervisor reviewed the sorted material for homogeneity before the containers were weighed using a pre-calibrated scale and recorded the weights for each sorted material category on the sampling form.

When household hazardous materials were discovered during the sorting process, they were weighed and then set aside for proper handling.

2.2.2 Visual Characterization Procedure

Once the entire sample was sorted into the defined material categories, the residual of the sorted stream was emptied onto the sorting table and separated for viewing. SCS performed a visual characterization by splitting the refuse into sections then estimated the percentage of notable materials by volume percentage and recorded the data on the data form. For example, if after reviewing the entire sample there appeared to be a significant number of textiles or multi-layered products, those percentages were noted. The objective was to identify large amounts of contaminants (e.g., the predominance of contaminant type(s)) that will help inform the MRWMD on appropriate outreach efforts and changes to the recycling program.

Exhibit 2. Manual Sorting Data Form

MRWMD Recycling Characterization Study			
Date:		M T W TH F	**Time:**
Sample #:		**Route:**	**Source:**
Major Waste Fractions	**Waste Component Categories**	**Examples**	**WEIGHT (In Pounds)**
			Tarred Weight for Entire Category
Recyclables	**Uncoated Corrugated Cardboard**	Non-waxed shipping/moving boxes, 3-layers, no food residue	
	White Office Paper	White paper	
	Mixed Paper	office paper, computer paper, paper bags, phone books, magazines and catalogs, food/detergent boxes, office mix, junk mail	
	Paper Board	Thick paper-based material, cereal box, supply box	
	ONP	Old newspaper	
	PET	CRV containers, soda and water bottles	
	PET Thermoform	Clamshells, cups, tubs, lids, boxes, trays, egg cartons and similar rigid, non-bottle packaging made of PET (#1) plastic resin	
	Natural HDPE	Milk jugs, small juice bottles	
	Pigment HDPE	Detergent bottles, some hair-care bottles, some margarine and yogurt tubs, clamshell packaging, empty motor oil, empty antifreeze, and other empty vehicle and equipment fluid containers	
	Polypropylene #5	Food containers (ketchup, yogurt, cottage cheese, margarine, syrup, take-out), medicine containers, straws, bottle caps, Britta filters, Rubbermaid and other opaque plastic containers, including baby bottles	
	Mixed Plastic #3, 4, 6, 7	Detergent/cleaning product bottles, personal care bottles, food containers, yogurt cups, syrup bottles, microwave trays, clamshell-shaped fast food containers, vitamin bottles	
	Film Plastic	Shrink-wrap, mattress bags, furniture wrap, and film bubble wrap, plastic shopping bags, dry cleaning bags, agricultural film	
	Mixed Glass	All glass bottles and jars (mayonnaise, apple juice bottles, wine bottles, etc.), CA redemption bottles (beer, juice, wine coolers, etc.)	
	Bi Metal	Steel/tin food and beverage cans, and foil food trays	
	Aluminum	Aluminum beverage cans	
	Aluminum other	Aluminum food cans (e.g., cat food cans), foil	
Organics	**Organic**	Food Waste, food soiled paper, green waste, landscaping	
Other	**HHW**	Paint, vehicle and equipment fluid, used oil, batteries, mercury containing items, fluorescent lights	
	Medical Waste	Sharps, bandages, items containing bodily fluids	
	Rigid Plastic	tubs, buckets, toys	
	Polystyrene	Styrofoam clam shells, Styrofoam packaging	
	Aseptic containers	soup containers, soy containers	
	Manufactured Products	Electronic waste, items with cord, brown goods, white goods	
	Refuse	Anything else that does not fit in the above category	

Comments:

Recycling Waste Characterization Study

This procedure involved four steps:

1. Estimating the volume of refuse;

2. Recording the estimated percentage of the residuals corresponding to each material class, and then record the estimated percentage for specific material types within the material classes;

3. Reconciling the percentages to be 100; and

4. Recording the weight of the entire load.

Data gathered from fieldwork were summarized to develop the composition of collected recyclables from each geographic area and each franchised hauler. The composition of materials delivered to the MRWMD MRF from each municipality is discussed in subsections below.

Contamination of source-separated recyclables that are delivered to the MRWMD MRF includes materials that typically do not have a market and which must be disposed in a landfill. Contaminants were initially classified into the following types of materials:

- Film Plastic
- Organics
- HHW
- Medical Waste
- Other Manufactured Products
- Refuse

At the end of sorting each sample, the field crew emptied materials in the Refuse category onto the sorting table and visually characterized the items into the following subcategories:

- Poly-coated Paper
- Textiles
- Wood Waste
- Remainder/Composite Paper
- Rubber
- Metal
- <3" debris
- <3" glass
- Remainder/Composite Plastic
- Organic Debris
- Other

The true proportion of contamination is estimated by the average of the individual samples. The 90% confidence interval contains the true proportion of contamination with 90% probability. The length of the confidence interval is based on sample-to-sample variability and the number of samples. For example, if the average sampled contamination is 20 percent and the associated 90% confidence interval is calculated to be plus/minus five percent, there is a 90% probability that the true proportion of contamination is between 15 and 25 percent of material delivered (20 percent +/- five percent). If the sampled municipality delivers 100 tons of source separated recyclables each

month, the quantity of contamination is estimated to be 20 tons (20 percent of 100 tons per month) with a 90% probability of being between 15 and 25 tons per month.

The goal of the project was to minimize the length of the 90% confidence interval. Since the individual municipalities delivered between 10 and 1,600 tons of source-separated recyclables each month, the number of samples was proportional to the monthly tonnage delivered by each municipality and varied between five and 50 samples.

Exhibit 3 presents the average monthly quantity of recyclables delivered to the MRWMD MRF by each hauler for each municipality. Based on results from a similar study conducted in 2018, the number of samples needed to achieve precision goals was calculated. Exhibit 2 also presents the expected 90% confidence limits for the proportion of contamination delivered from each municipality and the associated 90% confidence limits for the monthly tonnage of contamination from each municipality.

Exhibit 3.   Number of Samples and Expected Confidence Interval

Hauler (City)	Tons/ Month	No of Samples	Anticipated Precision (90% Confidence) for Average Contamination	
			Composition	Tons/ Month (tpm)
Greenwaste Recovery				
Marina	170	10	+/- 5.8%	+/- 10 tpm
Sand City	10	5	+/- 8.2%	+/- 1 tpm
Del Rey Oaks	25	5	+/- 8.2%	+/- 2 tpm
Seaside	265	10	+/- 5.8%	+/- 15 tpm
Carmel by the Sea	150	10	+/- 5.8%	+/- 9 tpm
Pebble Beach	110	10	+/- 5.8%	+/- 6 tpm
Pacific Grove	175	10	+/- 5.8%	+/- 10 tpm
Monterey Disposal				
City of Monterey	175	10	+/- 5.8%	+/- 10 tpm
Waste Management				
Unincorporated Monterey County	1350	40	+/- 2.9%	+/- 39 tpm
King City	150	10	+/- 5.8%	+/- 9 tpm
Republic Services				
Salinas	1600	50	+/- 2.6%	+/- 42 tpm
City of Watsonville (Public Works Dept.)				
City of Watsonville	120	10	+/- 5.8%	+/- 7 tpm
Recology				
San Benito	416	20	+/- 4.1%	+/- 17 tpm
Total	**4,716**	**200**	**+/- 1.3%**	**+/- 61 tpm**

3.0   RESULTS

3.1   STUDYWIDE

Overall, the MRWMD MRF receives about 4,700 tons of source-separated recyclables each month from six haulers delivering material from 13 municipalities. On average, 21.9 percent (1,034 tons) of this material is contamination. The City of Salinas delivers the most material to the MRWMD MRF and also has the highest proportion of contamination (26.2 percent of material delivered) which equates to about 420 tons per month. There is a 90% probability that the true quantity of contamination delivered from Salinas is between 378 and 464 tons each month. In contrast, about 15.2 percent of the recyclables delivered from Sand City are contamination; however, since Sand City delivers the least quantity of recyclables per month, their two tons of contamination delivered per month has a lesser impact.

Exhibit 4 presents the results of a four-week field effort that collected and manually characterized 201 samples of source-separated recyclables from residential and commercial sources delivered to the MRWMD MRF.

Exhibit 3.   Summary of Contamination Delivered to MRWMD Per Month

			Contamination			
			Proportion		Monthly Tons	
Hauler (City)	Tons/ Month	No of Samples	Average	90% Confidence	Average	90% Confidence
Greenwaste Recovery	**905**	**61**	**18.9%**	**+/- 2.9%**	**171**	**+/- 26**
Marina	170	10	25.5%	+/- 13.7%	43	+/- 23
Sand City	10	5	15.2%	+/- 4.7%	2	+/- 0.5
Del Rey Oaks	25	5	15.9%	+/- 3.6%	4	+/- 1
Seaside	265	10	18.2%	+/- 4.5%	48	+/- 12
Carmel by the Sea	150	11	16.0%	+/- 3.4%	24	+/- 5
Pebble Beach	110	10	18.1%	+/- 6.7%	20	+/- 7
Pacific Grove	175	10	20.4%	+/- 7.1%	36	+/- 12
Monterey Disposal	**175**	**10**	**17.9%**	**+/- 4.8%**	**31**	**+/- 8**
City of Monterey	175	10	17.9%	+/- 4.8%	31	+/- 8
Waste Management	**1,500**	**50**	**21.4%**	**+/- 3.3%**	**320**	**+/- 50**
Unincorporated Monterey County	1,350	40	22.4%	+/- 3.7%	302	+/- 50
King City	150	10	17.3%	+/- 7.2%	26	+/- 11
Republic Services	**1,600**	**50**	**26.2%**	**+/- 2.6%**	**420**	**+/- 42**
Salinas	1,600	50	26.2%	+/- 2.6%	420	+/- 42
City of Watsonville (Public Works Dept.)	**120**	**10**	**18.7%**	**+/- 7.1%**	**22**	**+/- 9**
City of Watsonville	120	10	18.7%	+/- 7.1%	22	+/- 9
Recology	**416**	**20**	**25.4%**	**+/- 5.7%**	**106**	**+/- 24**
San Benito County	416	20	25.4%	+/- 5.7%	106	+/- 24
IN DISTRICT	**2,430**	**111**	**20.1%**	**+/- 2.1%**	**487**	**+/- 52**
OUT OF DISTRICT	**2,286**	**90**	**24.2%**	**+/- 2.3%**	**554**	**+/- 52**
Total	**4,716**	**201**	**21.9%**	**+/- 1.6%**	**1,034**	**+/- 74**

3.1.1   Comparison to 2018 Results by Hauler

Exhibit 4 presents the average and associated confidence intervals for the proportion of contamination delivered by each hauler. The bold green horizontal line identifies the maximum desired level of contamination for a municipal recycling program of 10 percent. It is noted that the SSR materials collected by Republic and Recology exceed the 20% contamination level. The SSR materials collected by Waste Management and the City of Watsonville have had slight improvements in the proportion of contamination present in the SSR materials delivered. The SSR materials collected by Greenwaste Recovery and Monterey Disposal likely have contamination levels below 20%, although both have higher proportions of contamination in the 2019 sampling than were present in the 2018 sampling.

Exhibit 4.   Average Proportion of Contamination and Associated 90% Confidence Intervals by Hauler: 2019 and 2018

■ 90% Confidence Interval for Contamination in 2019
▬ Average Contamination in 2019
■ 90% Confidence Interval for Contamination in 2018
▬ Average Contamination in 2018
▬ Maximum Desired Contamination Level of 10%
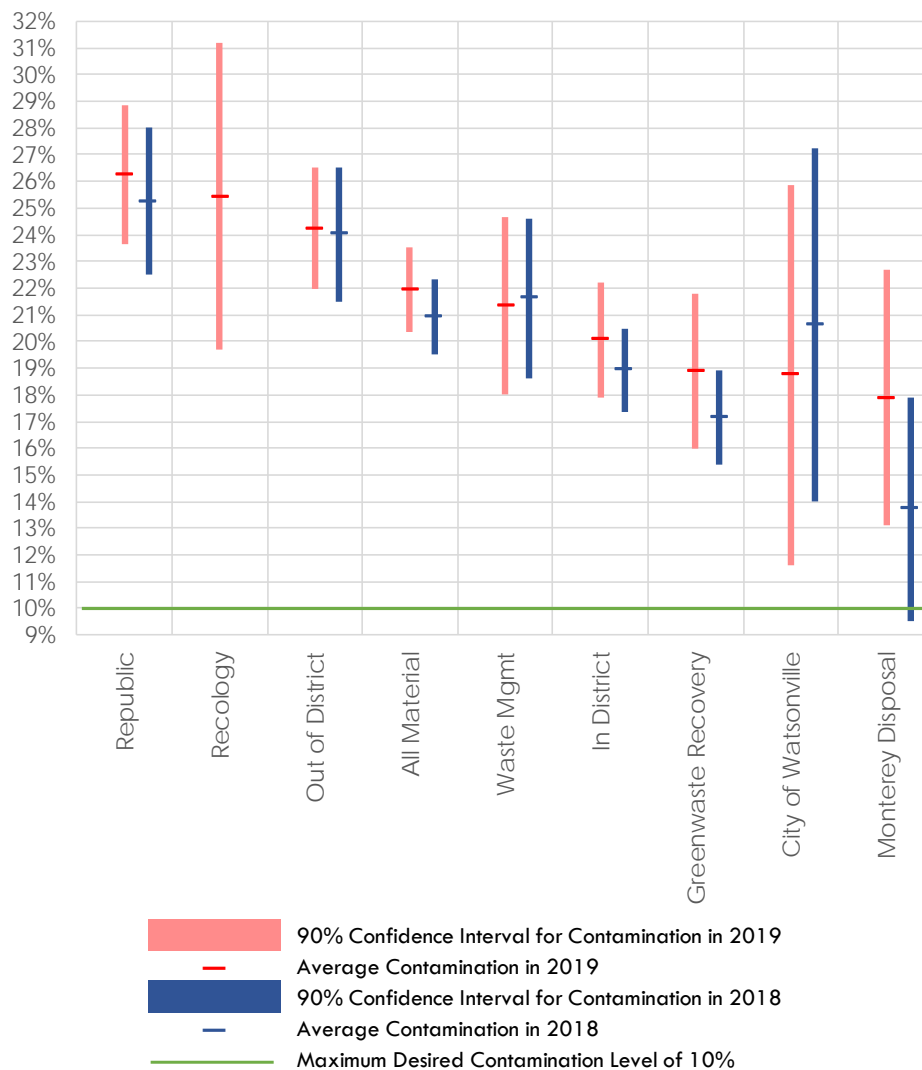
Exhibit 5 presents the average monthly tons and associated 90% confidence intervals for each hauler. Since Republic and Waste Management bring in substantially more SSR materials each month, the effect of high contamination has a greater impact on the MRF processing activities than small tonnage sources.

Exhibit 5.   Average Monthly Tons of Contamination and Associated 90% Confidence Intervals by Hauler: 2019 and 2018

Legend:
- 90% Confidence Interval for Contamination in 2019
- Average Contamination in 2019
- 90% Confidence Interval for Contamination in 2018
- Average Contamination in 2018
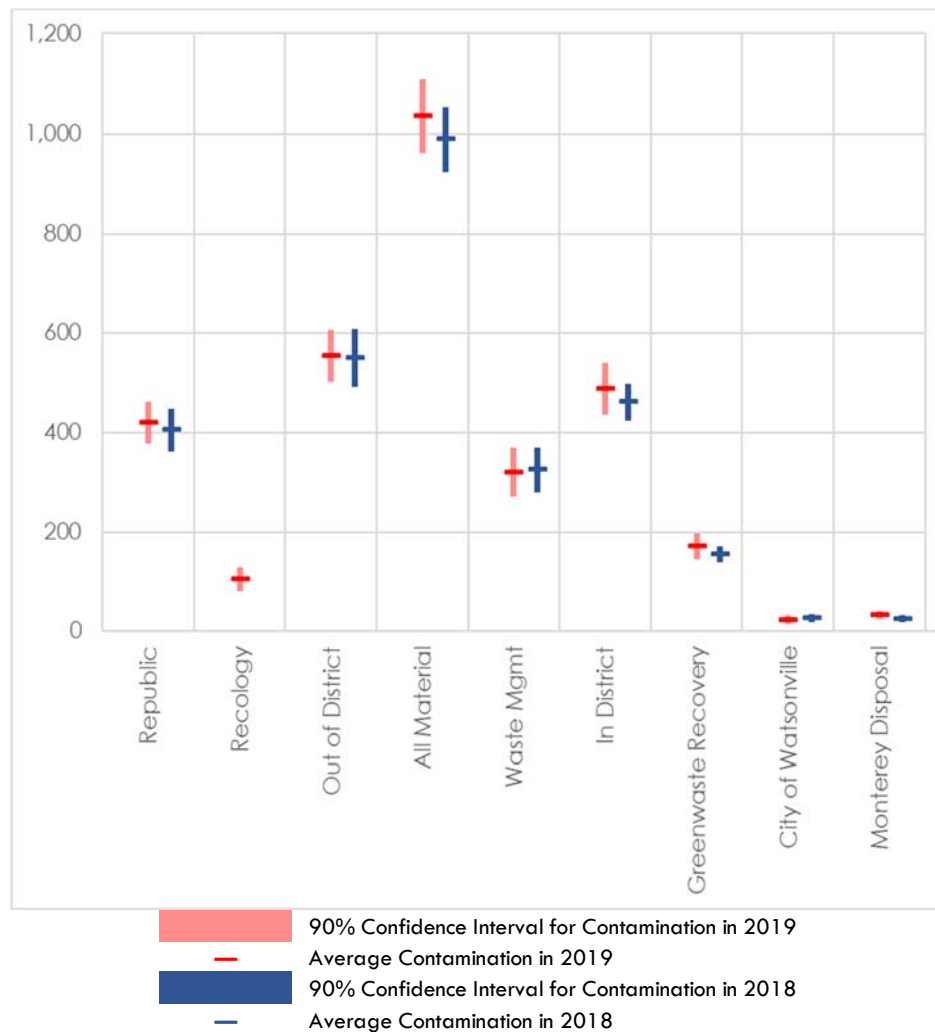
3.1.2   Comparison to 2018 Results by Municipality

As presented in **Exhibit 6**, the municipalities of Salinas and Marina, and portions of San Benito County, and Unincorporated Monterey County likely have contamination that exceeds 20 percent of the total materials delivered to the MRWMD MRF. The municipalities of King City, Carmel by the Sea, Del Rey Oaks, and Sand City likely have contamination below 20 percent. The remaining municipalities have contamination around 20 percent. All locations have significantly more than the 10 percent maximum level of contamination desired in a municipal recycling program.

Exhibit 6.   Average Proportion of Contamination and Associated 90% Confidence Intervals by Municipality: 2019 and 2018
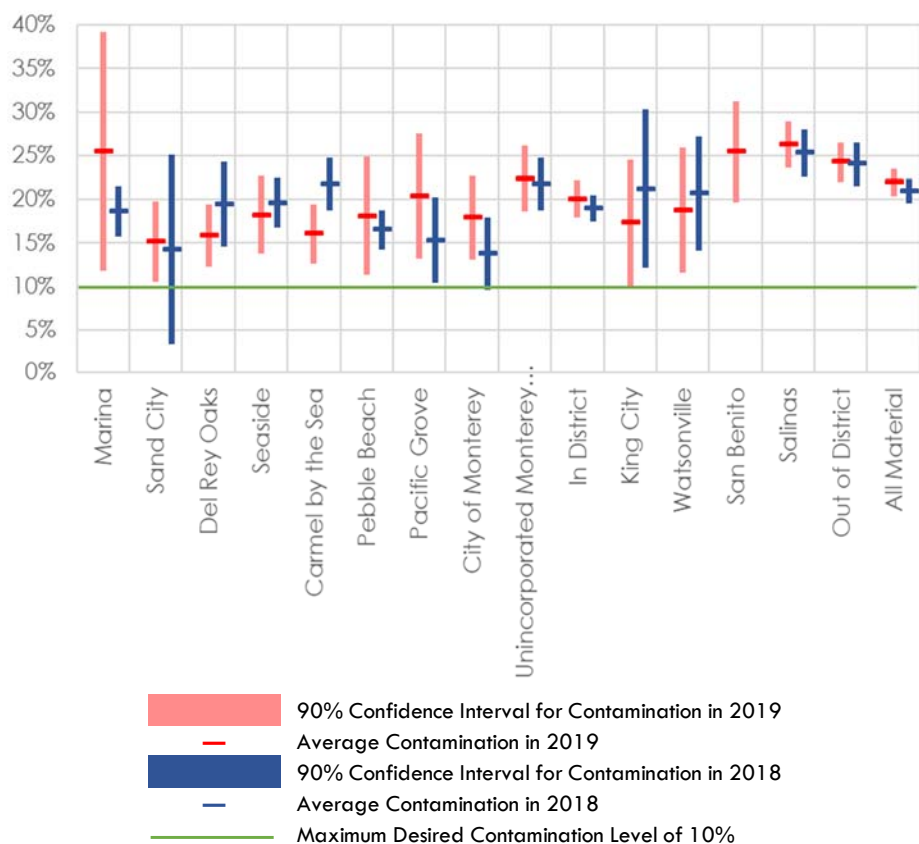
3.2   HAULER: GREENWASTE

Greenwaste Recovery is the franchise hauler for Carmel by the Sea, Del Rey Oaks, Pacific Beach, Pebble Beach, Sand City and Seaside. In total, SCS completed 61 recycling stream samples from the cities that Greenwaste Recovery services. Of the material sampled, 81.1 percent is Recyclable and 18.9 percent is Contamination as shown in **Exhibit 7**.

Exhibit 7.   Detailed Recycling Composition of Loads Hauled by Greenwaste

Greenwaste					
Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	21.2%	164	192	221
	White Office Paper	0.8%	4	8	11
	Mixed Paper	11.8%	90	107	124
	Paper Board	2.4%	19	22	24
	Old Newspaper	2.4%	17	22	28
	Waxed Cartons	0.1%	1	1	2
Plastic	PET	1.8%	14	16	18
	PET Thermoform	0.6%	4	5	6
	Natural HDPE	0.7%	4	6	8
	Pigment HDPE	0.8%	5	7	8
	Polypropylene #5	0.4%	3	4	5
	Mixed Plastic #3, 4, 6, 7	0.3%	2	3	3
	Rigid Plastic	2.7%	17	24	31
Film Plastic	Film Plastic	1.1%	8	10	11
Glass	Mixed Glass	31.2%	256	282	309
Metal	Bi Metal	2.9%	20	26	33
	Aluminum	0.5%	4	4	5
	Aluminum other	0.4%	2	3	5
Organics	Organics	2.9%	20	26	32
Other	HHW	0.3%	1	2	4
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	1.9%	7	17	28
	Expanded Polystyrene	0.1%	1	1	1
	Aseptic	0.2%	1	2	3
	Refuse	12.4%	85	112	139
Total		100.0%		905	
Contamination (noted in grey shading above)		18.9%	145	171	197

The following section examines the recycling composition per municipality that Greenwaste Recovery services. Results are compared to a similar study performed in the summer of 2018.

3.2.1　Carmel By the Sea (Carmel)

Recycling Composition

The composition of Carmel's recycling stream by category is presented in **Exhibit 8**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Glass, representing 41.1 percent of the overall recycling stream. Recyclable Paper represents 34.9 percent of the overall recycling stream, and Contamination represents 16.0 percent, which is a reduction from the 2018 study.

Exhibit 8.　Composition of Recyclable Loads from Carmel, 2019 and 2018
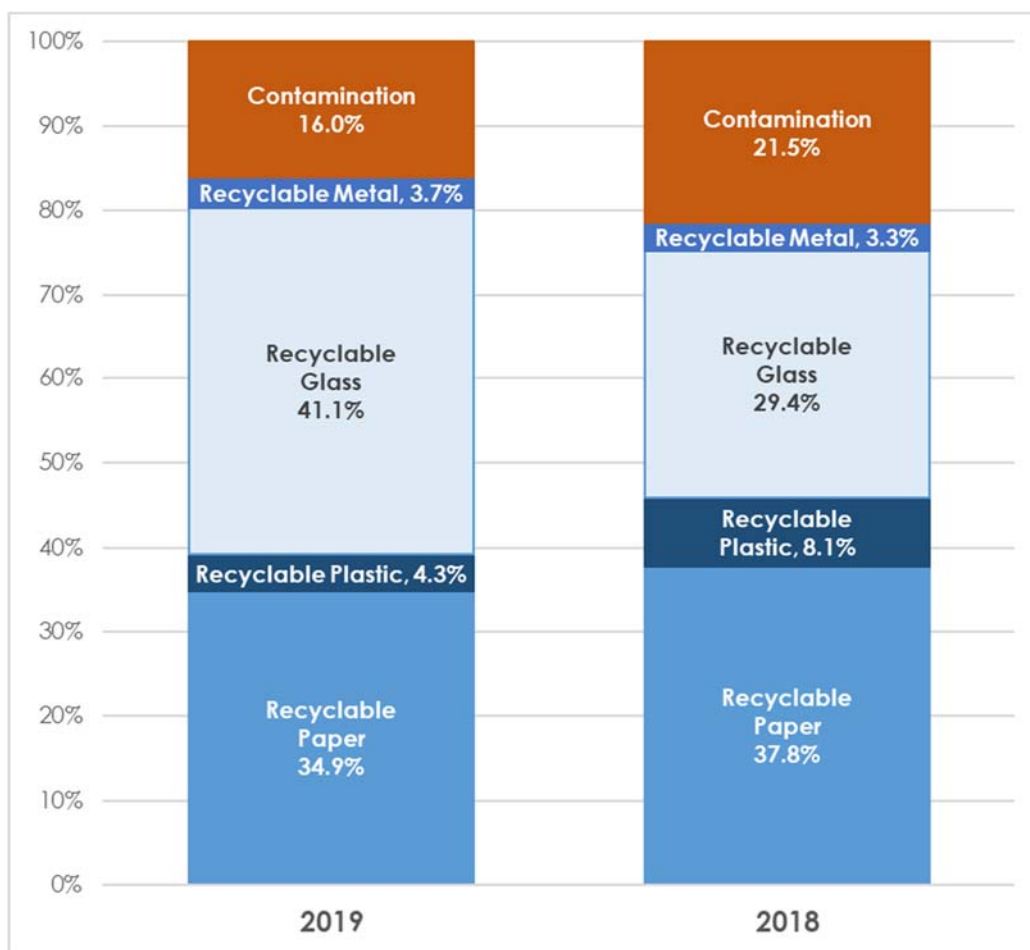
A detailed breakdown of Carmel's recycling stream by category and material type in material type in percentage, and 90% confidence interval is presented by material type **Exhibit 9**.

Exhibit 9. Detailed Recycling Composition from Carmel

CARMEL BY THE SEA					
Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	19.1%	16	29	41
	White Office Paper	1.3%	<0.5	2	5
	Mixed Paper	9.7%	9	15	20
	Paper Board	1.9%	2	3	4
	Old Newspaper	2.8%	2	4	6
	Waxed Cartons	0.2%	<0.5	0	0
Plastic	PET	1.4%	2	2	3
	PET Thermoform	0.5%	<0.5	1	1
	Natural HDPE	0.3%	<0.5	0	1
	Pigment HDPE	0.5%	<0.5	1	1
	Polypropylene #5	0.5%	<0.5	1	1
	Mixed Plastic #3, 4, 6, 7	0.2%	<0.5	0	1
	Rigid Plastic	1.0%	1	1	2
Film Plastic	Film Plastic	1.3%	1	2	3
Glass	Mixed Glass	41.1%	50	62	73
Metal	Bi Metal	2.7%	1	4	7
	Aluminum	0.4%	<0.5	1	1
	Aluminum other	0.7%	<0.5	1	3
Organics	Organics	3.7%	3	5	8
Other	HHW	0.1%	<0.5	0	1
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	1.1%	<0.5	2	4
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.2%	<0.5	0	0
	Refuse	9.5%	9	14	19
Total		100.0%		150	
Contamination (noted in grey shading above)		16% +/-3.4%	19	24	29

Residual Characterization

The residual in Carmel's recycling stream is 16.0 percent of incoming recyclables and is presented by category in **Exhibit 10.** Based on the visual characterization, the most prevalent contaminant is Organics at 3.7 percent. Other material represents 2.1 percent and Small Debris (less than three inches) represents 1.6 percent of the overall recycling stream.

Exhibit 10. Composition of Residuals from Carmel
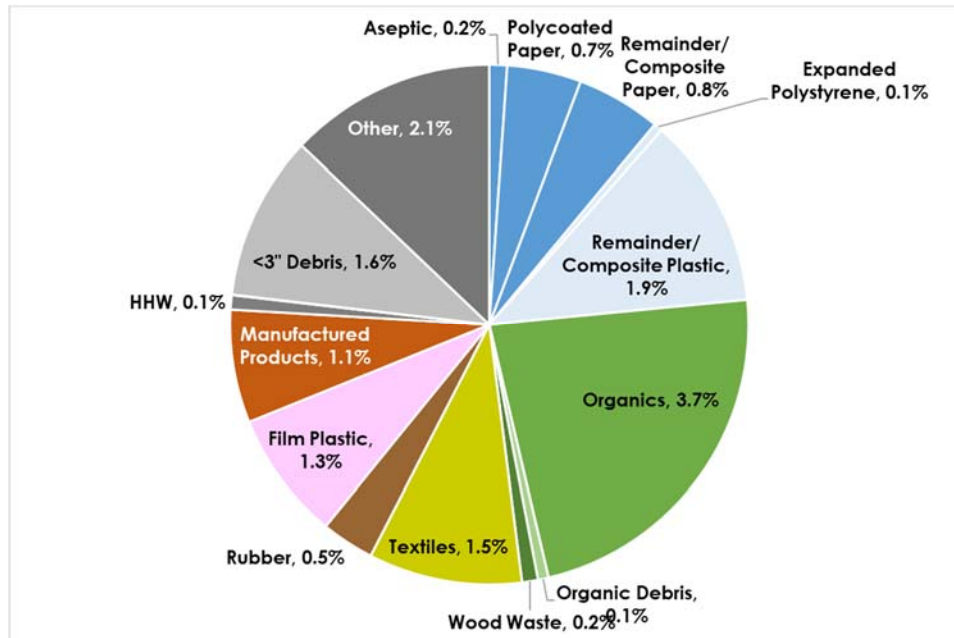
The residuals varied significantly by sector as presented in **Exhibit 11**, with residential loads having 20.5 percent residuals compared to commercial and mixed loads which had 13.2 and 13.5 percent residuals, respectively.

Exhibit 11. Proportion of Residuals from Carmel by Sector

Sector	Number of Samples	Percent
Residential Loads	4	20.5%
Commercial Loads	1	13.2%
Mixed Loads	6	13.5%
Total	11	16.0%

3.2.2   Del Rey Oaks

Recycling Composition

The composition of Del Rey Oak's recycling stream by category is presented in **Exhibit 12**. Based on the samples collected, the most prevalent material category by percentage is Paper, representing 41.0 percent of the overall recycling stream. Recyclable Glass represents 25.7 percent of the overall recycling stream, and Contamination represents 15.9 percent, which is a reduction from the 2018 study.

Exhibit 12.   Composition of Recyclable Loads from Del Rey Oaks, 2019 and 2018
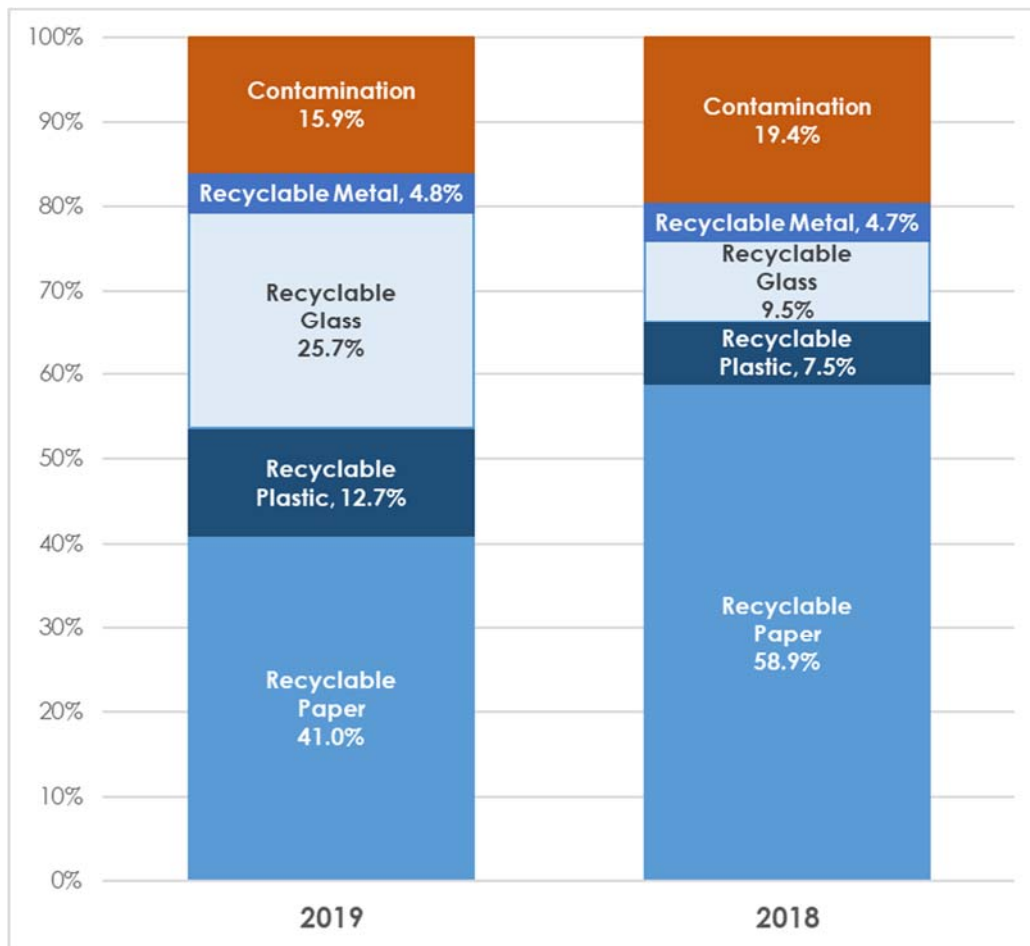
A detailed breakdown of Del Rey Oaks's recycling stream by category, material type in percentage, and 90% confidence interval is presented by material type in **Exhibit 13**.

Exhibit 13. Detailed Recycling Composition from Del Rey Oaks

| Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	26.1%	4.8	6.5	8.2
	White Office Paper	0.4%	<0.5	0.1	0.2
	Mixed Paper	9.6%	1.5	2.4	3.3
	Paper Board	3.1%	0.6	0.8	1.0
	Old Newspaper	1.4%	<0.5	0.3	0.6
	Waxed Cartons	0.4%	<0.5	0.1	0.1
Plastic	PET	2.0%	<0.5	0.5	0.7
	PET Thermoform	1.2%	<0.5	0.3	0.4
	Natural HDPE	0.8%	<0.5	0.2	0.3
	Pigment HDPE	1.1%	<0.5	0.3	0.5
	Polypropylene #5	0.5%	<0.5	0.1	0.2
	Mixed Plastic #3, 4, 6, 7	0.3%	<0.5	0.1	0.1
	Rigid Plastic	6.9%	0.5	1.7	2.9
Film Plastic	Film Plastic	0.7%	<0.5	0.2	0.3
Glass	Mixed Glass	25.7%	4.5	6.4	8.3
Metal	Bi Metal	3.6%	0.6	0.9	1.2
	Aluminum	0.4%	<0.5	0.1	0.1
	Aluminum other	0.8%	<0.5	0.2	0.5
Organics	Organics	1.1%	<0.5	0.3	0.5
Other	HHW	0.6%	<0.5	0.2	0.3
	Medical Waste	0.0%	NA	0.0	NA
	Manufactured Products	1.8%	<0.5	0.5	0.8
	Expanded Polystyrene	0.1%	<0.5	0.0	0.1
	Aseptic	0.1%	<0.5	0.0	0.0
	Refuse	11.3%	1.9	2.8	3.8
Total		100.0%		25.0	
Contamination (noted in grey shading above)		15.9% +/-3.6%	3.1	4.0	4.9

Residual Characterization

The residuals in Del Rey Oak's recycling stream is 15.9 percent of incoming recyclables and is presented by category in Error! Reference source not found.. Based on the visual characterization, the most prevalent material category by percentage are Textiles, representing 2.8 percent of the overall recycling stream. Other materials represent 2.0 percent of the overall recycling stream, and Manufactured Products represent 1.8 percent of the overall recycling stream.

Exhibit 14.   Composition of Residuals from Del Rey Oaks
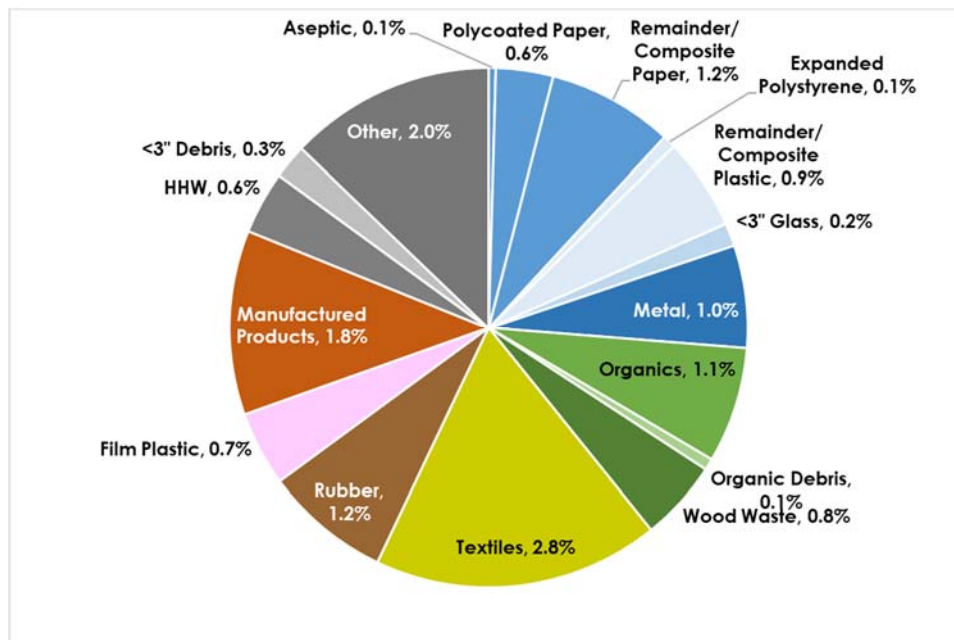
The residuals varied significantly by sector as presented in **Exhibit 15**, with residential loads having 12.5 percent residuals compared to commercial loads which had 18.1 percent residuals.

Exhibit 15.   Proportion of Residuals from Del Rey Oaks by Sector

Sector	Number of Samples	Percent
Residential Loads	2	12.5%
Commercial Loads	0	NA
Mixed Loads	3	18.1%
Total	5	15.9%

3.2.3 Marina

Recycling Composition

The composition of Marina's recycling stream by category is presented in **Exhibit 16**. Based on the samples collected, the most prevalent material category by percentage is Paper, representing 38.1 percent of the overall recycling stream. Glass represents 25.2 percent of the overall recycling stream, and Contamination represents 25.5 percent of the overall recycling stream.

Exhibit 16. Composition of Recyclable Loads from Marina, 2019 and 2018
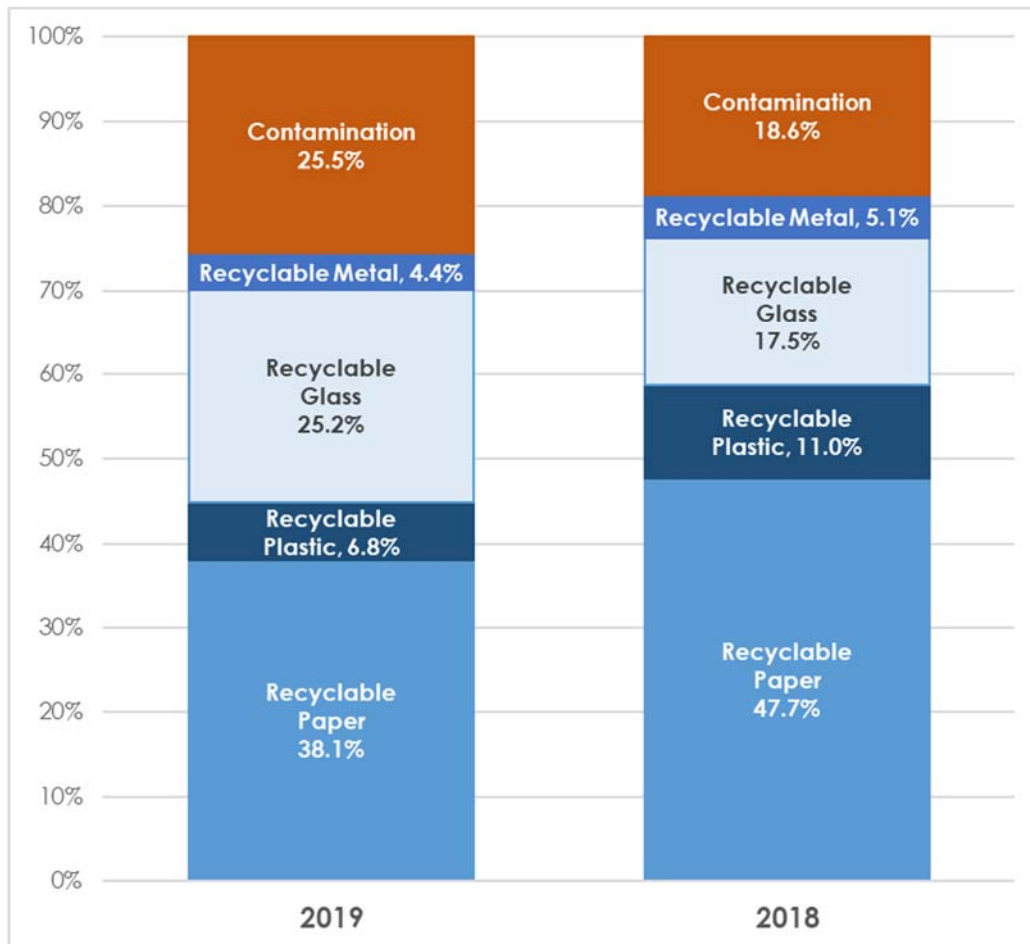
A detailed breakdown of Marina's recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 17.**

Exhibit 17.   Detailed Recycling Composition from Marina

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	19.9%	23	34	45
	White Office Paper	0.8%	<0.5	1	4
	Mixed Paper	13.5%	9	23	37
	Paper Board	2.9%	3	5	7
	Old Newspaper	0.8%	<0.5	1	3
	Waxed Cartons	0.0%	<0.5	0	0
Plastic	PET	1.8%	2	3	4
	PET Thermoform	0.4%	<0.5	1	1
	Natural HDPE	1.0%	<0.5	2	3
	Pigment HDPE	0.9%	1	2	2
	Polypropylene #5	0.5%	<0.5	1	1
	Mixed Plastic #3, 4, 6, 7	0.4%	<0.5	1	1
	Rigid Plastic	1.8%	1	3	5
Film Plastic	Film Plastic	0.8%	1	1	2
Glass	Mixed Glass	25.2%	31	43	55
Metal	Bi Metal	3.6%	1	6	11
	Aluminum	0.5%	<0.5	1	1
	Aluminum other	0.3%	<0.5	1	1
Organics	Organics	3.5%	3	6	9
Other	HHW	0.2%	<0.5	0	1
	Medical Waste	0.0%	NA	0	NA
	Manufactured Products	2.5%	1	4	8
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.2%	<0.5	0	1
	Refuse	18.2%	6	31	56
Total		100.0%		170	
Contamination (noted in grey shading above)		25.5% +/-13.7%	20	43	67

"NA indicates that we did not find the material during the field effort.

Residual Visual Characterization

The residual in Marina's recycling stream by category is presented in Exhibit 13. Based on the visual characterization, the most prevalent material category by percentage is Other, representing 7.2 percent of the overall recycling stream. Textiles and Organics each represent 3.5 percent of the overall recycling stream.

Exhibit 18.   Composition of Residuals from Marina
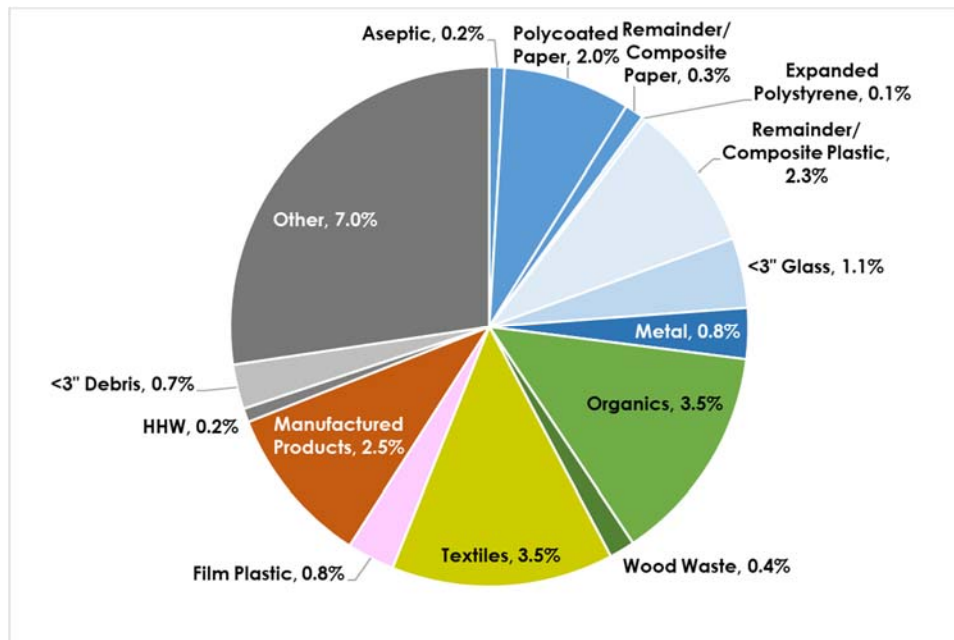
The residuals varied significantly by sector as presented in **Exhibit 19**, with residential loads having 11.5 percent residuals compared to commercial and mixed loads which had 92.9 and 31.0 percent residuals, respectively.

Exhibit 19.   Proportion of Residuals from Marina by Sector

Sector	Number of Samples	Percent
Residential Loads	6	11.5%
Commercial Loads	1	92.9%
Mixed Loads	3	31.0%
Total	10	25.5%

3.2.4 Pacific Grove

Recycling Composition

The composition of Pacific Grove's recycling stream by category is presented in **Exhibit 20**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Glass, representing 39.0 percent of the overall recycling stream. Recyclable Paper represents 30.9 percent of the overall recycling stream, and Contamination represents 20.4 percent of the overall recycling stream.

Exhibit 20.   Composition of Recyclable Loads from Pacific Grove, 2019 and 2018
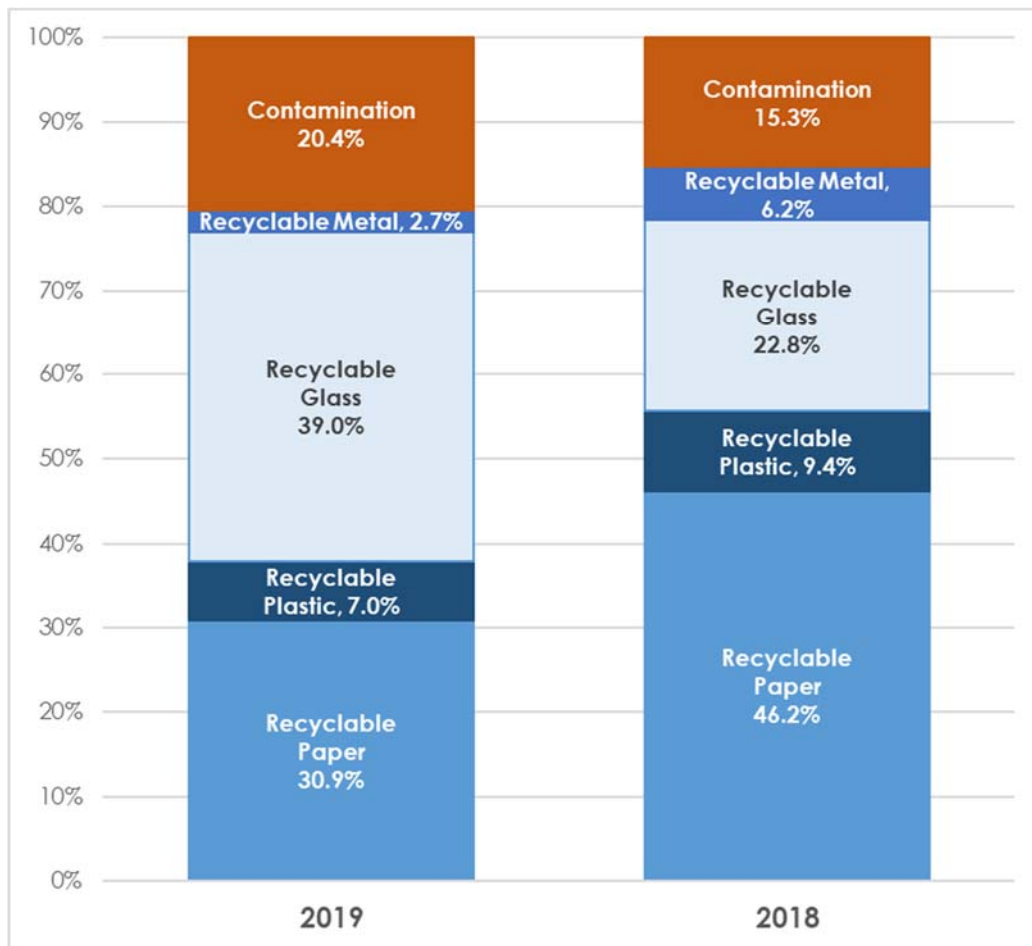
A detailed breakdown of Pacific Grove's recycling stream by category, material type in percentage, and 90 percent confidence interval is presented by material type in **Exhibit 15.**

Exhibit 21. Detailed Recycling Composition from Pacific Grove

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	17.5%	19	31	42
	White Office Paper	1.1%	<0.5	2	4
	Mixed Paper	7.9%	9	14	19
	Paper Board	1.8%	2	3	4
	Old Newspaper	2.6%	2	4	7
	Waxed Cartons	0.0%	<0.5	0	0
Plastic	PET	1.9%	2	3	4
	PET Thermoform	0.7%	1	1	2
	Natural HDPE	0.5%	<0.5	1	2
	Pigment HDPE	0.4%	<0.5	1	1
	Polypropylene #5	0.3%	<0.5	1	1
	Mixed Plastic #3, 4, 6, 7	0.3%	<0.5	1	1
	Rigid Plastic	2.8%	3	5	7
Film Plastic	Film Plastic	0.7%	1	1	2
Glass	Mixed Glass	39.0%	58	68	78
Metal	Bi Metal	1.8%	2	3	5
	Aluminum	0.7%	1	1	2
	Aluminum other	0.2%	<0.5	0	1
Organics	Organics	3.7%	2	6	11
Other	HHW	0.0%	<0.5	0	0
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	4.9%	<0.5	9	22
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.2%	<0.5	0	1
	Refuse	10.9%	7	19	31
Total		100.0%		175	
Contamination (noted in grey shading above)		20.4% +/-7.1%	23	36	48

Residual Characterization

The residual in Pacific Grove's recycling stream by category is presented in **Exhibit 22**. Based on the visual characterization, the most prevalent material category are Manufactured Products, representing 4.9 percent of the overall recycling stream. Textile represents 4.2 percent of the overall recycling stream, and Organics represents 3.7 percent of the overall recycling stream.

Exhibit 22.   Composition of Residuals from Pacific Grove
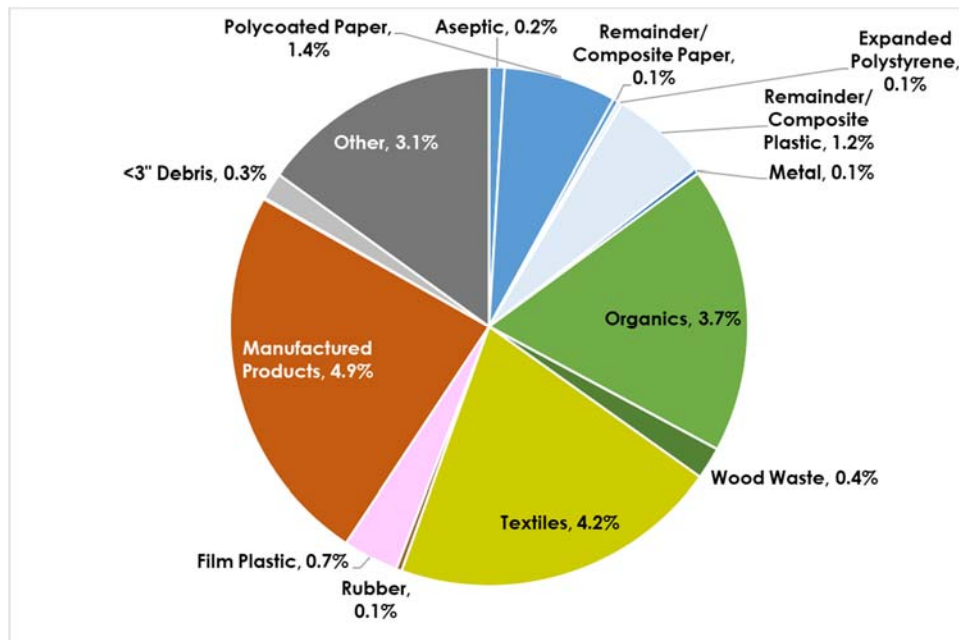
The residuals did not vary significantly by sector as presented in **Exhibit 23**, with residential loads having 21.5 percent residuals compared to commercial loads which had 19.2 percent residuals.

Exhibit 23.   Proportion of Residuals from Pacific Grove by Sector

Sector	Number of Samples	Percent
Residential Loads	5	21.5%
Commercial Loads	0	NA
Mixed Loads	5	19.2%
Total	10	20.4%

3.2.5   Pebble Beach

Recycling Composition

The composition of Pebble Beach's recycling stream by category is presented in **Exhibit 17**. Based on the samples collected, the most prevalent material category, by weight, is Recyclable Paper, representing 37.2 percent of the overall recycling stream. Glass represents 33.6 percent of the overall recycling stream, and Contamination represents 18.1 percent of the overall recycling stream.

Exhibit 24.   Composition of Recyclable Loads from Pebble Beach, 2019 and 2018
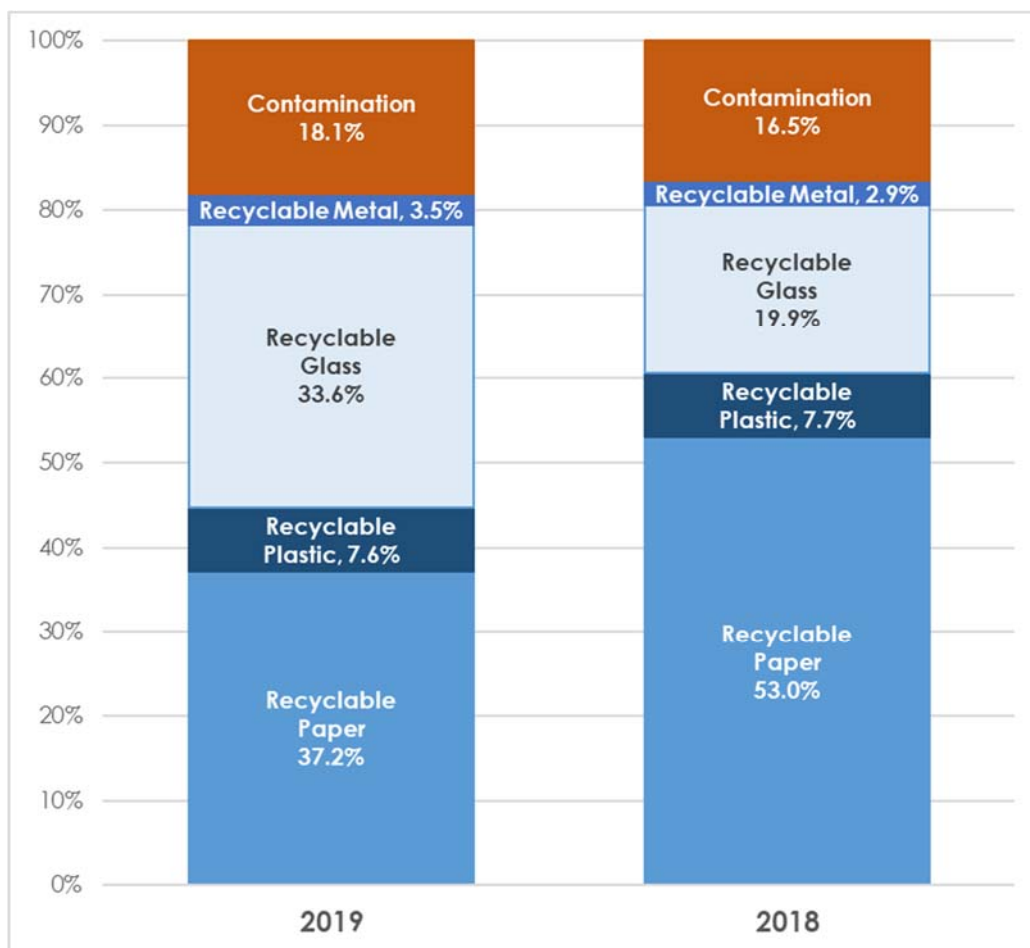
A detailed breakdown of Pebble Beach's recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 25.**

Exhibit 25.   Detailed Recycling Composition from Pebble Beach

PEBBLE BEACH

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	12.1%	7	13	19
	White Office Paper	0.2%	<0.5	0	1
	Mixed Paper	17.2%	14	19	24
	Paper Board	3.1%	3	3	4
	Old Newspaper	4.4%	3	5	7
	Waxed Cartons	0.2%	<0.5	0	0
Plastic	PET	2.2%	2	2	3
	PET Thermoform	0.7%	1	1	1
	Natural HDPE	0.3%	<0.5	0	0
	Pigment HDPE	0.8%	1	1	1
	Polypropylene #5	0.6%	<0.5	1	1
	Mixed Plastic #3, 4, 6, 7	0.3%	<0.5	0	0
	Rigid Plastic	2.8%	1	3	5
Film Plastic	Film Plastic	1.3%	1	1	2
Glass	Mixed Glass	33.6%	32	37	42
Metal	Bi Metal	2.8%	2	3	4
	Aluminum	0.5%	<0.5	1	1
	Aluminum other	0.3%	<0.5	0	0
Organics	Organics	3.6%	2	4	6
Other	HHW	0.4%	<0.5	0	2
	Medical Waste	0.1%	<0.5	0	1
	Manufactured Products	0.2%	<0.5	0	1
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.2%	<0.5	0	0
	Refuse	12.2%	6	13	21
Total		100.0%		110	
\multicolumn{2}{l}{Contamination (noted in grey shading above)}	18.1% +/-6.7%	13	20	27

Residual Characterization

The residual in Pebble Beach's recycling stream by category is presented in **Exhibit 26**. Based on the visual characterization, Other materials comprise the majority of residuals at 4.6 percent of the overall recycling stream. Organics represents 3.6 percent of the overall recycling stream, and Small Debris (less than 3 inches) represents 1.9 percent of the overall recycling stream.

Exhibit 26. Composition of Residuals from Pebble Beach
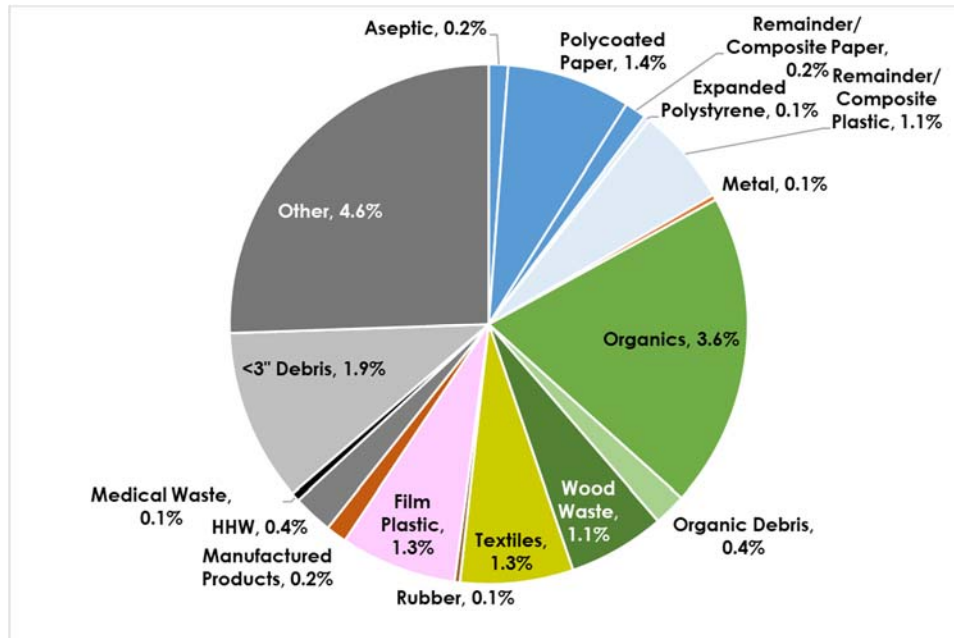
The residuals varied significantly by sector as presented in **Exhibit 27**, with residential loads having 19.0 percent residuals compared to commercial loads which had 14.7 percent residuals.

Exhibit 27. Proportion of Residuals from Pebble Beach by Sector

Sector	Number of Samples	Percent
Residential Loads	8	19.0%
Commercial Loads	0	NA
Mixed Loads	2	14.7%
Total	10	18.1%

3.2.6 Sand City

Recycling Composition

The composition of Sand City's recycling stream by category is presented in **Exhibit 28**. Based on the samples collected, the most prevalent material category by percentage is Paper, representing 63.3 percent of the overall recycling stream. Recyclable Glass represents 15.0 percent of the overall recycling stream, and Contamination represents 15.2 percent of the overall recycling stream.

Exhibit 28. Composition of Recyclable Loads from Sand City, 2019 and 2018
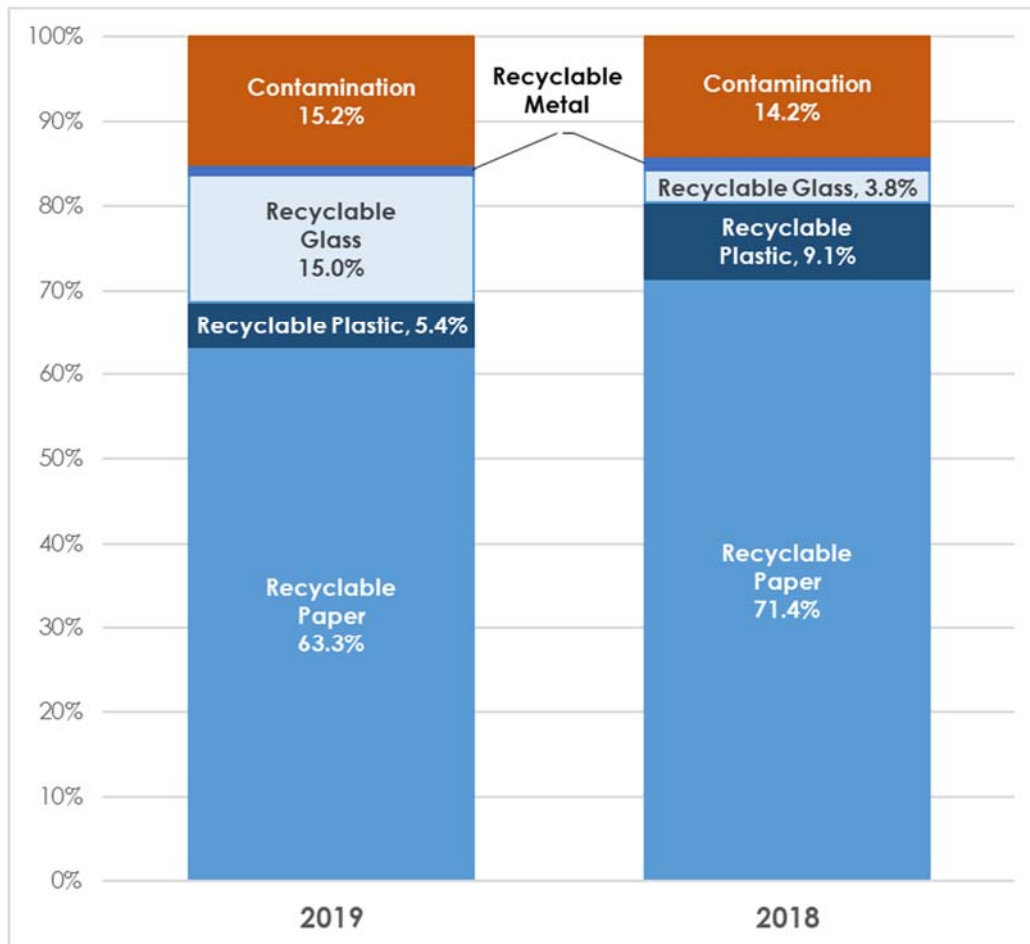
A detailed breakdown of Sand City's recycling stream by category, material type in percentage and the 90 percent confidence interval is presented by material type in **Exhibit 29.**

Exhibit 29.   Detailed Recycling Composition from Sand City

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	41.3%	2.8	4.1	5.5
	White Office Paper	1.7%	<0.5	0.2	0.3
	Mixed Paper	13.7%	0.6	1.4	2.2
	Paper Board	2.3%	<0.5	0.2	0.4
	Old Newspaper	4.3%	<0.5	0.4	0.9
	Waxed Cartons	0.0%	NA	0.0	NA
Plastic	PET	1.2%	<0.5	0.1	0.2
	PET Thermoform	0.3%	<0.5	0.0	0.1
	Natural HDPE	0.3%	<0.5	0.0	0.1
	Pigment HDPE	1.2%	<0.5	0.1	0.3
	Polypropylene #5	0.3%	<0.5	0.0	0.1
	Mixed Plastic #3, 4, 6, 7	0.1%	<0.5	0.0	0.0
	Rigid Plastic	2.0%	<0.5	0.2	0.4
Film Plastic	Film Plastic	1.9%	<0.5	0.2	0.3
Glass	Mixed Glass	15.0%	0.6	1.5	2.4
Metal	Bi Metal	0.7%	<0.5	0.1	0.1
	Aluminum	0.4%	<0.5	0.0	0.1
	Aluminum other	0.0%	<0.5	0.0	0.0
Organics	Organics	0.3%	<0.5	0.0	0.0
Other	HHW	0.2%	<0.5	0.0	0.1
	Medical Waste	0.0%	NA	0.0	NA
	Manufactured Products	1.8%	<0.5	0.2	0.4
	Expanded Polystyrene	0.1%	<0.5	0.0	0.0
	Aseptic	0.1%	<0.5	0.0	0.0
	Refuse	10.8%	0.6	1.1	1.5
Total		100.0%		10.0	
Contamination (noted in grey shading above)		15.2% +/-4.7%	1.0	1.5	2.0

Residual Characterization

The residual in Sand City's recycling stream by category is presented in **Exhibit 22**. Based on the visual characterization, the most prevalent material category by percentage is Other, representing 6.7 percent of the overall recycling stream. Film Plastic represents 1.9 percent of the overall recycling stream, and Manufactured Products represent 1.8 percent of the overall recycling stream.

Exhibit 30.   Composition of Residuals from Sand City
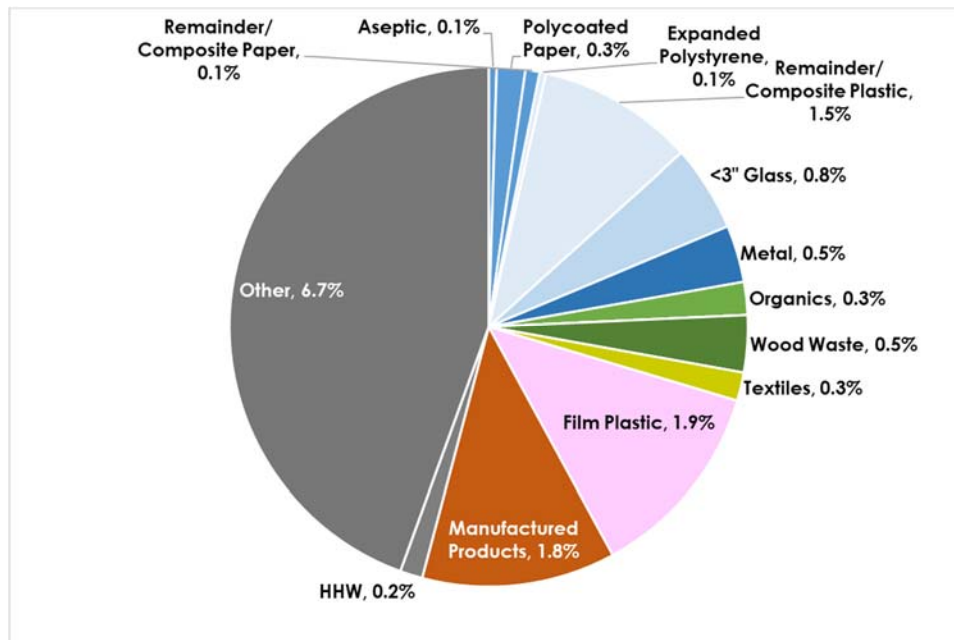
The residuals varied significantly by sector as presented in **Exhibit 31**, with residential loads having 19.0 percent residuals compared to commercial loads which had 14.7 percent residuals.

Exhibit 31.   Proportion of Residuals from Sand City by Sector

| Sector	Number of Samples	Percent
Residential Loads	4	13.4%
Commercial Loads	1	22.1%
Mixed Loads	0	NA
Total	5	15.2%

3.2.7   Seaside

Recycling Composition

The composition of Seaside's recycling stream by category is presented in **Exhibit 32**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 40.6 percent of the overall recycling stream. Recyclable Glass represents 27.0 percent of the overall recycling stream, and Contamination represents 18.2 percent of the overall recycling stream.

Exhibit 32.   Composition of Recyclable Loads from Seaside, 2019 and 2018
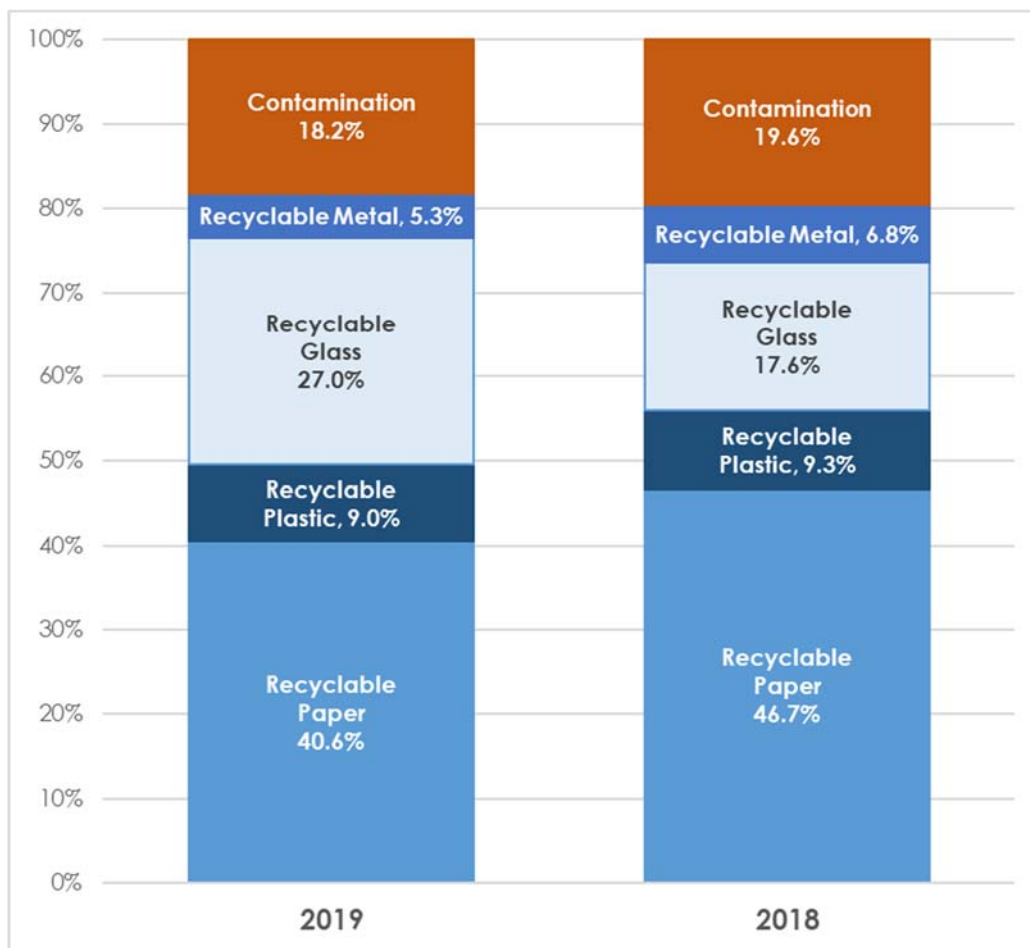
A detailed breakdown of Seaside's recycling stream by category, material type in percentage, and the 90 percent confidence interval is presented by material type in **Exhibit 33.**

Exhibit 33.   Detailed Recycling Composition from Seaside

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	25.3%	47	67	87
	White Office Paper	0.5%	<0.5	1	2
	Mixed Paper	11.2%	21	30	39
	Paper Board	2.1%	3	6	8
	Old Newspaper	1.3%	1	3	5
	Waxed Cartons	0.1%	<0.5	0	1
Plastic	PET	2.0%	4	5	7
	PET Thermoform	0.6%	1	2	2
	Natural HDPE	1.4%	1	4	7
	Pigment HDPE	0.9%	1	2	3
	Polypropylene #5	0.3%	<0.5	1	1
	Mixed Plastic #3, 4, 6, 7	0.4%	1	1	2
	Rigid Plastic	3.3%	2	9	16
Film Plastic	Film Plastic	1.1%	2	3	4
Glass	Mixed Glass	27.0%	55	72	89
Metal	Bi Metal	4.5%	7	12	17
	Aluminum	0.5%	1	1	2
	Aluminum other	0.3%	<0.5	1	1
Organics	Organics	2.2%	1	6	10
Other	HHW	0.3%	<0.5	1	2
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	1.1%	<0.5	3	6
	Expanded Polystyrene	0.2%	<0.5	0	1
	Aseptic	0.5%	<0.5	1	3
	Refuse	12.9%	21	34	48
Total		100.0%		265	
Contamination (noted in grey shading above)		18.2% +/-4.5%	36	48	60

Residual Characterization

The residual in Seaside recycling stream by category is presented in **Exhibit 34**. Based on the visual characterization, the most prevalent material category by percentage are Textiles and Other, each representing 4.4 percent of the overall recycling stream. Organics represents 2.2 percent of the overall recycling stream.

Exhibit 34.   Composition of Residuals from Seaside
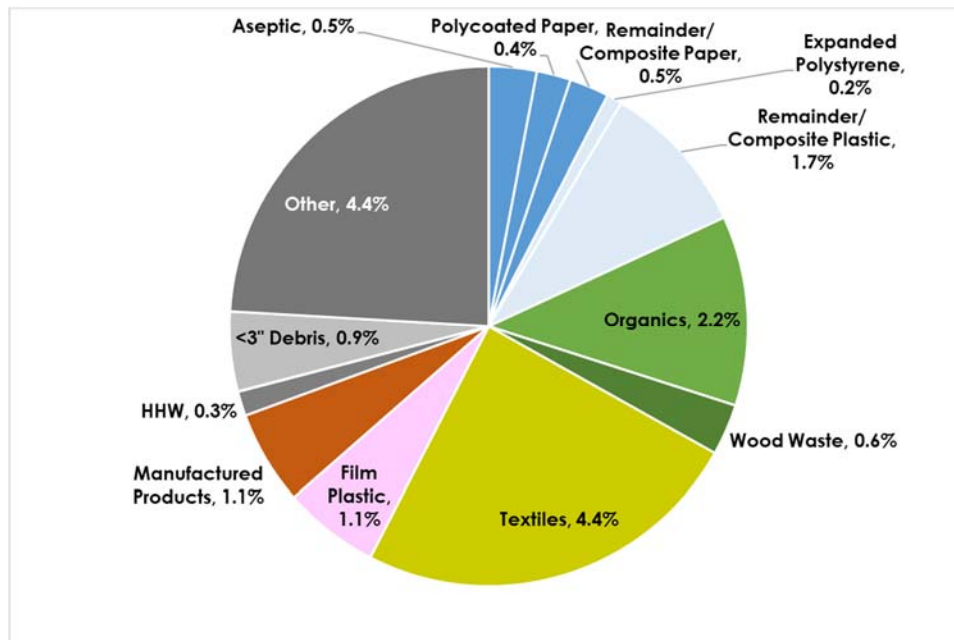
The residuals varied slightly by sector as presented in **Exhibit 35**, with residential loads having 19.2 percent residuals compared to commercial loads which had 16.6 percent residuals.

Exhibit 35.   Proportion of Residuals from Seaside by Sector

Sector	Number of Samples	Percent
Residential Loads	6	19.2%
Commercial Loads	0	NA
Mixed Loads	4	16.6%
Total	10	18.2%

3.3 HAULER: MONTEREY DISPOSAL

Monterey Disposal is the hauler for Monterey City. In total, SCS completed 10 recycling stream samples from Monterey City. Of the material sampled, 82.1 percent is Recyclable and 17.9 percent is Contamination as shown in **Exhibit 36**.

The following section examines the recycling composition by category and material type, the 90% confidence interval, and the visual characterization for Monterey City.

3.3.1 Monterey City

Recycling Composition

The composition of Monterey City's recycling stream by category is presented in **Exhibit 36**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Glass, representing 35.8 percent of the overall recycling stream. Recyclable Paper represents 34.1 percent of the overall recycling stream, and Contamination represents 17.9 percent of the overall recycling stream.

Exhibit 36. Composition of Recyclable Loads from Monterey City, 2019 and 2018
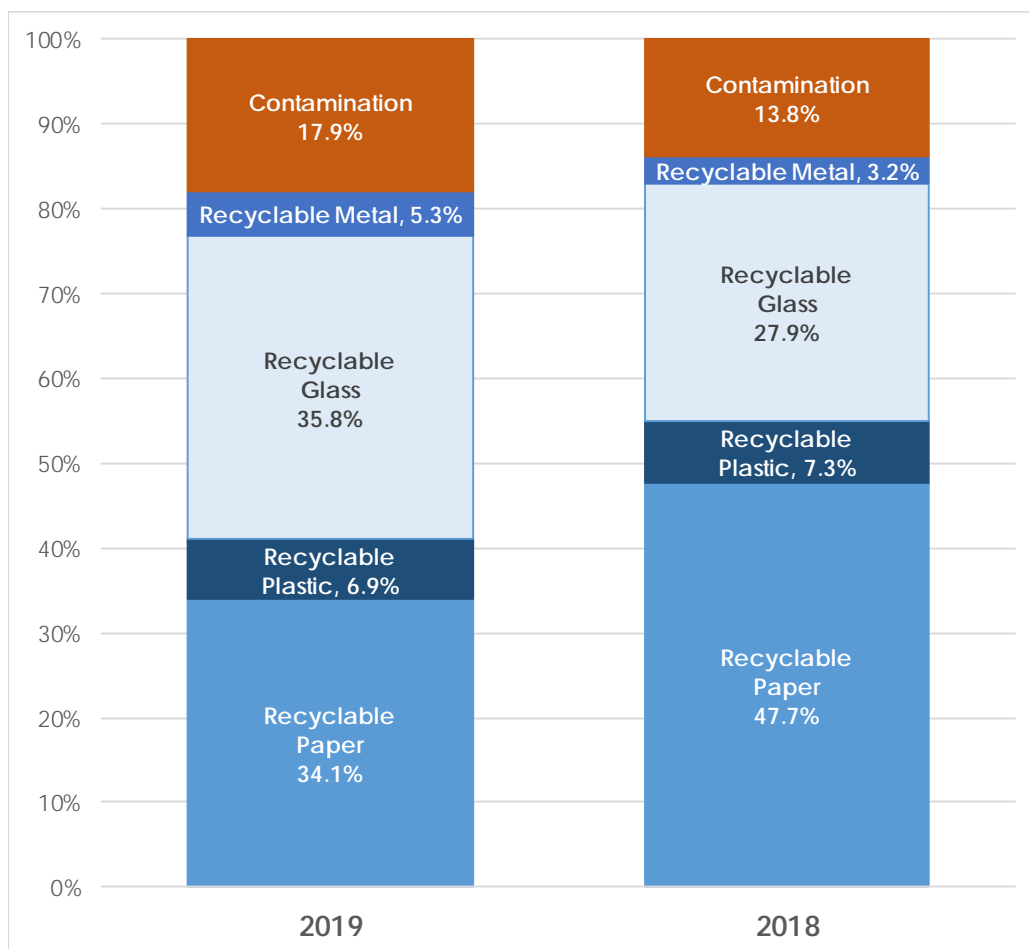
A detailed breakdown of Monterey City's recycling stream by category, material type in percentage, and the 90 percent confidence interval is presented by material type in **Exhibit 37.**

Exhibit 37. Detailed Recycling Composition from Monterey City

CITY OF MONTEREY					
Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	11.2%	6	20	34
	White Office Paper	1.2%	<0.5	2	4
	Mixed Paper	12.6%	17	22	28
	Paper Board	4.1%	5	7	9
	Old Newspaper	4.7%	4	8	13
	Waxed Cartons	0.2%	<0.5	0	1
Plastic	PET	2.1%	3	4	5
	PET Thermoform	0.9%	1	2	2
	Natural HDPE	0.5%	1	1	1
	Pigment HDPE	0.7%	<0.5	1	2
	Polypropylene #5	0.8%	1	1	2
	Mixed Plastic #3, 4, 6, 7	0.3%	<0.5	0	1
	Rigid Plastic	1.6%	1	3	4
Film Plastic	Film Plastic	1.6%	1	3	5
Glass	Mixed Glass	35.8%	50	63	75
Metal	Bi Metal	4.2%	<0.5	7	15
	Aluminum	0.7%	1	1	2
	Aluminum other	0.4%	<0.5	1	1
Organics	Organics	2.0%	3	4	4
Other	HHW	0.4%	<0.5	1	2
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	2.5%	<0.5	4	11
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.1%	<0.5	0	0
	Refuse	11.2%	14	20	25
Total		100.0%		175	
Contamination (noted in grey shading above)		17.9% +/-4.8%	23	31	40

Residual Characterization

The residual in Monterey City's recycling stream by category is presented in **Exhibit 38**. Based on the visual characterization, the most prevalent material category by percentage is Remainder/Composite Plastic, representing 2.8 percent of the overall recycling stream. Manufactured Products represent 2.5 percent of the overall recycling stream, and Organics represent 2.0 percent of the overall recycling stream.

Exhibit 38.   Composition of Residuals from Monterey City
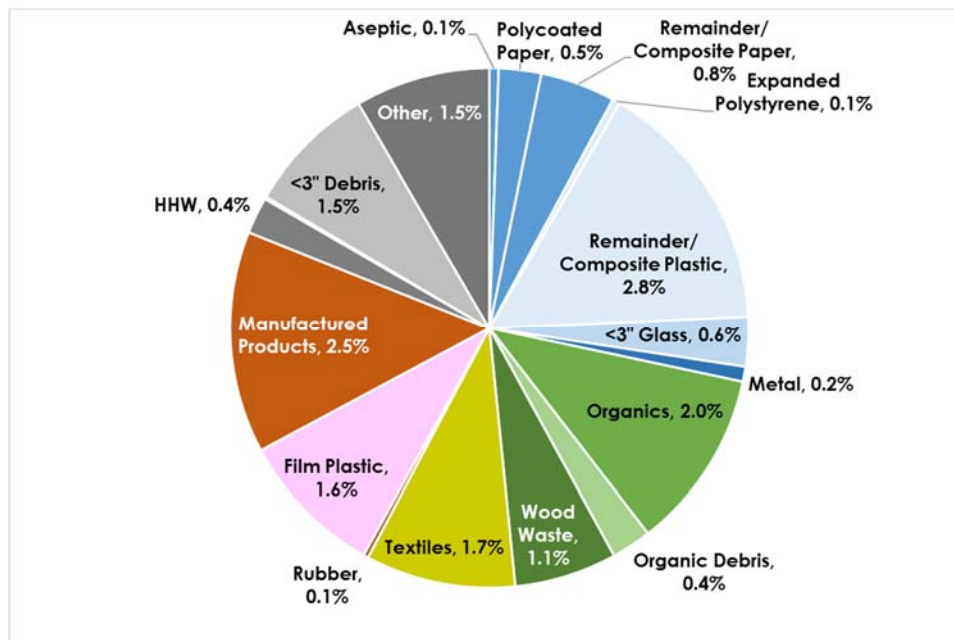
The residuals varied significantly by sector as presented in **Exhibit 39**, with residential loads having 19.0 percent residuals compared to commercial loads which had 15.3 percent residuals.

Exhibit 39.   Proportion of Residuals from Monterey City by Sector

Sector	Number of Samples	Percent
Residential Loads	7	19.0%
Commercial Loads	0	NA
Mixed Loads	3	15.3%
Total	10	17.9%

3.4   HAULER: WASTE MANAGEMENT

Waste Management is the hauler for Unincorporated Monterey County and King City. In total, SCS completed 50 recycling stream samples from cities that Waste Management services. Of the material sampled, 78.6 percent is Recyclable and 21.4 percent is Contamination as shown in **Exhibit 40**.

Exhibit 40.   Detailed Recycling Composition of Loads Hauled by Waste Management

Waste Management				
Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	35.4%	447	531	614
	White Office Paper	0.6%	3	9	14
	Mixed Paper	8.1%	94	122	150
	Paper Board	4.1%	48	61	75
	Old Newspaper	1.5%	10	23	36
	Waxed Cartons	0.2%	1	2	3
Plastic	PET	2.2%	21	32	44
	PET Thermoform	1.3%	9	19	29
	Natural HDPE	1.2%	12	18	24
	Pigment HDPE	1.2%	12	17	23
	Polypropylene #5	0.5%	6	8	9
	Mixed Plastic #3, 4, 6, 7	0.2%	2	3	4
	Rigid Plastic	2.8%	31	43	55
Film Plastic	Film Plastic	2.1%	22	32	41
Glass	Mixed Glass	16.0%	187	240	292
Metal	Bi Metal	2.8%	29	42	55
	Aluminum	0.5%	5	8	11
	Aluminum other	0.2%	2	3	4
Organics	Organics	2.2%	20	34	48
Other	HHW	0.1%	<0.5	2	4
	Medical Waste	0.0%	<0.5	0	1
	Manufactured Products	1.4%	2	21	39
	Expanded Polystyrene	0.2%	2	3	5
	Aseptic	0.1%	1	2	2
	Refuse	15.1%	185	227	268
Total		100.0%		1,500	
Contamination (noted in grey shading above)		21.4%	271	320	370

The following section examines the recycling composition by category and material type, the 90% confidence interval, and the visual characterization for cities that Waste Management services.

3.4.1 Unincorporated Monterey County

Recycling Composition

The composition of Unincorporated Monterey County's recycling stream by category is presented in **Exhibit 41**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 44.8 percent of the overall recycling stream. Recyclable Glass represents 18.8 percent of the overall recycling stream, and Contamination represents 22.4 percent of the overall recycling stream.

Exhibit 41. Composition of Recyclable Loads from Unincorporated Monterey County, 2019 and 2018
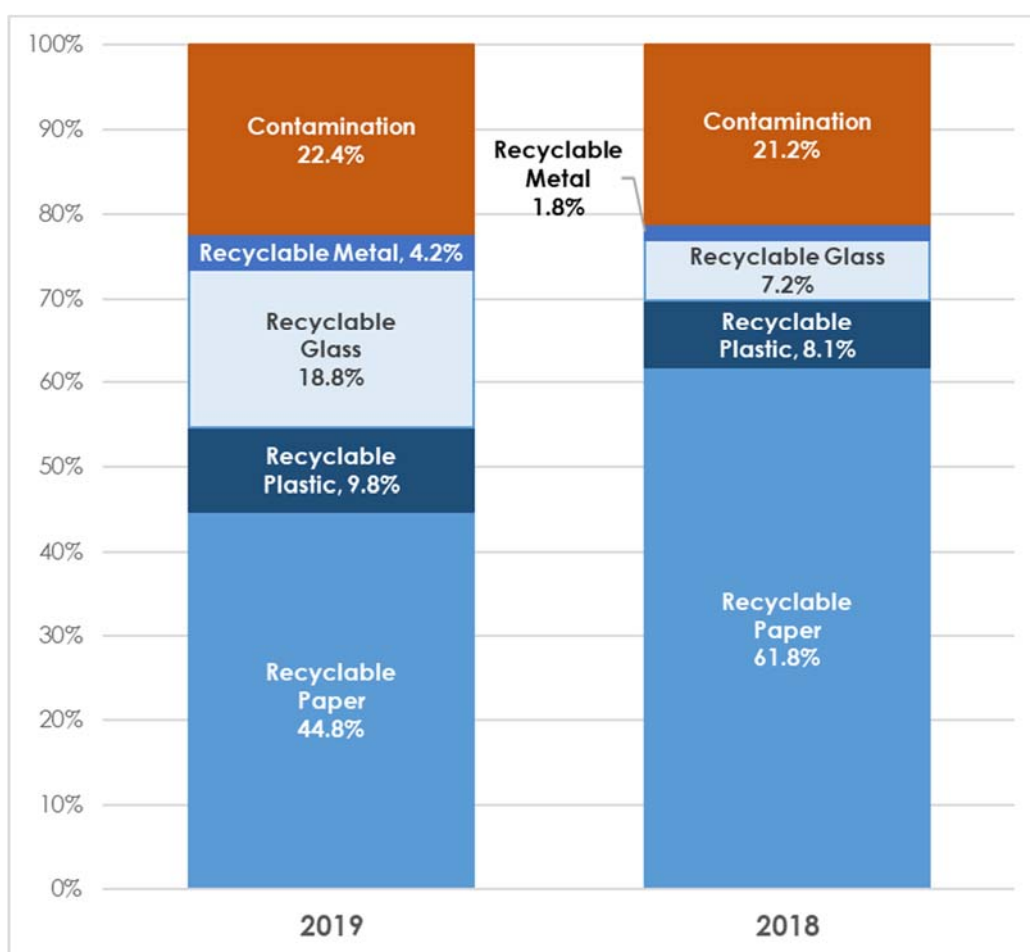
A detailed breakdown of MCE's commercial recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 42.**

Exhibit 42. Detailed Recycling Composition from Unincorporated Monterey County

UNINCORP MONTEREY					
Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	28.5%	315	385	454
	White Office Paper	0.7%	1	9	18
	Mixed Paper	9.4%	97	127	158
	Paper Board	4.8%	49	64	79
	Old Newspaper	1.3%	10	17	24
	Waxed Cartons	0.2%	1	3	4
Plastic	PET	2.5%	21	34	47
	PET Thermoform	1.5%	9	21	33
	Natural HDPE	1.0%	11	14	17
	Pigment HDPE	1.0%	9	13	16
	Polypropylene #5	0.6%	6	8	10
	Mixed Plastic #3, 4, 6, 7	0.2%	2	3	5
	Rigid Plastic	3.0%	32	40	49
Film Plastic	Film Plastic	2.0%	<0.5	27	82
Glass	Mixed Glass	18.8%	239	254	269
Metal	Bi Metal	3.3%	41	45	48
	Aluminum	0.6%	7	8	9
	Aluminum other	0.2%	<0.5	3	21
Organics	Organics	2.5%	30	33	36
Other	HHW	0.2%	2	2	3
	Medical Waste	0.0%	<0.5	0	76
	Manufactured Products	1.7%	<0.5	23	95
	Expanded Polystyrene	0.3%	NA	4	NA
	Aseptic	0.2%	NA	2	NA
	Refuse	15.5%	158	210	261
Total		100.0%		1,350	
Contamination (noted in grey shading above)		22.4% +/-3.7%	252	302	352

Residual Characterization

The residual in Unincorporated Monterey County's recycling stream by category is presented in **Exhibit 43**. Based on the visual characterization, the most prevalent material category by percentage is Other, representing 5.3 percent of the overall recycling stream. Textiles represent 2.7 percent of the overall recycling stream and Organics represent 2.5 percent of the overall recycling stream.

Exhibit 43. Composition of Residuals from Unincorporated Monterey County
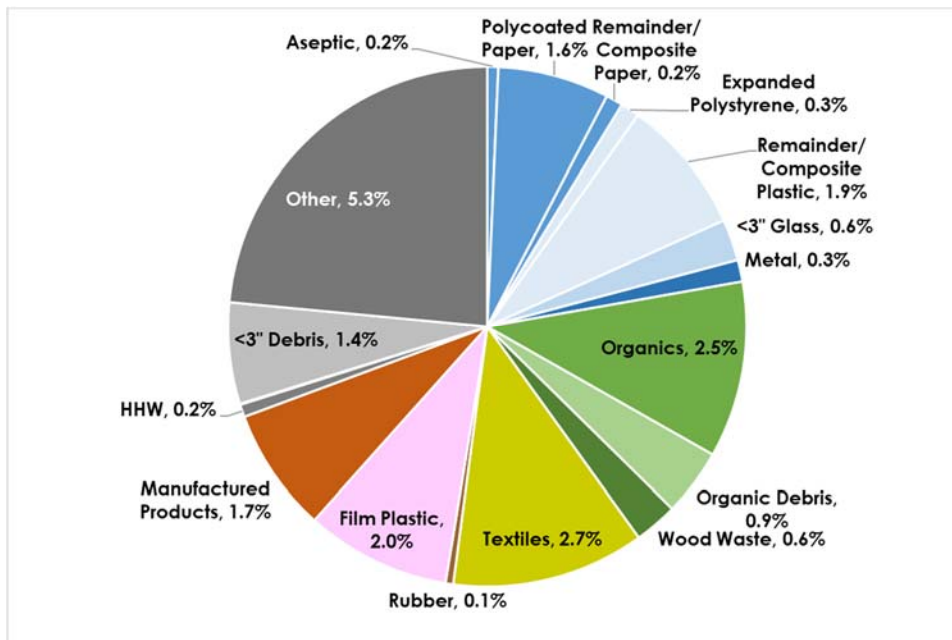
The residuals did not vary significantly by sector as presented in **Exhibit 44**, with residential loads having 22.3 percent residuals compared to commercial and mixed loads which had 21.9 and 30.0 percent residuals, respectively.

Exhibit 44. Proportion of Residuals from Unincorporated Monterey County by Sector

Sector	Number of Samples	Percent
Residential Loads	26	22.3%
Commercial Loads	13	21.9%
Mixed Loads	1	30.0%
Total	40	22.4%

3.4.2 King City Commercial Recycling Study Results

Recycling Composition

The composition of King City's commercial recycling stream by category is presented in **Exhibit 45**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 70 percent of the overall recycling stream. Recyclable Plastic represents 7.3 percent of the overall recycling stream, and Contamination represents 17.3 percent of the overall recycling stream.

Exhibit 45.   Composition of Recyclable Loads from King City, 2019 and 2018
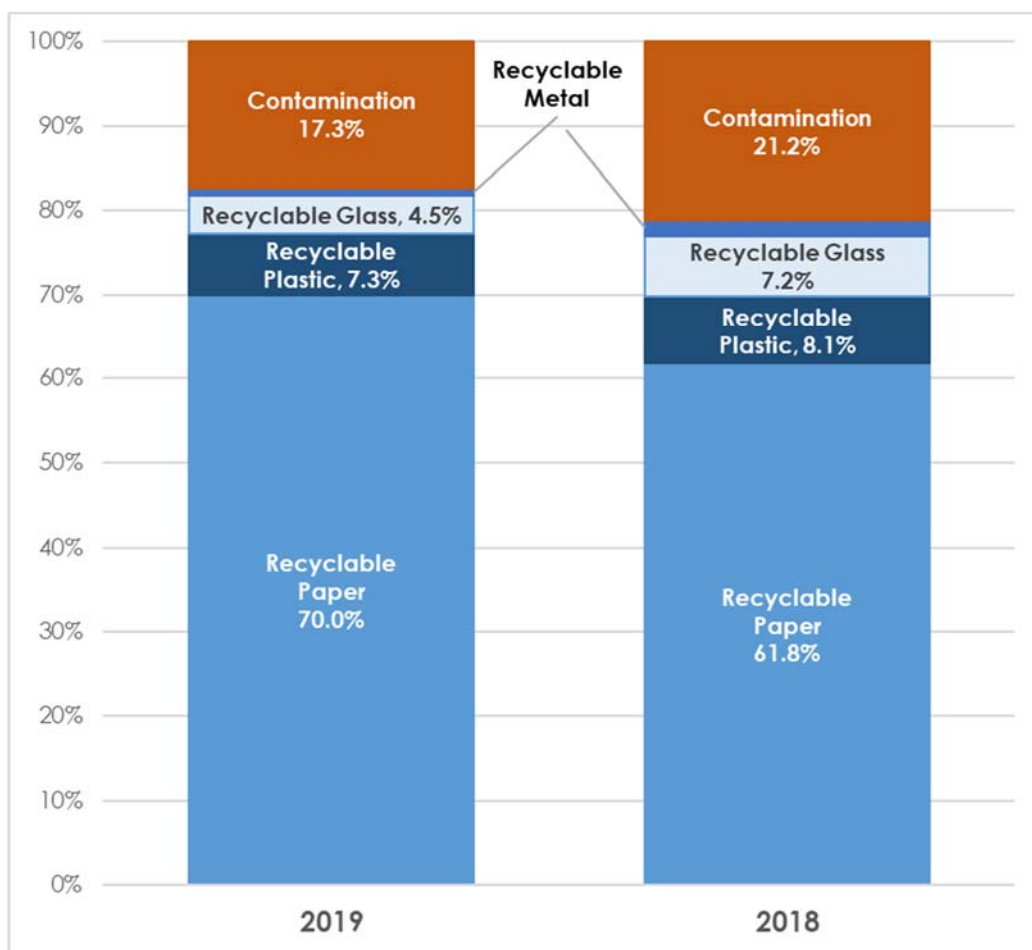
 A detailed breakdown of King City's commercial recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 46.**

Exhibit 46. Detailed Recycling Composition from King City

| Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	63.0%	79	94	110
	White Office Paper	0.1%	<0.5	0	1
	Mixed Paper	2.9%	<0.5	4	8
	Paper Board	1.4%	1	2	3
	Old Newspaper	2.7%	<0.5	4	14
	Waxed Cartons	0.0%	<0.5	0	0
Plastic	PET	0.8%	1	1	2
	PET Thermoform	0.1%	<0.5	0	0
	Natural HDPE	1.9%	<0.5	3	6
	Pigment HDPE	2.0%	<0.5	3	6
	Polypropylene #5	0.2%	<0.5	0	1
	Mixed Plastic #3, 4, 6, 7	0.1%	<0.5	0	0
	Rigid Plastic	2.2%	1	3	6
Film Plastic	Film Plastic	2.5%	<0.5	4	7
Glass	Mixed Glass	4.5%	1	7	13
Metal	Bi Metal	0.6%	<0.5	1	1
	Aluminum	0.2%	<0.5	0	0
	Aluminum other	0.0%	<0.5	0	0
Organics	Organics	1.4%	<0.5	2	4
Other	HHW	0.0%	NA	0	NA
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	0.0%	NA	0	NA
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.0%	<0.5	0	0
	Refuse	13.3%	10	20	30
Total		100.0%		150	
Contamination (noted in grey shading above)		17.3% +/-7.2%	15	26	37

Residual Characterization

The residual in King City's commercial recycling stream by category is presented in **Exhibit 47**. Based on the samples collected, the most prevalent material category by percentage is Remainder/Composite Plastic, representing 3.9 percent of the overall recycling stream. Textile and Other each represent 2.6 percent of the overall recycling stream.

Exhibit 47. Composition of Residuals from King City
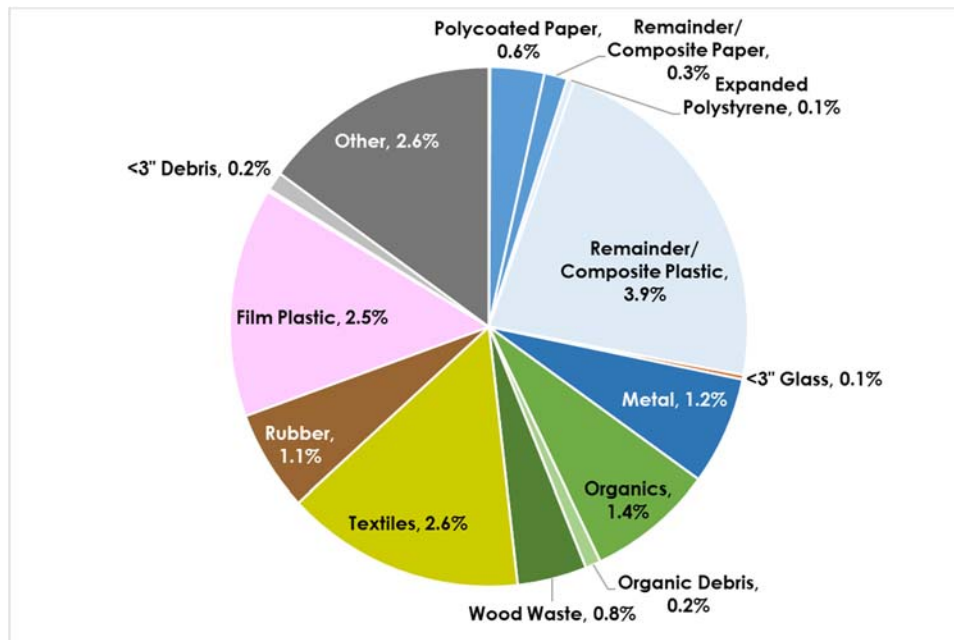
The residuals varied slightly by sector as presented in **Exhibit 48**, with commercial loads having 16.8 percent residuals compared to mixed loads which had 19.4 percent residuals.

Exhibit 48. Proportion of Residuals from King City by Sector

Sector	Number of Samples	Percent
Residential Loads	0	NA
Commercial Loads	8	16.8%
Mixed Loads	2	19.4%
Total	10	17.3%

3.5 HAULER: REPUBLIC SERVICES

Republic Services is the hauler for Salinas. In total, SCS completed 50 recycling stream samples from Salinas. Of the material sampled, 74.8 percent is Recyclable and 26.2 percent is contamination as shown in **Exhibit 49**.

The following section examines the recycling composition by category and material type, the 90% confidence interval, and the visual characterization for Salinas.

3.5.1 Salinas Recycling Composition

Recycling Composition

The composition of Salinas's recycling stream by category is presented in **Exhibit 49**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 44.9 percent of the overall recycling stream. Recyclable Glass represents 12.1 percent of the overall recycling stream, and Contamination represents 26.2 percent of the overall recycling stream.

Exhibit 49. Composition of Recyclable Loads from Salinas, 2019 and 2018
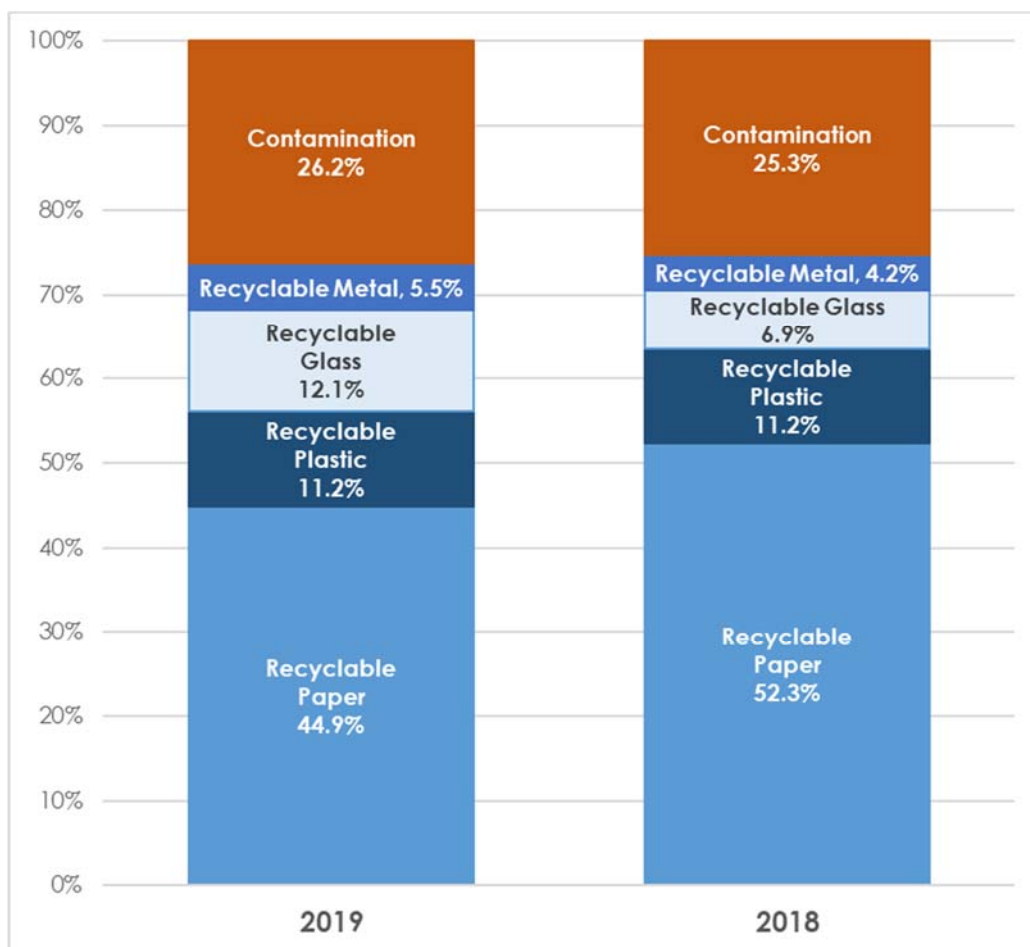
A detailed breakdown of Salinas's recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 50.**

Exhibit 50.   Detailed Recycling Composition from Salinas

SALINAS		Average Composition	Monthly Tons (90% Confidence)		
Category	Material Type		Low	Average	High
Paper	Uncoated Corrugated Cardboard	28.3%	378	453	529
	White Office Paper	1.0%	10	16	22
	Mixed Paper	11.0%	151	176	200
	Paper Board	3.1%	43	49	55
	Old Newspaper	1.4%	17	23	29
	Waxed Cartons	0.1%	1	2	3
Plastic	PET	1.3%	17	20	24
	PET Thermoform	1.6%	10	26	42
	Natural HDPE	0.9%	12	14	17
	Pigment HDPE	1.3%	16	21	26
	Polypropylene #5	0.8%	6	13	20
	Mixed Plastic #3, 4, 6, 7	0.4%	4	6	9
	Rigid Plastic	4.9%	71	78	84
Film Plastic	Film Plastic	1.7%	<0.5	28	64
Glass	Mixed Glass	12.1%	174	194	214
Metal	Bi Metal	5.0%	79	79	80
	Aluminum	0.2%	<0.5	3	6
	Aluminum other	0.4%	<0.5	6	20
Organics	Organics	4.1%	62	66	70
Other	HHW	0.4%	6	7	7
	Medical Waste	0.0%	<0.5	0	63
	Manufactured Products	4.0%	24	64	104
	Expanded Polystyrene	0.1%	<0.5	2	327
	Aseptic	0.1%	NA	2	NA
	Refuse	15.7%	210	252	294
Total		100.0%		1,600	
Contamination (noted in grey shading above)		26.2% +/-2.6%	378	420	462

Residual Characterization

The residual of Salinas's recycling stream by category is presented in **Exhibit 51.** Based on the samples collected, the most prevalent material category by percentage are Textiles, representing 5.5 percent of the overall recycling stream. Organics represents 4.1 percent of the overall recycling stream, and Manufactured Products represents 4.0 percent of the overall recycling stream.

Exhibit 51. Composition of Residuals from Salinas
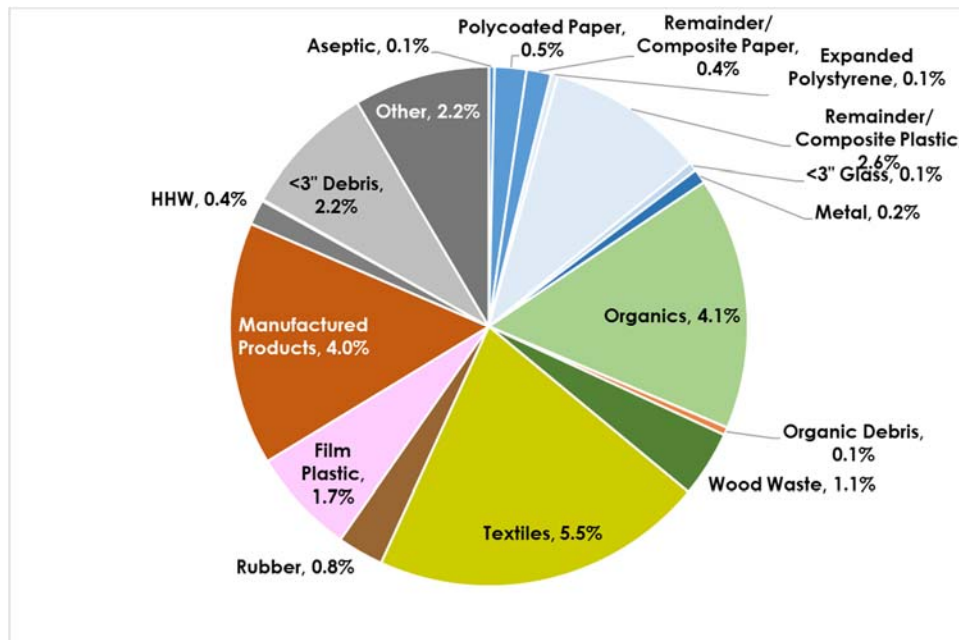
The residuals varied significantly by sector as presented in **Exhibit 52**, with residential loads having 33.8 percent residuals compared to commercial loads which had 20.2 percent residuals.

Exhibit 52. Proportion of Residuals from Salinas by Sector

Sector	Number of Samples	Percent
Residential Loads	10	33.8%
Commercial Loads	16	20.2%
Mixed Loads	24	27.1%
Total	50	26.2%

3.6   HAULER: CITY OF WATSONVILLE PUBLIC WORKS

The City of Watsonville is the hauler for Watsonville. In total, SCS completed 10 recycling stream samples from the City of Watsonville. Of the material sampled, 81.3 percent is Recyclable and 18.7 percent is Contamination as shown in **Exhibit 53**.

The following section examines the recycling composition by category and material type, the 90% confidence interval, and the visual characterization for Watsonville.

3.6.1   Watsonville

Recycling Composition

The composition of Watsonville commercial recycling stream by category is presented in **Exhibit 53**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 43.0 percent of the overall recycling stream. Recyclable Glass represents 17.1 percent of the overall recycling stream, and Contamination represents 18.7 percent of the overall recycling stream.

Exhibit 53.   Composition of Recyclable Loads from Watsonville, 2019 and 2018
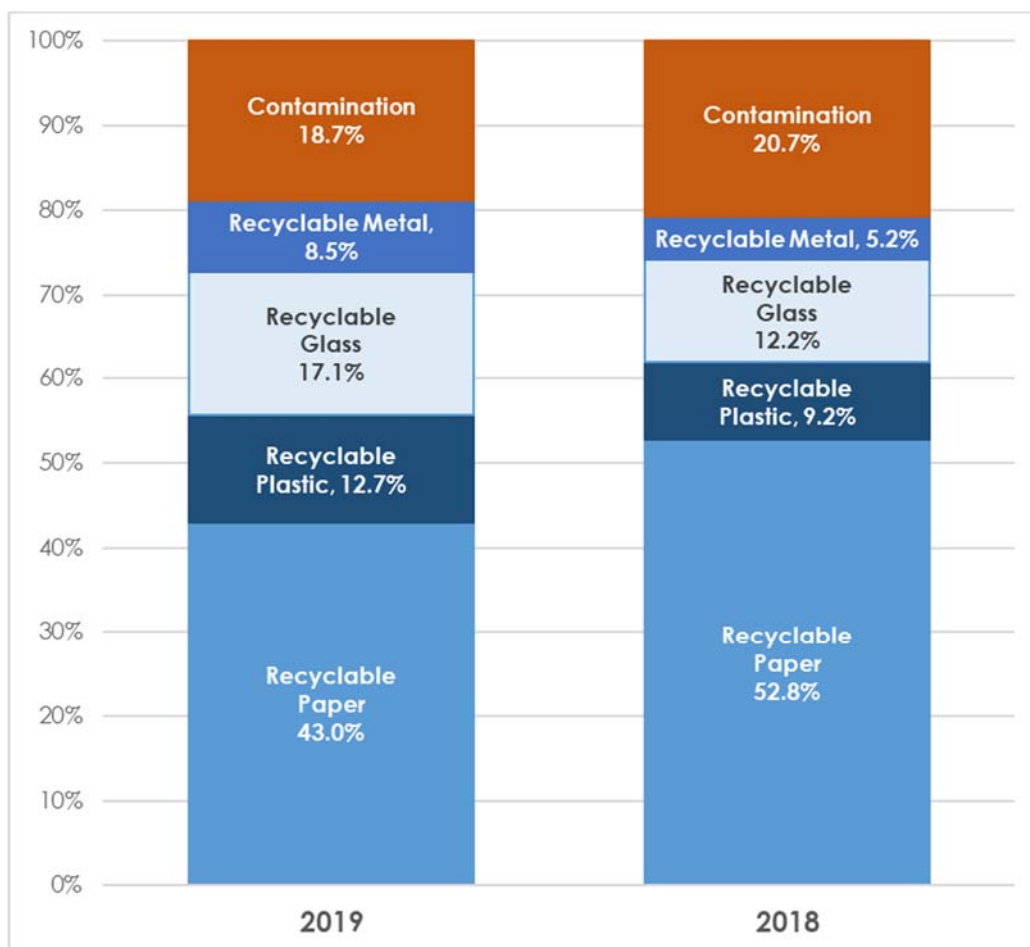
A detailed breakdown of Watsonville's commercial recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 54.**

Exhibit 54. Detailed Recycling Composition from Watsonville

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	35.3%	22	42	63
	White Office Paper	0.2%	<0.5	0	1
	Mixed Paper	4.7%	3	6	9
	Paper Board	2.1%	1	3	4
	Old Newspaper	0.7%	<0.5	1	2
	Waxed Cartons	0.0%	NA	0	NA
Plastic	PET	2.2%	1	3	4
	PET Thermoform	0.3%	<0.5	0	1
	Natural HDPE	1.4%	1	2	3
	Pigment HDPE	1.6%	1	2	3
	Polypropylene #5	0.4%	<0.5	0	1
	Mixed Plastic #3, 4, 6, 7	0.4%	<0.5	1	1
	Rigid Plastic	6.3%	2	8	13
Film Plastic	Film Plastic	0.7%	<0.5	1	1
Glass	Mixed Glass	17.1%	10	20	31
Metal	Bi Metal	7.6%	5	9	13
	Aluminum	0.4%	<0.5	1	1
	Aluminum other	0.5%	<0.5	1	1
Organics	Organics	1.9%	<0.5	2	6
Other	HHW	0.1%	<0.5	0	1
	Medical Waste	0.0%	<0.5	0	0
	Manufactured Products	1.6%	<0.5	2	4
	Expanded Polystyrene	0.1%	<0.5	0	0
	Aseptic	0.6%	<0.5	1	2
	Refuse	13.7%	7	16	25
Total		100.0%		120	
Contamination (noted in grey shading above)		18.7% +/-7.1%	14	22	31

Residual Characterization

The residual in Watsonville's commercial recycling stream by category is presented in **Exhibit 55.** Based on the samples collected, the most prevalent material category by percentage is Other representing 4.4 percent of the overall recycling stream. Textiles represent 3.4 percent of the overall recycling stream, and Remainder/Composite Plastic represents 2.6 percent of the overall recycling stream.

Exhibit 55.   Composition of Residuals from Watsonville
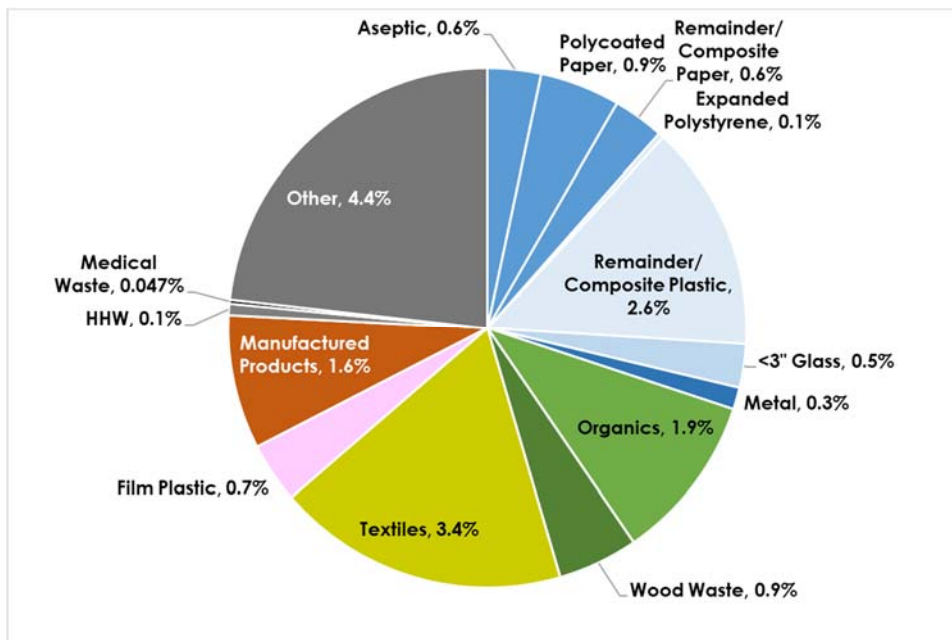
The residuals varied significantly by sector as presented in **Exhibit 56**, with residential loads having 25.1 percent residuals compared to commercial loads which had 12.8 percent residuals.

Exhibit 56.   Proportion of Residuals from Watsonville by Sector

Sector	Number of Samples	Percent
Residential Loads	4	25.1%
Commercial Loads	4	12.8%
Mixed Loads	2	18.0%
Total	10	18.7%

3.7 HAULER: RECOLOGY

Recology is the hauler for San Benito County. In total, SCS completed 20 recycling stream samples from San Benito County. Of the material sampled, 74.6 percent is Recyclable and 25.4 percent is Contamination as shown in **Exhibit 57**.

The following section examines the recycling composition by category and material type, the 90% confidence interval, and the visual characterization for San Benito County.

3.7.1 San Benito County

Recycling Composition

The composition of San Benito County's recycling stream by category is presented in **Exhibit 57**. Based on the samples collected, the most prevalent material category by percentage is Recyclable Paper, representing 50.2 percent of the overall recycling stream. Recyclable Glass represents 11.7 percent of the overall recycling stream, and Contamination represents 25.4 percent of the overall recycling stream.

Exhibit 57. Composition of Recyclable Loads from San Benito, 2019 and 2018
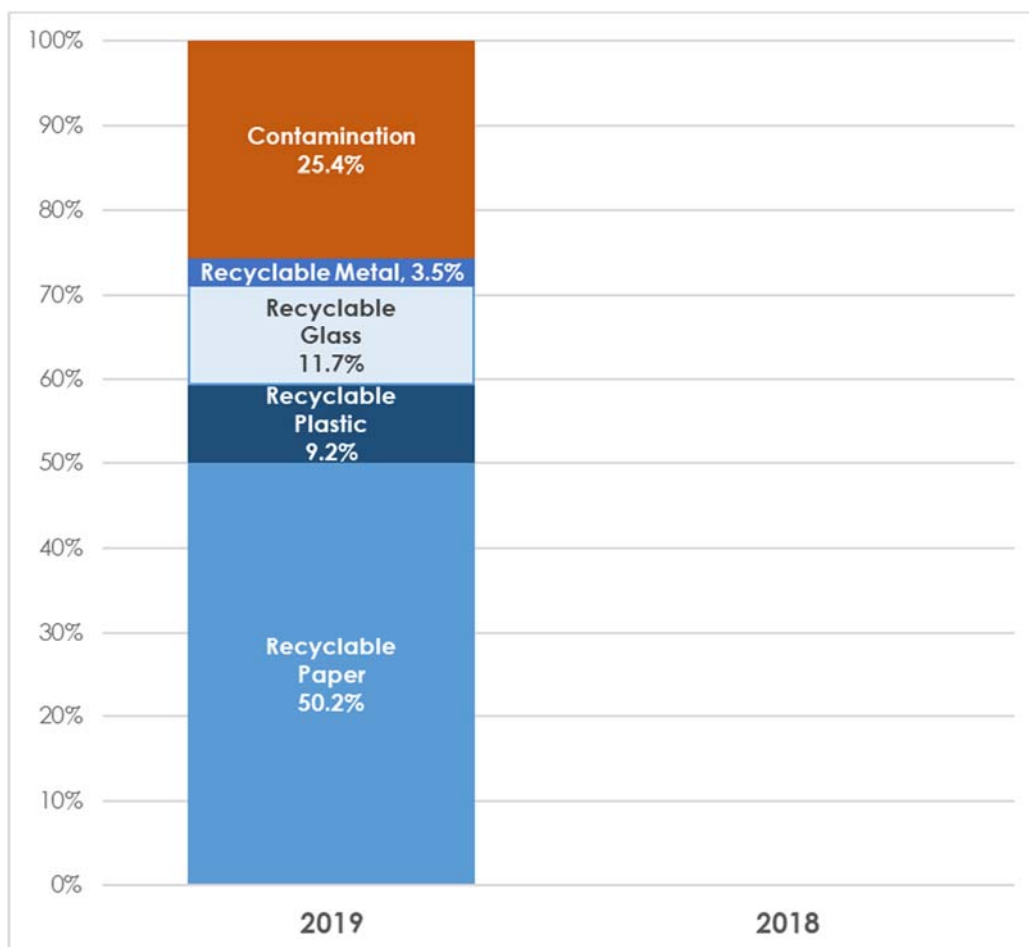
A detailed breakdown of San Benito County's commercial recycling stream by category, material type in percentage, and the 90% confidence interval is presented by material type in **Exhibit 58.**

Exhibit 58. Detailed Recycling Composition from San Benito

Category	Material Type	Average Composition	Monthly Tons (90% Confidence)		
			Low	Average	High
Paper	Uncoated Corrugated Cardboard	27.8%	77	116	154
	White Office Paper	0.6%	<0.5	2	5
	Mixed Paper	16.0%	42	67	91
	Paper Board	4.2%	13	18	22
	Old Newspaper	1.4%	3	6	8
	Waxed Cartons	0.2%	1	1	1
Plastic	PET	1.9%	6	8	10
	PET Thermoform	0.6%	2	3	3
	Natural HDPE	1.1%	3	5	6
	Pigment HDPE	1.3%	4	5	7
	Polypropylene #5	0.6%	2	2	3
	Mixed Plastic #3, 4, 6, 7	0.7%	<0.5	3	6
	Rigid Plastic	3.0%	10	12	14
Film Plastic	Film Plastic	2.0%	<0.5	8	23
Glass	Mixed Glass	11.7%	45	49	53
Metal	Bi Metal	2.8%	11	12	12
	Aluminum	0.4%	1	2	2
	Aluminum other	0.2%	<0.5	1	12
Organics	Organics	5.6%	23	23	23
Other	HHW	0.1%	<0.5	0	5
	Medical Waste	0.5%	<0.5	2	6
	Manufactured Products	1.2%	<0.5	5	22
	Expanded Polystyrene	0.2%	NA	1	NA
	Aseptic	0.2%	NA	1	NA
	Refuse	15.8%	41	66	90
Total		100.0%		416	
Contamination (noted in grey shading above)		25.4% +/-5.7%	82	106	130

Residual Characterization

The residual in San Benito County's commercial recycling stream by category is presented in **Exhibit 59.** Based on the samples collected, the most prevalent material category by percentage are Organics, representing 5.6 percent of the overall recycling stream. Other represents 4.3 percent of the overall recycling stream, and Remainder/Composite Plastic represents 3.1 percent of the overall recycling stream.

Exhibit 59.   Composition of Residuals from San Benito
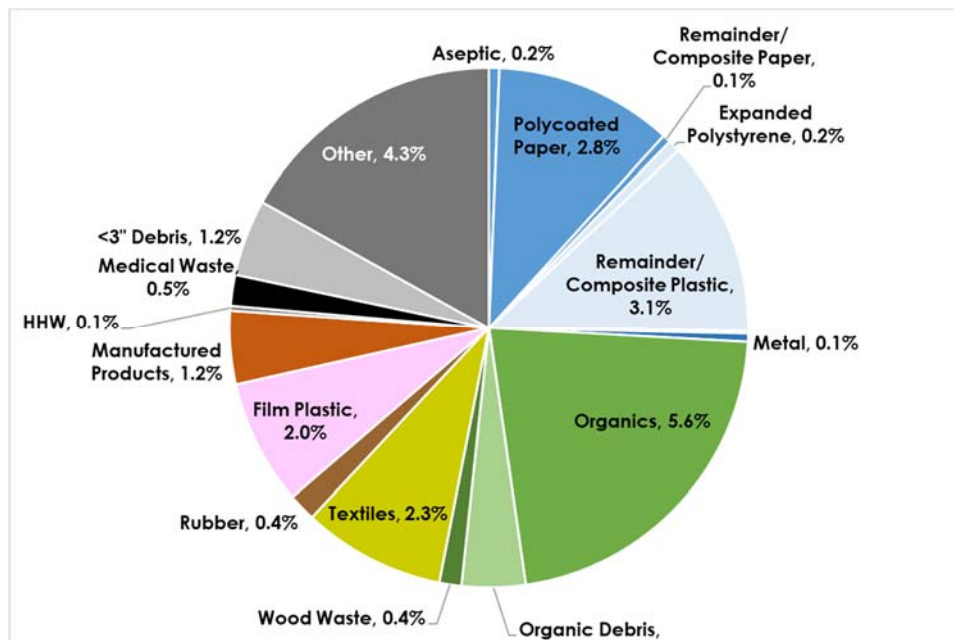
The residuals varied significantly by sector as presented in **Exhibit 60**, with residential loads having 28.0 percent residuals compared to commercial loads which had 8.1 percent residuals.

Exhibit 60.   Proportion of Residuals from San Benito by Sector

Sector	Number of Samples	Percent
Residential Loads	11	28.0%
Commercial Loads	4	8.1%
Mixed Loads	5	33.8%
Total	20	25.4%