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**DATE:** October 10, 2024

**TO:** Programs & Administration Committee  
Recycling Board

**FROM:** Emily Alvarez, Program Manager

**SUBJECT:** 2023-24 Waste Characterization Study Overview

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## **SUMMARY**

As part of the FY 22-23 Agency budget, the Waste Management Authority (WMA) approved funding for a Waste Characterization Study (WCS) and awarded a contract to SCS Engineers for completion of the study. A WCS identifies predominant materials in the waste stream and changes in composition over time and will be used by StopWaste and member agencies to refine programs and track progress toward the long-term goal of landfill obsolescence and upstream waste prevention. The study investigated the landfill, recycling, and organics streams — the first StopWaste WCS to collect data from all three streams. This memo summarizes several important trends from the data that may influence the Agency’s work.

## **BACKGROUND**

A WCS is a snapshot in time of the materials that are consumed in Alameda County and ultimately comprise our material streams. It can contribute to informing Agency priorities by highlighting the largest components of the landfill, recycling, and organics streams in order to understand what materials are commonly disposed of, how accurately those materials are sorted, and to what extent the organics and recycling streams are contaminated. In addition to these general study purposes, the WCS will satisfy the organics processing capacity planning requirements of SB 1383. The following sections present key takeaways from the 2023-24 study. The full study can be found at: [www.stopwaste.org/resource/alameda-county-2024-waste-characterization-study](http://www.stopwaste.org/resource/alameda-county-2024-waste-characterization-study).

## **DISCUSSION**

### Sampling Methodology

Staff and SCS identified a list of approximately 70 material types that align with both standard WCS practices and the Agency’s priorities and programs. The main study included samples of the materials on this list by weight to understand the makeup of each stream. To further understand additional metrics that affect our work, the study also included a sub-sort of certain material categories to further identify the materials and get counts in addition to weight. The data was also processed to examine consumption patterns and sorting behavior.

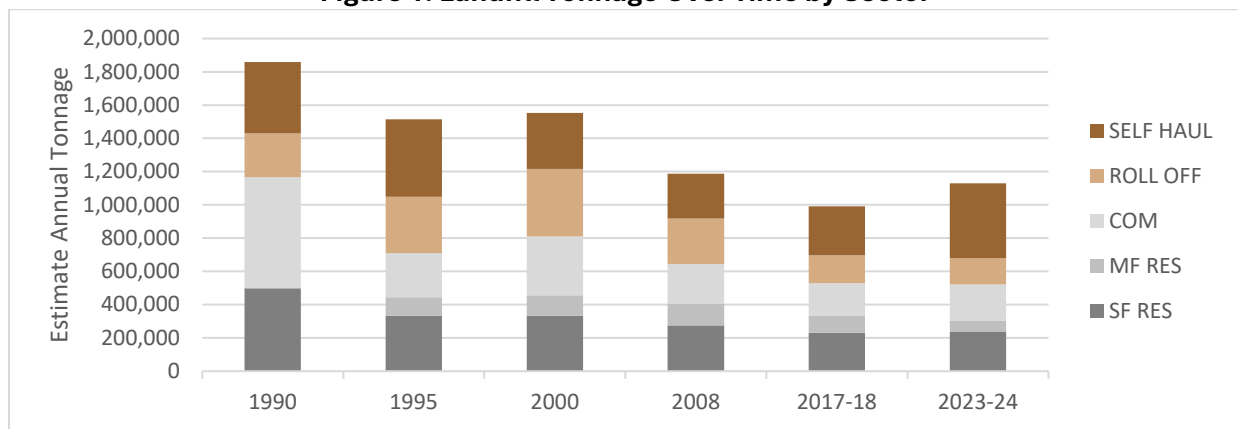
From June 2023 to June 2024, the consultant team sorted over 650 samples at facilities throughout the county across the landfill, recycling, and organics streams. The landfill stream was broken

down into single-family residential, multi-family residential, commercial, self-haul, and roll-off<sup>1</sup> sectors. The recycling and organics streams include residential and commercial data. In the final report and the charts below, the landfill stream is referred to as Municipal Solid Waste (MSW), recycling as Source Separated Recycling (SSR), and organics as Source Separated Organics (SSO).

### WCS Results

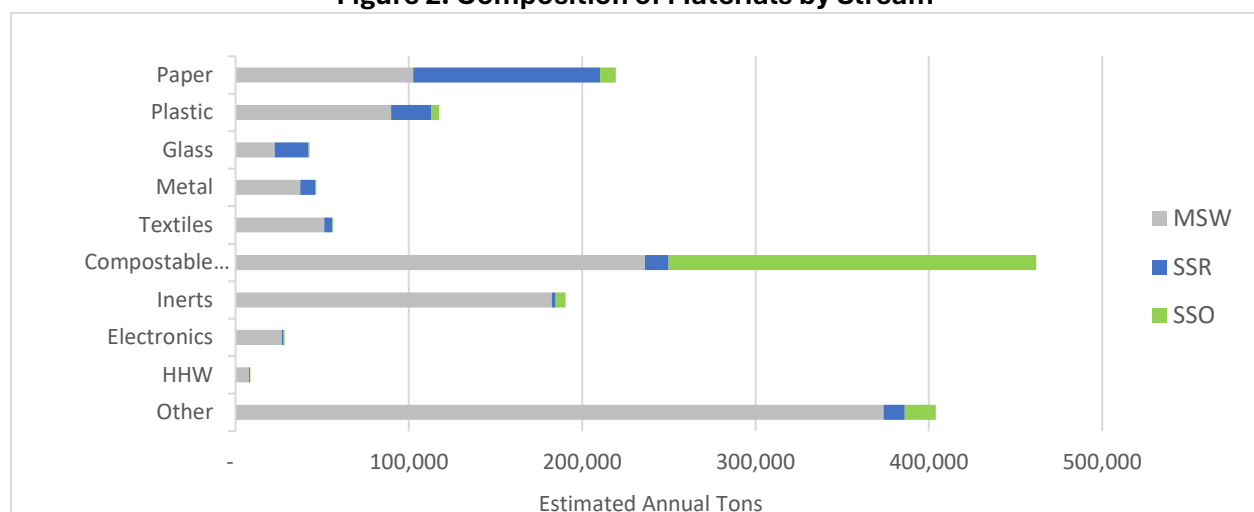
Figure 1 below shows the annual tonnage of material collected in the landfill stream in Alameda County Waste Characterization Studies since 1990. Since 1990, there has been a decreasing trend in the amount of material sent to landfill. This decreasing trend is present despite an increase in the County’s population over the same time period. In 1990, Alameda County had approximately 1.3 million residents, which equates to about 1.43 tons per person per year. In 2023, the County grew to about 1.6 million people, which is 0.98 tons per person per year.

**Figure 1. Landfill Tonnage Over Time by Sector**



The single- and multi-family residential, commercial, and roll-off sectors have remained steady since the last WCS in 2017-18. The most recent study shows an increase in self-hauled materials. As noted previously, all other studies done by the Agency have only looked at the landfill stream, therefore historical trends are not available for the recycling and organics streams. Even when adding the 2023-24 recycling and organics to the landfill tonnage, the total amount of material across all three streams is still less than just the landfill stream in 1990.

**Figure 2. Composition of Materials by Stream**



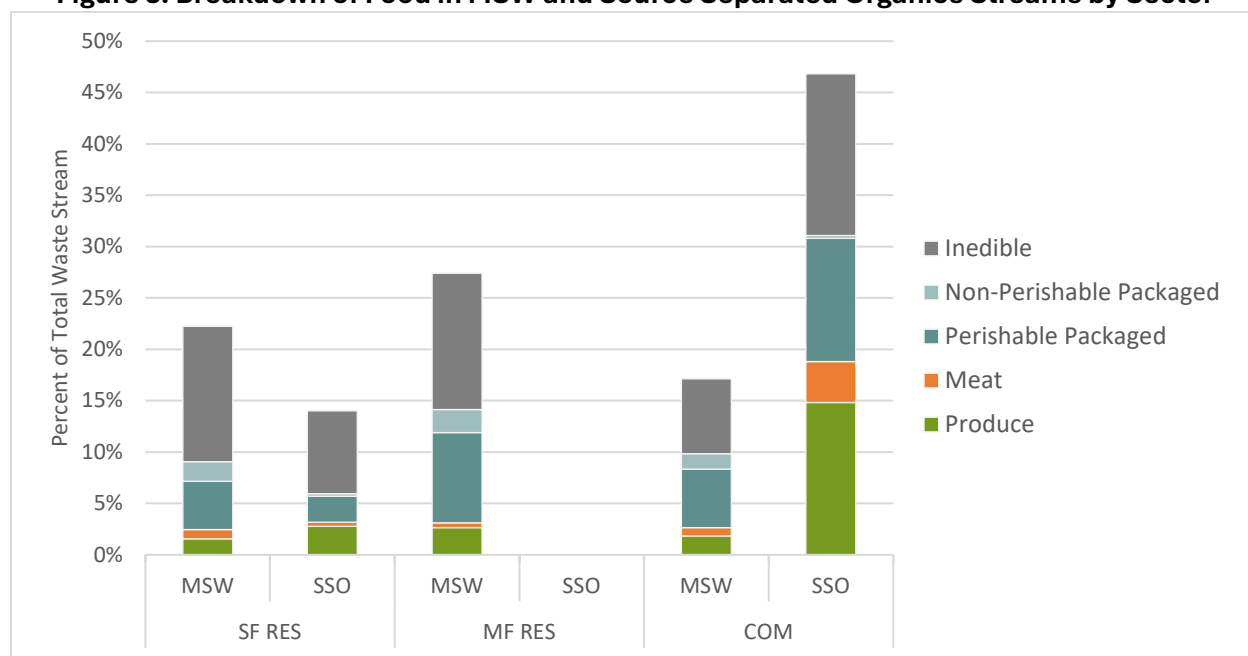
<sup>1</sup> The roll-off sector is material collected in dumpsters.

Figure 2 above shows a breakdown of the ten primary material categories in the WCS and the annual tonnage across the landfill, recycling, and organics streams. The largest category of material is Compostable Organics, followed by Other. Note that Other is a catchall category for materials that are either unidentifiable or do not fit into a different category. About 50% of Compostable Organics are found in the landfill stream. Paper is the top category in the recycling stream.

### Significant Trends

Unfortunately, food in the landfill and edible food waste persists as issues in the 2023-24 study. Approximately 47% of the Compostable Organics found in the landfill stream is Food. Figure 3 below shows a breakdown of what kind of Food is being found in both the landfill and organics streams by sector. Note that organic stream data is not available for multi-family residential and are combined with either the single-family residential or commercial streams, depending on the collection route. The majority of Food, except for the commercial organics stream, is considered Inedible. Across all streams and sectors, Perishable Packaged Foods is the next largest category. This includes items such as baked goods, packaged produce, or premade food items (e.g., burritos, salad bar, or rotisserie chicken).

**Figure 3. Breakdown of Food in MSW and Source Separated Organics Streams by Sector**



Related to edible food waste, it also appears that edible perishable food is wasted more often than non-perishable or shelf stable items (e.g., cans of beans, peanut butter, or uncooked pasta). This is logical, since shelf stable items last longer and there is more time to consume them compared to items that spoil quickly. This is especially true in the commercial organics stream, where Edible Produce, Meat, and Perishable Packaged food are all disposed of at a significantly higher rate than the residential sectors. However, in the commercial sector, most of this Food is fortunately winding up in the organics stream versus the landfill.

Another trend in the 2023-24 study is the presence of Film Plastic across all streams and sectors. Film Plastic is the top material in the Plastics category and comprises about 2.8% of the annual waste stream, despite not being a heavy material. Commercial landfill (14,852 tons) and single-family residential landfill (14,187 tons) are the sectors with the highest amount of Film Plastic.

While the specific type of Film Plastic is unknown, in commercial, this is likely to include a significant amount of pallet wrap. For residential, it is more likely to be film from wrapping around consumer products, such as toilet paper, paper towels, or cases of soda. The Film Plastic category does not include plastic or compostable plastic grocery checkout bags or produce bags, which are included in their own subcategories. Film Plastic is a particularly problematic material since it is not easily recyclable, can get caught in machinery, and is difficult to remove during organics processing.

As shown in Figure 1, self-haul tonnage has increased over time. In the 2023-24 study, it comprised about 28.6% of the total waste stream. Self-haul is when individuals bring their waste to a transfer station and versus being collected curbside or source-separated for recycling or reuse. Since roll-off and self-haul loads are usually made up of fewer, but much heavier items, they cannot be hand sorted in the same methodology of the rest of the study and instead are visually characterized. Therefore, despite being a substantial portion of the waste stream, we have less detail about it than the residential and commercial sectors. This is likely where material from garage clean-outs and construction and demolition waste can be found. As such, the majority of the self-haul sector is Inerts<sup>2</sup> and Other. With few projects currently focusing on this sector, the Agency intends to investigate more into what makes up this stream and how we may potentially address it.

### Potential Areas of Focus

The data in the WCS helps the Agency understand progress, but also sets an important baseline for the recycling and organics streams, as this data has not been collected before. Additionally, the trends described above will help guide the Agency's projects and priorities. This section describes several examples of issues that are important to address to reach the goal of landfill obsolescence outlined in the Alameda County Integrated Waste Management Plan (CoIWMP).

### Contamination Issues

Contamination of the recycling and organics streams is a hurdle to processing materials into marketable commodities and achieving true waste diversion. If the quality of these streams is poor, materials may ultimately end up in the landfill, despite being source separated. Certain contaminants found in the WCS can easily be identified by weight, as this is the primary metric in such studies. For example, the second largest category of non-compostable materials (first being Other) in the WCS is Inerts, specifically Crushable Inerts and Treated Wood Waste. Treated Wood Waste may be especially problematic as pressure-treated wood can leach chemicals into the organics. Other contaminants may not be significant by weight but can have an outsized impact. While Non-Automotive Batteries make up only 0.03% of the recycling stream, a single lithium-ion battery can start a fire that can be extremely dangerous and destructive. Similarly, Diapers and Sanitary Products are a small percentage of the recycling stream but can cause entire loads of recyclable material to be landfilled.

### Sorting Challenges

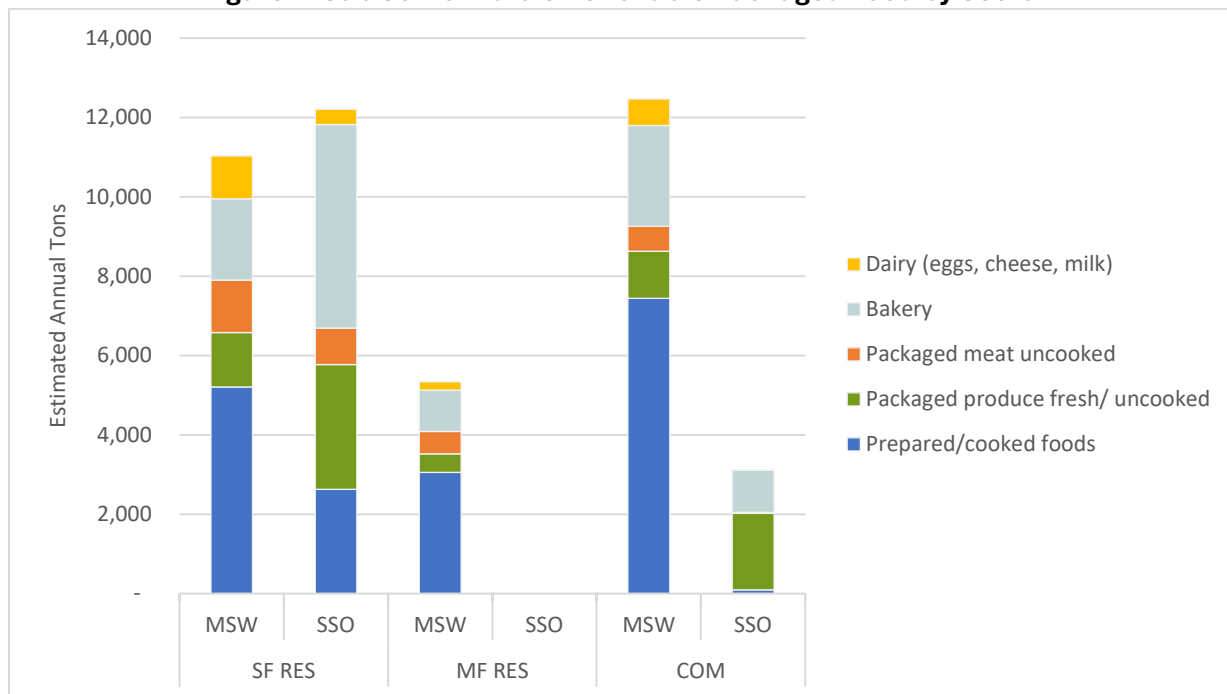
Related to contamination are issues regarding proper sorting. Packaged Foods in the WCS present behavioral challenges around sorting multi-material products. As seen in Figure 4 below, which shows a more detailed sort of the Edible Perishable Packaged Food category, there are distinct trends between the landfill and organics streams. The landfill stream is primarily Prepared/Cooked Food and the organics stream is more Packaged Produce and Bakery items. In both cases, it is

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<sup>2</sup> Inert materials are those that are neither chemically nor biologically reactive and will not decompose or decompose very slowly. Examples include concrete and brick.

clear that people are not often de-packaging their food before disposing of it. For example, not separating the foil from the remainder of a burrito before tossing in the trash or not removing the wilted salad greens from their plastic bag before putting in the compost. In the latter example, it is possible that some “wish-cycling” is happening, where the consumer knows the greens are compostable and assumes that the plastic will be separated during processing. This presents a complicated issue where we don’t want compostable food to be placed in the MSW stream, where it will be sent to landfill and produce methane emissions, but we also don’t want plastic to contaminate the organics stream potentially decreasing the quality of product.

**Figure 4. Sub Sort of Edible Perishable Packaged Food by Sector**



### Source Reduction

While it is encouraging to see the total tonnage of materials going to landfill decrease over time, even despite population growth in the county, there is still a significant amount of progress needed to meet the Agency’s goals. Diversion needs to remain a key part of the strategy, but the total amount of material consumed is important to understand in addition to where these items are disposed of. For example, 57.8% of Uncoated Corrugated Cardboard across all streams and sectors is sent to recycling, and this increases to 79.6% for materials collected curbside (excluding roll-off and self-haul). It is a positive trend to see this material most often winding up in the recycling stream, but since over 112,000 tons of Uncoated Corrugated Cardboard are consumed annually in the county, that means over 43,000 tons are still sent to landfill.

While it is necessary to properly sort and divert all possible materials from the landfill stream, there are still many materials for which the landfill stream is the current best place, as they cannot be composted or recycled. This includes many durable goods (e.g., furniture, mattresses, plastic toys, and small plug-in appliances). Some durable goods have their own category in the WCS, such as Durable Plastic Goods and Brown Goods, while many would fall into the Other category. Addressing these materials requires strategies other than proper sorting, including re-designing them to have recyclable or compostable components, focusing on reuse and repair programs, and reducing consumption overall.

A significant amount of data has been collected for the 2023-24 WCS which will allow the Agency to understand all three material streams and sorting behavior in a way that was not possible with previous landfill only studies. The complete data set is presented in the [Final Report](#). Since completion of the report, staff leading the WCS have met with project teams to discuss what the data means and potential implications for the Agency's work. These conversations, as well as considerations of factors such as legislation, public interest, and partnerships, will continue to shape our understanding of materials consumed and disposed of within the county, and how we may best achieve our goals.

## **RECOMMENDATION**

This item is for information only.