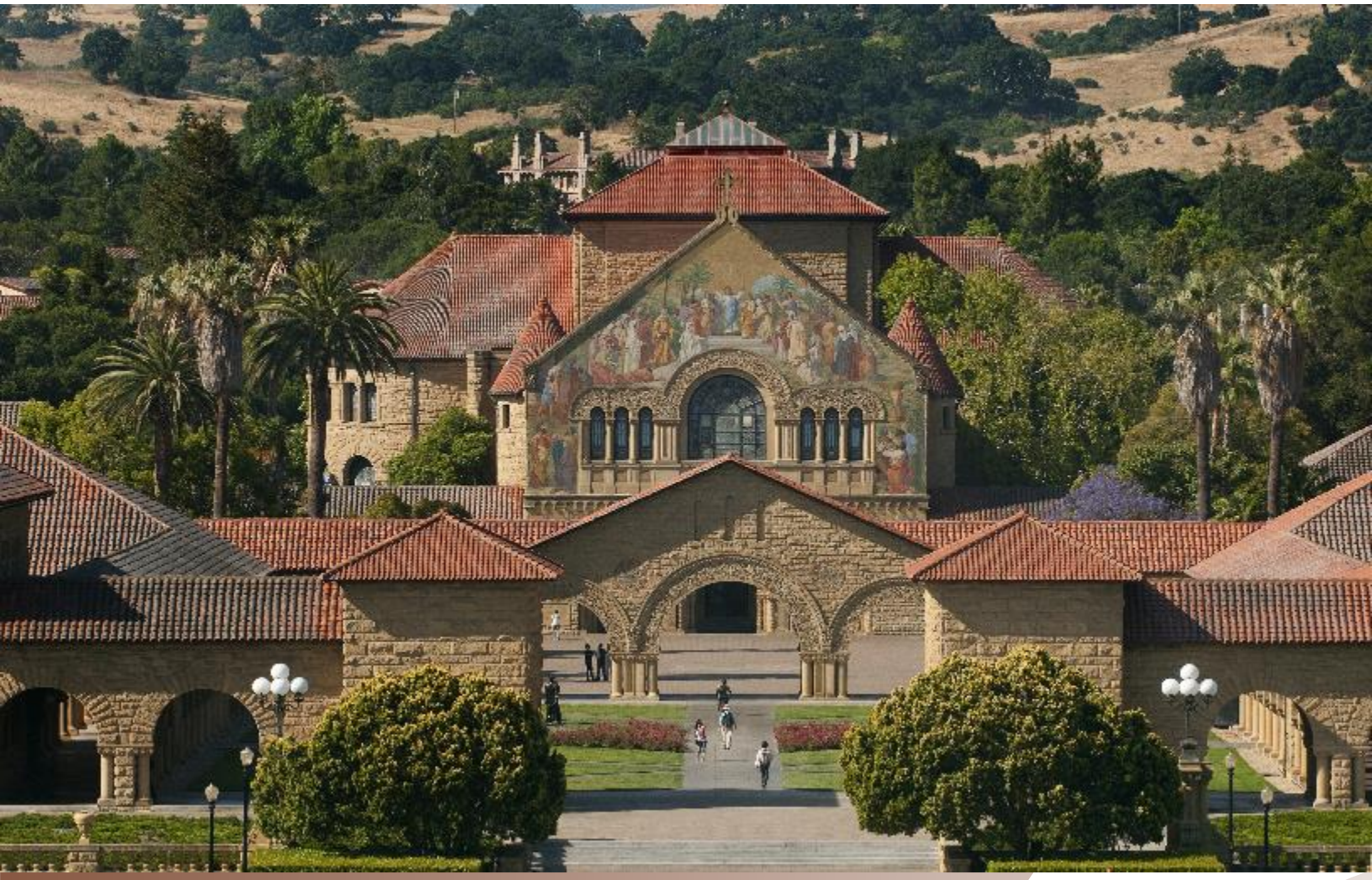


STANFORD WASTE CHARACTERIZATION SUMMARY MEMO

Prepared by Cascadia Consulting Group, Inc.

September 13th, 2019

SUSTAINABLE STANFORD

CASCADIA CONSULTING GROUP

Cascadia Consulting Group, Inc.
Tel (206) 343-9759
Fax (206) 343-9819
www.cascadiaconsulting.com

PROJECT SUMMARY

Stanford University has taken bold strides to ensure that its management of resources and waste are aligned with an overall ethos of stewardship and sustainability. Stanford's recycling and reuse program is more than 38 years old, and has evolved to handle more materials, engage more stakeholders, and divert more waste from the landfill each year. Stanford currently generates roughly 22,000 tons of waste material annually; over 64% of this material is diverted from the landfill through the University's robust recycling, composting, and reuse programs.

Confirming its leadership and innovation in sustainable materials management, Stanford developed internally a comprehensive zero waste plan (available upon request) charting a path towards achieving a diversion rate of 90% or greater. The planning process referenced historical data and incorporated input from subject-matter experts, resulting in a list of nearly fifty solutions. These solutions were then linked together into a model to project the likely costs and impacts of a range of planning scenarios, which was then peer reviewed by Cascadia Consulting Group.

In order to strengthen the model's inputs and outputs, Stanford's decision makers needed access to clear, reliable data on the types and quantities of post-consumer materials that are being generated and managed within the university waste system. To provide this data and further refine Stanford's existing Waste Cost Model, Cascadia Consulting Group conducted a campus-wide waste characterization study of the University's landfill, recycling, and compost streams, which resulted in a detailed estimation of the campus's waste generation and the composition of each stream. This memo details the project methodology and key findings from the waste characterization study.

WASTE CHARACTERIZATION METHODOLOGY

This section outlines the methodology used to complete a campus-wide characterization study in order to develop a comprehensive estimation of Stanford's waste generation and composition.

Task 1: Study Design and Coordination

Cascadia worked with Stanford's waste hauler Peninsula Sanitary Services, Inc. (PSSI), SEM, and Stanford Residential & Dining Enterprises (R&DE) to develop a comprehensive list of *generator areas.* These generator areas represent groups of buildings or locations with similar usage types, waste generation profiles, and disposal patterns. For this study, the Cascadia team collected and sorted waste from the following generator areas:

- Academic & Administrative
- Cafes (within mixed-use buildings)
- Labs
- Residential (dorms)
- Residential (apartments)
- Residential (row houses)

Note: Stanford athletics and dining facilities were not included in this study.

Figure 1. Waste sorting location and setup

After the waste generation locations were assigned to a generator area, Cascadia randomly selected locations within each generator area for sampling.

Task 2: Plan and Organize Sampling

Cascadia conducted sampling and sortation over a five-day period between April 8th and April 12th in 2019. Landfill samples were collected by PSSI and delivered to a vacant lot in Bonair Siding, where Cascadia hand-sorted them; recycling and compost samples were visually characterized at the disposal locations for each building.

Table 1 displays Cascadia's proposed and actual sample counts for the characterization study. Cascadia collected 15-22 landfill samples per generator area and 7-12 recycling and compost samples per generator area. The sampling plan was designed so generator areas that generated larger quantities of waste, such as apartments and labs, were sampled more frequently than smaller generator areas such as row houses.

Table 1. Planned vs. Actual Sample Counts, by Stream and Generator Area

	Total Samples (by Stream)											
	Compost			Paper			PMG			Landfill		
Generator Areas	Planned	Actual	+/-	Planned	Actual	+/-	Planned	Actual	+/-	Planned	Actual	+/-
Apartment	10	11	1	12	12	0	12	13	1	21	22	1
Café	12	12	0	10	10	0	10	9	-1	24	22	-2
Dormitory	11	10	-1	10	10	0	10	10	0	18	18	0
Lab	8	7	-1	10	11	1	10	11	1	21	21	0
Office/Administrative	11	12	1	10	11	1	10	10	0	20	21	1
Row House	10	9	-1	8	7	-1	8	8	0	15	15	0
Total	**62**	**61**	**-1**	**60**	**61**	**1**	**60**	**61**	**1**	**119**	**119**	**0**

Task 3: Collect Samples and Characterize Waste

The below sections detail the methodology for both the hand-sort and the visual characterization.

3.1 Hand-Sort (Landfill Steam)

For each sampling day, the Field Manager used a *Sample Tracking Form* to ensure all targeted samples were collected by recording the information on each *Sample Placard*, along with a unique identifying number associated with the selected sample on that day. The sorting team obtained between one and four samples from the designated incoming landfill containers. Once each sample was collected, the following steps were taken to characterize the sample:

1. **Photograph the sample.** Each sample was photographed with its sample placard identifying the waste generator area, sample number, and point of origin.

2. **Characterize waste.** All of the contents of every sample were hand-sorted into 50 predetermined material categories by a team of four waste sorters. A detailed materials list can be found in Appendix A.
3. **Weigh materials**. After the materials were sorted, the Field Manager verified the purity of each material as it was weighed in its basket using a pre-calibrated scale.
4. **Record data.** As each material class was weighed, the Field Manager entered the weights for each material into Cascadia's customized, cloud-based database.

Figure 2. Café landfill sample with placard.

5. **Dispose of sample.** PSSI provided landfill, compost, Paper, and PMG containers for the sorting crew to dispose of the sorted material. These containers were collected at the end of the sorting week.

3.2 Visual Characterization (Recycling and Compost Streams)

Cascadia's Visual Sort Manager conducted the visual characterization of recycling and compost samples directly at their disposal containers, visiting over 40 locations across campus. Each visual characterization included the following steps:

1. **Prep the sample.** For each bag in each sample, we opened the bag and spread its contents onto a tarp, photographed the sample, and recorded the information on the sample placard.
2. **Measure the sample volume.** We leveled out the sample and measured the length, width, and height of the sample to determine the sample volume.

3. **Characterize the sample.** The Visual Sort Manager visually categorized the contents of each sample by volumetrically estimating the percentage of each material type within the sample. We visually characterized the samples into 30 predetermined material types.
4. **Record results.** After characterizing the material, the volume of each material type was recorded into Cascadia's customized, cloud-based database.

Figure 3. Non-recoverable gloves and plastic film in the Cantor Arts Center café recycling stream.

5. **Sample disposal.** After finishing the characterization, the material was returned to the container that it was collected form.

Task 4: Analyze Data

Following the conclusion of the waste characterization, the Cascadia Project Manager reviewed the data entry in the database, identified and corrected data entry errors, and confirmed any outlier material categories by checking the photos of the samples in question.

The volumetric composition estimates from the visual characterization were converted to weights using material-specific density factors (e.g., 29.5 lbs. per cubic yard for *plastic containers*). The resulting weights were combined with the hand-sort data to develop comprehensive waste generation and composition profiles for each generator area and for the campus overall.

The generator area results were weighted based on the service levels provided by PSSI to develop the overall generation and composition estimates.

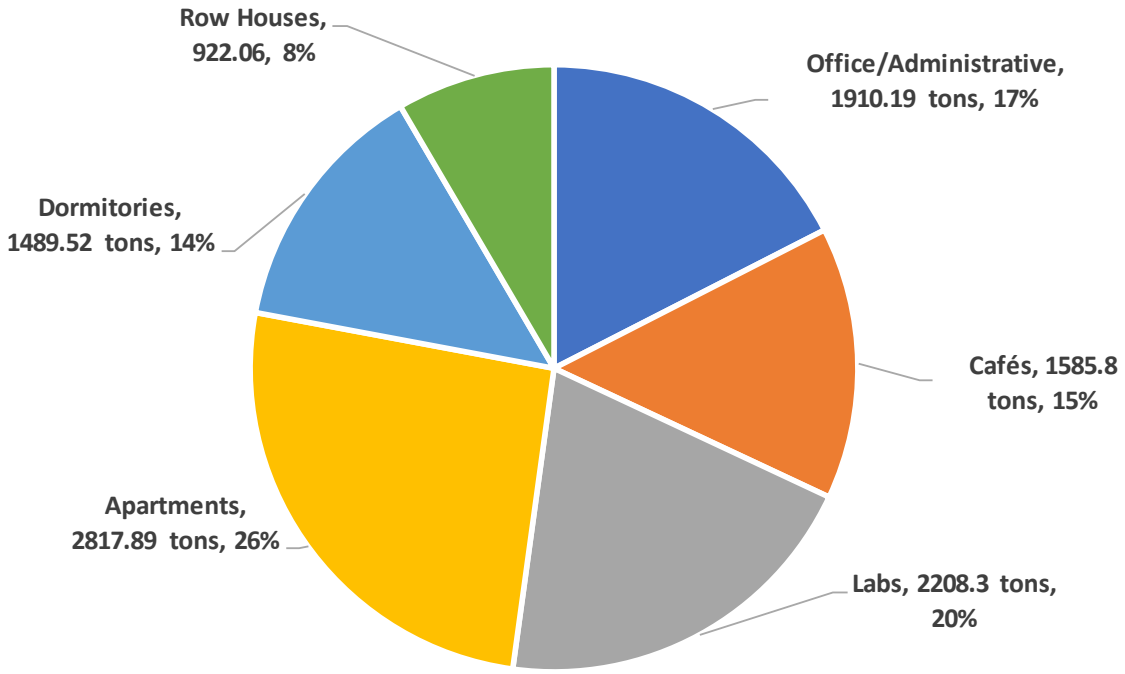
KEY FINDINGS

Landfill Stream

Cascadia collected and characterized nearly 120 landfill samples across all six generator areas. The resulting data was scaled up to develop annual waste generation and composition estimates. The following section describes the key findings for the landfill stream.

Table 2 displays the estimated annual landfill generation for each generator area.

Table 2. Estimated Annual Landfill Generation, by Generator Area



Apartment areas are responsible for the largest amount of landfill material (over 25%), while Row Houses account for the least (less than 8.5%)

Table 3 on the following page displays the detailed composition for the overall landfill stream. The detailed landfill composition for each generator area is available in Appendix B.

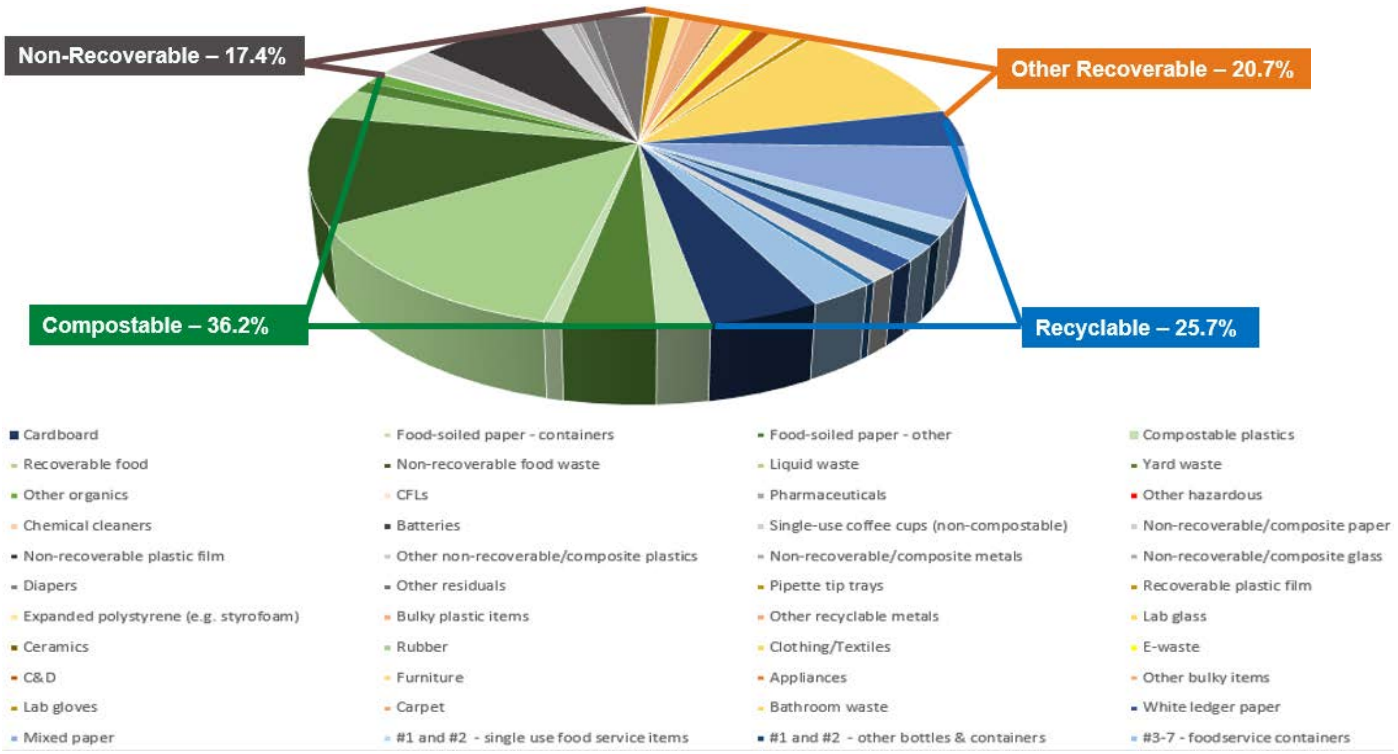
Table 3. Detailed Landfill Composition, Overall

Material	Annual Tons	%
Cardboard	324.11	4.86%
White Ledger Paper	264.06	3.96%
Mixed Paper	495.73	7.43%
Food-soiled paper - containers	139.11	2.08%
Food-soiled paper - other	249.77	3.74%
Single-use coffee cups (non-compostable)	94.76	1.42%
Non-recoverable/Composite paper	136.89	2.05%
#1 and #2 - single use food service items	104.80	1.57%
#1 and #2 - other bottles & containers	67.74	1.01%
#3-7 - foodservice containers	102.47	1.53%
#3-7 - other containers	85.44	1.28%
Compostable Plastics	47.38	0.71%
Pipette tip trays	8.77	0.13%
Recoverable plastic film	64.87	0.97%
Expanded Polystyrene (e.g. styrofoam)	56.14	0.84%
Non-recoverable plastic film	473.42	7.09%
Bulky plastic items	31.19	0.47%
Other non-recoverable/composite plastics	119.61	1.79%
Recyclable metal containers	77.73	1.16%
Aluminum foil	28.90	0.43%
Other Recyclable Metals	111.69	1.67%
Non-recoverable/Composite Metals	29.16	0.44%
Recyclable Glass containers	182.47	2.73%
Lab glass	7.45	0.11%
Non-recoverable/composite glass	16.71	0.25%
Recoverable food	834.33	12.50%
Non-recoverable food waste	741.54	11.11%
Liquid Waste	206.04	3.09%
Yard Waste	82.69	1.24%
Other Organics	72.51	1.09%
CFLs	0.70	0.01%
Pharmaceuticals	1.15	0.02%
Other Hazardous	1.83	0.03%
Chemical cleaners	3.73	0.06%
Batteries	3.61	0.05%
Ceramics	12.51	0.19%
Rubber	4.82	0.07%
Clothing/Textiles	85.49	1.28%
E-waste	35.82	0.54%
C&D	68.19	1.02%
Furniture	127.71	1.91%
Appliances	6.03	0.09%
Other Bulky Items	3.06	0.05%
Lab gloves	34.33	0.51%
Carpet	2.03	0.03%
Bathroom Waste	743.51	11.14%
Diapers	55.01	0.82%
Other Residuals	228.65	3.43%
Total	**6675.67**	**100.00%**

The audit findings revealed the most prevalent material category found in the landfill steam to be recoverable food waste at 12.5% (834.3 tons). The second and third most prevalent categories were non-recoverable food waste at 741.5 tons and bathroom waste (primarily paper towels) at 743.5 tons, both at around 11% of the overall landfill stream.

Table 4 displays the recoverability of the overall landfill stream.

Table 4. Recoverability of Overall Landfill Stream

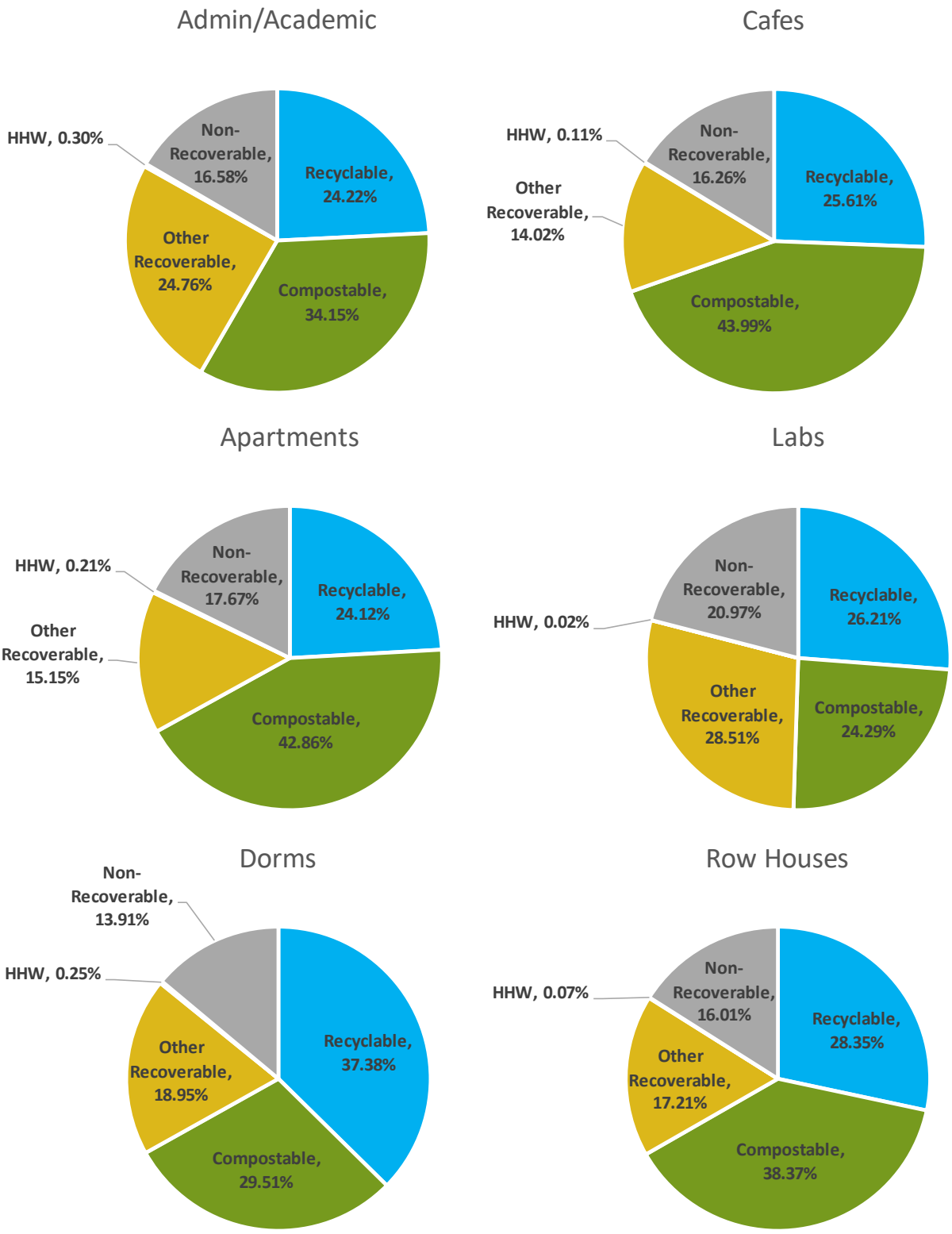


Note: Household Hazardous Waste accounts for less than 0.2% of Stanford's landfill stream.

Over 61% of the landfill stream could be recovered through Stanford's existing recycling and composting programs. Approximately 34% of the landfill stream is compostable (primarily food waste and food-soiled paper) and an additional 27% is recyclable (primarily mixed paper, cardboard, and recyclable glass containers). About 20% of Stanford's landfill waste is categorized as *other recoverable*, meaning that it could be recovered, but not through Stanford's standard recycling and composting programs. Materials in this category include clothing, furniture, appliances, and construction and demolition waste.

Figure 4 below displays the recoverability of the landfill stream for each generator area.

Figure 4. Recoverability of the Landfill Stream by Generator Area



Recovered Stream Composition

Cascadia collected and characterized over 180 recycling and compost samples over the course of the sampling week. Table 5 below displays the detailed material composition for the recovered streams.

Table 5. Detailed Material Composition, Recovered Streams

Material	PMG		Paper		Compost	
	Est. Tons	%	Est. Tons	%	Est. Tons	%
Cardboard	4.62	0.8%	79.54	9.6%	20.60	0.3%
White ledger paper	0.00	0.0%	97.37	11.7%	0.00	0.0%
Mixed paper	43.82	7.1%	565.55	68.0%	1.51	0.0%
Food-soiled paper	0.00	0.0%	5.29	0.6%	601.05	9.9%
Single-use coffee cups (non-compostable)	3.21	0.5%	2.88	0.3%	0.00	0.0%
Recyclable Glass Containers	168.49	27.4%	0.00	0.0%	0.00	0.0%
Non-recoverable/composite glass	0.00	0.0%	0.00	0.0%	0.00	0.0%
Recyclable metals	106.00	17.2%	0.00	0.0%	0.45	0.0%
Non-recoverable/composite metals	3.24	0.5%	0.17	0.0%	0.00	0.0%
#1-7 single-use foodservice items	10.49	1.7%	4.59	0.6%	76.67	1.3%
#1-7 other	80.13	13.0%	0.00	0.0%	1.47	0.0%
Compostable plastics	0.00	0.0%	1.45	0.2%	12.44	0.2%
Recoverable plastic film	5.36	0.9%	2.35	0.3%	0.00	0.0%
Bulky plastic items	58.92	9.6%	0.00	0.0%	0.00	0.0%
Non-recoverable/composite plastics	68.17	11.1%	48.90	5.9%	111.43	1.8%
Recoverable food waste	14.52	2.4%	18.39	2.2%	2666.34	43.8%
Non-recoverable food waste	0.00	0.0%	0.00	0.0%	1885.70	31.0%
Yard Waste	0.00	0.0%	0.00	0.0%	0.00	0.0%
Other organics	7.25	1.2%	1.62	0.2%	711.48	11.7%
Hazardous Household Waste	0.00	0.0%	0.00	0.0%	2.50	0.0%
Clothing/Textiles	0.00	0.0%	0.00	0.0%	0.00	0.0%
Bathroom waste	0.39	0.1%	0.00	0.0%	0.00	0.0%
Diapers	0.00	0.0%	0.00	0.0%	0.00	0.0%
Construction & demolition	0.00	0.0%	0.00	0.0%	0.00	0.0%
E-waste	1.06	0.2%	0.00	0.0%	0.00	0.0%
Bulky items	13.73	2.2%	0.00	0.0%	0.00	0.0%
Ceramics	0.00	0.0%	0.00	0.0%	0.00	0.0%
Furniture	0.00	0.0%	0.00	0.0%	0.00	0.0%
Other residuals	25.77	4.2%	3.22	0.4%	0.00	0.0%
Total	**615.17**	**100.0%**	**831.30**	**100.0%**	**6091.63**	**100.0%**

Contamination levels varied between the recovered streams. Table 6 below details the recoverability summaries for the paper, PMG (plastics, metal, and glass), and compost streams.

Table 6. Recoverability, Campus-wide Recovered Streams

Paper	%
Paper	89.9%
PMG	1.2%
Compost	4.5%
HHW	0.0%
Other Materials	4.3%
Total	**100.0%**

PMG	%
Paper	9.8%
PMG	74.4%
Compost	3.6%
HHW	0.0%
Other Materials	12.2%
Total	**100.0%**

Compost	%
Paper	0.7%
PMG	1.2%
Compost	96.8%
HHW	0.0%
Other Materials	1.3%
Total	**100.0%**

The compost stream was fairly clean (approximately 3% contamination), with the primary contaminants being non-recoverable plastics (predominantly plastic film) and single-use plastic foodservice items. The paper stream was about 10% contaminated. The primary contaminants in the paper stream were largely food waste and non-recoverable plastics. The PMG stream was heavily contaminated at just over 25% contamination. The primary contaminants in the PMG stream were mixed paper, non-recoverable plastics, and food waste.

The following tables display the contamination levels for each stream by generator area. Table 7 below details the recoverability and contamination levels for each generator area's paper stream.

Table 7. Recoverability of the Paper Stream, by Generator Area

Paper						
Material Type	**Admin/Academic**	**Apartments**	**Cafes**	**Dorms**	**Labs**	**Row Houses**
Paper	85.4%	95.4%	91.7%	85.5%	86.1%	97.6%
PMG	1.5%	0.6%	0.5%	0.2%	1.1%	0.2%
Compost	6.3%	1.4%	2.9%	9.7%	0.3%	0.1%
Non-Recoverable	6.8%	2.7%	5.0%	4.6%	12.5%	2.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Contamination levels varied between the different generator areas. The Admin/Academic areas had the most contaminated paper recycling at just under 15%, while the Row Houses had the lowest contamination at less than 3%. Table 8 below details the recoverability and contamination levels for each generator area's PMG stream.

Table 8. Recoverability of the PMG Stream, by Generator Area

PMG						
Material Type	**Admin/Academic**	**Apartments**	**Cafes**	**Dorms**	**Labs**	**Row Houses**
Paper	3.4%	5.6%	3.7%	17.4%	19.6%	3.1%
PMG	58.4%	79.3%	81.6%	68.6%	49.8%	91.2%
Compost	14.8%	0.8%	1.8%	4.7%	0.1%	2.6%
Non-Recoverable	23.4%	14.2%	12.9%	9.3%	30.6%	3.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Lab areas had the most contaminated PMG material, at over 50% contamination, while Row Houses had the least contaminated material, at just under 9% contamination. The following table displays the recoverability and contamination levels for each generator area's compost stream.

Table 9. Recoverability of the Compost Stream, by Generator Area

Compost						
Material Type	**Admin/Academic**	**Apartments**	**Cafes**	**Dorms**	**Labs**	**Row Houses**
Paper	0.4%	0.3%	0.0%	2.4%	2.1%	1.3%
PMG	0.1%	0.1%	3.1%	0.2%	0.1%	0.7%
Compost	99.2%	96.5%	93.2%	96.9%	97.4%	96.9%
Non-Recoverable	0.3%	3.1%	3.7%	0.5%	0.4%	1.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Compost contamination rates were relatively low across all generator areas. The Cafes had the highest contamination levels at just under 7%, while the Admin/Academic areas had the lowest contamination levels at less than 1%

CONCLUSION

Stanford currently has a very high performing waste and recycling program. The current diversion rate of 64% is among the highest currently found at institutions of higher education. Cascadia did identify substantial opportunities to increase waste diversion, decrease waste generation, and reduce the amount of contamination found in the recovered streams. The detailed Waste Cost Model contains over 50 strategies that will help Stanford achieve its 90% diversion rate goal by 2030. Based on the findings of the characterization study, Cascadia would like to highlight the following key findings:

- **Over 1/3 of Stanford's landfill stream could be composted.** Improved composting efforts could keep over 2,000 tons of material out of the landfill annually.

- **Bathroom waste accounts for over 11% of the campus-wide landfill stream.** Cascadia's Field Manager noted that over 90% of bathroom waste was composed of potentially compostable paper towels. Much of this waste could be removed from the landfill stream by installing compost containers in bathroom areas.

- **Some waste enclosures are difficult for students to access or do not have signage that is consistent with the rest of campus.** Ensuring that all containers have the same signage and color-coding will help to reduce contamination in the recovered streams and keep recoverable material out of the landfill.

- **Much of the non-recoverable waste and other recoverable waste in the landfill can be attributed to furniture, packaging, and electronic waste.** Expanding material reuse programs, developing a strong Environmentally Preferable Purchasing (EPP) policy that bans certain materials such as Styrofoam® or plastic film, and strengthening existing difficult-to-recover material collection programs will all help to reduce the amount of waste generated overall.

Based on the key findings above and the opportunities and strategies outlined in the Zero Waste plan, Stanford is in a strong position to remain a leader in sustainable materials management and reach its ambitious 2030 goals.

APPENDIX A: MATERIALS LIST

PAPER

1. *CARDBOARD*: Corrugated container boxes and Kraft paper.

2. *WHITE LEDGER PAPER*: White and lightly colored bond, rag, or stationary grade paper. This includes white or lightly colored sulfite/sulfate bond, copy papers, notebook paper, envelopes, continuous-feed sulfite/sulfate computer printouts and forms of all types, excluding carbonless paper.

3. *MIXED PAPER*: Mixed paper acceptable in Palo Alto's residential curbside program. This includes junk mail, magazines, colored papers, bleached Kraft, boxboard, mailing tubes, carbonless copy paper, ground wood computer printouts, paperback books, telephone directories, spiral notebooks, paper shopping bags, and frozen/refrigerator packaging. Excludes juice concentrate cans.

4. *FOOD-SOILED PAPER - CONTAINERS*: Polycoated milk, ice cream, and aseptic juice containers, including those with plastic spouts attached. Also includes: paper plates, bowls, and cups, including wax-coated paper plates, bowls, and cups, and items labeled “compostable.”

5. *FOOD-SOILED PAPER - OTHER*: Paper towels, waxed paper, tissues, and other papers that were soiled with food during use.

6. *SINGLE-USE COFFEE CUPS*: Paper cups not labeled “compostable” and that appear to have a plastic lining or coating.

7. *NON-RECOVERABLE/COMPOSITE PAPER*: Predominantly paper with other materials attached (e.g. orange juice cans), and other non-recyclable papers such as carbon copy paper, hardcover books, plastic-lined envelopes, and photographs.

PLASTIC

8. *#1 AND #2 PLASTICS – SINGLE-USE FOODSERVICE ITEMS*: Blow-molded PET (#1) and high-density polyethylene (#2) bottles, jars, etc. Includes milk, juice, and other beverage bottles; some to-go clamshells, forks, spoons, cups, cup lids, and salad trays.

9. *#1 AND #2 PLASTICS – OTHER:* Blow-molded PET (#1) and high-density polyethylene (#2) bottles, jars, etc. not intended for single-use food service. Includes many oil, vinegar, distilled water, liquid detergent bottles, and some hair care bottles.

10. *#3-7 – FOODSERVICE CONTAINERS*: Blow-molded #3-#7 plastic bottles, jars and containers used for single-use foodservice. Includes to-go food containers.

11. *#3-7 – OTHER CONTAINERS*: Blow-molded #3-#7 plastic bottles, jars and containers not used for single-use foodservice. Can include containers for products such as yogurt, cottage cheese, margarine, and prescription medication. Also includes unmarked rigid plastic packaging (excluding expanded polystyrene, or Styrofoam), such as cookie tray inserts, plastic frozen food trays, and disposable plant pots. Excludes toxic product containers.

12. *COMPOSTABLE PLASTICS:* Includes clamshells, cups, cup lids, and salad trays, if they are labeled "compostable." Excludes clamshells, cups, plates, bowls, and other food service items made of Styrofoam.

13. *PIPETTE TIP TRAYS*: Trays of plastic pipette tips.

14. *RECOVERABLE PLASTIC FILM*: Polyethylene film and bags which were not contaminated with food, liquid, or grit during use. Includes clean plastic sheeting, clean trash bags, and mattress packaging.

15. *EXPANDED POLYSTYRENE:* Includes *Styrofoam* products used to contain food, such as "clamshells," cups, plates, and bowls. Also includes non-food packaging and finished products made of expanded polystyrene.

16. *NON-RECOVERABLE PLASTIC FILM*: Film packaging not defined above, or: was contaminated with food, liquid or grit during use; is woven together (e.g., grain bags); or that contains multiple layers of film or other materials that have been fused together (e.g., potato chip bags). This category also includes contaminated plastic sheeting, photographic negatives, shower curtains, any bags used to contain liquid or food (e.g., produce), contaminated trash bags, used garbage bags, and shopping bags used as garbage bags.

17. *BULKY PLASTIC ITEMS*: Pipes and fittings made of PVC, ABS, or other rigid plastics; toys, vinyl hose, plastic lawn furniture, foam mattresses, and durable plastic pots.

18. *OTHER NON-RECOVERABLE/COMPOSITE PLASTICS*: Items that are predominately plastic with other materials attached, such as disposable razors, pens, lighters, toys, and 3-ring binders.

GLASS

19. *RECYCLABLE GLASS CONTAINERS*: Glass bottles and containers of all colors, including pop, liquor, wine, juice, beer, extract, mayonnaise, facial cream, and vinegar bottles.

20. *LAB GLASS*: Glass used in laboratory containers and other laboratory materials, including vials, beakers, and test tubes.

21. *NON-RECOVERABLE/COMPOSITE GLASS*: Flat glass such as window panes, doors, and table tops; automotive glass; mirrors; and glassware.

METAL

22. *RECYCLABLE METAL CONTAINERS*: Aluminum and steel cans, food containers, and trays.

23. *ALUMINUM FOIL*: Clean aluminum foil that has not been contaminated by food or other substance.

24. *OTHER RECYCLABLE METAILS*: Aluminum products and scrap such as window frames and cookware, metal hangers, tubing, or other recoverable metal.

25. *NON-RECOVERABLE/COMPOSITE METALS*: Items that are predominately metal with other materials attached, such as aerosol cans, motors, insulated wire, and finished products containing a mixture of metals, or metals and other materials.

COMPOSTABLE ORGANICS

26. *RECOVERABLE FOOD*: Food that was most likely edible and/or donatable at the time of disposal. Includes whole and partial ingredients and prepared meals.

27. *NON-RECOVERABLE FOOD WASTE:* Food wastes and scraps, including bone, rinds, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside. Biodegradable packaging peanuts (made from corn starch) are also included in this category. Excludes fats, oils, and grease.

28. *LIQUID WASTE:* Includes containers full of beverages or other food-related liquids where container weight is not appreciable compared to the liquid inside.

29. *YARD WASTE*: Woody and non-woody plant materials from a yard or garden area, including grass clippings, branches, leaves, weeds, and garden wastes.

30. *OTHER ORGANICS:* Organics not including yard, food or liquid waste; this can include animal by-products such as animal food, waste, and fur.

HOUSEHOLD HAZARDOUS WASTES

31. *COMPACT FLUORESCENT LIGHTS (CFL):* Small, fluorescent bulbs similar in appearance to incandescent bulbs. These bulbs typically have a spiral or tubular design.

32. *PHARMACEUTICALS:* Prescription and over-the-counter medications and supplements in all forms, including pills, liquid medications, creams, and ointments. Does not include containers for these items, except for tubes for creams and ointments and other containers that cannot be easily separated from the product they contain.

33. *CHEMICAL CLEANERS:* Non-caustic cleaners, and other household chemicals, and caustic acids and bases whose primary purpose is to clean surfaces, unclog drains, or perform other actions.

34. *BATTERIES*: Batteries of various sizes and types. Rechargeable batteries are those found in cordless power tools, cell phones, laptops, digital cameras, toothbrushes, and remote-control toys. Dry-cell batteries include button cell batteries, such as those found in watches and hearing aids. Wet-cell batteries are commonly used in automobiles.

35. *OTHER HAZARDOUS*: Can include liquid latex paints, oil-based paints/solvents, solvent- or water-based adhesives/glues, pesticides, herbicides, gasoline, kerosene, motor oil or diesel, asbestos, explosives, and medical wastes.

OTHER WASTE

36. *CERAMICS*: Finished ceramic or porcelain products such as toilets, sinks, and some dishware.

37. *RUBBER PRODUCTS*: Finished products and scrap materials made of natural and synthetic rubber, such as bath mats, inner tubes, rubber hoses, rubber carpet padding, and foam rubber.

38. *CLOTHING/TEXTILES*: Rag stock fabric materials including natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, and polyester. Can also include Non-rag stock grade textiles such as upholstered items, non-leather shoes and handbags, heavy linens, and draperies.

39. *ELECTRONICS:* Cell phones, audio/visual equipment, computer monitors, televisions, and computer items not containing CRTs, such as processors, mice and mouse pads, keyboards, disk drives, laptops, and other video displays without cathode ray tubes (CRT).

40. *CONSTRUCTION AND DEMOLITION WASTE*: Items leftover from construction, remodeling, or demolition work including lumber, engineered wood, pallets, crates, painted wood, gypsum scrap, concrete, asphalt, roofing, fiberglass insulation, rock, and other construction debris.

41. *FURNITURE*: Mixed-material furniture such as upholstered chairs. Furniture that is made purely of one material, such as plastic or metal, would be categorized according to that material (e.g., plastic products or other ferrous metal).

42. *APPLIANCES*: Small electric appliances such as toasters, microwave ovens, power tools, curling irons, and light fixtures.

43. *OTHER BULKY ITEMS:* Composite items and bulky items that are not included as C&D waste, such as mattresses and box springs.

44. *LAB GLOVES:* Latex and nitrile gloves used in a laboratory setting.

45. *CARPET:* Carpet and carpet padding: a general category of flooring applications and non-rag stock textiles consisting of various natural or synthetic fibers bonded to some type of backing material.

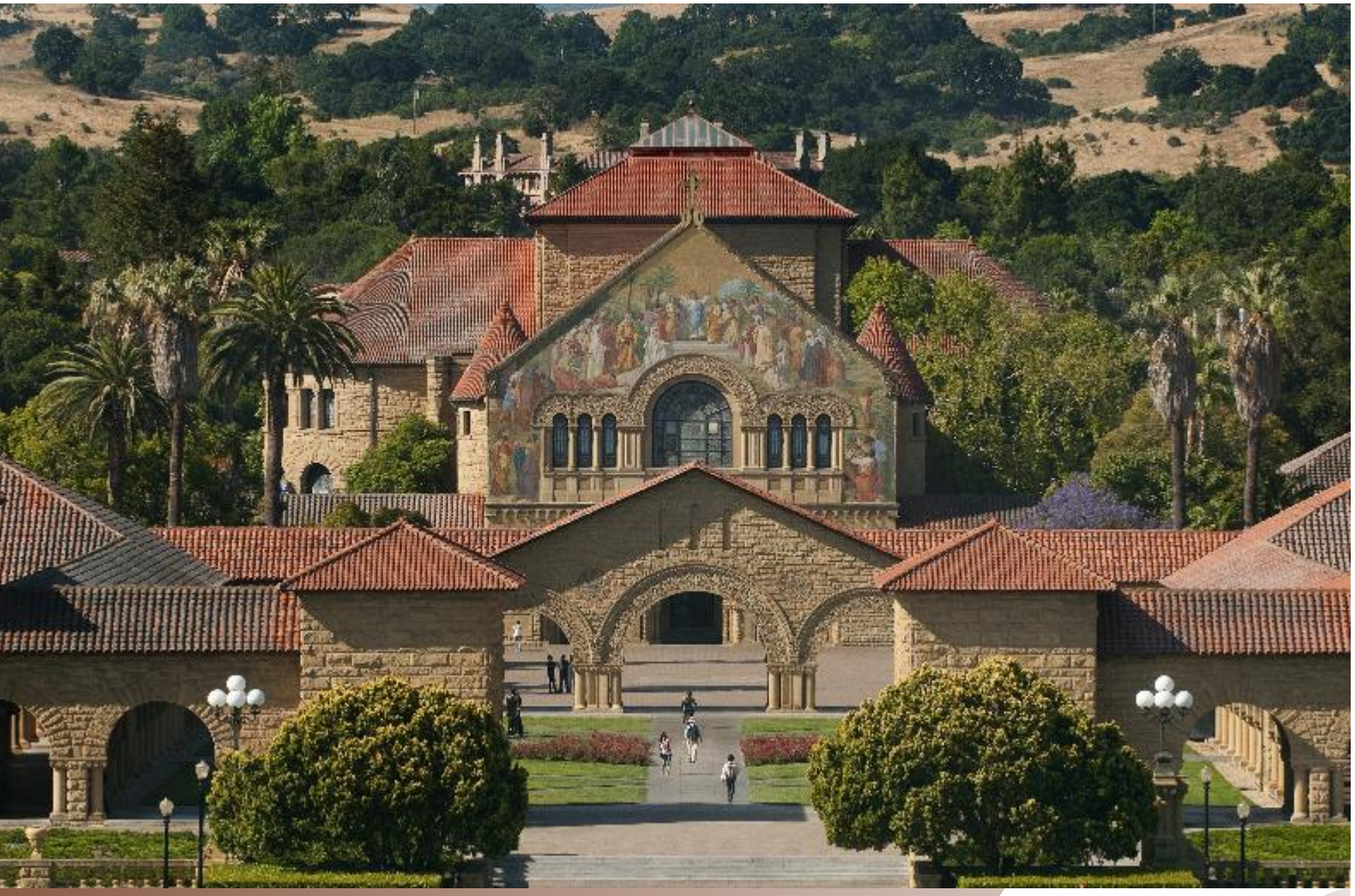
46. *BATHROOM WASTE*: A mix of paper towels and other hygiene products collected as waste from bathrooms.

47. *DIAPERS:* Diapers made from cloth or a combination of fibers, synthetic and/or natural, and made for the purpose of single use. This includes disposable baby diapers and adult protective undergarments.

48. *OTHER RESIDUALS:* Miscellaneous, non-recoverable materials or unidentifiable materials not listed elsewhere. Can include mylar food packaging wrappers, cigarette butts; scraps of leather and leather products including shoes and belts; briquettes; fireplace, burn barrel and fire pit ash; and other organic and inorganic materials not classified elsewhere.

APPENDIX B: DETAILED COMPOSITION BY AREA

	Admin/Academic		Apartment		Café		Dorms		Labs		Row Houses		Overall (Weighted)	
Material	Annual Tons	%	Annual Tons	%	Annual Tons	%	Annual Tons	%	Annual Tons	%	Annual Tons	%	Annual Tons	%
Cardboard	31.90	2.74%	32.95	1.92%	33.48	3.46%	162.50	17.87%	43.76	3.25%	19.52	3.47%	324.11	4.86%
White Ledger Paper	49.24	4.22%	77.70	4.52%	30.21	3.12%	20.56	2.26%	69.85	5.18%	16.49	2.93%	264.06	3.96%
Mixed Paper	92.75	7.95%	119.37	6.94%	73.84	7.63%	68.31	7.51%	94.39	7.00%	47.08	8.36%	495.73	7.43%
Food-soiled paper - containers	28.79	2.47%	36.82	2.14%	36.80	3.80%	9.39	1.03%	19.13	1.42%	8.18	1.45%	139.11	2.08%
Food-soiled paper - other	35.81	3.07%	78.40	4.56%	57.78	5.97%	16.34	1.80%	52.44	3.89%	9.00	1.60%	249.77	3.74%
Single-use coffee cups (non-compostable)	16.99	1.46%	18.16	1.06%	13.06	1.35%	16.96	1.86%	19.02	1.41%	10.58	1.88%	94.76	1.42%
Non-recoverable/Composite paper	19.24	1.65%	42.42	2.47%	16.32	1.69%	23.41	2.57%	18.79	1.39%	16.71	2.97%	136.89	2.05%
#1 and #2 - single use food service items	14.40	1.24%	31.44	1.83%	17.21	1.78%	14.62	1.61%	17.18	1.27%	9.94	1.77%	104.80	1.57%
#1 and #2 - other bottles & containers	13.82	1.18%	19.69	1.14%	8.54	0.88%	7.47	0.82%	10.60	0.79%	7.62	1.35%	67.74	1.01%
#3-7 - foodservice containers	15.36	1.32%	25.48	1.48%	19.25	1.99%	14.62	1.61%	17.66	1.31%	10.10	1.79%	102.47	1.53%
#3-7 - other containers	17.24	1.48%	18.49	1.07%	10.47	1.08%	9.90	1.09%	20.15	1.49%	9.18	1.63%	85.44	1.28%
Compostable Plastics	10.04	0.86%	8.08	0.47%	12.15	1.25%	6.69	0.74%	7.38	0.55%	3.04	0.54%	47.38	0.71%
Pipette tip trays	0.08	0.01%	0.00	0.00%	0.00	0.00%	0.00	0.00%	8.69	0.64%	0.00	0.00%	8.77	0.13%
Recoverable plastic film	9.37	0.80%	16.29	0.95%	12.29	1.27%	4.91	0.54%	16.13	1.20%	5.87	1.04%	64.87	0.97%
Expanded Polystyrene (e.g. styrofoam)	6.50	0.56%	15.68	0.91%	6.82	0.70%	6.76	0.74%	16.82	1.25%	3.55	0.63%	56.14	0.84%
Non-recoverable plastic film	72.12	6.18%	118.76	6.90%	83.93	8.67%	37.52	4.13%	129.92	9.64%	31.17	5.54%	473.42	7.09%
Bulky plastic items	2.70	0.23%	7.66	0.45%	0.00	0.00%	7.33	0.81%	8.44	0.63%	5.06	0.90%	31.19	0.47%
Other non-recoverable/composite plastics	26.28	2.25%	19.61	1.14%	13.55	1.40%	17.25	1.90%	35.89	2.66%	7.02	1.25%	119.61	1.79%
Recyclable metal containers	11.47	0.98%	18.60	1.08%	17.00	1.76%	10.34	1.14%	13.66	1.01%	6.66	1.18%	77.73	1.16%
Aluminum foil	3.74	0.32%	8.93	0.52%	2.93	0.30%	3.81	0.42%	5.16	0.38%	4.33	0.77%	28.90	0.43%
Other Recyclable Metals	51.31	4.40%	3.59	0.21%	8.41	0.87%	1.67	0.18%	42.06	3.12%	4.64	0.82%	111.69	1.67%
Non-recoverable/Composite Metals	6.87	0.59%	5.79	0.34%	2.59	0.27%	2.97	0.33%	9.49	0.70%	1.44	0.26%	29.16	0.44%
Recyclable Glass containers	23.13	1.98%	46.01	2.67%	22.72	2.35%	22.92	2.52%	44.89	3.33%	22.80	4.05%	182.47	2.73%
Lab glass	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	7.30	0.54%	0.15	0.03%	7.45	0.11%
Non-recoverable/composite glass	3.33	0.29%	3.26	0.19%	2.47	0.26%	2.63	0.29%	4.25	0.32%	0.78	0.14%	16.71	0.25%
Recoverable food	108.17	9.27%	280.40	16.30%	152.75	15.78%	117.49	12.92%	96.55	7.16%	78.96	14.03%	834.33	12.50%
Non-recoverable food waste	133.16	11.42%	235.65	13.70%	107.40	11.09%	88.11	9.69%	99.83	7.40%	77.39	13.75%	741.54	11.11%
Liquid Waste	44.84	3.84%	50.19	2.92%	48.63	5.02%	15.03	1.65%	28.98	2.15%	18.38	3.26%	206.04	3.09%
Yard Waste	29.08	2.49%	19.89	1.16%	2.18	0.22%	8.31	0.91%	9.72	0.72%	13.53	2.40%	82.69	1.24%
Other Organics	8.38	0.72%	27.91	1.62%	8.23	0.85%	7.00	0.77%	13.46	1.00%	7.53	1.34%	72.51	1.09%
CFLs	0.53	0.05%	0.00	0.00%	0.05	0.00%	0.00	0.00%	0.00	0.00%	0.12	0.02%	0.70	0.01%
Pharmaceuticals	0.00	0.00%	1.06	0.06%	0.08	0.01%	0.02	0.00%	0.00	0.00%	0.00	0.00%	1.15	0.02%
Other Hazardous	0.00	0.00%	0.00	0.00%	0.00	0.00%	1.83	0.20%	0.00	0.00%	0.00	0.00%	1.83	0.03%
Chemical cleaners	2.76	0.24%	0.97	0.06%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	3.73	0.06%
Batteries	0.23	0.02%	1.50	0.09%	0.99	0.10%	0.42	0.05%	0.22	0.02%	0.25	0.04%	3.61	0.05%
Ceramics	0.59	0.05%	5.18	0.30%	2.83	0.29%	2.05	0.23%	0.75	0.06%	1.12	0.20%	12.51	0.19%
Rubber	0.74	0.06%	2.12	0.12%	1.96	0.20%	0.00	0.00%	0.00	0.00%	0.00	0.00%	4.82	0.07%
Clothing/Textiles	7.28	0.62%	42.03	2.44%	4.68	0.48%	13.26	1.46%	7.91	0.59%	10.34	1.84%	85.49	1.28%
E-waste	4.48	0.38%	22.23	1.29%	0.71	0.07%	1.43	0.16%	3.75	0.28%	3.23	0.57%	35.82	0.54%
C&D	51.84	4.45%	10.75	0.62%	1.44	0.15%	0.00	0.00%	3.69	0.27%	0.47	0.08%	68.19	1.02%
Furniture	8.40	0.72%	10.39	0.60%	0.00	0.00%	5.42	0.60%	100.91	7.48%	2.59	0.46%	127.71	1.91%
Appliances	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	6.03	1.07%	6.03	0.09%
Other Bulky Items	0.00	0.00%	0.00	0.00%	0.00	0.00%	3.06	0.34%	0.00	0.00%	0.00	0.00%	3.06	0.05%
Lab gloves	2.60	0.22%	0.77	0.04%	5.59	0.58%	0.20	0.02%	24.01	1.78%	1.15	0.20%	34.33	0.51%
Carpet	0.00	0.00%	1.75	0.10%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.27	0.05%	2.03	0.03%
Bathroom Waste	152.20	13.05%	138.50	8.05%	103.34	10.67%	131.16	14.42%	160.04	11.87%	58.26	10.35%	743.51	11.14%
Diapers	7.01	0.60%	42.92	2.49%	0.00	0.00%	2.12	0.23%	2.67	0.20%	0.30	0.05%	55.01	0.82%
Other Residuals	41.51	3.56%	53.08	3.09%	25.55	2.64%	23.65	2.60%	62.74	4.65%	22.13	3.93%	228.65	3.43%
Total	**1166.28**	**100.00%**	**1720.48**	**100.00%**	**968.22**	**100.00%**	**909.43**	**100.00%**	**1348.29**	**100.00%**	**562.97**	**100.00%**	**6675.67**	**100.00%**



SUSTAINABLE STANFORD

CASCADIA CONSULTING GROUP

Cascadia Consulting Group, Inc.
Tel (206) 343-9759
Fax (206) 343-9819
www.cascadiaconsulting.com