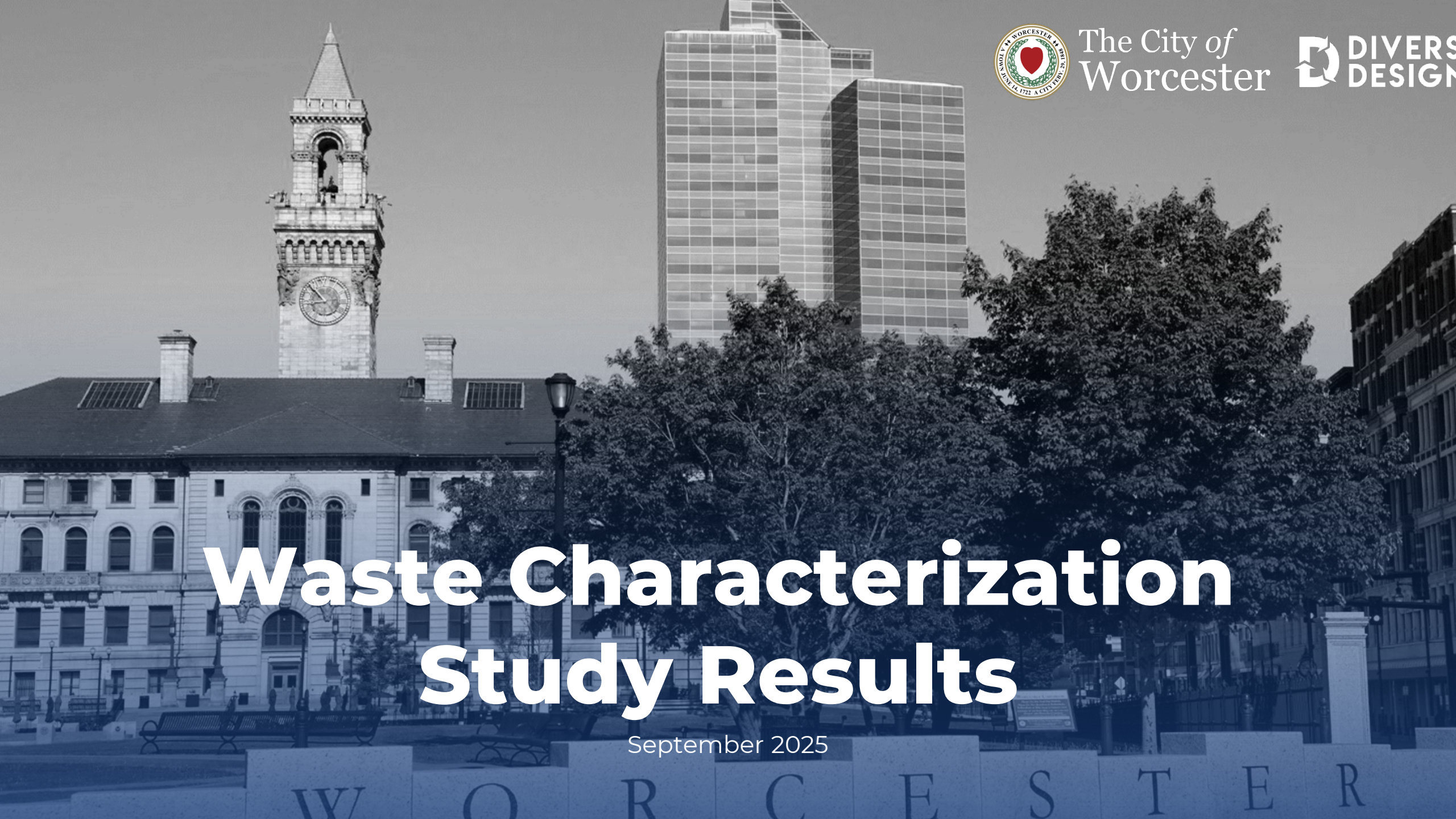


Waste Characterization Study Results

September 2025

Waste Characterization Study Overview

- Worcester hired Diversion Designers, LLC. to conduct a comprehensive waste characterization study in April 2025 to provide baseline data for its Zero Waste Master Plan (ZWMP).

- Diversion Designers collected 111 samples weighing over 22,000 pounds total from 103 locations across six sectors: residential (1-6 units, serviced by the City's curbside collection programs), multi-family residential (7+ units, not serviced by the City's curbside collection programs), Worcester Public Schools, commercial businesses, municipal buildings, and illegal dump sites

- Materials were sorted into 50 categories using stratified random sampling to achieve 90% confidence level statistical significance.

Samples Collected & Studied

Sector	Refuse Samples	Recycling Samples	Locations
Residential (1-6 units)	25	-	5 routes over 5 days
Multi-family Residential (7+ units)	15	3[1]	4 typologies
Commercial	40	5	10 typologies
Schools	9	-	3 elementary, 3 middle, 3 high
Municipal Buildings	8	-	7 facilities
Illegal Dump Sites	4[2]	-	4 locations
Total	**103**	**8**	**103 locations**

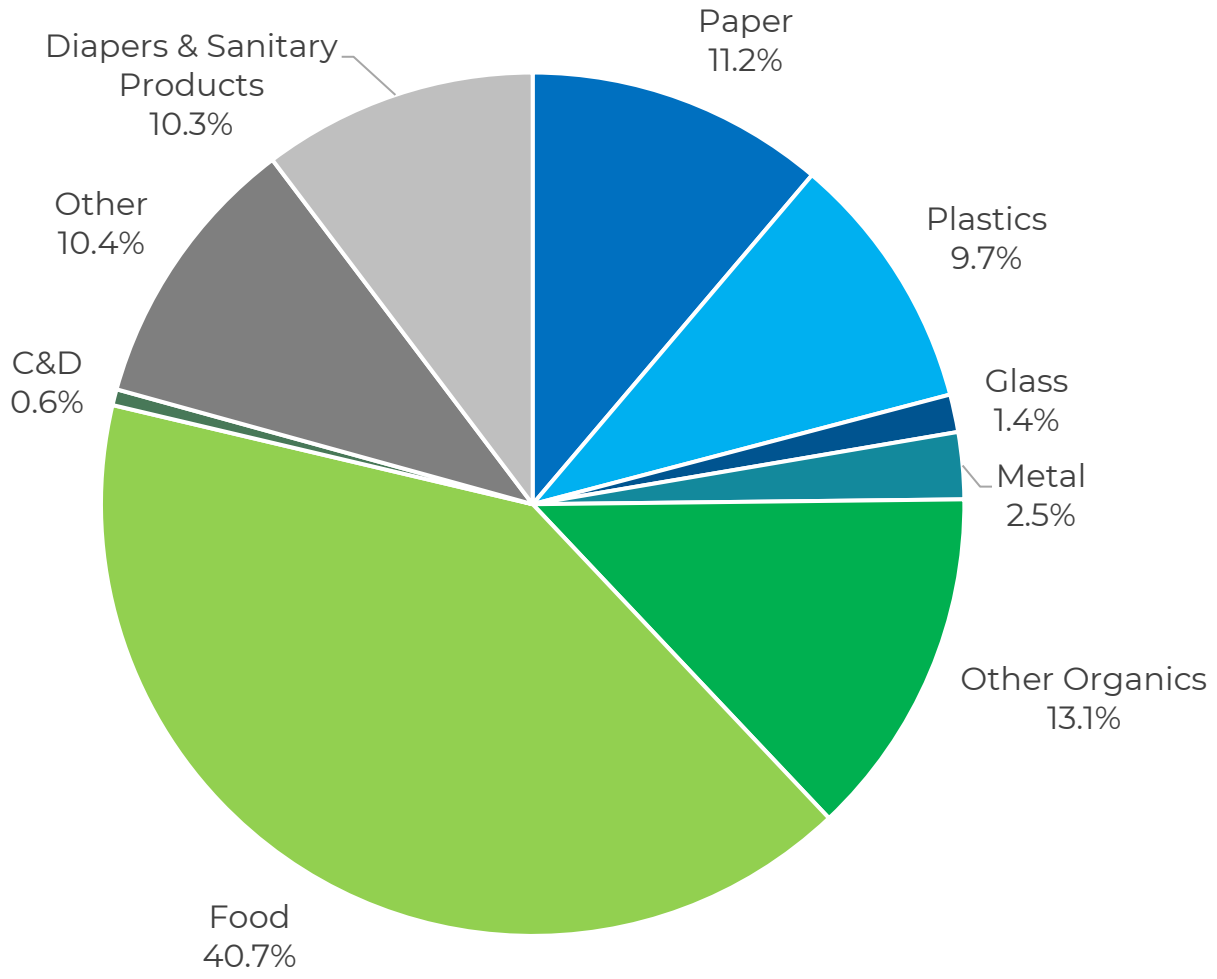
1. Intended to collect more recycling samples from multi-family buildings; however, random sampling revealed that many buildings did not have recycling dumpsters available
2. Intended to sample five sites; however, one site was found to be clean at the time of sampling.

STUDY RESULTS BY SECTOR

Residential Trash (1-6 units)

Sample:

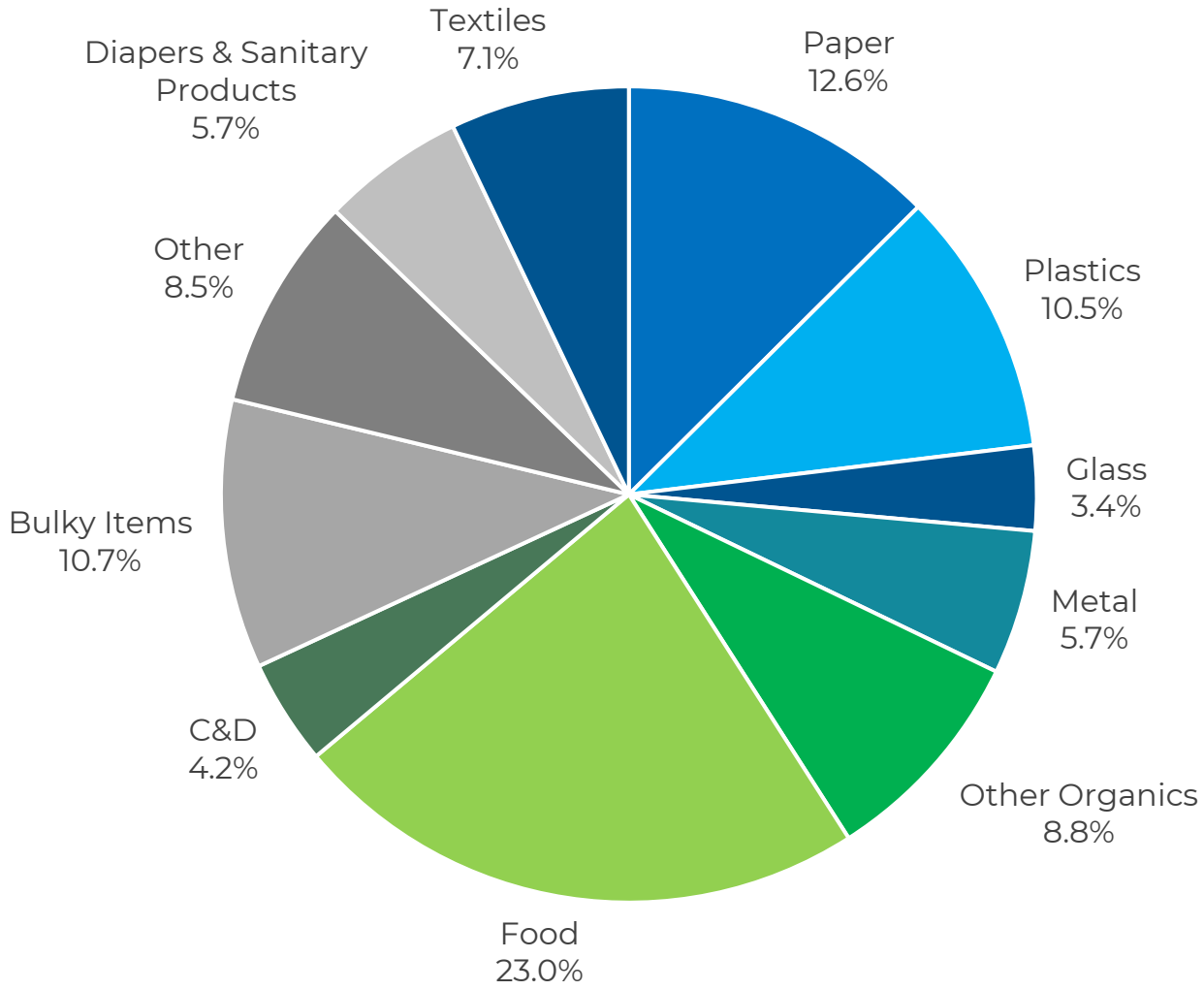
- Collected from all five collection routes over five weekdays during normal collection hours.
- Houses randomly selected using a random number generator to determine skip intervals.
- Multiple residences combined to produce 200+ pound samples.



Residential Trash (7+ units)

Sample:

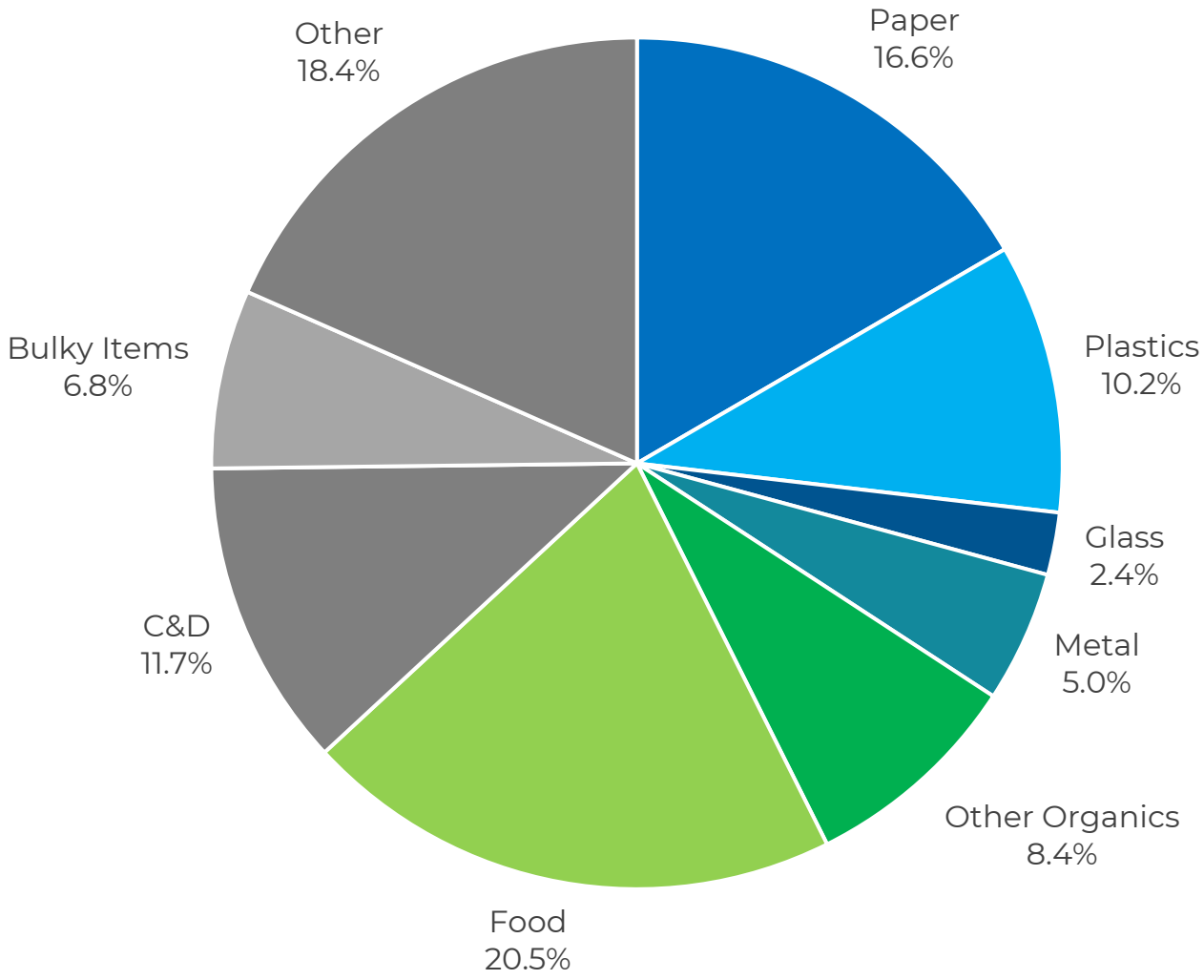
- Used quadrant-based mobile collection with random number generator determining sampling sequence
- Mid-rise apartments (4-7 stories)
- Garden-style apartments (1-3 stories)
- Mixed-use buildings
- Converted warehouses/lofts.



Commercial Trash

Sample:
40 businesses across 10 typologies using post-stratification random sampling. Business types included:

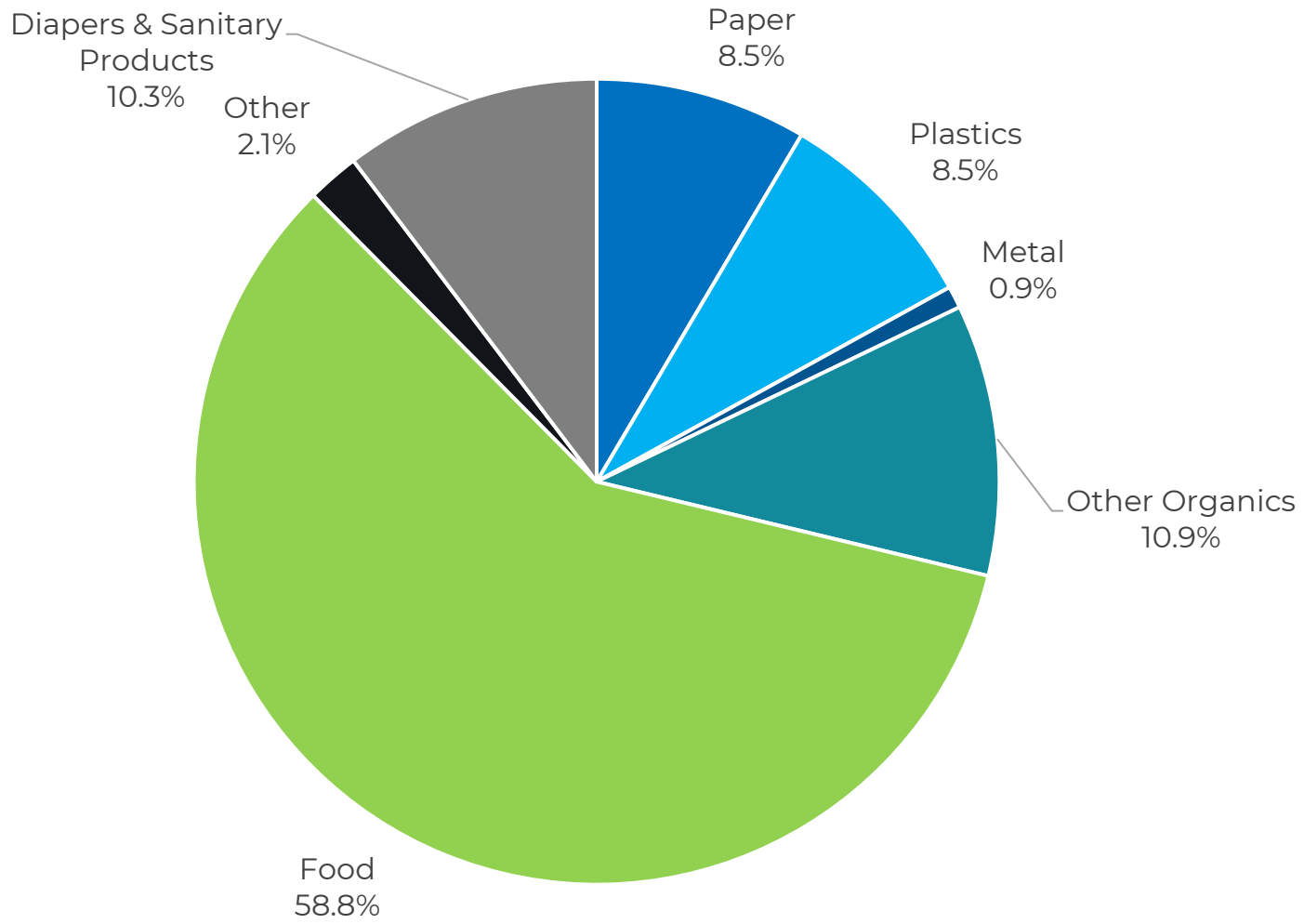
- Food Service & Hospitality
- General Retail
- Healthcare Facilities
- Educational Institutions
- Office and Professional Services
- Manufacturing and Industrial
- Personal Services
- Freight and Logistics



Worcester Public Schools

Sample:

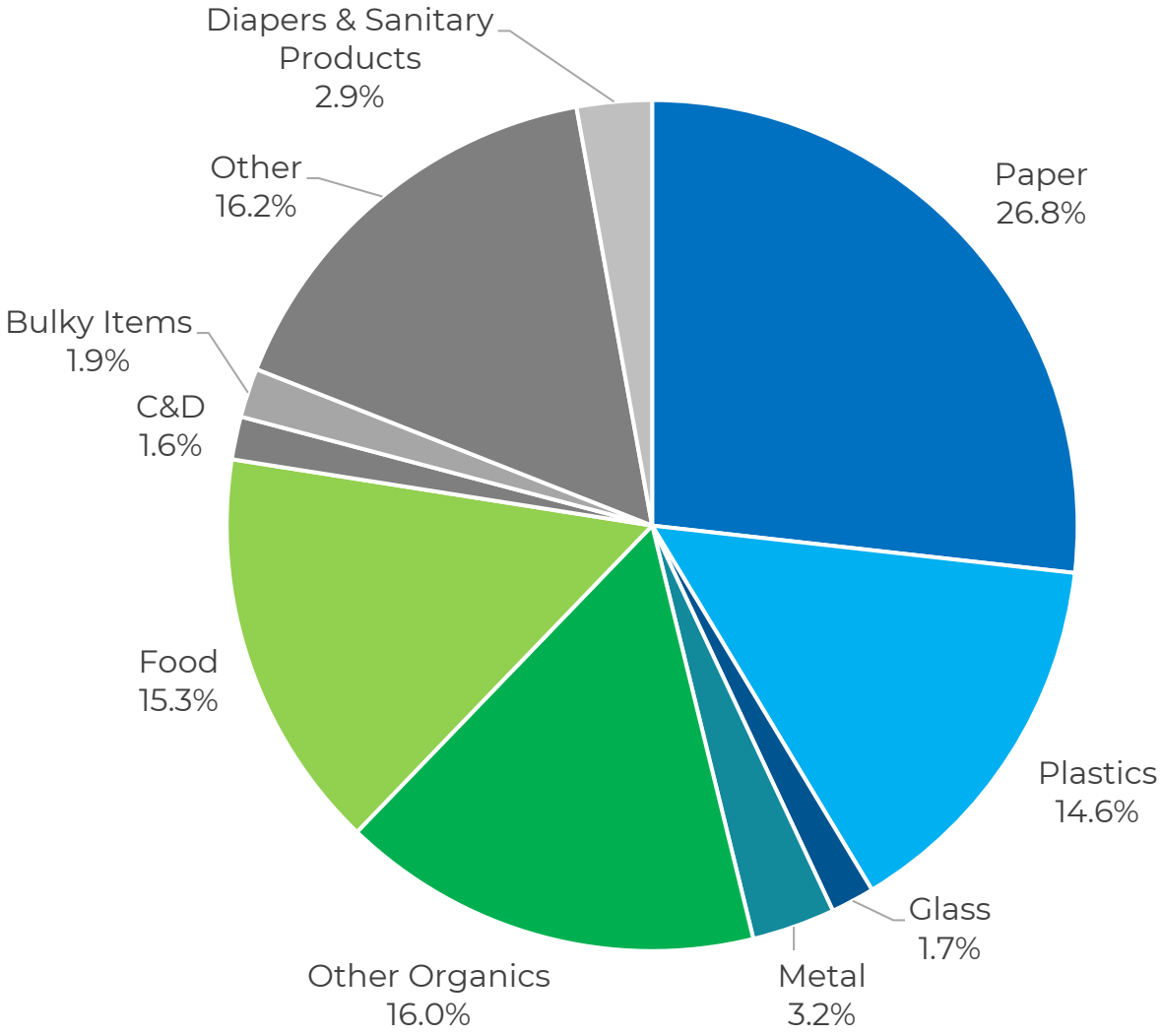
- Three schools per level (elementary, middle, high) selected for geographic and socioeconomic diversity.
- Sampling during the regular school year from aggregated cafeteria, classroom, and administrative waste.



Municipal Buildings

Sample:

1. Inspectional Services
2. Worcester Public Library (main)
3. City Hall
4. Emergency Management Headquarters
5. Worcester Senior Center
6. Fire Department Headquarters
7. Police Headquarters

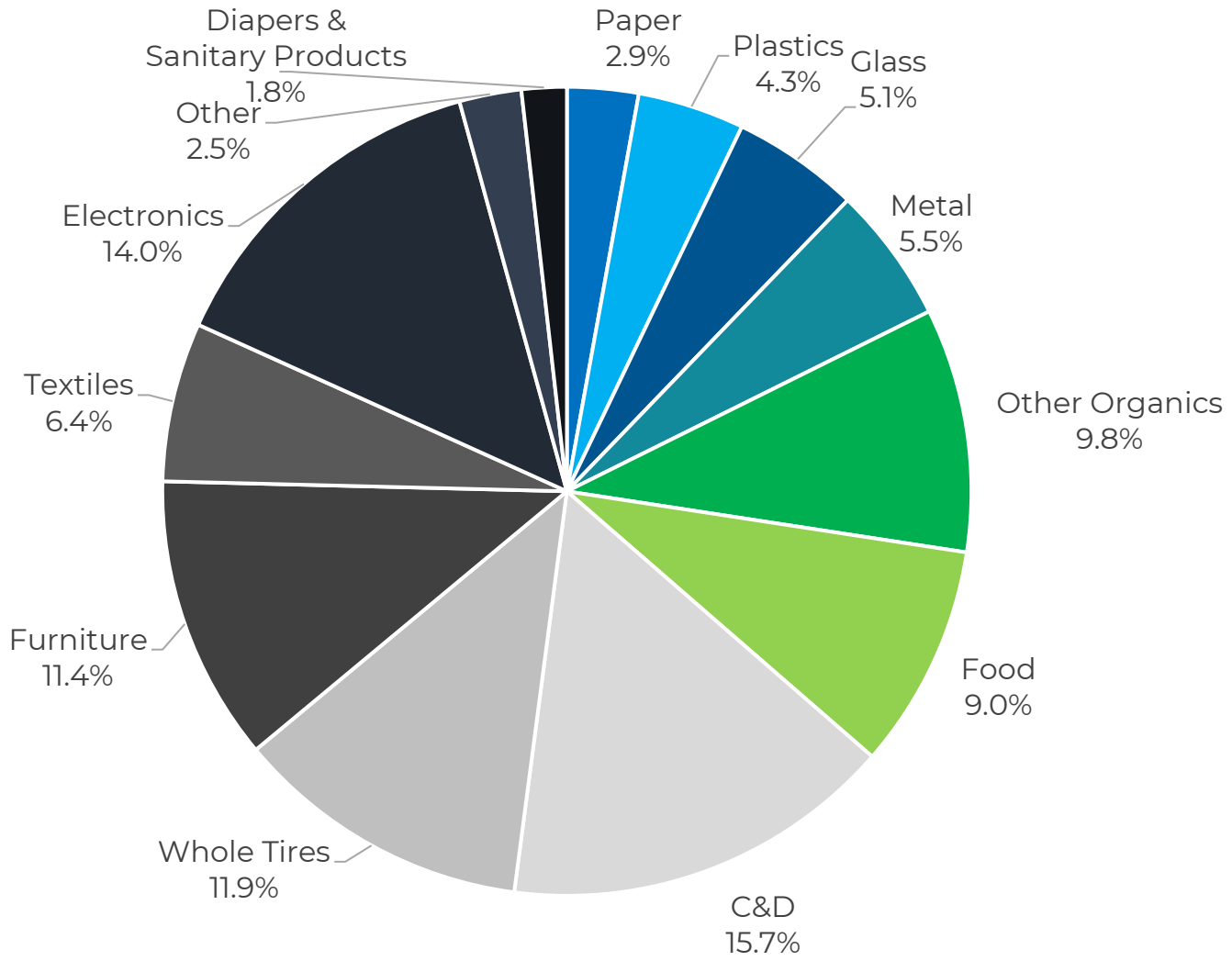


Illegal Dump Sites

Sample:

Five locations were selected as sampling sites based on high-litter areas identified through Quality of Life Team coordination:

- Granite St.
- Bluff St.
- Walpole St.
- Mayfield St.
- Eastern Ave. was also identified but contained no refuse at the time of sampling.



Material Composition by Sector

Material	Resi. (1-6)	Resi. (7+)	Comm.	Schools	Muni.	Illegal Dumps	Recycle (7+)	Recycle Comm
Paper	11.20%	12.55%	16.61%	8.49%	26.78%	2.85%	47.10%	93.80%
Plastics	9.71%	10.52%	10.24%	8.49%	14.58%	4.27%	12.18%	1.36%
Glass	1.41%	3.36%	2.37%	0.02%	1.66%	5.09%	3.81%	2.58%
Metal	2.50%	5.72%	4.99%	0.88%	3.16%	5.45%	2.70%	0.67%
Organics	53.87%	31.76%	28.91%	69.69%	31.32%	18.72%	5.62%	0.49%
C&D	0.60%	4.18%	11.69%	0.02%	1.63%	15.69%	0.13%	0.00%
Bulky	0.00%	10.66%	6.79%	0.00%	1.87%	23.31%	16.91%	0.00%
Other	20.71%	21.25%	18.40%	12.42%	19.01%	24.61%	11.53%	1.11%

KEY FINDINGS

Organics & Yard Waste

- **High Organics Across Sectors:** Food scraps, soiled paper, and compostables made up a large share of waste, showing strong diversion potential.
- **Schools Highest in Organics:** 68.7% of school waste was organics, and 79% of that was edible food scraps.
- **Minimal Yard Waste Overall:** PAYT households had very low levels (0.12%), while larger residential buildings (7+ units, not on curbside collection) showed significantly more yard debris (4.46%).

Sector	Organics	Yard Waste
Residential (1-6 units)	53.75%	0.12%
Residential (7+ units)	27.30%	4.46%
Commercial	27.58%	2.33%
Worcester Public Schools	68.73%	0.96%
Municipal Buildings	30.75%	0.57%
Illegal Dump Sites	12.01%	6.71%

Recyclables

- Recyclable materials (paper, plastic, metal, and glass) were present throughout waste samples, but glass and metal were very low in all sectors.
- In municipal trash, paper accounted for nearly 27% (largest of all sectors), including 19% from corrugated cardboard and mixed recyclable paper.
- Plastics made up 15% of municipal trash (largest of all sectors), with nearly one-fifth coming from PET (#1) containers.
- Multi-family recycling was dominated by paper (47.1%), primarily corrugated cardboard and mixed recyclable paper (44.6%).

Curbside Collection Programs Divert More Waste – PAYT Success

- Significantly more divertible materials were found in residential 7+ unit building trash not serviced by the City's curbside collection programs which demonstrates targeted collection programs achieve significant diversion when properly implemented

Material	Residential (1-6 units)	Residential (7+ units)
Yard debris	0.12%	4.46%
Bulky waste	0%	10.66%
C&D	0.60%	4.18%
Recyclables	24.82%	32.15%

Other Observations

- Illegal dumpsites had the highest rates of glass (5.1%), construction & demolition debris (15.7%), and bulky items (23.3%), along with high levels of metal (5.5%) and electronics (14%).
- Diapers and sanitary products were most prevalent in residential waste – 7+ units (5.7%) and 1-6 units (10.3%).

LEARN MORE

- Read the full report and learn more about Worcester's Zero Waste Program at: WorcesterMA.gov/DSR

- Contact us at: ZeroWaste@worcesterma.gov