Zero Waste Master Plan 2.0

City of Cambridge

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CITY OF CAMBRIDGE | THE CAMBRIDGE DEPARTMENT OF PUBLIC WORKS | ZERO WASTE CAMBRIDGE

EXECUTIVE SUMMARY

The City of Cambridge's recycling program began in 1989 by a group of dedicated volunteers. Since that time the recycling program and other programs to reduce waste have greatly expanded. In 2009, the City made a commitment to zero waste by establishing its first formal waste reduction goals; reduce trash 30% by 2020 and 80% by 2050, with 2008 as a baseline. In 2019, the city developed its first Zero Waste Master Plan (ZWMP 1.0) that identified key strategies to meet these goals. By 2019, the City had successfully met the 2020 goal of reducing trash by 30%.

This updated Zero Waste Master Plan (ZWMP 2.0) provides status updates on the strategies implemented through ZWMP 1.0, establishes an interim waste reduction goal for 2030 (50% reduction, with 2008 as a baseline), and identifies additional strategies that will be needed in order to meet these goals.

The plan has four key goals:

- Reduce trash 50% by 2030 and 80% by 2050, with 2008 as a baseline.
- Improve sanitation and reduce rodent activity.
- Reduce environmental impacts of waste streams by maximizing reduce & reuse and diverting waste from the trash.
- Make the City's waste programs more equitable and accessible.

As of 2024, the City has reduced trash by 36%. Through this ZWMP 2.0, eighteen strategies have been prioritized using data about existing programs, evaluating best practices from across the country, and through extensive community engagement including listening sessions, interviews, public events, and surveys. These strategies do not reflect all of the work that the City is undertaking to reduce trash, but are the key strategies that are critical to implement in order to meet the trash reduction goals.

The strategies prioritize actions in the next five years, with a commitment to update the Zero Waste Master Plan (ZWMP 3.0) in 2030. In addition to new strategies, the plan also highlights Ongoing Strategies that play a critical role in supporting the community's commitment to zero waste, ensuring steady progress and long-term sustainability.

Throughout this document, the icons below are used to indicate which areas are a focus of each strategy.

Short-Term Strategies (1-3 Years)	Primary Topics
Strategy #1: Require annual Zero Waste Plans for residential buildings (13+ units) and commercial buildings (25,000+ square feet).	
Strategy #2: Require food waste diversion for all residential and commercial buildings. Educate residents and property managers on these new requirements.	
Strategy #3: Reduce move-in / move-out waste.	
Strategy #4: Reduce waste from food establishments.	
Strategy #5: Improve accessibility to the Recycling Center.	

Medium-Term Strategies (3-5 Years)	Primary Topics
Strategy #6: Enforce food waste diversion requirements for residents and businesses.	
Strategy #7: Evaluate a hybrid Pay-As-You-Throw (PAYT) program.	
Strategy #8: Provide technical assistance to the commercial sector.	

Long-Term Strategies (5+ Years)	Primary Topics
Strategy #9: Foster a "Reduce & Reuse" Culture in the Commercial Sector	
Strategy #10: Lead by example and continually revisit policies and practices.	

Ongoing Strategies	Primary Topics
Strategy #11: Host educational events and workshops on reduce & reuse topics.	
Strategy #12: Conduct waste composition studies every three years.	
Strategy #13: Advocate for Extended Producer Responsibility (EPR) at the state level with other municipalities.	
Strategy #14: Collaborate with recycling facilities to determine if new materials can be diverted or reused from the current trash stream.	
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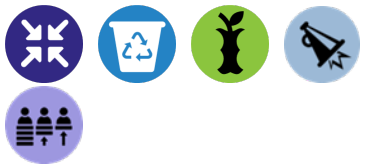
Strategy #17: Increase access to waste diversion programs to residents that are less familiar with the programs and provide information in multiple languages.	
Strategy #18: Remain nimble and adjust plans as needed.	

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Introduction

In 2009, the City of Cambridge began its path to zero waste by establishing its first waste reduction goals; reduce trash 30% by 2020 and 80% by 2050, with 2008 as a baseline. In 2019, the City published its first Zero Waste Master Plan (ZWMP 1.0). The Plan identified key strategies to meet the waste reduction goals. By 2019, the City had successfully met the 2020 goal of reducing trash by 30%. The City has continued reducing trash and by 2024 achieved a 36% reduction in trash.

This Zero Waste Master Plan, ZWMP 2.0, provides updates on ZWMP 1.0 strategies, establishes an interim waste reduction goal for 2030 (50% reduction), and identifies additional strategies to meet the 2030 and 2050 goals.

While definitions of "zero waste" vary, the City adopts the approach that the term encapsulates a long-term vision: after strong efforts to reduce & reuse, all remaining discarded materials are designed to become resources for others. This aligns with the definition applied by organizations like the Zero Waste International Alliance.[1]

Achieving zero waste takes time and is sequential: it starts with small steps that lead to other small steps and, over time yields big results. This "crawl, walk, run" philosophy of change is a theme of ZWMP 2.0. We aim to support individuals, organizations, institutions, and businesses as we all take the short, medium and long-term steps to adopt zero waste practices.

ZWMP 2.0 supports four guiding principles that drive the Department of Public Works (DPW): provide high-quality public services, protect and support the health of employees and the public,

[1] *Zero Waste International Alliance, http://zwia.org/standards/zw-definition/*

manage costs, and reduce trash. To develop ZWMP 2.0, the City hired Resource Recycling Systems (RRS).

UPDATE FROM ZWMP 1.0

The City has successfully implemented key strategies from ZWMP 1.0, as summarized below.

ZWMP 1.0 Accomplishments:

- The Curbside Compost program expanded to all 1-12 unit residential buildings (2018), 13+ unit residential buildings on a rolling basis (2019-present), and small food establishments (2021 and expanded in 2022).
- The Small Business Recycle Program was launched (2018) and expanded (2020).
- The "Recycle Right" Campaign reduced contamination in recycling from 11% in 2018 to 4% in 2020, reducing recycling processing costs by $90,000/year.
- The Mattress Recycling Program was launched (2019).
- Yard Waste Collection was extended by two weeks through December 31 (2020).
- A comprehensive Textiles Recovery Program was initiated (2021).
- Standard Trash Carts were launched across the City (2022).

The City met its 2020 goal of reducing trash 30% in 2019. By 2024, the City achieved a 36% reduction in trash. The next two goals are to reduce trash 50% by 2030 (11.4 pounds/household/week) and 80% by 2050 (4.6 pounds/household/week).

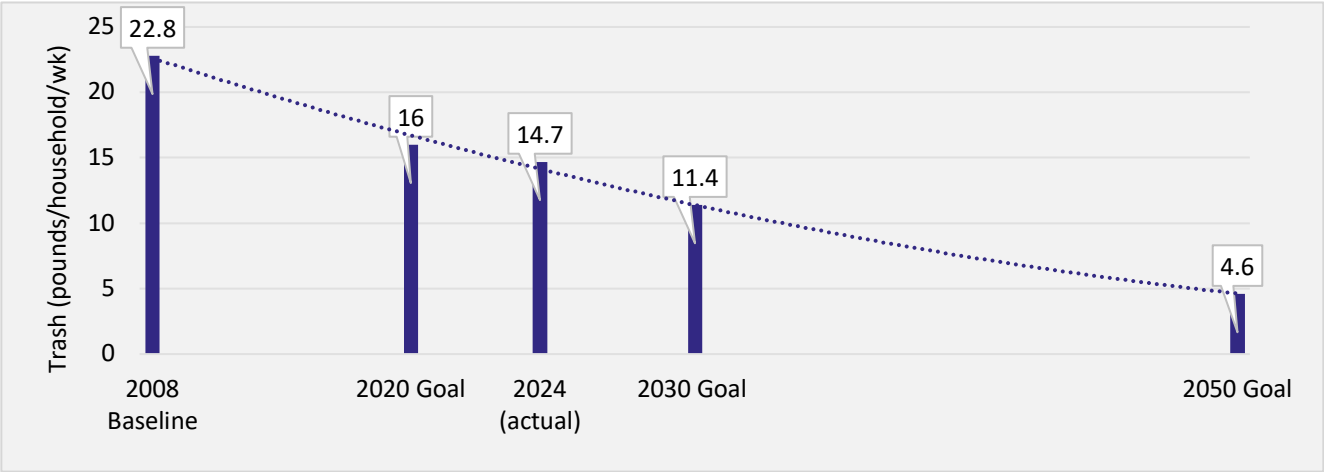


Figure 1: Cambridge Trash Reduction Goals

ZWMP 2.0 OVERVIEW

One of the first steps in the ZWMP 2.0 development was for the City and RRS to take a deep dive into current data, information, and trends in waste disposal both nationally and regionally.

Figure 2 shows the price for disposing of trash, recycling, and compost (food waste) from 2014 to 2024 (the costs do not include hauling). The most pronounced change over this 10-year period is the per-ton cost for trash disposal, which has risen 85% in the last 10 years (from $75 in 2014 to $139 in 2024). Massachusetts has the highest trash disposal costs in the US and the future trends are bleak. Trash disposal costs are expected to continue to increase as the Northeast faces limited disposal capacity, and more trash is being exported out of state each year. In 2014, MA sent approximately 700,000 tons of trash out of state. By 2023, the figure had ballooned to 2.7 million tons exported.[2] Meanwhile, nearby states have seen reduced capacity or have banned out-of-state trash.

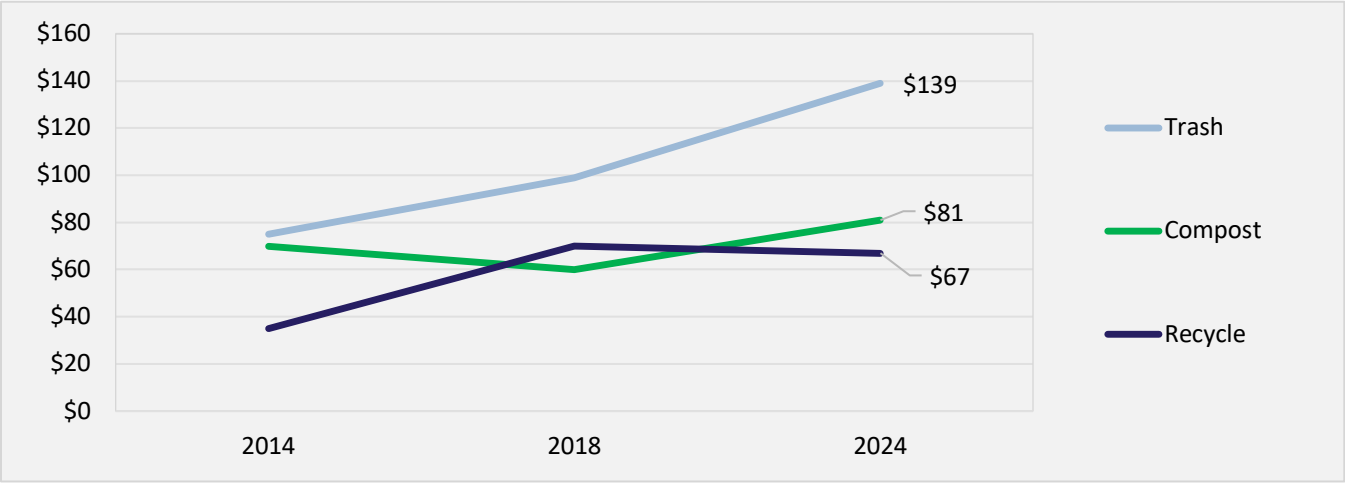


Figure 2: Disposal Fees for Cambridge Waste; note: recycling disposal costs are variable based on market rates.

[2] https://www.mass.gov/doc/2018-solid-waste-data-update/download & https://www.mass.gov/doc/2023-solid-waste-data-update/download

To understand the composition of our current waste, the City conducted a waste characterization study in 2022. In this study, residential trash is collected and sorted to determine what residents are putting in their trash.

Approximately 55% of what is placed in residential trash can be diverted through existing city programs for compost (29%), recycling (13%), or programs to manage textiles, metal or e-waste (13%). The remaining 45% of the residential trash that was sorted was considered "trash" and includes diapers, pet waste, plastic film/bags, and other items not accepted in current recycling and compost programs. This data highlights how vital it is to continue increasing participation in the compost and recycling programs.

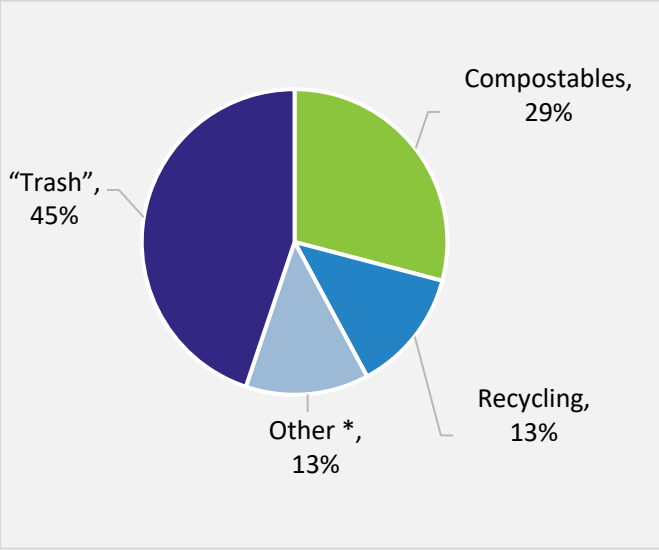


Figure 3: 2022 Cambridge Waste Characterization. *=Textiles, metal, or e-waste

It is important to note that trash reduction goals and the data shared above are focused on the City's residential sector, the area where DPW has more control and the capacity to implement zero waste strategies.

COMMERCIAL TRASH & RECYCLING

Cambridge has a large commercial sector and in 2022, the City worked with a consultant to estimate the volume of commercial and residential trash produced in the city.[3] This Trash Generation Study estimated that more than 120,000 tons of commercial trash are generated annually. That is

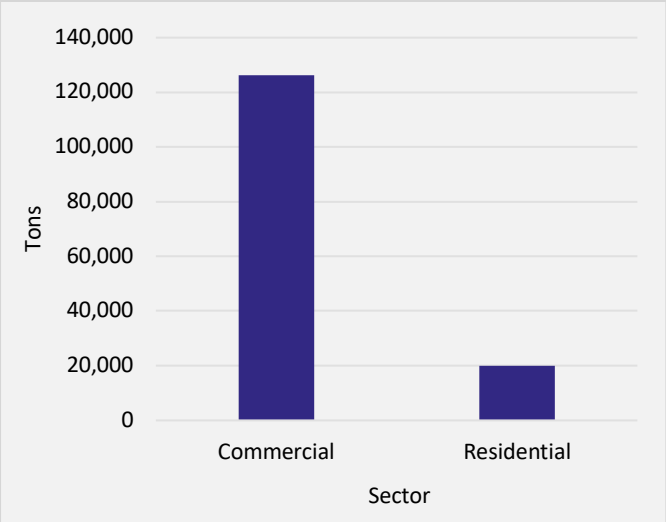


Figure 4: Estimated Citywide Trash Generation

[3] https://www.cambridgema.gov/-/media/Files/publicworksdepartment/recyclingandrubbish/zerowastemasterplan/citywidetrashgenerationstudy2022.pdf

more than 6 times the estimated 20,000 tons of residential trash generated citywide.

A significant goal of ZWMP 2.0 is to better understand the mix of trash, recycling and compost in the commercial sector. By understanding this data, effective diversion programs and policies can be implemented in the commercial sector where the potential gains are significant.

EXISTING CITY CONDITIONS

The City currently provides residents with a variety of services. The DPW collects trash, food waste, appliances, and TVs from residents using city staff and private contractors to collect recyclables, yard waste, mattresses and textiles. Private-sector contractors also provide waste processing and/or disposal, as well as most collection services for commercial buildings.

Cambridge is an excellent waste diversion performer. In 2023, Cambridge households generate (14.7 lbs of trash per week) less than half the statewide household average (31.9 lbs of trash per week, as estimated by MassDEP). Figure 5 shows 2021 data from the most comparable communities in the state and highlights the success of Cambridge's efforts to reduce trash.

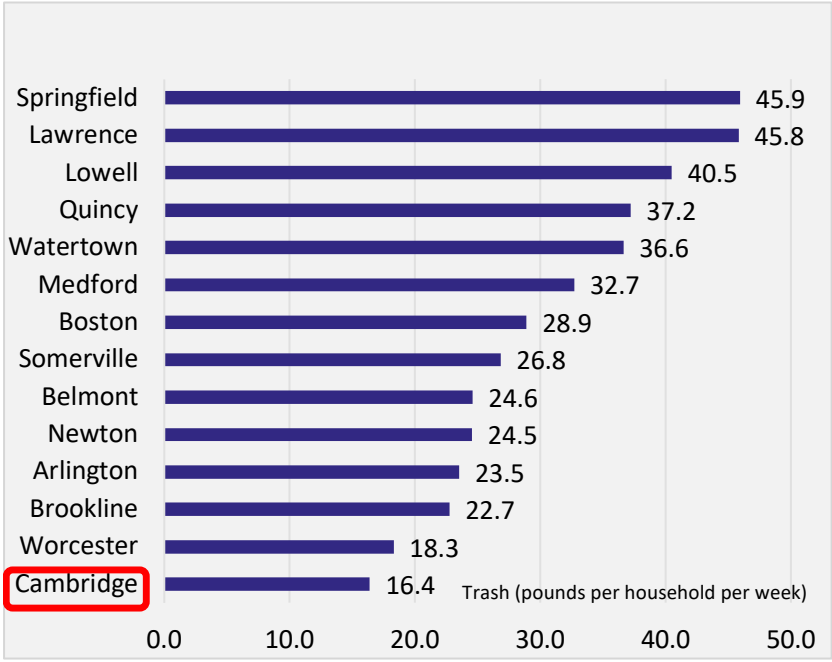


Figure 5: Average Household Trash Generation in Peer Municipalities (2021)

KEY STATISTICS

2020 Census Population:	118,403
Approximate # of Households:	58,000
2024 Residential Diversion Rate:	51%

CHANGES TO CITY MANAGED RESIDENTIAL WASTE GENERATION BETWEEN 2018 AND 2024:

Trash Collected:	7% ↓
Food Waste Collected:	63% ↑
Other Diversion Collected:	182% ↑

In addition to reducing trash, Cambridge is committed to reducing the environmental impact of its collection vehicles. The City has three hybrid collection vehicles, and three all-electric collection vehicles (EVs); another EV will arrive in 2026. Additionally, the City's contractor for recycling and yard waste collection will add two EV collection vehicles to their fleet beginning in Fall 2025.

EXISTING PROGRAM LANDSCAPE

The City tracks daily tonnage reports for trash, recycling, compost, yard waste, mattresses, textiles, e-waste, and scrap metal, as well as the number of households and businesses that each program serves.

Table 1: Existing Residential Curbside Services by Material and Disposal Sites

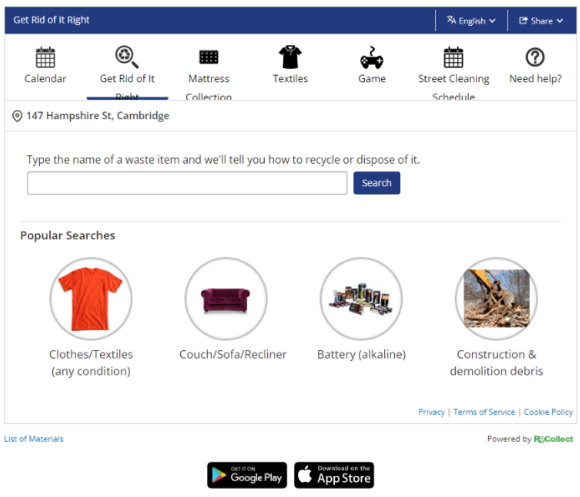
MATERIAL	COLLECTION SERVICES	DISPOSAL SITE(S)
Trash	Weekly collection by city staff 32,800 households	-Turnkey Landfill, NH -Landfill in Virginia -Covanta Incinerator, Haverhill, MA
Single Stream Recycling	Weekly collection by contractors 48,500 households 268 small businesses	-Casella; Charlestown, MA
Compost (Food Waste)	Weekly collection by city staff 39,000 households (with approx. 50% participation rate) 87 small businesses	-WM CORe; Charlestown, MA. -Greater Lawrence Sanitary District; North Andover, MA
Yard Waste	Weekly collection by contractors (Apr 1 – Dec 31) 48,500 households	-Landscape Express; Woburn, MA or West Roxbury, MA. -Save That Stuff, Brockton, MA

Table 2: Other Services Available through the City

MATERIAL	SERVICE	ACCEPTED ITEMS
Household Hazardous Waste (HHW)	4 collection days annually	Chemicals (antifreeze, motor oil, cleaners, etc.), mercury containing products, paints, poisons, prescription medicines, propane and fire extinguishers, and non-alkaline batteries.
Bulky Materials	Weekly collection: some items require $25 payment	Appliances, TVs, mattresses, other large metal/electronic items.
Recycling Center	Open three days per week Serves residents, and small businesses / non-profits with fewer than 50 employees	Mercury-containing items, small electronics, plastic film, books, scrap metal, bulky rigid plastics, printer cartridges, single-stream recycling.
Textiles	Weekly collection and drop-off bins	All textiles, including footwear, clothing, linens, accessories.
School Recycling & Composting	All 14 Public Schools	Recycling and composting

EDUCATION & OUTREACH

The City's DPW staff do extensive education and outreach with residents, businesses, institutions and schools. The DPW webpage for curbside collection includes information on how to sort waste properly and donate unwanted items, along with resources for multi-family buildings including flyers in multiple languages. The Get Rid of It Right tool allows residents to look-up how to properly dispose of waste, see their collection calendar and take the recycling game to test their knowledge. The Get Rid of It Right tool is used to look up disposal questions more than 500 times per day.



DPW staff provides technical assistance for increasing waste diversion throughout the city. For example, the Recycling Program Manager works closely with custodians at all city and school

buildings to ensure recycling and composting are being used to the fullest extent. City staff also give presentations and work with property managers to improve diversion at muti-family properties. A few other key education and outreach efforts the City performs are:

- Mailing postcards to all residential addresses annually to share resources on waste reduction programs.
- Emailing newsletters to more than 10,000 addresses each month with updates on waste programs, fun facts, and reduce & reuse tips.
- Inviting residents and city officials to webinars and tours of waste management facilities
- Tabling at large citywide events such as Fresh Pond Day, Danehy Park Day, and River Fest.

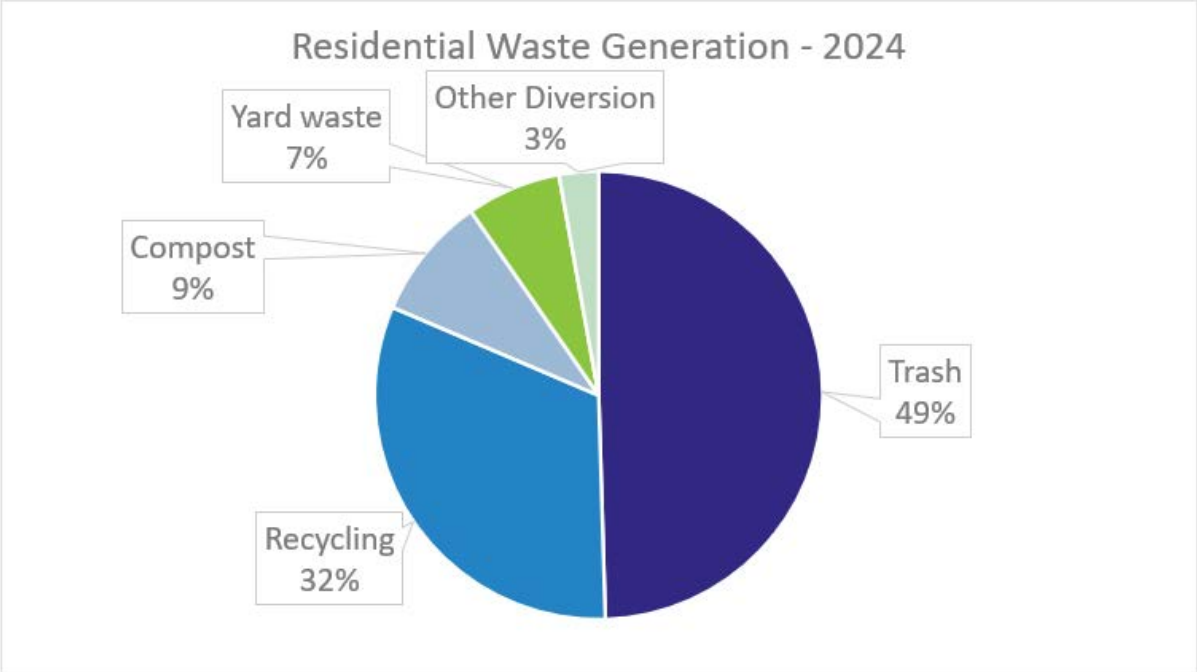


Figure 6: 2024 Residential Waste Generation

All of these education and outreach programs have contributed to high marks from residents on waste management services. In a 2024 survey to a representative sample of residents, 85% of resident rated the trash, recycle and compost programs as “Excellent” or “Good”.

In 2023, for the first time ever, more materials were diverted through recycling, composting, yard waste, mattresses, textiles, and e-waste than were trashed.

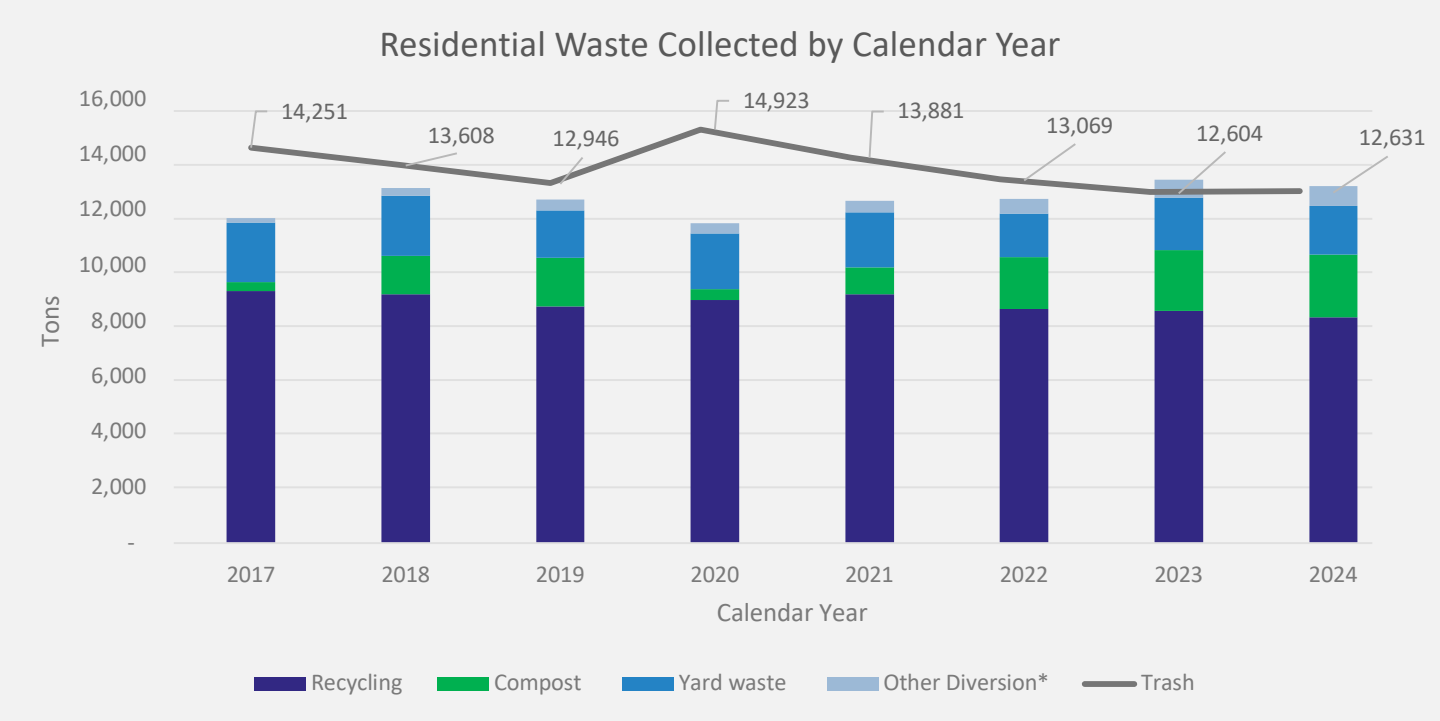


Figure 7: Historical Residential Materials Collected by Calendar Year; *Other Diversion=Scrap metal, textiles, mattresses, and e-waste.

Caption: Recycling Advisory Committee (RAC) members and City staff conduct outreach.

Caption: RAC members, residents, City staff, and City Councilors join for tours of various waste management facilities to learn more about how to improve our programs and outreach efforts.

Top Row: Volunteer Fixers help residents fix items at the Cambridge Fix-It Clinic

Middle Row: Residents scoop up finished compost for their garden on Earth Day 2024; DPW Staffer helps students reduce trash at lunchtime at Cambridge Public School.

Bottom Row: Advertisements for recycle and compost programs at MBTA and BlueBikes stations.

STAKEHOLDER ENGAGEMENT

The City of Cambridge recognizes that achieving a successful and equitable ZWMP 2.0 requires meaningful engagement with residents, businesses, and stakeholders. To ensure broad community participation and input, the City implemented a comprehensive outreach and engagement strategy throughout 2024. This multi-faceted approach included in-person events, online surveys, newsletters, social media outreach, and direct community engagement efforts to educate residents and collect feedback.

Public Meetings and Community Events

- Open House – June 2024: The City and its consultants, RRS, hosted an Open House at the King Open School to introduce the Zero Waste Master Plan update and gather resident input on current waste behaviors and preferences. More than 100 Cambridge households attended the event, engaging in discussions and providing feedback through a structured multiple-choice survey.
- City Council Hearing – October 22, 2024: DPW presented draft strategies for the Zero Waste Master Plan at a hearing of the City Council's Health & Environment Committee. The presentation included a review of past achievements, current challenges, and proposed zero waste strategies for ZWMP 2.0.

Community Flyer Distribution

To reach residents who may not engage with digital media, the City distributed printed flyers advertising Zero Waste Plan Open House & Zero Waste Plan 2.0 Survey at key locations, including:

- The Cambridge Recycle Center
- Household Hazardous Waste Collection Day
- All Cambridge Public Library branches
- City parks, municipal buildings, youth centers, and health centers
- Local businesses
- Additionally, the Cambridge Public School E-Newsletter (June 2024) featured a flyer to engage school communities.

Online Surveys and Feedback Collection

To ensure that residents could provide input at their convenience, the City conducted multiple rounds of online public surveys:

- Zero Waste Plan 2.0 Survey – June 2024: Launched alongside the Open House, this survey gathered responses from more than 600 residents, providing valuable insights into household waste management behaviors and priorities. To enhance

accessibility, the survey was translated into seven languages and distributed widely through digital and print channels. The online survey was open from July 15 to August 16, 2024.

- Draft Strategies Public Feedback Survey – October 29 to November 30, 2024: Following the presentation to the City Council on October 22, the City launched an additional round of public feedback on the Draft Zero Waste Strategies. This survey allowed residents to review key recommendations and provide feedback before finalizing the plan.

Newsletters and Email Communications

The Cambridge Recycling Newsletter, which reaches more than 10,000 subscribers, played a key role in promoting engagement opportunities:

- January 2024: Announced a community webinar introducing the City's recycling and compost programs and initiating discussions on the Zero Waste Master Plan update.
- May 2024: Encouraged residents to attend the Zero Waste Plan Open House on June 12, providing a link to past zero waste achievements.
- July 2024: Shared a "Missed the Kick-Off? You Can Still Participate!" update, encouraging survey participation.
- August 2024: Published a final call for Zero Waste Plan 2.0 Survey responses, urging residents to provide input before the deadline.
- October 2024: Thanked residents for their participation and announced the next step—a City Council hearing on October 22.
- November 2024: Launched the "Zero Waste Master Plan – Seeking Feedback" campaign, providing links to the October 22 presentation and draft strategies, with feedback open until November 30.

Social Media and Digital Communications

The City of Cambridge Official Facebook page and other social media platforms were actively used to promote engagement opportunities:

- January 15, 2024: Announced the Jan. 2024 webinar to educate the community.
- June 11, 2024: Encouraged attendance at the Zero Waste Plan Open House.
- August 12, 2024: Reminded residents to complete the Zero Waste Plan 2.0 Survey before the August 16 deadline.
- November 3 and November 12, 2024: Published announcements about the Draft Zero Waste Strategies, urging residents to review and provide feedback.

City Website and Cambridge Daily Updates

Key updates were posted on the City of Cambridge website and included in the Cambridge Daily Update (6,000 subscribers), a widely distributed digital bulletin:

- June 10, 2024: Promoted the Zero Waste Plan Open House.
- August 14, 2024: Issued a final reminder to "Take the Zero Waste Plan 2.0 Survey before August 16".
- November 9, 2024: Published a feature on the Draft Zero Waste Master Plan Strategies, linking to the City Council presentation and public feedback form.

CAMBRIDGE RESIDENTS

A summary of the feedback from the Zero Waste Open House and Zero Waste Plan 2.0 survey is provided in Appendix A.

CITY STAFF

The RRS team worked with the Department of Public Works, Inspectional Services Department, Economic Opportunity and Development Division, and other city staff throughout the development of this plan.

RECYCLING ADVISORY COMMITTEE

The RRS team met with the Recycling Advisory Committee (RAC) to solicit recommendations for this plan. RAC members discussed various topics through a guided discussion and helped shape the strategies.

LARGE PROPERTY MANAGERS

The City and RRS met with several of the largest commercial property managers including Alexandria Real Estate, DivcoWest, Boston Properties, and MIT Investment Management Company. On the residential side, the City met with Cambridge Housing Authority (CHA) and other large residential property managers.

WASTE SITES

The City met with staff at the Greater Lawrence Sanitary District and Waste Management to discuss the food waste program. The City met with Casella to understand how their retrofitted Material Recovery Facility (MRF) is managing materials and increasing value to the City.

MIT AND HARVARD UNIVERSITY

The RRS team met with sustainability and waste management staff at MIT and Harvard University to better understand the universities' waste generation, diversion efforts, and opportunities for collaboration.

ZWMP 2.0 STRATEGIES

ZWMP 2.0 is organized into four sets of strategies: short, medium, long-term, and ongoing strategies. The strategies are designed to build off of and support each other, while achieving the desired trash reduction goals.

ZERO WASTE PLAN OBJECTIVES:

- Reduce trash 50% by 2030 and 80% by 2050, with 2008 as a baseline.
- Improve sanitation and reduce rodent activity.
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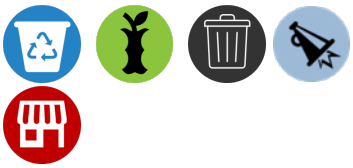
Strategy #8: Provide technical assistance to the commercial sector.	

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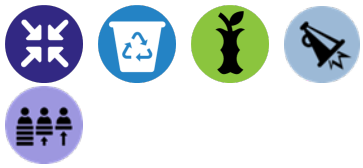
Strategy #15: Facilitate community-based programs to complement the City's efforts.	
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Short-Term 

STRATEGY #1: REQUIRE PROPERTY MANAGER ZERO WASTE PLANS

Background

Cambridge has changed significantly over the last 10+ years with the addition of new neighborhoods and major residential and commercial developments. The result is more commercial real estate and more residents living in large buildings, as Table 3 shows.

Maximizing diversion in both commercial and multi-family residential buildings is critical to achieving the City's zero waste goals. Commercial waste is the largest source of waste generation. The City doesn't manage this waste and currently cannot effectively measure it. The City also doesn't manage waste from many of the larger residential buildings. Moreso, each year, 20% of residents move out, to be replaced by new tenants who need to learn about proper waste disposal practices.

BUILDING SIZE	PERCENT OF HOUSING STOCK
1-2 units	19%
3-6 units	19%
7-50 units	18%
51+ units	44%

Table 3: Size of Buildings and Percentage of Housing Stock

Requiring Zero Waste Plans for these commercial and residential buildings is an effective way to better understand the state of the industry, develop effective waste reduction strategies, and increase communication between city staff and property managers to improve compliance, reduce waste, and better control rodents citywide.

Plan of Action

REQUIRE PROPERTY MANAGERS SUBMIT ANNUAL ZERO WASTE PLANS

To better understand the management of residential and commercial waste, the City will require Zero Waste Plans for multi-family residential and commercial buildings.

The City can be proactive to ensure that this requirement rolls out successfully by:

- Prioritizing 13+ unit residential buildings and 25,000+ square foot commercial buildings.
- Providing property managers with six months notice before implementing the plan requirement.
- Providing sample plans and templates for Zero Waste Plans.
- Providing technical assistance to property managers to help them meet the requirements and educate residents.

The Zero Waste Plans should address:

- What vendor(s) are collecting which materials?
- What volumes of materials are being trashed, composted, or recycled?

- How are mattresses and textiles being handled?
- How are residents, employees, and/or tenants educated and engaged to compost and recycle?
- What training do custodial staff receive?
- How often do building managers inspect dumpsters and bins for compliance? How are inspections tracked?
- What will the property manager be doing to increase waste reduction and diversion in the coming year?

Short-Term

STRATEGY #2: REQUIRE FOOD WASTE DIVERSION

Background

The City's compost (food waste) program began in April 2014 with a 600-household pilot program. Since then, the program has grown to serve more than 39,000 households and 87 small businesses. Although the program has grown significantly since the launch of citywide collection in 2018, food waste still accounts for 29% of Cambridge's residential trash stream (see Figure 3), making it the largest portion of the City's trash that can be diverted immediately.

The compost program has three significant benefits for the community:

1. Disposal costs for compost ($81/ton) are significantly lower than those for trash ($139/ton), (see Figure 2).
2. Diverting food waste reduces climate emissions more than incinerating or landfilling.[4,5] By sending food waste to anaerobic digestion[6], the City is reducing climate emissions at landfills, and producing clean energy.
3. Compost carts help reduce rodent activity because their latches make it harder for rodents to access the food waste.

Many U.S. cities, such as Seattle, Austin, and Boulder (see Appendix B), have successfully implemented mandates to manage food waste. Feedback from stakeholders and the Recycling Advisory Committee (RAC) indicate that residents

[4] *Food Waste Recycling — Environmental and Economic Assessment, https://www.biocycle.net/food-waste-recycling-environmental-and-economic-assessment/*

[5] *US EPA Food Recovery Hierarchy, https://www.biocycle.net/new-epa-reports-include-food-recovery-hierarchy-replacement-and-great-methane-data/*

[6] *Anaerobic digestion is a process that breaks down organic materials without oxygen to produce biogas and digestate.*

generally support mandatory food waste diversion and expanding the program into larger residential buildings, restaurants, and office buildings.

Plan of Action

1. REQUIRE FOOD WASTE DIVERSION FOR ALL RESIDENTIAL AND COMMERCIAL BUILDINGS

- Require all residential and commercial buildings to provide residents/tenants with sufficient collection bins for food waste.
- Provide technical assistance where needed to ensure that property managers can effectively implement the program.
- Require food establishments collect and divert food scraps generated back of house (pre-consumer). Encourage front of house diversion (post-consumer) if appropriate.
- Hire an additional DPW Compliance Officer to work with residents and businesses on the implementation of the food waste diversion program through a combination of education and enforcement.
- Implement the requirement through a 3-year phased-in approach.
    - 2025: Pass the Ordinance and educate the public on the upcoming policy change.
    - 2026-2027: Begin enforcement for large properties or generators. Direct outreach and support to entities that are still not diverting food waste.
    - 2028: Evaluate the level of compliance and determine if more technical assistance is needed. Consider increased enforcement.

Case Study: City of Cambridge Rodent Analysis

In the summer of 2024, Cambridge DPW conducted a curbside audit of trash and compost carts to determine how frequently rodents are chewing through carts.

The majority of the compost carts had been at the curb since 2018, when the City rolled out citywide curbside food scrap collection.

The majority of trash carts had been at the curb since 2022, when the City rolled out citywide standard trash carts.

The audit compared compost and trash carts. Although the trash carts were much newer, DPW found that 10% of trash carts had rodent holes, compared to less than 2% of compost carts. This supports the City's hypothesis that locking carts for food scraps work far better than trash carts for rodent control.

Encourage Food Waste Avoidance as Preferable To Food Waste Diversion

- Encourage residents and businesses to recover and donate unwanted, consumable food before disposing of it as food waste.
- Promote opportunities for avoiding food waste, such as efficient freezer use, food preservation, ways to reuse food scraps, and food donation outlets.

Short-Term

STRATEGY #3: REDUCE MOVE-IN/MOVE-OUT WASTE

Background

Each year approximately 20% of Cambridge residents move out, disposing of many reusable items as trash—including furniture, household goods, kitchen items, textiles, electronics, and books. During the three busiest moving weeks (in late May, late August, and early September) trash increases by approximately 20%. Other community members could use these resources, and diverting them from the trash stream can reduce costs to the City and lessen our environmental impact.

Plan of Action

1. DEVELOP A RESIDENT TOOLKIT FOR MOVE-IN & MOVE-OUT

- Develop a toolkit to include best practices to reuse (or recycle) common items that are frequently discarded when people move.
- Ask property managers to share the toolkit with tenants of multi-family buildings.
- Use existing outreach and communication channels (i.e. emails, social media, and newsletters) to promote the toolkit.

2. PILOT METHODS TO REDUCE TRASH DURING MOVE IN AND MOVE OUT SEASON

It's hard to know how much waste from move-in/move-out can be diverted from the trash. By piloting programs, the City can develop best practices for reducing trash.

- MassDEP has awarded the City a reuse micro-grant to pilot a move-out waste initiative in May 2025. This grant will fund the collection of goods (i.e. furniture, household goods, etc.) for reuse. This will allow the City to evaluate the amount of demand for diverting good-quality items during move-out periods.
- The Recycling Center accepts some items residents dispose of during moving seasons. However, space at the Center is limited and not all residents can access it. The City will consider piloting a mobile Recycle Center (see Strategy #5). Also, the City will identify other partners that can help divert move-out waste.
- In large buildings not served by the DPW, private waste haulers may charge extra for bulky waste items like furniture. Using city services can avoid these charges, saving residents money.

3. SUPPORT AND PROMOTE EXISTING PROGRAMS

- Continue to support Free Stores organized by the Recycling Advisory Committee (RAC).
- Continue to encourage residents to use online exchanges such as the five Buy

Nothing Cambridge Facebook groups, which currently have a total of 17,000 members.

August 2024 Free Store Organized by the Recycling Advisory Committee

Short-Term

STRATEGY #4: REDUCE WASTE FROM FOOD ESTABLISHMENTS

Background

During stakeholder input, more than 100 residents said the City should require customers to opt-in for single-use items (utensils, napkins, straws, etc.), rather than opting out. Both customers and business owners expressed an interest in reducing these single-use items.

Plan of Action

1. ADOPT A SINGLE-USE ORDINANCE AND UPDATE THE BRING YOUR OWN BAG ORDINANCE

- Adopt an ordinance to require that food establishments ask customers to specifically request (that is, opt in to) single-use items such as napkins, utensils, and straws, rather than expecting them to opt out.
- Update the Bring-Your-Own-Bag Ordinance, which requires retailers to charge a minimum of 10 cents per bag,[7] to further reduce the use of plastic bags.

Case Study: The Environmental Impact of Take-Out Containers

During the stakeholder input process, many residents suggested requiring businesses to switch to compostable serviceware. However, environmental lifecycle analyses show that it's not that simple. For example, in Oregon[8] and Colorado,[9] managers of composting facilities have asked consumers to not include compostable serviceware in their compost streams, as they are difficult to compost.

The environmental impact of a product is more complex than its ability to be recycled or composted; it includes upstream impacts like extraction, production, and transportation as well as downstream impacts like disposal, recycling, landfill, and digestion. The United Nations Lifecycle Institute conducted a meta-analysis of environmental lifecycle assessments for take-out materials to try to identify optimal single-use products.[10] The study concluded that

[7] https://library.municode.com/ma/cambridge/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.68BRYOOWBA

[8] https://www.oregonmetro.gov/tools-working/guide-recycling-and-waste-reduction-work/guide-choosing-single-use-service-ware

[9] https://www.wastedive.com/news/colorado-compost-contamination-materials-organics/643855/

[10] https://www.lifecycleinitiative.org/wp-content/uploads/2020/10/Take-Away-food-containers_REPORT_LR.pdf

there are no clear winners between plastic, paper, and aluminum packaging. Therefore, the ZWMP 2.0 does not recommend banning any particular material in favor of another because no material is a clear environmental win every time. What is a winner? Reduce & reuse every time! The best policy of all is to simply not use a single-use item in the first place.

2. PROVIDE TECHNICAL ASSISTANCE TO REDUCE WASTE AND SINGLE-USE PRODUCTS

- Some single-use items are less desirable than others. For example, black plastic take-out items are not accepted in recycling. The City can help businesses identify better alternatives.
- The City will work with RecyclingWorks, a state-funded waste reduction program, to offer free technical assistance to businesses in Cambridge so they can reduce waste while being mindful of costs on the businesses.

3. SUPPORT A CULTURE OF REUSE

Building a culture around reduce & reuse can allow the City to find efficient paths for diverting additional materials. With less material to recycle or dispose of, the City can redirect its efforts at education, outreach, and services towards the materials that remain.

- Facilitate a pilot program for businesses to adopt reusable take-out containers (i.e Recirclables).
- Introduce a recognition program to highlight outstanding efforts by businesses. Those that make significant strides toward the City's zero waste goals could receive a "Zero Waste Business" sticker as a symbol of their commitment and be nominated for a prestigious "Zero Waste Business of the Year" award.

Case Study: RecyclingWorks in Massachusetts

Reusable Takeout Containers Guidance[11]

RecyclingWorks in Massachusetts has developed comprehensive guidance to help food establishments transition to reusable takeout containers. Recognizing the growing environmental impact of single-use packaging, the initiative provides businesses with resources and strategies to adopt sustainable practices. The guidance includes detailed steps for selecting appropriate reusable containers, implementing cleaning, and sanitizing protocols, and managing customer engagement. By emphasizing operational efficiency and compliance with health regulations, RecyclingWorks empowers establishments to make the shift while maintaining high standards of service.

The program also highlights successful case studies from Massachusetts businesses that have adopted reusable container systems, demonstrating the financial and environmental benefits. For example, establishments using deposit-based models to encourage container returns have reported reductions in waste

[1111] *https://recyclingworksma.com/reusable-containers-guidance/*

generation and disposal costs. RecyclingWorks supports businesses by offering free technical assistance, workshops, and online resources, ensuring that the transition is accessible and effective.

Short-Term

STRATEGY #5: IMPROVE ACCESSIBILITY TO THE RECYCLE CENTER

Background

In ZWMP 1.0, one of the medium-term goals was to investigate increasing access to the City's Recycling Center. As ZWMP 2.0 was developed, the need for an improved center became apparent. During the stakeholder phase, a few dozen residents, as well as members of the RAC said they want to see more open hours for the Center, along with more convenient locations where residents can leave divertible materials. As the Waste Characterization Study found, approximately

10% of residential trash could be diverted through the programs the Center offers.

Plan of Action

1. IMPROVE THE RECYCLING CENTER AT DPW FOR EASIER ACCESS AND USE

- Move the Recycling Center from the back of the DPW yard to an area closer to the front and make infrastructure improvements such as improved lighting and a new universal waste[12] shed.
- The City will pilot a mobile Recycle Center with a focus on maximizing diversion and capturing waste, likely during the moving season in 2026.
- Improving access to the Recycle Center is also important for achieving safety goals. Lithium-Ion (Li-ion) batteries are increasingly being disposed of improperly, leading to fires in waste management vehicles and facilities. These batteries can be safely disposed of at the Recycle Center.

[12] *Universal waste generally refers to batteries, mercury-containing items such as fluorescent lights or thermostats.*

Medium-Term 

STRATEGY #6: ENFORCE FOOD WASTE DIVERSION REQUIREMENT

Background

After seven years of citywide food waste collection, about 29% of the residential trash collected in Cambridge is still food and organic waste. This segment of the waste stream must be diverted if the City is to meet its zero waste goals (see Strategy #1).

Plan of Action

1. ENFORCE MANDATORY FOOD WASTE DIVERSION

For the first two years the focus will be on implementing the requirement to divert food waste through education and encouragement. The City will then shift efforts to enforcement. This phased approach recognizes that residents and businesses may need time to adapt to the new requirements.

Case Study: Minneapolis, Minnesota

In 2020, Hennepin County, MN enacted requirements for businesses to recycle their food waste. These regulations applied to all businesses that generate large quantities of food waste including 17 different sectors (e.g., restaurants, hotels, etc.) that generate at least a ton of waste a week, or contract for 8 cubic yards or more of trash service per week. These large generators are required to contract with a food waste recycler and must use back-of-house food waste containers for separation.

Case Study: Seattle, Washington

Seattle initiated its mandatory food waste separation program in 2015. The policy requires residents and businesses to separate food scraps, yard waste, and compostables from regular trash.[13] To encourage compliance, Seattle offers robust curbside composting, provides green bins, and educates residents on proper sorting practices.

To enforce the mandate, the City imposes fines for non-compliance but initially focuses on education. Inspectors check bins for improperly disposed compostables, issuing warnings before penalties. This approach fosters behavior change and community participation.

Seattle's program has become an impressive model: more than 60% of its food waste is diverted from landfills. By making it easy, and by educating and enforcing, Seattle has shown that food waste mandates can be effective, can reduce environmental impacts, and can raise awareness of the role diversion plays in combating climate change.

13 https://www.seattle.gov/utilities/your-services/collection-and-disposal/food-and-yard/food-waste-requirements

Medium-Term 

STRATEGY #7: EVALUATE HYBRID PAY-AS-YOU-THROW (PAYT)

Background

After focusing on current diversion programs, the City will evaluate the remaining trash stream and determine how waste can be further reduced, including evaluating a Pay-As-You-Throw (PAYT) program. Currently, more than 100 communities in Massachusetts have adopted PAYT programs to encourage waste reduction, and increased recycling and composting.

Implementing PAYT sends important economic signals to residents that trash disposal is the least desirable approach to waste management.

Plan of Action

1. RESEARCH AND ANALYZE HYBRID PAY-AS-YOU-THROW OPTIONS

To determine the impact and feasibility of implementing a PAYT program in Cambridge, the City will conduct a comprehensive financial and environmental cost-benefit analysis. Based on the findings, the City could develop an ordinance to establish a PAYT program. It could include a standard cart size for all residents, with additional costs applied for extra carts per property or address, promoting fairness and providing incentives to reduce waste.

Medium-Term 

STRATEGY #8: PROVIDE TECHNICAL ASSISTANCE TO THE COMMERCIAL SECTOR

Background

Commercial waste represents more than 80% of Cambridge's trash stream. It is critical to engage with large commercial generators and establish goals for them to reduce and divert trash. The City will offer enhanced technical assistance to help businesses find the best path towards reducing trash.

Plan of Action

1. ESTABLISH GOALS FOR REDUCTION AND DIVERSION WITHIN THE COMMERCIAL AND INSTITUTIONAL SECTORS

Currently, no citywide goal for waste diversion exists outside of the residential sector. To address this gap, the City plans to gather data from large properties (Strategy #1) and establish clear, measurable, and achievable diversion goals for the commercial and institutional sectors in ZWMP 3.0.

2. ENGAGE WITH THE LARGEST COMMERCIAL GENERATORS

Engaging with the largest commercial waste generators is a crucial step toward reducing trash and encouraging everyone to adopt reusable materials. The City will identify these key stakeholders and invite them to participate in dedicated workshops to share challenges, successes, and innovative ideas for waste reduction. By fostering collaboration and providing practical strategies, the City can encourage these entities to take meaningful action to support broader sustainability goals and reduce overall waste output.

Long-Term

STRATEGY #9: FOSTER A "REDUCE & REUSE" CULTURE IN THE COMMERCIAL SECTOR

Background

The City can drive collaboration and innovation in the commercial sector by bringing multiple stakeholders together. One highly effective tool used in other large communities (i.e. San Francisco, New York City) are online reuse marketplaces. Fostering the culture for diverting waste and conserving resources is something the City can lead on. By partnering with existing regional and state-level programs, the city can make these platforms more visible and accessible, ensuring that a wide range of businesses can participate.

Plan of Action

1. SUPPORT ONLINE REUSE MARKETPLACES FOR BUSINESSES

The City will support state and/or regional online marketplace systems that share resources for the commercial sector. These resources aim to be one-stop platforms for a "buy-sell-trade" model to keep reusable materials out of landfills, and reduce costs for businesses. This may apply to office furniture, appliances, excess pallets, etc.

Such platforms streamline the process of finding and exchanging reusable goods: a business with surplus office furniture can connect with another company in need, while manufacturers can offer excess materials to local contractors. These exchanges contribute to a circular economy by keeping items in use longer. They reduce the environmental impact associated with production, transportation, and disposal while helping businesses save money and promote sustainability.

Educational initiatives will highlight these platforms' benefits and ease of use. Over time, this approach can drive a cultural shift toward a circular, more waste-conscious business environment, reducing waste and supporting long-term sustainable practices.

Case Study: Online Reuse Platforms in Massachusetts

Massachusetts offers several online platforms to facilitate the reuse of materials among businesses, aiming to divert usable items from landfills and promote a circular economy:

The Great Exchange: Operated by the Devens Eco-Efficiency Center, this program engages with numerous municipal, nonprofit, commercial, and industrial entities throughout Massachusetts. It facilitates the repurposing of idle resources such as office supplies, furniture, and fixtures, diverting approximately 50,000 pounds of materials from landfills annually. [14]

[14] https://tgedevens.com/

MIT: The institute partners with Rheaply, an online platform that assists with sharing resources across a campus or community. The Rheaply marketplace allows MIT users to identify available resources for reuse across different departments on campus. MIT community members can list surplus equipment and offer it to the community, and post requests for specific equipment or supplies.

Long-Term 

STRATEGY #10: LEAD BY EXAMPLE AND REVISIT POLICIES

Background

Cities aiming to advance a sustainable future increasingly focus on initiatives that promote resource conservation and waste reduction, prioritizing the lifecycle environmental impact of products, and not just the downstream impacts. The City will lead by example to foster a circular economy that minimizes waste and maximizes resource reuse. Additionally, deconstruction ordinances can facilitate the recovery of valuable materials from construction and demolition.

Plan of Action

1. LEAD BY EXAMPLE TO FOSTER A CIRCULAR ECONOMY

As mentioned briefly in Strategy #4, the consumption of goods has upstream and downstream impacts. Much of this plan focuses on the downstream end-of-life of items. It is also important to think broadly about waste and resource conservation overall.

To advance the circular economy, the City will consider implementing policies that foster repair, sharing, resale, and remanufacturing to maximize asset use. Furthermore, there may be opportunities to collaborate with the Economic Opportunity & Development Division to support local businesses.

2. RESEARCH DECONSTRUCTION AS A MEANS TO RECOVER VALUABLE CONSTRUCTION AND DEMOLITION MATERIALS

Deconstruction can be successful if there is market for the recovered materials, either for new construction or for the historical value the components bring. Deconstruction requirements often include a threshold for the year of original construction, since newer construction materials are less valuable (lower quality) than the older ones.

Case Study: Boulder, Colorado

In July 2020, Boulder, Colorado enacted Ordinance 8366, mandating that all full-structure removals and major remodeling projects divert at least 75% of deconstruction materials by weight from landfills.[15] This includes materials such as concrete and asphalt, with a requirement to divert a minimum of three distinct material types (e.g., glass, metal, structural wood, electronics). Additionally, applicants must submit a Sustainable Deconstruction Plan prior to obtaining a demolition permit, pay a refundable deconstruction deposit of $1 per square foot (min. $1,500), and a non-refundable administrative fee.

A notable application of this ordinance was the deconstruction of the former Boulder Community Health Hospital. Through planning and execution, the project achieved a 93.5% diversion rate, with over 60.8 million pounds of materials either reused or recycled. Salvaged materials, including steel beams, were repurposed in new city structures, such as a fire station.

15 https://bouldercolorado.gov/services/sustainable-deconstruction-requirements

ONGOING STRATEGIES

To maximize the impact of ZWMP 2.0, the City will continue to support ongoing strategies to maintain a strong backbone for its zero waste initiatives. These ongoing strategies complement the short, medium, and long-term strategies and are just as important.

ONGOING STRATEGIES	PRIMARY TOPICS
Strategy #11: Host educational events and workshops on reduce & reuse topics. • Work with local organizations and residents to provide events and workshops related to zero waste, composting, clothing repair workshops, Fix-It Clinics, etc.	
Strategy #12: Conduct waste composition studies every three years. • Determine which portions of the waste stream should be targeted for recycling or reduction and to evaluate the current program's success. 	
Strategy #13: Advocate for Extended Producer Responsibility (EPR) at the state level with other municipalities. • Focus on hard-to-manage materials such as household hazardous waste (HHW), packaging, and electronic waste.	
Strategy #14: Collaborate with recycling facilities to determine if new materials can be diverted or reused from the current trash stream. • Evaluate new diversion programs for poly-coated paper packaging (e.g., paper cups, cartons, etc.), aseptic packaging, and other potentially divertible streams. • Collaborate with local vendors on new materials that have the potential to be recycled using alternative approaches. Examples are lab plastics, chopsticks, compostable paper and plastic items, and other items not currently accepted in single-stream recycling or compost programs.	

Strategy #15: Facilitate community-based programs to complement the City's efforts.

- The Recycling Advisory Committee (RAC) is an integral part of the City's outreach efforts and continued emphasis will be placed on their role in effective outreach, and the role of the general public in contributing to outreach efforts.
- Regularly collaborate with the resident stakeholders to evaluate the impact of educational and communication plans around zero waste.

Strategy #16: Continue to expand zero waste efforts with public school students and staff.

- Utilize annual training for school custodians and staff. Meet with the Facilities Director annually to review procedures and pursue more waste reduction opportunities as they arise.

Strategy #17: Increase access to waste diversion programs to residents that are less familiar with the programs and provide information in multiple languages.

Most residents have a strong grasp of how to recycle. As the City's waste programs expand to include hard-to-recycle materials such as electronics, textiles, and metal, it's important to educate residents and property managers on how to use these programs.

- Offer recycling training in different languages and/or provide interpreters.
- Develop material with more visuals and fewer words to ensure that information is accessible.

Strategy #18: Remain nimble and adjust plans as needed.

As strategies are rolled out and the waste landscape shifts, the City must remain flexible in considering new ideas that may arise.

CONCLUSION

The strategies outlined in this plan represent the best opportunities for the City to achieve its waste reduction goals, while continuing to support the community. If implementation of the strategies goes as planned, Figure 8 shows a projection of Cambridge's residential waste generation by stream (food waste, yard waste, other diversion, recycling, and trash) through 2050. The projection makes assumptions about the waste generation impacts of each strategy outlined above and assumes that Cambridge's population will grow by an average of 1% per year.

This projected analysis shows that Cambridge will reach its goal of 50% reduction of trash by 2030. With the strategies laid out in this plan, the City is also projected to achieve 65% reduction of trash by 2045. In upcoming versions of the ZWMP, the City will need to implement additional strategies to more aggressively reduce trash to reach the goal of 80% reduction by 2050. The City will continue to track waste generation over time, periodically revising the projections to be more accurate and incorporate additional strategies in ZWMP 3.0 (2030).

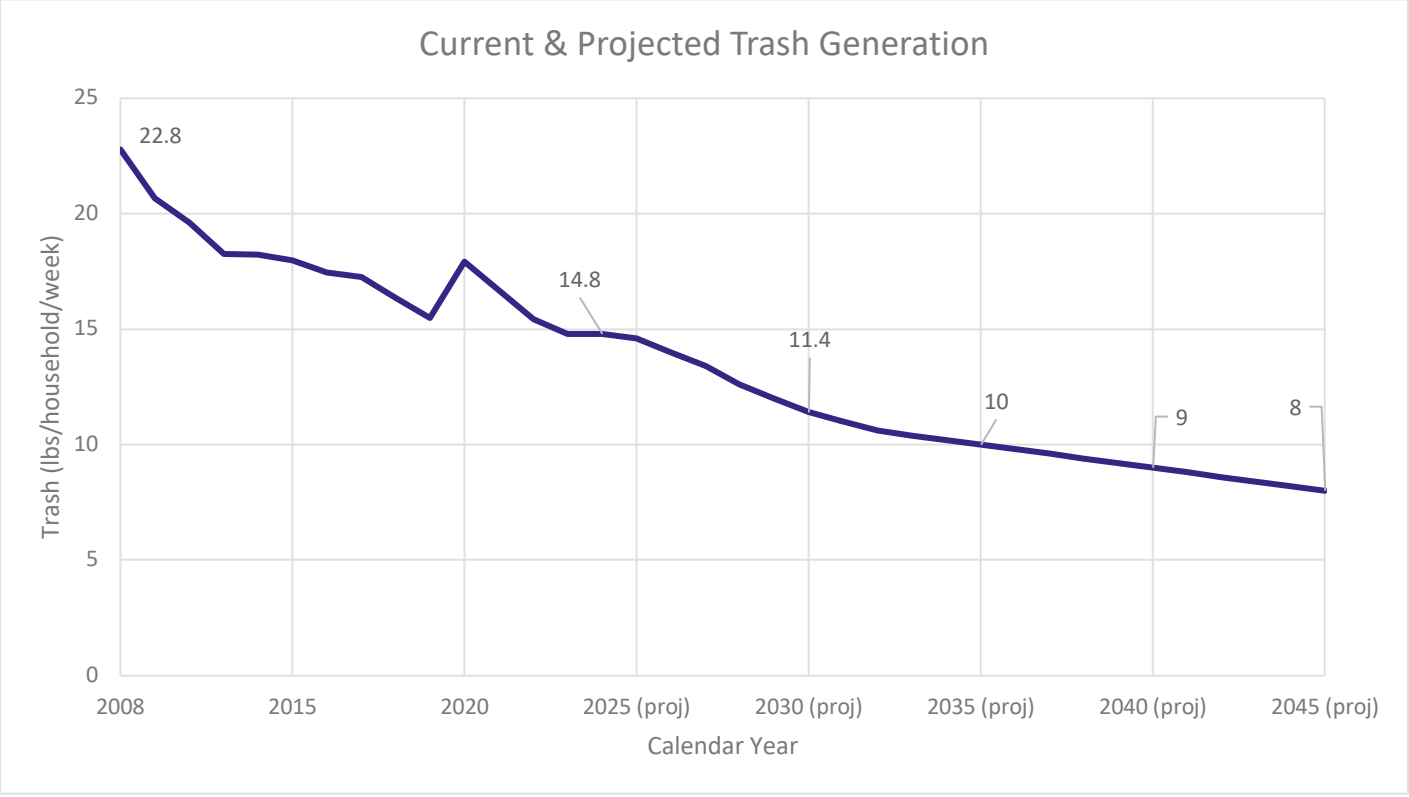


Figure 8: Projection of trash generation through 2045.

NEXT STEPS

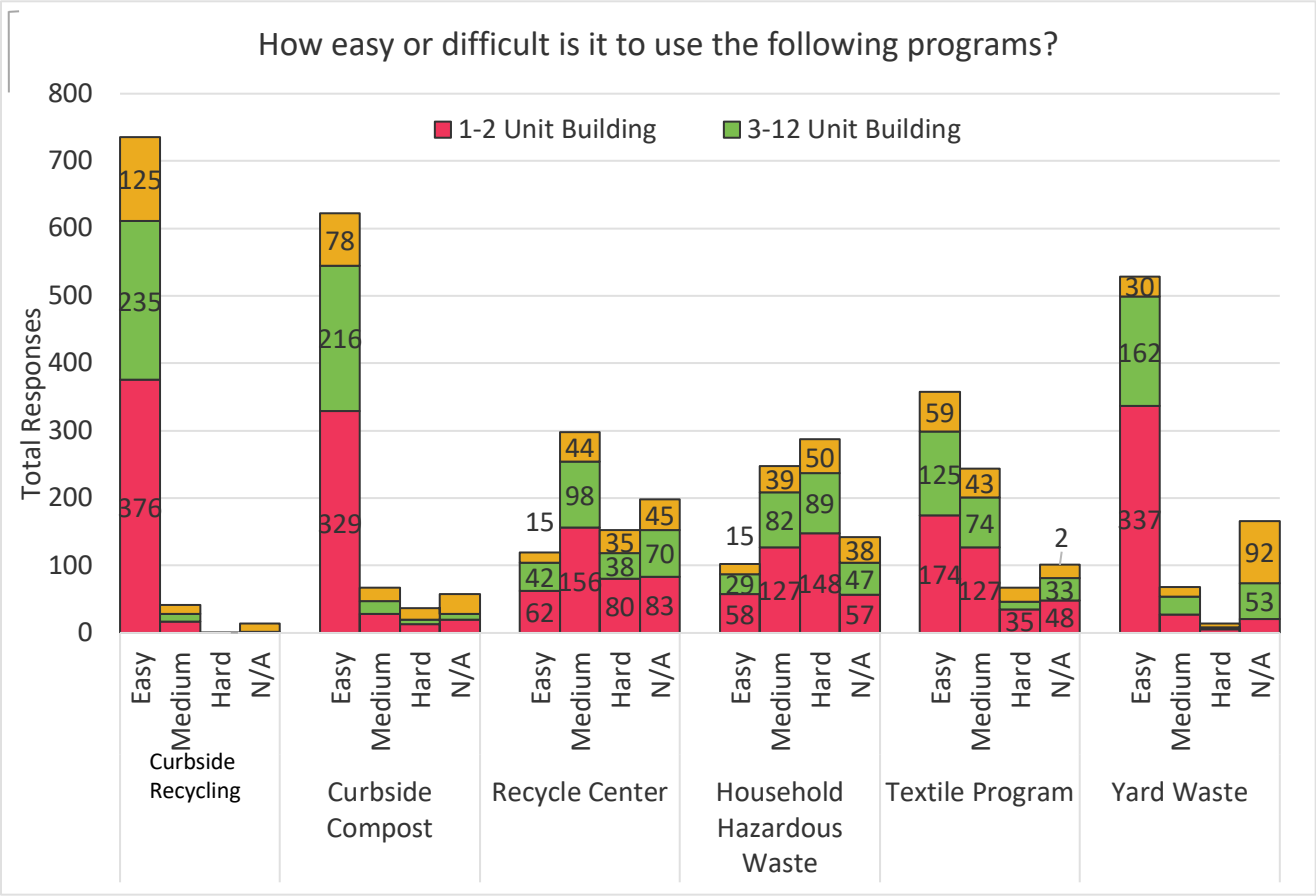
- The City will continue to measure the effectiveness of the 18 strategies and adapting to changes in the zero waste landscape as they arise.
- The City will re-evaluate strategies and the 2050 Zero Waste goal in 2030 with a ZWMP 3.0.
- ZWMP 3.0 will be informed by a fuller understanding of the City's commercial and institutional sectors, and establish goals for those sectors.

APPENDICES

APPENDIX A: STAKEHOLDER ENGAGEMENT METHODS AND OUTCOMES

For full Appendix A, please visit: www.cambridgema.gov/ZWMP

The City gathered information from Cambridge residents through a public event in June 2024 at the King Open School and an online survey with identical questions. Participants answered multiple-choice and open-ended questions, identifying their housing type: 1–2 unit (red), 3–12 unit (green), or 13+ unit (yellow). At the event, attendees placed color-coded dots on multiple-choice answers and provided written feedback at topic tables. The online survey, promoted via the City's newsletter and website, received over 700 responses, while approximately 100 households were represented in person. Of the respondents, 371 lived in 1- to 2-unit buildings, 225 in 3- to 12-unit buildings, and 128 in buildings of 13+ units.



APPENDIX B: ORDINANCE EXAMPLES FROM OTHER MUNICIPALITIES

For full Appendix B, please visit: www.cambridgema.gov/ZWMP.

New Construction: Space for Recycling and Organics Collection

Cities like Fort Collins, CO and Santa Ana, CA already mandate space for recycling and organics in multi-family and commercial buildings, ensuring compliance with local green codes.

Property Manager Recycling/Solid Waste Plans

Cities such as Alexandria, VA, Arlington, VA, Austin, TX, and Montgomery County, MD require property managers to submit annual recycling plans, often with reporting tools, education, and compliance incentives.

Construction and Demolition Waste

Portland, OR leads in deconstruction ordinances, supported by community engagement and material reuse infrastructure. Milwaukee, WI has passed but not yet implemented a similar policy. Mixed C&D diversion relies on cost-effective processing, transportation, and markets, with incentives or penalties supporting landfill alternatives.

Single-Use Products "Upon Request"

Outside of Massachusetts, there are many other municipalities that have implemented opt-in policies for single use products. The City of Berkeley, CA has an ordinance that requires businesses offering takeout to charge $0.25 for disposable cups and provide disposable accessory items (e.g., straws, napkins, utensils) only upon request.

Mandatory Food Waste Separation

Seattle, WA, Austin, TX, and Boulder, CO, have all implemented mandatory food diversion.

City of Toronto

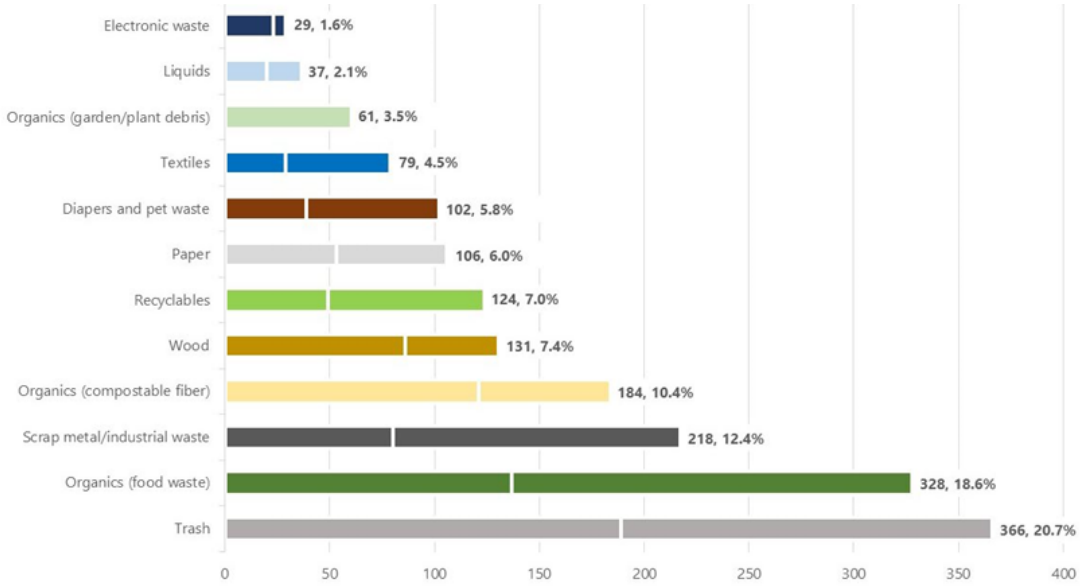
In 2002, Toronto started its Green Bin program, which accepts food waste collected in plastic bags, an 85% participation rate. Toronto made the conscious decision to allow conventional plastic bag liners for collection of food waste. Residents and businesses are instructed to use any plastic bag to line their container, noting that no special plastic or biodegradable bag is needed. The City explains that 98-99% of plastic is removed during the pre-processing step and the compost meets provincial standards for AA compost, suitable for home application. The City received some questions from residents during the first year or two following the allowance of any bag, however, now residents are quite familiar with program features.

Appendix C: Other Cambridge Waste Studies

Residential Waste Characterization Study (2022)

For full study, please visit: www.cambridgema.gov/ZWMP

The City partnered with CDM Smith and VHB to conduct a comprehensive characterization study of residential trash. Using representative samples that DPW collected on October 24 and 27, 2022, VHB performed waste audits at Casella Waste Systems' Charlestown facility in Boston, following protocols outlined in the study.



Source: VHB, 2022

Citywide Trash Generation Study:

For full study, please visit: www.cambridgema.gov/ZWMP

Approximately 65% of residential trash is collected through municipal curbside programs, while the remaining 35% is handled by private haulers contracted by larger multi-family complexes. Commercial trash collection is entirely managed by private haulers. Cambridge DPW provides detailed records on municipal curbside waste tonnage, including data from mixed waste sources like street cleaning and catch basin debris, which totaled 14,380 tons in 2019. However, raw trash data from private haulers was unavailable and estimated for this inventory. Labor force and unemployment data for Cambridge in 2019 were also referenced for contextual analysis. Combining the private haul trash collection estimates for commercial properties and large multi-family housing developments, total waste collected by private haulers in 2019 was determined to be 133,219 tons.