



Routt County ORGANICS RECOVERY STUDY



Prepared by
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Executive Summary

This Organics Recovery Study is intended to provide the City of Steamboat Springs (City) and Routt County (County) with information, assessments, and recommendations to move organics recovery from a low-priority, voluntary and limited activity to a core component of their overall municipal solid waste stream (MSW) management system. This work was undertaken in the context of the Routt County Climate Action Plan (CAP) 2050 goals of 85% landfill diversion and 69% greenhouse gas (GHG) reduction from the waste sector and its priority of expanding community-wide composting collection and infrastructure.

The Study is focused on organics in the MSW and local government's role (or potential role) in managing the primary components of food waste, yard waste, and wood waste. In addition, the Study provides general information regarding other organic wastes not generally considered part of MSW.

The Study is a high-level feasibility study intended to address the chicken-and-egg dilemmas associated with organics recovery in Routt County. It provides background information on current organic waste management practices, estimates current generation and recovery, identifies challenges and gaps, assesses opportunities to increase recovery, and provides high-level recommendations for future improvements aimed at bolstering on-going recovery efforts to collectively meet CAP goals.

Current Organics Waste System

The City and County have diverse organics recovery activities already underway, ranging from food rescue and animal feeding to onsite composting, food waste collection, and centralized compost processing facilities. Residential, commercial, and institutional generators have limited access to food waste recovery, however. Without an economic driver (e.g., pay-as-you-throw, mandatory organics collection service, and easy access to services), only a small number of generators will voluntarily recycle organics. At the same time, without reliable, sufficiently large quantities of source-separated organics, composting facilities lack the incentive to significantly increase capacity.

As a consequence of this dynamic - combined with the fact that waste collection is open market and processing, and disposal infrastructure is privately controlled - the current organics recovery system will not expand significantly without local government taking a more proactive role.

Organics Waste Disposal and Recovery Estimates

Previous studies estimated that residential and commercial trash contain approximately 25% organics consisting primarily of food waste. Very little yard waste was found in the MSW stream, which is likely due to the arid alpine environment and landscapers collecting yard waste separately. While residential waste is relatively consistent in composition, the amount of food waste in commercial and institutional (CI) waste differs greatly. Food-based businesses like restaurants, grocery stores, and institutional kitchens tend to generate large amounts of food waste, so they are typically a primary target for food waste collection.

Residential, including larger multi-family unit (MFU), and CI food waste represents the single largest untapped opportunity to increase organics recovery from MSW generated in Routt County. It is estimated that only 5% of food waste and yard waste in residential and CI MSW is

recovered, the vast majority of which is due to breweries and distilleries diverting spent grains to animal feeding. It is estimated that over 40% of yard waste and wood waste generated by landscape and tree services is diverted, however their ability to divert is unpredictable and unreliable.

The GHG impact of MSW organics disposal is estimated at 1,460 metric tons (mtCO_{2e}), which could be reduced by over 2,100 metric tons if significant progress is made towards the County CAP goals.

Case Studies

Four Colorado mountain resort municipal/county systems are profiled in the Study providing a range of examples of how the City and County may expand and enhance organics recovery. Communities that show the greatest achievement towards diverting organic material from the landfill have strong MSW policies and programs that incentivize diversion in combination with multi-stakeholder engagement and partnerships between government, non-profits, resorts, and private waste service providers.

System Assessment

Existing food rescue activities are well established and capable of expanding if additional sources of wasted food suitable for human consumption can be identified and funding secured to manage it. Animal feeding is well established for spent grains but there appears to be opportunities to increase recovery of food scraps from other sources (e.g., groceries, bakeries, restaurants, etc).

Residential and CI food waste collection serves less than 2% and 1% of customers, respectively. It is limited to “early adopters” who are willing to pay extra for service and put in the effort without any other form of incentive. In parallel, the two companies collecting, and composting food waste currently have limited capacity, staffing, and resources and are using innovative collection schemes to overcome the unique challenge of food waste collection in mountain communities, namely the need for bear-resistant carts. These carts represent a significant investment and there are very limited options for carts in sizes suitable for food waste collection.

The current situation is very similar to communities across the U.S. where small grass-roots organics recovery businesses fill a niche of limited demand in the absence of mandates, financial incentive (e.g., pay-as-you-throw programs), or collection services coordinated by local government. Such businesses face challenges achieving economies of scale and sustainability. Residential and CI food waste collection will not grow significantly in an open market without government taking a more active role.

The two existing composting facilities are located at least 30 round-trip miles from the City of Steamboat Springs, which represents an added challenge to economic viability due to the time and cost of hauling. Both have site capacity constraints that limit their ability to readily expand and compost more organics. Both also face the fundamental challenge of operating in an open market without government policy or government-sponsored collection to ensure a guaranteed quantity of organics needed to justify capital investment and risk.

Improvement Options

Voluntary programs are often not enough to meet landfill diversion and GHG reduction goals where high material recovery rates are required. Without local government being directly invested and involved, it is not possible to achieve the public awareness, participation, ease of access, services, and infrastructure necessary to achieve high recovery rates in line with CAP goals. The options considered in the study fall broadly into four categories that represent increasing levels (“tiers”) of government engagement:

- Tier 1: Government Programs and Services
- Tier 2: Collection Service Requirements
- Tier 3: Mandates and Bans
- Tier 4: Government-Sponsored Infrastructure

Recommendations and Next Steps

Using a range of criteria including impacts on diversion and GHG reduction, ease of implementation, impacts on residential and CI generators, and integration with previously evaluated recycling initiatives in the City, the following improvement options for organics recovery are recommended:

- Tier 1: Public Education and Outreach (PEO) Program, Technical Assistance Program, Improved Data Collection and Government Resources
- Tier 2: Pay-As-You-Throw (PAYT)
- Tier 3: Mandatory Organics Collection
- Tier 4: Community Collection Enclosures and Organics Drop-off Centers

Recommended options represent all four tiers so that when implemented over time they will comprise a comprehensive organics recovery program that can significantly increase organics recovery. A phased approach is recommended, which first lays the groundwork with Tier 1 and 2 actions followed by Tier 3 and 4 efforts focused on significantly ramping up organics recovery, but which takes more time for stakeholder engagement, political decision-making, financial commitment, implementation, and expansion of organics collection services and compost processing capacity.

These recommendations are likely to look different depending on where in the County they are implemented. Most notably, the City of Steamboat Springs already has some diversion policies in place and is likely to implement more aggressive programs more quickly than other municipalities or the unincorporated areas of the County. Regardless of these differences, Routt County and its municipalities must collaborate on enhanced waste diversion practices to achieve the CAP goals and – at a minimum – implement the recommendations delineated in this Study.

To develop a strategy that establishes the most effective improvement options, it is recommended that City and County staff prepare a comprehensive waste diversion road map that integrates all waste diversion initiatives including both recyclables and organics. This plan could be developed in 2023 and implemented in two phases by 2030.

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List of Abbreviations

CAFO	Concentrate Animal Feeding Operations
CAP	Climate Action Plan
CI	Commercial and Institutional (business, institution & government generators)
County	Routt County
Cowgirl	Cowgirl Compost CO
CSFS	Colorado State Forest Service
CSU	Colorado State University
CYPY	Cubic Yards Per Year
GHG	Greenhouse Gas
KCI	Kessler Consulting, Inc.
LBA	LBA Associates
PAYT	Pay-As-You-Throw
PEO	Public Education & Outreach
MFU	Multi-Family Unit
MSW	Municipal Solid Waste
mtCO ₂ e	Metric Tons of Carbon Dioxide Equivalent
RREO	Recycling Resources Economic Opportunity
SSRC	Steamboat Ski & Resort Corporation
TA	Technical assistance
TPY	Tons Per Year
Twin Enviro	Twin Environmental
URO	Universal Recycling Ordinance
WM	Waste Management, Inc.
WWTP	Wastewater Treatment Plant
YVSC	Yampa Valley Sustainability Council

1 Introduction

Municipal solid waste (MSW) contains significant amounts of organic materials (e.g., food waste, yard waste, and wood waste). A 2018 waste audit found that MSW disposed in Routt County (County) contained 22% food waste and 2% yard waste.¹ In addition to commonly recycled materials, the organic fraction of MSW presents a major opportunity to increase waste diversion, reduce disposal, reduce greenhouse gas (GHG) emissions, and produce compost and mulch products for beneficial use. Organics recovery activities are already underway in the County with a small cohort of residential, commercial, and institutional “early adopters” (both generators and service providers) recovering and composting organics. However, the overall community impact is limited at this time; County sustainability goals require significant improvements.

Expanded organics recovery programs can play a pivotal role in achieving two key goals established by the Routt County Climate Action Plan (CAP) for 2050:

- Increase landfill diversion to 85% – 2021 diversion levels were estimated at 9%²
- Reduce 2018 GHG emission levels from the waste sector 69% – this will need to be achieved largely through increased recovery and landfill diversion

The CAP places a high priority on expanding community-wide composting collection and processing infrastructure and making composting equally accessible throughout the community. It will be challenging to achieve these goals given the size and rural nature of the County, the dearth of quantitative information regarding organics generation and sources, limited organics collection and processing infrastructure, absence of government policy (mandates and/or bans), and limited outreach and technical assistance.

This Organics Recovery Study is intended to provide the City of Steamboat Springs (City) and Routt County (County) with information, assessments, and recommendations to move organics recovery from a low-priority, voluntary and limited activity to a core component of their overall MSW management system.

1.1 Study Description

The Organics Recovery Study is focused on organics in the MSW stream and local government’s role (or potential role) in managing it. MSW includes three generating sectors:

- Residential – small residents with 1- or 2-household units
- Multi-family Units (MFUs) – large residents with three or more household units
- Commercial and institutional (CI) – businesses, institutions and government facilities

These sectors generate three major categories of organic waste:

- Food waste (excess and discards from preparation and consumption, i.e., pre- and post-consumer waste)
- Yard waste (leaves, grass clippings, and brush trimmings)

¹ Northwest Colorado Waste Diversion Study, 2018 by Souder, Miller & Associates.

² The Routt County diversion rate was estimated in the City’s 2021 Recycling Study.

- Clean wood waste (from landscaping and tree services)

The Study also considers a wider range of materials generated in parallel to and not typically controlled by local government MSW management system. These include biosolids, marijuana waste, livestock manure, and forest residue.

This report provides an overview of current organic waste management, discusses the challenges and gaps associated with organics recovery in the County, assesses potential opportunities for increased organics recovery, and provides high-level recommendations for future improvements aimed at bolstering on-going recovery efforts to collectively meet CAP goals.

This Study was initiated in early 2022 after completion of the Recycling Study for the City of Steamboat Springs. The two documents provide a complementary vision of opportunities for a comprehensive integrated materials management system focused on expanding opportunities for increasing materials recovery and landfill diversion in support of the Routt County CAP and Colorado diversion goals. This Study was undertaken with the assistance of the LBA Team of LBA Associates and Kessler Consulting and overseen by a project management team of the County, the City, and the Steamboat Ski & Resort Corporation (SSRC) staff.

1.2 City Versus County Focus

While the focus of this Study was County-wide, it is expected that program changes will vary depending on where in the County they are implemented:

- City of Steamboat Springs – the City is an obvious focal point
 - It is home to more than half of the County’s population and a strong majority of multi-family properties and commercial operations
 - The City has mandated residential recyclables collection for many years
 - The City also conducted a 2021 Recycling Study and is in the process of implementing several recommendations – including a public education and outreach (PEO) program, enhanced hauler reporting, mandatory recycling services for MFUs and CIs, and centralized commercial collection for recyclables
- The three other incorporated towns are notably smaller - of these only Hayden is a home-rule municipality
- While the unincorporated area population is significant, the overall density of waste generators is low enough to make some of the improvement options difficult to achieve

Regardless of these differences, Routt County and its municipalities must collaborate on enhanced waste diversion practices to achieve the CAP goals and – at a minimum – implement the recommendations delineated in this Study.

1.3 Study Disclaimers

The Organics Recovery Study is a high-level feasibility study intended to address the chicken-and-egg dilemmas associated with organics recovery in Routt County. It is based on available information and has been impacted by data limitations that significantly hamper the ability to reliably assess current programs and services, capture rates, diversion and recovery rates, future diversion potential, and other factors. To address data gaps, assumptions were made

where necessary; while these assumptions are based on the LBA Team's experience in other Western Slope communities, they are not a substitute for actual local data.

1.4 Acknowledgements

Work to prepare the Organics Recovery Study included interviews and discussions with a wide range of stakeholders. Work also included three meetings with stakeholders representing restaurants, institutions, small businesses, residents, special event organizers, landscape and tree service providers, organics collectors and composters, and local government. We thank all the stakeholders who took time to meet with us; their willingness to share knowledge and insights with the LBA Team is greatly appreciated.

Lastly, we thank the project management team for the information, advice, and input they provided throughout the execution of this project:

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2 Current Organic Waste System

This section describes the general structure of the current organics system in Routt County and the City.

2.1 Food Rescue

Food rescue is the most preferable option for food that is suitable for human consumption. LiftUp Routt County is the primary local food rescue organization. LiftUp receives food donations from various sources, coordinates and delivers rescued materials through multiple distribution channels into the local food system. Local sources of food are grocery stores (e.g., near-sell date items), excess production from restaurants and catering services, the Colorado Mountain College, and public donations.³ LiftUp volunteers operate a greenhouse and garden that supplements the supply of fresh produce. LiftUp purchases the majority of its volume from Food Bank of the Rockies. The primary distribution channels are through its storefronts (Steamboat, Hayden, and Oak Creek), government assistance programs (i.e., the Emergency Food Assistance Program and the EverGreen Box/The Everyday Eats Program), and school snack packs (Rocket Packs).

2.2 Animal Feeding

Animal feeding is the most preferable option for food unsuitable for human consumption and food manufacturing by-products provided that these materials can be integrated into a safe and healthy diet. Common items include brewery spent grains from breweries and distilleries, bakery waste, food products past sell date, and restaurant food scraps. In the City and the County, the predominant sources of these materials are breweries and distilleries. Many of these operations currently recover their spent grains and stillage for animal feeding with most of it going to hog farms. Other common sources for animal feeding include bakeries, dairy product manufacturing, and restaurants. Based on discussions with some stakeholders, there is only a limited amount of such recovery currently happening. A notable exception is the seasonal Pumpkins for Piggies held annually after Halloween.

2.3 Collection

This section begins with a summary of the trash and recyclables collection system and then describes current collection practices for both MSW and non-MSW organics.

2.3.1 Trash and Recyclables Collection

Private haulers offer trash and single stream recycling curbside collection services on a subscription-basis to residential, MFU, and CI generators county-wide. Neither the County nor the City has universal service requiring generators to have curbside organics collection, so a variety of collection options are used by the small number of early adopters including self-hauling.

³ Donations from some of these sources (especially the college) were interrupted by the pandemic and are only just being considered for re-instatement.

Generators can self-haul recyclables and trash to the Milner Landfill (free for Twin Enviro’s customers, all others pay); Waste Management’s (WM’s) Steamboat Springs facility accepts recyclables from their customers for free. Currently, no free recycling drop-off center exists for generators who do not pay for curbside service.

The City of Steamboat Springs is the only government with recyclables collection policy. It requires haulers who operate in its jurisdiction to provide their single family customers (1- & 2-unit structures) with recycling service as part of their curbside trash service for no extra cost. However, it is estimated that as many as 30% may choose not to recycle and the remaining 70% may recycle only periodically. Bundled recycling and trash service is not required for MFU and CI generators currently, although haulers will be required to provide their MFU and CI trash customers with recycling service beginning in 2023. It is estimated that about 50% choose to pay extra for recycling service and the remaining 50% do not recycle or do so only periodically. Private trash and recycling service providers are summarized in Table 2-1.

Table 2-1 Recyclables and Trash Service Providers

	Twin Environmental	Waste Management	SRC Recycle & Refuse
Customer Base	Approximately ½ residential & commercial generators	Approximately ½ residential & commercial generators	Small number of residential generators
Infrastructure	Recycling: Ultimate Specialties located at Milner Landfill	Recycling: transfer facility (haul to Denver)	Recycling: Haul to Eagle County
	Disposal: Milner Landfill	Disposal: transfer facility (haul to Denver)	Disposal: Haul to Eagle County

2.3.2 Residential and CI Food Waste Collection

Residential and CI generators have two options for food waste collection services: Cowgirl Compost CO (Cowgirl) and Twin Environmental (Twin Enviro).

Cowgirl Compost CO

In late 2021, Cowgirl began providing subscription-based food waste collection program. Cowgirl accepts food waste and compostable service ware (e.g., cups and service ware) but not compostable plastic bags. Residential customers are provided with a food waste collection bucket. Customers may bring their bucket to a staffed drop-off operated one day per week at the Steamboat Rodeo parking lot. Cowgirl also operates a residential curbside collection based on a “neighborhood ambassador” model whereby certain customers volunteer to host a bear-resistant food waste cart at their home and allow nearby residents to bring their buckets to it for weekly collection.

CI customers are provided with buckets or carts depending on their needs. Some customers bring their food waste to the drop-off while Cowgirl collects others as part of a combined weekly

cart route.⁴ CI customers include city buildings, restaurants, coffee shops, and schools.

At the time of this report, residential curbside collection fees are \$25/month with annual subscription discounts; bucket deposits are \$15 (commercial generator fees vary depending on need and quantity). Cowgirl currently serves 75 – 100 residential and 12 – 15 CI customers, including government buildings. The vast majority of customers are in Steamboat Springs. Cowgirl currently uses a pick-up truck and trailer to provide collection service and brings food waste to its composting site near Hayden. Information regarding the composting operation is provided later in this report.

Twin Environmental

In early 2022, Twin Enviro began providing a new subscription-based food waste collection. Twin Enviro installs a hook inside subscribers' bear-resistant trash carts and instructs residents to place food waste in compostable bags and hang them on the hook after their regular garbage collection to be collected the following day. Twin Enviro serves residential and CI customers with the same collection method utilizing a rear-loader waste truck. Twin Enviro is currently working to obtain regulatory approval to pilot test an innovative, hybrid collection method utilizing a trailer-mounted mixer prefilled with ground wood waste (food waste would be added to the mixer and blended as part of the collection process and delivered to Twin Enviro composting facility). The company is also considering the feasibility of establishing a network of conditionally exempt compost sites where small-scale composting operations could be established in partnership with landscapers, tree services, and others.

At the time of this report, Twin Enviro was evaluating the ability to reduce their residential curbside collection fees to less than \$25/month; and customers purchase their own plastic bags (commercial generator fees vary depending on need and quantity). The company currently provides curbside service to an estimated 60 – 70 residential customers and a few CI customers, including one government building. Twin Enviro brings food waste to its composting site at the Milner landfill, which is described later in this report.

Other Haulers

Other residential and CI haulers operating in the County do not collect organics (i.e., WM and SRC), although SRC has expressed interest in providing organics recovery services in the future.

2.3.3 Government Building Food Waste Collection

Both the County and the City have implemented food waste collection utilizing Cowgirl and/or Twin Enviro in some government buildings. The City food waste collection is limited and difficult to expand. Because food waste collection is not part of their current cleaning contract, it relies on staff volunteers for internal collection and outdoor placement. The County has included internal collection from common areas in its cleaning contract. However, staff are still responsible for internal collection from office and outdoor placement, and it can be challenging finding consistent volunteers.

⁴ Starting in 2022, both Cowgirl and Twin Enviro were awarded City contracts to locate additional carts on City properties for the drop-off collection of organics by their respective residential customers.

2.3.4 Special Event Food Waste Collection

The City and Routt County are home to many special events throughout the year and a diverse group of stakeholders are promoting and implementing zero waste practices and food waste collection. The City permits over 100 events during the year many of which span several days. In the past year, approximately 30 of them were zero waste events that provided recycling diversion and organics recovery if food was provided at the event.

In 2021, Yampa Valley Sustainability Council (YVSC) and the City conducted a study to determine the drivers of zero waste event success, which confirmed the need for staffing all zero waste stations to engage people and ensure proper separation.

In 2022, the City allocated \$30,000 for sustainability incentives for special events that include:

- Level 1 – Pre-planning: Must utilize technical assistance for pre-event planning; incentive = \$60/event
- Level 2 – Eliminate Single-Use Water/Beverage Containers: Must contract for or provide water monster or other reusable water/beverage options; incentive = \$150/event
- Level 3 – Use compostable/recyclable materials: Must use only compostable/recyclable materials service ware; only events that involve permitted food vendors are eligible; incentive = \$250/event
- Level 4 – Zero Waste: Must have staffed zero waste stations (trash, recycle and organics (the latter if the event includes food services)) as needed for event size; own or rent zero waste equipment; contract for recycling and compost pick up; provide documentation that stations were staffed and receipts for zero waste stations; incentive = 75% of the cost up to \$5,000

Of note, the incentives do not include measuring the three material streams or verifying achievement of minimum diversion thresholds. Instead, it is assumed that if the event complies with the incentive requirements, it will by default achieve a high diversion rate.

Currently there are limited resources for assisting event organizers conduct zero waste events in Routt County. YVSC provide services to support some of the Level 1-4 actions and has the capacity to provide up to 20 zero waste stations but only limited resources for staffing zero waste stations. Diversion Designers is a for-profit company that has just started working in the County with a limited number of stations and staff. Use of contractor services by event organizers is voluntary; many have chosen to achieve sustainability incentives themselves or to not undertake any zero waste efforts.

2.3.5 MSW Yard Waste and Wood Waste Collection

Yard Waste

Yard waste is handled by a network of landscape service providers or self-managed by residential and CI generators; private waste haulers do not collect these materials separately. Yard waste includes brush trimmings, tree trimmings, grass clippings, and leaves and is generated from landscape installation and maintenance as well as fire mitigation to remove excess fuel. Residential and CI generators either mix yard waste in trash or stockpile onsite (if a small amount) but take larger amounts to the landfill. Landscapers can generate significant amounts of yard waste, especially during spring and fall seasons, most of which is disposed at

the landfill due to lack of composting infrastructure. Some stockpile small amounts on their site if space allows but none are known to be actively composting.

Wood Waste

Wood waste is predominantly generated and handled by tree service and land clearing companies. It can come from tree maintenance and removal or wildfire mitigation practices. Companies maintain informal networks of people who want chips or logs (for firewood) and contact them when conveniently located to job sites and travel routes. One company brings wood chips to Cowgirl, however that site's capacity is limited. Another company that operates in, but is located outside, the County has the option to bring chips to Rocky Mountain Pellet Company in Walden.

Disposal is the option of last choice due to time and cost to haul it. Reportedly, wood chips may be accepted at the landfill for \$0, but tip fees are charged for whole wood waste. Twin Enviro has a stockpile of wood waste at the landfill, which is periodically ground, a portion of which is used in biosolids composting; however, information is not available regarding how the remainder is managed. Sometime in the next decade, it is possible that the Excel Hayden Generating Station may become a major market for wood waste for wood pellet production and biomass power generation (see discussion in Forest Residue section below).

Role of Local Government

The City of Steamboat Springs' Parks and Recreation Department manages yard waste and wood waste from its properties (as well as from others like the Yampa River Botanic Park). The City provides seasonal chipping of Christmas trees at the Howelsen Rodeo Grounds. This service could potentially be expanded to a spring and fall program allowing residents to drop off woody waste as part of a broader fire mitigation campaign.

2.3.6 Collection of Non-MSW Organics

Biosolids

The City wastewater treatment plant (WWTP) accounts for the vast majority of biosolids, which are hauled to Twin Enviro for composting. The other wastewater facilities are small package plants and/or lagoon systems which produce small amounts of biosolids on an occasional basis and are reportedly being landfilled.

Animal Waste (Manure and Bedding)

Agricultural and equestrian operations generate animal manures and bedding. The need for offsite management is limited to operations with concentrated feeding or stabled animals, e.g., hog and cattle concentrated animal feeding operations (CAFOs) and equestrian stables with enclosed facilities. CAFOs are not present in the County and existing hog and cattle operations manage manures onsite. Several equestrian facilities exist in the County and depending on size and location contract with private haulers to remove bedding and manures (this includes the City stables at Howelson Park). Some facilities reportedly also can stockpile material onsite, allowing it to decompose. Undecomposed bedding is not suitable for direct land application because it is mostly pine shavings and urine.

Marijuana Waste

Marijuana grow houses generate various types of organic wastes (primarily root balls, stems, and trim) which must be managed with a clear chain of custody and in compliance with state requirements. Recently, Innovative Regeneration Colorado (a compost facility no longer in operation) worked with a grow house to collect root balls, separate the roots and soil media from the pot, compost those materials, and cleaned and returned the pots to the grower. The State of Colorado requires that all recognizable plant parts must be shredded and blended 50-50 with other material. One local company contacted said that it currently grinds plant parts with cardboard and paper to meet the requirement and places materials for collection/haul to Milner Landfill. The company expressed interest in having this material composted; local compost facilities, however, either do not currently have the capacity or are not accepting this material.

Forestry Waste

By and large, forest residue does not enter the MSW stream and management responsibilities of local government, so for the purpose of this study it is generally considered to be outside the scope of a County and the City organics recovery system. That said, current practices and future options are noted here to provide a more complete picture of the overall organics management system.

Routt County contains substantial tracts of forest (Medicine Bow Routt National Forest as well as privately owned land). Forestry, fire mitigation, and land management operations produce “slash,” which consists of treetops, limbs, and small diameter wood not suitable for lumber production. Other significant sources of wood waste from forestlands in the County are dead timber (primarily from spruce budworm and fires). Slash generally represents approximately 5 – 10% of the cut timber and is commonly gathered into piles and burned during winter months. The Colorado State Forest Service (CSFS) considers chip-in-place to be a best practice, whereby the organic material can be returned to the soil and used for erosion control and slope stabilization. However, cost and logistics can be an impediment.

Suitable material may be removed for alternative offsite uses (e.g., pellets or charcoal production). Given the substantial logistical challenges and transportation costs, very little offsite use occurs, however. CSFS is considering other onsite beneficial use options, including mobile biochar and using chips from chip-in-place activities for erosion control and land restoration on forest fire scars. The challenge with the latter option is again the cost and logistics of getting chips from slash to the fire scar.

2.4 Composting and Other Processing Infrastructure

2.4.1 Summary of Colorado Composting Regulations

6 CCR 1007-2, Part 1, Section 14 contains the regulations for composting facilities. Facilities are generally classified by the types and quantities of feedstock they handle. Following is a summary of the material types and composting facility classifications.

Material Types:

- Type 1: vegetative waste and other materials that pose low risk to health and the environment

- Type 2: animal waste, manure, source-separated organics, food residuals, and vegetative food processing waste
- Type 3: biosolids, mixed solid waste, processed solid waste, food residuals not covered in Type 2, fats, oils, greases, dairy manufacturing waste, and other waste

Facility Classifications:

- Generally Exempt: backyard composting; agricultural composting facilities handling only onsite agricultural waste and registered with the Department of Agriculture; and biosolids composting facilities at a WWTP permitted according to Biosolid Regulations
- Conditionally Exempt: small quantity facilities with less than 100 cubic yards of Type 1 material onsite or in process and less than 5 to 10 cubic yards of Type 2 material; agricultural facilities composting only onsite waste and imported bulking agent
- Class I: facilities with less than 50,000 cubic yards of Type 1 materials onsite or in process; facilities with no more than 5,000 cubic yards of Type 2 materials and area of two acres or less; facilities at the site of generation or on agricultural property owned by the generator using only onsite agricultural waste and imported bulking agent
- Class II: facilities with less than 50,000 cubic yards of Type 1 materials and manures onsite or in process
- Class III: facilities handling Type 1, Type 2, and/or Type 3 materials
- Pilot Projects: projects performed for academic research, compost market analysis, composting method viability, or otherwise approved, and not exceeding two years in length

Colorado regulations also address compost distribution and marketing. Any compost that is distributed and used offsite must meet testing and quality standards. Compost must be sampled and tested once for every 10,000 cubic yards produced, or at least annually. The compost must not have levels of heavy metals or pathogens that exceed maximum allowable concentrations established in the regulations. Compost that meets the regulatory standards can be distributed and used without restrictions.

2.4.2 Onsite Composting

Earth Cubes

In 2018, YVSC obtained a grant to purchase and set up four small onsite composting bins. YVSC selected Green Mountain Technologies' Earth Cube. The units have capacity to handle approximately 1.5 cubic yard of material in batch process. The Earth Cube is comprised of an insulated metal frame, a mixing auger (hand drill needed), and a temperature probe. It can be equipped with an electrical blower for aeration and/or heating system for winter operation. The unit is designed to handle up to 50 pounds per day of food scraps and bulking agent (dry carbonaceous material) if operated under optimal conditions. To optimize the composting process, materials must have a proper blend of food waste and bulking agent, and the moisture content and temperature monitored. Feedstocks must be loaded, and compost unloaded manually. If operated as designed, the Earth Cube only partially composts materials (21 days), which need to be composted and cured for additional 1 to 6 months.

Earth Cubes were originally set up at:

- LiftUp Routt County
- Colorado Mountain College
- Strawberry Park Elementary School
- Soda Creek Elementary School

At the time of this report, the LiftUp Earth Cube was the only one still in use. Although the college is not actively including composting as part of their current curriculum and student work study program, there is interest in bringing it back in the future. Reportedly, the units require more labor and oversight to manage than these organizations were able to provide.

Steamboat Ski & Resort Corporation

SSRC is currently developing an onsite composting operation to handle its food waste. The plan is to initially establish an operation to serve the base area in order to test the technology and assess site demand and material handling logistics. Depending on results, a second operation would be established on-mountain in order to handle all food waste and minimize logistics of collecting and transporting food waste. The composting system selected is the BioCoTech BioSpeed M4 unit, which has a reported design capacity of 940 pounds per day of waste and will be placed in an enclosed small metal structure like a shipping container. Similar to other onsite in-vessel systems, the unit is designed to handle the initial phase of composting, after which the partially composted material must be removed and piled for additional time to fully complete the decomposition process. This operation will include additional containers for dry storage of bulking agent and compost curing. It is expected that compost will be finished and utilized on SSRC property.

Backyard Composting

Information is not available regarding the extent to which residents practice backyard composting. An active, community-scale backyard composting program does not currently exist. However, there are several sources that provide guidance and basic resources; YVSC's website and the Colorado State University Extension Service are two examples.

2.4.3 Compost Processing Facilities

Two small facilities currently exist that have limited site capacity and infrastructure: Cowgirl Compost and Twin Enviro.

Cowgirl Compost

The Cowgirl operation is located on Route 40 in Hayden. The operation is permitted as a conditionally-exempt facility. The current operation is very small covering about 0.1 acres. There appears to be a total of 0.3 acres potentially available for composting if old greenhouse frames can be removed. Based on a turned windrow configuration designed for operation with a skid steer, the current area has capacity for approximately 170 cubic yards of materials in process at any given time. The total area available would have capacity for about 650 cubic

yard in process.⁵ However, as an open windrow operation, it is limited by regulation a maximum of 100 cubic yard of Type 1 material and 5 cubic yards of Type 2 material. Therefore, it would need to obtain a Class I permit to fully utilize the current site.

Cowgirl currently operates the facility mostly with manual labor and occasional use of a skid steer. The company was awarded a Recycling Resources Economic Opportunity (RREO) grant in 2022 to purchase a dedicated skid steer. Food waste is blended with wood chips delivered by a local landscape service company on an as needed basis given site constraints. Compost piles are built, monitored for temperature, and turned during active composting. Water is added to windrows as needed. At the time of this study, Cowgirl had produced only limited amount of finished compost since it began in late 2021. It plans to test its compost and market it for sale. Finished compost is manually screened.

Cowgirl is actively looking for a larger site so that it can grow its collection and composting operation.

Twin Enviro

The Twin Enviro composting operation is located at the Twin Enviro landfill in Milner. It is permitted as a Class III facility. The current site is approximately 1.3 acres. A portion is used for receiving and mixing materials, primarily biosolids and bulking agent plus food waste as organics collection services grow. The remainder of the site is dedicated to turned windrow composting. Based on a windrow configuration for the current type of operation, the operation has capacity for approximately 2,600 cubic yard of material in windrows. Another 1.3 acres adjacent to the site operation may be available if it can be dedicated to composting, in which case the total area may have total capacity for approximately 6,600 cubic yards in windrow.⁶

Twin Enviro's facility utilizes a large bucket loader for materials handling (mixing feedstock, building and turning windrows, etc.). Bulking agent is supplied from Twin Enviro's wood grinding operation and potentially supplemented with wood chips received from tree service companies. At the time of the visit, the site was very full and access between windrows and stockpiles was very limited and the receiving area for biosolids was at capacity. Finished compost is reportedly stockpiled and screened periodically with a rented trommel screen if needed. None of the compost product is tested or distributed offsite.

2.4.4 Other Facilities

The Excel Hayden Generating Station may be an option for offsite beneficial use of forest residue in the future. The company has plans to convert the station into a combined renewable energy facility that uses biomass to power one of its units and convert the other unit into a molten salt energy storage and generating unit. While the plan has to clear many hurdles (e.g., financial, regulatory, political, and technological) if it comes to fruition sometime in the late

⁵ Based on a generic layout for a manual and skid steer operation, including windrow dimensions, aisles between windrows, perimeter set back, and areas reserved for receiving and mixing, screening, and product storage.

⁶ Based on a generic layout for a front loader operation, including the same site components and activities as above.

2020's there may be large scale demand for wood waste and pelletized wood waste as a fuel replacement for coal in the generation of electricity.

2.5 Compost Distribution, Use and Marketing

2.5.1 Current Practices

Twin Enviro currently does not distribute or market its compost but instead is reportedly using it onsite, e.g., landfill vegetative cover, erosion control, or stockpiled. The company has indicated that it intends to begin to test, distribute, and market compost as part of its plans to develop and expand food waste composting in the future. Cowgirl Compost has developed a dividend program with its customers, which is expected to utilize some of its compost. Other compost will likely be marketed to landscaping companies.

In the absence of locally available compost, landscapers, bulk material suppliers, market garden farms, and other compost users have relied on compost trucked in from the Front Range or south of Interstate 70. At the time of this report, the price for this compost was costing landscapers \$100 per ton (approximately \$40 per cubic yard) for truck load quantities delivered to the County.

2.5.2 Overview of Compost Benefits and Typical Markets

Compost offers many benefits to soil and plants including organic matter, moisture-holding capacity, porosity, erosion resistance, nutrient retention, disease suppression, and soil microecology. Compost facilities need to produce stable, mature compost that can be safely applied to the land so users can realize the benefits.

Compost marketing is fundamentally different than recyclables marketing, the key difference is that compost is a wholesale and retail product not an input to manufacturing. Distribution and marketing need to focus on meeting local and regional consumer market needs. Major compost uses include the following.

- Soil amendment: Compost can be incorporated into the soil when preparing beds for planting. Compost is applied in a one- to two-inch layer over the surface of the bed, then tilled to a depth of six to eight inches.
- Topdressing: Compost can be applied as a top or side dressing to existing or perennial crops.
- Soil blending: When preparing planting beds, compost is mixed with native soil. In general, up to half of the volume of soil can be supplemented by compost.
- Mulch: Coarser compost or screen overs can be used as a mulch layer in landscape maintenance.
- Civil application: Compost and mulch can be used in a variety of applications, including erosion control, slope stabilization, silt barriers, and stormwater filtration.

The following bullets summarize major compost markets.

- **Landscape & Horticulture:** Given the land use and development patterns in the County, this is expected to be the largest potential market sector. New landscape installations require the soil amendment application noted above. Additionally, compost can be mixed at 25% -50% with native soil as back fill material when planting. For ongoing application, compost could be applied in a one-inch layer to established plants. Screen overs or unscreened compost could be used in the landscape as mulch as well.
- **Home Use:** Direct sale to residents and businesses can be another major market. Direct, retail sales can yield the highest net revenue per ton for a composter. Customers can either pick up compost directly from the compost site in bulk or the facility can deliver loads to customers directly.
- **Agriculture and Gardens:** Farms and gardens represent a large potential market for bulk compost. Organic farms and gardens in particular use compost for its macro and micronutrient content as well as its beneficial soil properties.⁷
- **Athletic Fields:** Compost can be used in both the establishment and ongoing maintenance of turfgrass on sports fields. When constructing a new field, one to two inches of compost can be applied tilled into the native soil. Fields that get heavy use can particularly benefit from regular compost topdressing.
- **Golf Courses:** Compost use on golf courses is similar to sports fields in that it can be incorporated into the turf bed for construction or reconstruction of courses or as an annual topdressing.
- **Nurseries:** Compost can be used in the nursery industry as an ingredient in potting mix as a sustainable replacement for sphagnum moss-based media. Compost characteristics and the amount used in the mix will depend on the specific crop and desires of the nursery grower. This is unlikely to be a significant market in the County because of the absence of production nurseries and garden centers.
- **Mulch:** Landscape construction and maintenance represents significant demand for mulch products derived from composting operations, e.g., “overs” from the screening process. Application rates are variable and can be in the range of two to four inches.
- **Roadway Construction:** Compost and mulch is used in a wide range of applications, including mulch blankets, erosion control, seeding and sodding, and backfill for landscape plantings. This can represent demand for very large quantities when such construction works are underway.⁸
- **Fire Scar Restoration:** Mulch and ground wood waste can be used to protect exposed soil and water resources in forest lands. This represents significant potential demand for

⁷ The Yampa River Botanic Park is an example of a garden setting that nearly produces enough compost to meet its own demand on an annual basis.

⁸ Colorado Department of Transportation provides standard specifications for compost and mulch use.

both chip-in-place as well as materials brought in from offsite. For example, large quantities of ground wood waste have been delivered by helicopter in the wake of the Cameron Peak fire.

Given the broad range of uses and potential markets for compost and mulch, composters can readily develop reliable demand for all they can produce. The only time it may not be possible to secure markets is when the product is contaminated or not properly produced.

2.6 Observations of Existing System

Table 2-2 outlines key observations and implications of the current MSW management system and organics in particular.

Table 2-2: Observations Regarding Existing System

Observations	Implications & Notes
Types of organic materials, quantities & sources vary widely	Effective organics management is more complicated & challenging than recyclables management
Limited generator access to organics recovery programs	Private sector haulers have limited-service coverage
Organics collection (City only) is an additional cost (up to \$25/household-month) not included in trash/recycling	Needing to pay a separate fee limits participation to the small percentage of generators willing to pay extra (current trash/recycling rate are \$30-\$35/household-month)
Lack of PAYT, mandatory diversion and/or bans fail to drive participation & predictable revenues for haulers / processors	“Catch 22” scenario between generator demand & ability to expand
Government buildings & special events have limited resources for significant recovery	Janitorial contracts & resources limit universal recovery
Twin Enviro does not yet have products for offsite use/sale; Cowgirl cannot produce adequate quantities	Significant potential market demand likely exists for compost/mulch, but production is limited
Industry experience indicates that markets exist or can be developed for compost that meets quality standards	Even if high recovery levels were incentivized or mandated, supply will not fully address demand
Twin Enviro’s composting site (Milner) is 30 round-trip miles from Steamboat Springs; Cowgirl’s (Hayden) is over 40 miles	Time and distance to composting facilities contribute to elevated collection fees and can be disincentive for self-hauling

3 Organic Waste Disposal and Recovery Estimates

It is not possible to reliably calculate the quantity of organics due to data limitations and unique community characteristics (high seasonal fluctuations in economic activity, a large transient and seasonal population, and major resorts). The information presented in this section is based on diverse sources, stakeholder information, and the LBA Team’s industry knowledge.

3.1 Disposal Quantity Estimates

To provide an approximate estimation, the LBA Team utilized a combination of data sources: regional waste composition studies, average generation rates and composition for specific commercial sectors, and information reported by local stakeholders contacted for this study. Figures 3-1 and 3-2 depict the overall composition of residential and commercial trash samples measured in 2018. This demonstrates the substantial potential for organics recovery to increase the County’s overall recovery rate.

Figure 3-1: Residential Trash

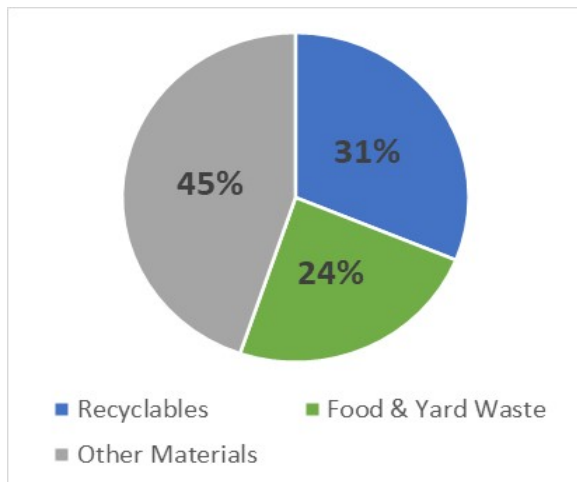
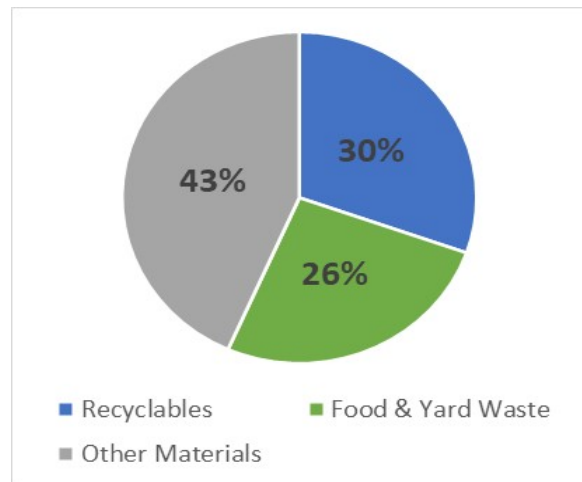


Figure 3-2: Commercial Trash



3.1.1 Residential & CI Food Waste and Yard Waste

Quantities

Table 3-1 provides current estimated and future projections of residential food and yard waste disposal based on the current MSW management system. The amount of yard waste in residential and commercial MSW is comparatively low. This is likely due to a combination of factors. First, the sample methodology of the 2018 study only included mixed loads of MSW collected by private haulers. It did not address organics brought to the landfill by landscape and tree services. Also, given the arid, alpine climate, yard waste generation is believed to be naturally low with the exception of maintained and irrigated properties, which it is assumed are in large part maintained by landscape services.

Table 3-1: Disposal Estimate for MSW Food Waste and Yard Waste (Tons/Year)⁹

Material / Source	2022	2027	2032
Food Waste			
Residential - City	1,220	1,280	1,350
Residential - County	1,080	1,140	1,200
CI	4,000	4,210	4,430
Subtotal – Food Waste	6,300	6,630	6,980
Yard Waste			
Residential – City	100	120	120
Residential – County	100	100	110
CI	280	290	310
Subtotal – Yard Waste	480	510	540
Total	6,780	7,140	7,520

Sources: 2020 waste disposal detailed in Recycling Study, 1.03% annual growth rate, and estimated waste composition per Souder, Miller & Associates (2018).

To provide another perspective on potential CI food waste disposal, the LBA Team utilized local employment data and typical generation rates for specific CI sectors known to discard significant percentages of food waste (see Table 3-2). Note these estimates would be a sub-set of Table 3-1.

Table 3-2: Food Waste Disposal Estimate for Specific CI Sectors (Tons/Year)

Source	2022	2027	2032
Restaurants	1,810	1,900	2,000
Hotels & Motels w/ Restaurants	850	890	940
Grocery Stores/Super Markets	580	610	640
School Districts	30	30	30
Total	3,270	3,430	3,610

Sources: U.S. Census Bureau employment data and generation and composition factors per CalRecycle 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California.

Please note, these are order of magnitude estimates intended only to provide a general sense of the relative contribution of these CI sectors to the food waste disposal estimates in Table 3-1. As with the residential sector, current recovery rates are relatively low and these disposal estimates approximate generation.

SSRC operates a broad range of food and beverage operations services and closely tracked food waste generation up until 2016 when it last was diverting food waste to composting at the Twin Enviro site. At that time, it was diverting roughly 110 tons per year. SSRC operations have since expanded, and it is estimated that volumes have increased by 10-15%. This tonnage

⁹ Based on MSW compositions studies, amounts of clean wood waste in mixed MSW are very limited and, therefore, were not estimated for this study.

would be a subset of Tables 3-1 and 3-2. As described previously, SSRC in the processing of developing onsite composting units to handle food waste from on-mountain and the base area.

3.1.2 Landscape and Tree Service Yard Waste & Wood Waste Quantities

Information regarding the quantities of organics from landscape and tree services is very limited. Based on information provided by stakeholders in these sectors, the LBA Team estimates that these businesses dispose in the range of 2,080 and 200 tons/year, respectively (see Table 3-3). In addition, the City reports disposing about 90 tons/year of landscape waste. Please note that estimates for this sector would be in addition to that in Table 3-1.

Table 3-3: Landscape and Tree Service Disposal Estimate (Tons/Year)

Source	2022
Landscape Services	2,080
Tree Services	200
City	90
Total	2,370

3.1.3 Non-MSW Organic Quantities

Biosolids

As noted previously, the City WWTP biosolids are composted (see Section 3.2 below). Small amounts of biosolids are generated elsewhere in the County (package plants and lagoons) for which management practices were not confirmed for the study but based on information from stakeholders it is expected that most if not all is landfilled.

Other Sources

Given a lack of available information and the high-level focus of this study, disposal and/or generation estimates were not developed for other sources (animal manures, marijuana grow houses, land clearing, and forestry).

3.1.4 Summary of Disposed Organics and Environmental Relevance

Based on the lack of consistent information and differences in methodologies, it is not possible to develop an accurate estimate of organics disposal. However, the estimates presented above provide a reasonable summary of the primary organic waste streams associated with MSW management that can be influenced by local government (see Table 3-4).

Table 3-4: MSW Organics Disposal Estimate (Tons/Year) & GHG Emission

Source	2022
<u>Tons/Year</u>	
Residential & CI Food Waste	6,300
Residential & CI Yard Waste	480
Landscape & Tree Services	2,370
Total	9,150
<u>Greenhouse Gas Emissions</u> (mtCO₂e)	1,460

While the estimates provided in this Section 3.1 are approximate assessments only, it is worth noting that if significant advances are made with respect to diverting the Table 3-4 disposal totals, progress towards the Routt County CAP goals could include:

- Current MSW diversion levels could increase by more than a factor of two¹⁰ – which could hypothetically bring the County’s diversion rate to roughly 30% (compared to current estimate of about 12%)
- Current GHG emissions could be reduced by over 2,100 metric tons (mtCO₂e)¹¹

3.2 Organics Recovery Quantities and Recovery Rate Estimates

The recovery estimates in this section are focused on the four current pathways for organics recovered from MSW in the County and City.

3.2.1 Food Rescue

In 2021, LiftUp distributed over 82 tons of food, over 1,900 boxes of government assistance food staples, and more than 107,000 Rocket Packs. Most of LiftUp’s supply comes from outside the region. Based on average weights and assuming 25% of supply comes from within the County, the LBA team estimates up to 30 tons/year of food rescue within Routt County.

3.2.2 Animal feeding

Local breweries and distilleries produce an estimated 250 tons/year of spent grain all of which is recovered as animal feed. Several stakeholders reported hearing of small-scale, informal or occasional animal feeding. It is also common practice for private citizens with small numbers of animals (e.g., fowl, goats, etc.) to feed food scraps to their animals. However, it is likely these small-scale activities recover de minimis quantities.

¹⁰ Based on assumed 50% recovery and 12% MSW diversion rate for Routt County (City’s 2021 Recycling Study, Appendix A).

¹¹ The Routt County CAP estimates that about 48,500 mtCO₂e was generated in 2018 from the solid waste sector (primarily from landfilling waste materials); estimate based on EPA WARM modelling.

3.2.3 Landscape and Tree Services

Based on discussions with service providers, it is assumed landscapers recover only small amounts of organics. Conversely, tree services reportedly divert most of their wood waste as chips or firewood to the general public and, in the case of at least one service provider, deliver wood waste to an out-of-county pellet mill. Based on estimates provided by services providers, the LBA Team estimates about 2,390 tons/year are recovered.¹² Please note, the vast majority of this is wood waste from tree services (chips and firewood).

3.2.4 Composting

Based on information provided by Cowgirl and Twin Enviro, their current combined food waste recovery is an estimated 80 tons/year. The yard waste and wood waste utilized as bulk agent for composting is assumed to be included in landscape and tree service recovery estimates.

3.2.5 Non-MSW Sources

As noted previously, most biosolids are being recovered from the City WWTP and composted at Twin Enviro. In 2021, biosolids management cost the City approximately \$180,000 and 2,700 tons of biosolids were received at Twin Enviro.

3.2.6 Summary of Recovered Organics

Table 3-5 summarizes current organics recovery for the three primary types of organics in residential and CI MSW.¹³ While it is important to recognize that these are rough estimates, they still confirm the fact that a very small amount of food waste is currently recovered (6%). The fact that tree service providers are able to divert most of the wood waste they generate is the key driver behind the 46% estimated combined recovery rate of yard waste and wood waste. As noted previously, landscapers have very limited options for beneficial use of the yard waste and currently rely primarily on disposal.

Table 3-5: 2022 Organics Recovery from MSW Estimate (Tons/Year)

	Recovery	Disposal	Generation	Rate
<u>Food Waste</u>				
Food Rescue	30			
Animal Feeding	250			
Residential and CI Collection	80	6,300		
<i>Subtotal</i>	<i>360</i>	<i>6,300</i>	<i>6,660</i>	<i>5%</i>
<u>Yard Waste & Wood Waste</u>				
Residential & CI Collection		480		
Landscape & Tree Services	2,390	2,370	5,240	46%
<i>Subtotal</i>	<i>2,390</i>	<i>2,850</i>	<i>5,240</i>	
Total	2,750	9,150	11,900	23%

¹² Based on quantities reported by a sample of service providers and estimates regarding their relative share of the Routt County market.

¹³ Given the focus on organics from MSW, the table does not include biosolids.

3.2.7 Comparison of Potential Compost Production and Market Demand

To provide a general idea of what a well-developed local compost supply and demand market might look like, one can compare compost production potential to average compost application rates for common market sectors. For example, if 50% of estimated food waste, yard waste, and wood waste generation (5,990 tons/year¹⁴) is recovered and composted, that would produce approximately 5,090 tons/year (tpy) of compost and mulch or about 13,570 cubic yards/year (cyp).¹⁵ At these rates, 50% recovery of total generated organics would satisfy the demand for 50 to 100 acres (see Table 3-6).

Table 3-6: Theoretical Compost Production and Acreage Required for Land Application

Recovery Rate	Recovered tpy	Compost Produced		Acres at Application Rate	
		tpy	cyp	1 inch	2 inches
35%	4,190	3,560	9,490	70	35
50%	5,990	5,090	13,570	100	50
75%	8,980	7,630	20,350	150	75

To provide a frame of reference, an average 18-hole golf course has about 30 acres of maintained fairway turf. From another perspective, there are over 40,000 acres of irrigated agricultural land in the County.

Based on the LBA Team’s experience, markets can be developed to match any increased production of quality compost, and thereby help support efforts to maximize organics recovery. It is recommended that when the City and County undertake efforts to increase compost production, they first conduct a compost market study to better understand potential demand and quality requirements.

YVSC’s 2019 Waste Diversion Strategic Plan for Routt County identified the opportunity to research market development for compost products. Given limited availability and potential awareness of compost and mulch products, it is essential that a compost market development study address three inter-related objectives. First it must educate potential users about benefits and uses; second it must identify current materials and practices; and third it must identify attitudes and perceptions. Based on this information and expertise in compost utilization, one can estimate potential market demand and value and identify the key messages and information to encourage users to switch from current practices.

3.3 Observations of Existing Disposal and Recovery Estimates

Table 3-7 (next page) outlines key observations and implications of the current MSW management system and organics in particular.

¹⁴ See Table 3-5.

¹⁵ Estimates are based on general “rules of thumb” regarding volatile solids loss, bulk density, and other composting factors. Please note, it is unlikely that all wood waste generated by tree services would be composted, so the numbers presented here likely overestimate compost and mulch production.

Table 3-7: Observations Regarding Existing Disposal and Recovery Estimates

Observations	Implications & Notes
Routt County trash contains significant quantities of organics	Food waste and yard waste measured 24% to 26% in residential and CI streams
Available data is limited (especially for non-MSW organics)	Only general observations can be made without further data (residential organics recovery data will be available for Steamboat Springs beginning in 2023)
Potential for landfill diversion and GHG reduction through organics recovery is notable	Potential increase of current landfill diversion rate by >two times & GHG emission reductions by over 2,100 mtCO ₂ e
Food waste represents the greatest recovery opportunity, followed by yard/wood waste from landscape & tree services	56% of total MSW organics is food waste but only 6% is currently diverted; 46% of yard/wood waste is diverted, most of which is wood waste
Wood waste is recovered through informal networks	Tree services must manage day to day and have challenges finding uses
Biosolids represent at least another 2,700 tons/year (tpy) & are largely composted	Costs to local governments is significant and in part is due to long-distance hauls

4 Case Studies

The LBA Team researched four Colorado communities with major resorts or significant tourism activity that have food waste recovery programs. The purpose of these case studies was to provide potential options for Routt County to consider. Three communities host major ski resorts and associated hospitality industries, which dominate the local economy (Aspen/Pitkin County, Breckenridge/Summit County, and Vail/Eagle County). The fourth (Durango) has a diverse local economy with significant tourism activity. While a more comparable comparison would have included only communities with private processing facilities, the public facilities in the case studies all operate in partnership with private and non-profit organizations. In all cases, except Durango, the ski resorts played major roles in promotion and utilization of the local food waste and organics programs.

The communities where the city, county, and ski resort have strong MSW policies and programs that incentivize diversion and participate in recovery efforts show the greatest achievement towards diverting organic material from the landfill. The partnership of the city, county, and resort, with their common theme of strong community commitment to environmental / sustainability issues, along with the private haulers that provide the collection and drop-off services, and non-profit education partners support strong food waste diversion programs.

4.1 Aspen / Pitkin County

The City of Aspen is county seat to Pitkin County and is home to the Aspen Snowmass Ski Resort (which encompasses four mountains). The population of the city and county are 7,000¹⁶ and 17,400, respectively.

The current diversion rate of Pitkin County is 38%, which is above the national average of 32.1%.¹⁷ This is likely due to aggressive city and county waste management ordinances and material bans. The city has adopted a residential PAYT ordinance for trash and recycling and a Universal Recycling Ordinance (URO) for MFU and commercial sectors, and the county has adopted the same for the unincorporated county areas. Aspen also has a plastic bag ban and yard waste disposal ban (and is pursuing a food waste ban in 2023). Haulers are required to be licensed and report collection metrics.

Aspen's solid waste system is comprised of open market curbside trash, recycling, and yard waste collection programs for residential and commercial sectors, as well as city and county drop-off centers. Recyclables are taken to the county-owned recycling transfer station, where they are aggregated into transport trailers and hauled to a privately-owned material recovery facility in Denver. Trash is landfilled at the Pitkin County Solid Waste Center.

Residential food waste is collected either curbside by private haulers or via drop-off centers (6.5-gallon buckets provided to residents by city and county). Commercial food waste is collected curbside by private haulers. Using state grant funds, the city offers free indoor commercial collection containers and education, and the county offers free bear-resistant outdoor commercial containers. All acceptable organic wastes (food waste, green waste and biosolids) are processed by turned windrows at the Pitkin County Solid Waste Center. Tip fees

¹⁶ All population data - United States Census Bureau, QuickFacts, 2020.

¹⁷ <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling>.

for compostable material range from \$15 to \$45 per ton. County staff estimates approximately 14,500 tons of organic waste is processed each year.¹⁸

4.2 Durango

Durango has a population of 19,100 and is the county seat of La Plata County (pop. 55,600). La Plata County demographics are also impacted by high tourism based on the Animas River, Fort Lewis College, the historic Narrow-Gauge Railway, and Purgatory Ski Resort.

The city's current diversion rate is 33% with a path to accomplish their goals for landfill diversion of 35% by 2026 and 45% by 2036. Durango's recycling ordinance is uncommon in Colorado as it requires large MFU complexes to provide recycling to residents. Additionally, the city's sustainability action plan is supported by a sustainability fee charged to every single family household.

The city is the exclusive provider of residential trash and recycling curbside collection. Commercial trash and recycling services are open market with the city also being a CI service provider. Recyclables collected by the city and received at the drop-off are aggregated at the city's recycling facility and hauled to a privately owned processing facility in New Mexico. Solid waste is taken out of county to a privately owned landfill.

Food waste is collected curbside for residential and commercial customers by privately owned companies. Residential service fees vary from \$6.25 per week per bucket to \$10.00 per pickup for larger quantities, and commercial rates vary based upon volume. Acceptable organics vary based on the service provider. One provider accepts most food waste (except for meat), yard waste and shredded paper. The other accepts all food waste (incl. small quantities of meat) and does not accept yard waste. Neither accepts compostable packaging, bones, or grease. Both processors use the turned windrow method of compost creation. It is estimated that 500-1,000 tons of organics are processed annually.

4.3 Breckenridge / Summit County

The Town of Breckenridge (pop. 5,100), is the largest jurisdiction in Summit County (pop. 31,100). Major resorts and institutions that reside in Summit County include Vail Resorts and conference venues, Breckenridge Grand Vacations, and Colorado Mountain College. The ratio of permanent residents to tourists in Breckenridge is estimated to be 20%¹⁹ or less.

The county and several towns including Breckenridge have hauler reporting requirements and flow control that requires all trash and recyclables to be hauled to the Summit County Resource Allocation Park. While both the town and county are in the process of passing PAYT and URO ordinances, their diversion efforts lag behind other best-practice examples with a diversion rate of only 20%.

Single stream recycling (no glass) and trash collection services are offered curbside through an open market to all generators. Residents may also drop off source separated recyclables (including glass) at county owned drop-off centers. Yard waste curbside collection is available by private haulers, or it may be self-hauled to the Allocation Park. Food waste (including meat

¹⁸ Email, Michael Port, Pitkin County Solid Waste Center.

¹⁹ Jessie Burley, Town of Breckenridge Sustainability Coordinator.

and bones) is also accepted at the drop-off centers. The food waste is then processed by turned windrows at the Allocation Park. Tipping fees for organics range from \$5.00 per ton to \$35.00 per ton. It is estimated that approximately 8,800 tons of organics (organics collection & biosolids, manure & other) are processed annually, with roughly 400 of those tons being food waste.

4.4 Vail / Eagle County

The Town of Vail (pop. 5,300) resides in Eagle County (pop. 55,700). Eagle County is comprised of fifteen communities and home to Vail Resorts and conference venues; Colorado Mountain College; multiple medical and educational institutions; and expansive accommodation, food service, and retail industries.

The diversion rate for the county is currently 30%. The town has a goal to divert 80% of the organics generated by 2030. Vail requires residential PAYT for trash and recycling services and mandates recycling for all MFU and commercial generators. Haulers are required to report quantities bi-annually to maintain their license.

For the Town of Vail and throughout Eagle County, curbside trash and recyclables collections are through an open market system. Additionally, trash can be self-hauled to the Eagle County Landfill and there are county-owned recycling drop-off centers in six communities.

Through an organics partnership, the Town of Vail and private hauler, Vail Honeywagon, offer residential organic waste collection to select neighborhoods in the West Vail Area. The town along with other communities in the county also host food waste drop-off centers through a membership-based program. Food waste is composted at Vail Honeywagon’s compost facility. Materials accepted include food waste, fiber/paper waste, and yard waste.

4.5 Observations Regarding Best Practices

Table 4-1 (next page) outlines key observations and implications regarding best practices derived from other Western Slope communities.

Table 4-1: Observations Regarding Best Practices in Other Western Slope Communities

Observations	Implications & Notes
Several Western Slope communities with tourism-based economies provide sustainable examples for waste recovery in general & organics recovery specifically	Many of these also have private collection & processing like Routt County; these leaders however have more comprehensive recovery policies, programs, infrastructure & partnerships
All examples have PAYT & URO policy that requires recycling by residential & CI generators (Breckenridge/Summit County in progress)	These include hauler reporting of collection metrics
All examples have curbside yard waste collection – Aspen has a yard waste collection ban (may add food waste in 2023)	Aspen, Breckenridge, Vail, Eagle County & Summit County also have yard waste drop-off centers
Three of the examples have publicly-owned & operated landfills, recycling & compost facilities	Durango (the only example with public collection) relies on public and private facilities

All examples have mix of targeted public outreach, subsidies & technical assistance	All examples have dedicated materials recovery staff – also public outreach/technical assistance (TA) staff or non-profit partnerships for same
Landfill diversion rates for three examples are more than 3 times that of Steamboat Springs' estimated 2021 rate	Breckenridge/Summit County's rate is only 2 times but is expected to increase once PAYT & URO are implemented in 2023

5 System Assessment

This section considers the services and infrastructure for handling MSW in general, and the organics within MSW specifically. It identifies key gaps and challenges impacting the current system and limiting organics recovery.

5.1 Food Rescue

Existing recovery through food rescue is well established. Given LiftUp's infrastructure and resources, it appears to be well positioned to handle additional volumes of food. As restaurant and catering services continue to recover from the pandemic and health restrictions are eased, it is likely that the quantity of rescued food will increase. For example, SSRC expects that food rescue efforts prior to COVID will be re-established. Also, there may be potential to increase the number of grocery stores that work with LiftUp.

While LiftUp appears to have a wide network of financial support and volunteers, food rescue operations are labor- and logistics-intensive. Rescuing prepared food from restaurants requires a streamlined process: prompt collection and refrigeration, food portioning and packaging, and delivery. Inventory management, ample storage (frozen, refrigerated, and shelf stable), and retail space are all critical. While various grants and subsidized programs help, food rescue organizations must also rely on community support (donations and volunteers).

5.2 Animal Feeding

Recovery for animal feeding is the "norm" for breweries and distilleries and represents 70% of current food waste diversion (see Table 3-5). However, other animal feeding (e.g., excess baked goods, dairy products, fruits, vegetables, and prepared foods) is limited. Animal feeding operations must comply with state and federal regulations. Colorado specifically requires that all animal-derived (e.g., dairy and meat) and vegetative food scraps must be heat-treated before being fed to swine. In addition, animal feeding operations must obtain a state permit. Spent grains readily comply with heat-treatment requirements. But complying with these requirements limits the number of entities willing to take on the additional work and expense necessary. Opportunities exist to support increased animal feeding (e.g., grocery stores, restaurants, and institutional kitchens) through partnerships and resource-sharing between local government, Community Agriculture Alliance, and Colorado State University (CSU) Extension Service.

Materials like spent grains, excess baked goods, vegetative scraps from food preparation, and dairy products can generally be fed to livestock without health concerns. Hogs are more amenable to variations in feed characteristics than cattle, however, certain types of food scraps are not acceptable or are not palatable for any livestock, e.g., coffee grounds. Hogs and cattle operations need to integrate recovered food into a well-balanced feeding program that does not endanger livestock.

5.3 Collection

5.3.1 Residential and CI Food Waste Collection

Residential (including MFUs) and CI food waste represents the single largest untapped source and opportunity to increase organics recovery from MSW generated in Routt County. Hence the current system assessment for this stream is more extensive.

Limited Number of Early Adopters

Residential and CI food waste collection currently serves a very small percentage of generators: less than 2% of residential and MFU customers and less than 1% of CI enterprises. The low level of participation is due to a combination of factors. The pool of potential customers is limited to those willing to pay additional fees and put in the effort to separate food waste (“early adopters”). Also, both collectors have limited collection capacity, staffing, and financial resources to pursue rapid growth. Of the two, Twin Enviro is better resourced and able to expand; however, the company does not test product, distribute or market it offsite.

Both hauler’s residential food waste curbside collection methods face challenges to grow significantly in scale due to the special procedures that customers must comply with (Cowgirl’s need to coordinate neighborhood ambassadors and Twin Enviro customer’s need to place food waste in carts only after trash has been collected).

Commercial food waste collection services typically focus on large quantity generators (e.g., restaurants, grocery stores, caterers, institutional food services) as a priority and during initial phases of program development. They represent the “low hanging fruit” where large quantities of relatively clean organics can be recovered that provide a foundation for expansion.

Mountain Composting

Mountain communities face an additional collection challenge. Food waste needs to be collected in bear-resistant containers like trash, which cost significantly more than regular carts. Also, the number of manufacturers of carts sized for food waste collection (48 or less gallons) is limited. The City is already in the process of converting residential collection to wildlife-resistant trash carts, with haulers primarily deploying only large sizes (e.g., 96 gallons). Charging customers for an additional bear-resistant cart for food waste would likely severely limit participation, which is likely why both haulers have devised unique collection systems to avoid the financial hurdle.

Observations

Challenges that must be addressed include establishing efficient internal source-separation and collection, having adequate internal storage space, and having accessible outdoor space to add dedicated collection carts or containers. It is also important to consider the difference between back-of-house (prep waste) and front-of-house (customer plate waste). Back-of-house is more easily controlled and separated before it becomes contaminated with non-organic waste. Front-of-house typically is more contaminated, especially when recyclable or disposable service ware is used.

The current situation is similar in many communities across the U.S. where small grass-roots organics recovery businesses fill a niche of limited demand in the absence of mandates, financial incentive (e.g., PAYT programs), or collection services coordinated by local government. Residential and CI food waste collection will not grow significantly in an open market without government taking a more active role. This is essentially the same constraint that local governments historically face with recycling: in order to achieve high participation and economies of scale local governments need to take a leading role, even if only as an active member of public-private partnership or creating the policy environment that drives wide-spread source separation and collection.

5.3.2 Government Building Collection

Organics generated by government buildings account for a relatively small portion of MSW. Nevertheless, local government can play a central role through leadership and demonstration to help build awareness and willingness of residential and CI generators to participate in collection services. Local governments can also provide early critical mass to help organics collection and recovery achieve scale.

City of Steamboat Springs Pilot Program

The current City pilot program only serves a handful of buildings. Logistical challenges and financial constraints limit further expansion at this time. Challenges encountered are common to institutions working to divert food waste and include the following: finding suitable internal and external collection points, determining the logistics for emptying internal collection points and placing food waste in outside containers for removal by a hauler. Also, with more than 130 locations throughout the City, diverse building setting, and the density of downtown development, it is difficult to find suitable external collection points close to buildings. Staff indicated that collection containers must be no further than ½ a block from the building.

Routt County Program

The County had fewer locations to manage. Staff are responsible for separating their own food waste and bringing it to collection containers in common areas that are then emptied by contracted cleaning staff who then bring food waste to outside hauler-serviced containers.

Observations

If the City and the County are able to include internal food waste collection in future service contracts and identify appropriate external collection points, they may be able expand their programs in the future. However, buildings with few employees or very small amounts of food waste may still face logistics challenges finding external locations and securing hauler collection services.

5.3.3 Special Event Collection

As a major tourist and resort community, many special events occur in the City ranging from the Farmer's Market and concerts to the annual rodeo and major street festivals. The City has implemented a package of incentives and support services aimed at reducing waste generation and increasing recovery at these events. These incentives fall short, however, of the City's 2021 Recycling Study report recommendations which included:

- Consulting labor for pre-event planning, onsite diversion (staffing stations) and post-event reporting
- A three-year phase-in period for all but the smallest events

Event organizers indicate that the City's initiatives are helpful, but without more resources it will be difficult to increase the number of zero waste events and increase waste reduction and recover recyclables and organics. Challenges include finding cost effective collection services, the need to recruit volunteers for critical functions (staffing zero waste stations and handling materials), volunteer turn-over and burnout, placing and enforcing requirements on vendors and food service providers at events, and having easy access to hauler collection containers during and after events.

The City is currently in the process of establishing a contract position for a new Community Recycling Coordinator. It is expected that this position will take over the incentives program for special events and provide additional technical assistance to event organizers.

5.3.4 Yard Waste and Wood Waste Collection

While tree service companies reportedly divert much of their wood waste, this is being accomplished through informal networks of individuals willing to accept the material. Companies indicated that this is time consuming and unpredictable. Landscapers have very limited options other than disposal. Unlike wood chips or firewood from tree services, yard waste is of little use or value unless it is composted. Both sectors expressed interest in having reliable access to a composting facility if the cost to do so and the hauling distance make it more economical than disposal. Landscapers in particular may be able to offer lower cost services to some customers because currently they have to charge customers for hauling and disposal.

While the City currently operates a Christmas tree chipping service for residents, it would face challenges expanding this to a more regular scheduled or seasonal service because City staff resources are limited and the location at the Steamboat Rodeo is not available in the summer.

5.4 Composting Infrastructure

5.4.1 Onsite Composting

Little is currently known about the extent of residential backyard composting in Routt County except that it is not believed to be a wide-spread practice. It is important to note that residential backyard composting of food waste can cause problems with wild animals. Also, home composting is typically not viable during winter months. CI activities are also limited, and previous efforts (Earth Cubes) have demonstrated the challenges, namely that it is difficult to maintain sustainable, long-term solutions that rely on volunteers and students. As a result, onsite management is a small niche opportunity and cannot be relied on to recover significant amounts of organics community wide.

Onsite composting (CI and residential) generally entails relatively small quantities of organics. This can be problematic in an alpine winter unless supplemental heat is provided to keep material from freezing and maintain elevated temperatures for proper composting. It is also important to note that onsite composting is generally not practiced in dense areas like downtown districts due to space constraints as well as potential odor and vermin problems.

Mechanical onsite composting technologies tend to be relatively expensive to purchase and require trained staff to operate, making them feasible primarily only for large CI generators. These technologies only partially compost organics; materials must subsequently be stockpiled for several months before a stable compost is produced.

Other technologies exist to manage organics onsite, e.g., dehydrators, dewatering machines, pulpers, and macerators (some of which may be marketed as composters). In general, dehydration and dewatering technologies can be beneficial in reducing the weight and/or moisture content of food waste prior to composting or disposal. Pulpers and macerators can be used to reduce the volume of food waste and used in combination with the other technologies. Alternately, they can be used (with the addition of water) to discharge food waste to the sewer system. If widely practiced this can lead to excessive biological oxygen demand at the local WWTP.

5.4.2 Compost Processing Facilities

Facility Location and Ability to Expand

The two existing composting facilities are located at least 30 round-trip miles from the City of Steamboat Springs, where half of the Routt County population and a majority of CI generators are located (these locations do provide better access for Hayden generators, however). The added cost of hauling these distances increases cost, creating an additional obstacle to organics recovery.

These facilities also have site capacity constraints that limit their ability to readily expand and compost more organics. Cowgirl's current location and method of operation faces more significant constraints than Twin Enviro. Without a larger site and equipment, Cowgirl will not be able to grow much more than its current size. Twin Enviro's facility is already at capacity for managing biosolids. Any significant increase in organics received would require development of more composting area. Both facilities face the fundamental challenge of operating in an open market without government policy or government-sponsored collection to ensure a steady and growing supply of organics.

It is the opposite of the "if you build it, they will come" principle. Private composting facilities in open- markets develop in areas where disposal tip fees provide an avoided disposal cost incentive, and they focus on serving the landscape and CI sources who can save money by diverting because their waste is predominantly compostable. Composters may also focus on serving the small niche of residential customers who are willing to pay but will never be able to grow beyond this group of "early adopters." Facilities do not scale-up to handle food waste from residential or other CI sources without government playing an active role (e.g., policy, mandates, programs, services, and/or infrastructure investment). As seen in the case studies, there is a strong correlation between high recovery rates and active government involvement in the mandating or providing services and/or composting infrastructure.

To provide a sense of composting infrastructure needed for a well-developed organics recovery system, the LBA Team estimates that if 50% of food waste, yard waste, and wood waste

generation (5,950 tons/year²⁰) is recovered, a 6 to 7 acre windrow composting facility would be needed.

Contamination

On another front, composting facilities must solve the contamination challenge. Contamination in residential and CI food waste increases when handling food waste from more than just the “early adopters” who tend to put greater effort with keeping unacceptable materials out of the organics. While both facilities serve residential customers, both have expressed concerns about being unable to manage contamination as volume increases. Neither facility is large enough to financially support investment in the processing equipment needed to remove contamination mechanically. Current equipment options are capital-intensive and designed for high-throughput operation.

5.5 Summary Observations on Current System

Table 5-1 outlines key observations and implications derived from the preceding assessment of the current system and future improvement options.

Table 5-1: Observations Regarding Current System and Improvement Options

Observations	Implications / Notes
Government role is critical	None of best practice examples achieve landfill diversion successes/meet sustainability goals without strong government roles in policy, programming or infrastructure even if role occurs through a public-private partnership
Incentives, mandates or bans are needed to encourage generator participation	Applicable to generators for collection service subscription or drop-off center usage (organics collection could ultimately be bundled with residential trash/recycling)
Compost facility locations should be close to generators, scalable & able to distribute quality products offsite	Balance is required to ensure level playing field for both facility owners (and any in future)
Public education & outreach is needed	To increase awareness, participation and reduce contamination
Generator subsidies, technical assistance and recognition efforts are critical	Could include grant funding, permitting assistance for commercial enclosures, expansion of YVSC’s green business program, etc.
Expanded government building & special event programs that lead by example	Local government operations/events need to lead by example

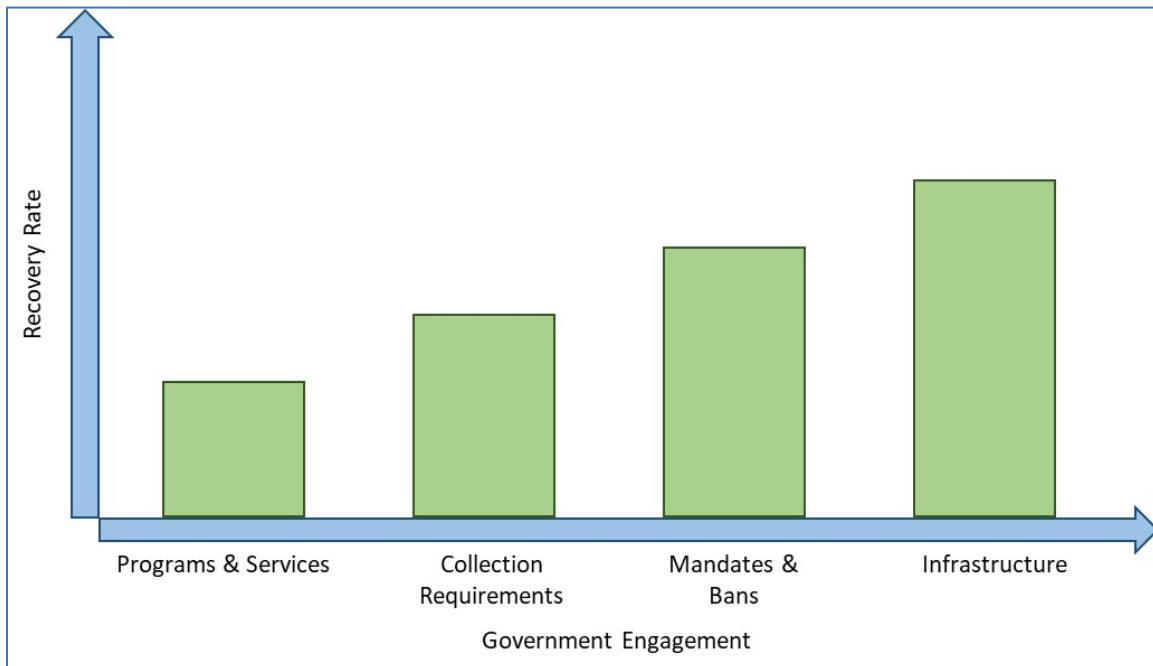
²⁰ See Table 3-6.

6 Improvement Options

This section describes options for improving customer access and services, increasing recovery, and achieving CAP goals. As noted previously, the Routt County CAP has established 2050 goals of diverting 85% of landfilled waste (the 2021 rate measured in the City's 2021 Recycling Plan was only 9%) and reducing 2018 GHG levels by 69%.

Based on general experience across the municipal recovery sector, government engagement is directly correlated to recovery. Voluntary programs are often not enough to meet landfill diversion and GHG reduction goals where significant increases in material recovery rates are required. Without local government being directly invested and involved, it is not possible to achieve the public awareness, participation, ease of access, services, and infrastructure necessary to achieve high recovery rates in line with CAP goals. Figure 6-1 summarizes the relationship between recovery rates and increasing levels of government responsibility and involvement, political support, and financial commitment.

Figure 6-1: Government Engagement's Impact on Recovery



The range of improvement options considered in this section are categorized into the four tiers as follows:

- Tier 1: Government Programs and Services
 - Public Education and Outreach
 - Technical Assistance
 - Improved Data Collection
 - Generator Subsidies and Incentives
 - Business Certification
 - Grant Funding
 - Government Resources

- Tier 2: Collection Service Requirements
 - Pay-As-You-Throw
 - Equal Space Requirement
 - Revised Cleaning Service Contracts
- Tier 3: Mandates and Bans
 - Mandatory Organics Collection
 - Collection or Disposal Bans
- Tier 4: Government-Sponsored Infrastructure
 - Community Collection Enclosures
 - Organics Drop-off Centers
 - Government Role in Compost Processing Facility(s)

Tier 1: Government Programs and Services

6.1 Public Education and Outreach Program

A comprehensive PEO program would address all stages of the organics recovery system (rescue, animal feeding, collection, composting, and markets). The following bullet points outline several specific aspects for consideration.

- Food Rescue: PEO effort would need to be coordinated with LiftUp to ensure continuity. Note that businesses can be concerned about potential liability associated with donating to food rescue organizations. Both Federal and Colorado laws (Good Samaritan Acts) protect food donors from liability unless injury is caused by willful or reckless acts. Information regarding these protections may help build awareness and willingness to rescue food.
- Animal Feeding: The fact that animal feeding already occurs and opportunities exist to expand it further is probably not widely known. The purpose of PEO activities would be to increase awareness among food manufacturing and food services sectors. For example, a list of permitted feeding operations and types of foods accepted could be disseminated.
- Collection: A PEO program must address contamination. Small-scale composting operations are particularly challenged by contamination because they lack the necessary scale and financial resources for specialized equipment to remove contaminants. Contamination problems increase as collection programs extend beyond “early adopters” to the majority of generators who will participate when it is widely available, not too costly, and easy.
- Special Events: A comprehensive PEO program could include activities that target special events. For example, community leaders and champions could use display booths to promote zero waste event efforts and publicize community-wide recovery, including organics.
- Backyard Composting: A comprehensive PEO program could include specific materials that promote backyard composting. This could entail re-energizing and expanding activities through YVSC.

There are several organizations in Routt County whose existing education and outreach programs currently address sustainable landscaping and gardening such as the Yampa River Botanic Park, Yampatika and the Colorado State University Extension Service Master Gardeners program. These could potentially be leveraged to include specific messaging around purchasing practices, sorting uncontaminated organics for diversion and backyard composting.

6.2 Technical Assistance Program

A multi-faceted Technical Assistance (TA) program would be focused primarily on generators and collection services but could also support development of farm-based composting capacity.

- **Animal Feeding:** Given regulatory requirements and the specific needs of animal feeding operations, the opportunity may exist to expand technical services through the Routt County Extension to existing and potential generators and animal feeding operations to provide help obtaining permits, applying for RREO grants for heat treatment equipment, and developing operating and financial plans. The Community Agriculture Alliance has also indicated interest to play an active role to increase animal feeding.
- **CI Generators:** YVSC currently has a project to assist businesses implement food separation and collection. To date the program has helped a handful of businesses; it is grant-funded and has limited resources. A well-established and funded TA program could more proactively promote and engage interested CI generators including groceries, restaurants, schools and other industrial kitchens. It could provide site-specific waste audits, assist with operational plans, provide lists of internal collection container options, provide instructional materials and signage, develop tracking tools, and calculate diversion and climate impacts, etc.
- **Special Events:** Based on feedback from special event organizers, vendors, and food services contractors, the current pre-planning TA offered through the Sustainability Incentives could be more extensive.
- **Farm-Based Composting:** Another TA program could focus on supporting and expanding farm-based composting. Some farms currently stockpile crop residue and other organic wastes allowing it to decompose for re-use on-site. Potential exists to provide technical assistance to upgrade and expand farm-based composting and create linkages with landscapers, commercial food waste generators, or other off-farm sources of organics. Potential partners include Community Agriculture Alliance and CSU Extension Service.

6.3 Improved Data Collection

6.3.1 Hauler Reporting

The City's 2021 Recycling Study highlighted the need and opportunity for improved hauler reporting and proposed that reporting requirements include data on the number of organics accounts, quantity and facility information. These recommendations have been approved as revised City code and the first report will be generated for the last quarter of 2022. The data generated will provide the City with significantly more information than is currently available.

Ideally, the other Routt County towns and the County itself would require similar reporting detail from haulers operating in their jurisdictions in the future.

6.3.2 Compost Processing Facility Reporting

To provide additional data regarding organics recovery, additional facility reporting could be required by Routt County. County and state regulatory reporting requirements for Class III facilities do not provide sufficient detail to track performance, determine recovery rates, and identify opportunities for improvement. Additional information could include volumes received for different types of organics, material sources and volumes of compost and mulch distributed to specific market sectors.

6.3.3 County-Wide Waste Composition Data

The last composition study of disposed MSW in Routt County was completed in 2018. It was conducted on only four samples of residential and CI trash collected primarily from the City. In addition to being outdated, this analysis was limited in terms of:

- Assessing samples from other Routt County municipalities and the County itself
- Isolating residential and MFU trash
- Isolating CI trash including discrete samples from the various types of large food waste generators (i.e., restaurants, hotels with restaurants, groceries and schools)
- Assessing quantities and composition of organics from landscape and tree services

A comprehensive waste composition study should analyze several samples from each of the categories noted above over both high and low seasons to fully evaluate the potential in mixed waste samples for recovery of additional recyclable and organics materials. These studies can be resource-intensive unless volunteer or student labor is available for sorting (professional planning, sorter guidance and data analysis is recommended). Additionally, collaboration with the provider sector (hauler, transfer station or landfill owner) to provide a safe sorting location is typically required.

6.4 Generator Subsidies and Incentives

A comprehensive set of subsidies would be customized to support different generator types.

- **CI Generator:** Setting up food waste collection requires purchase of containers and carts for internal collection. To address CI generators, the City Sustainability Incentives program budget could be expanded to establish specific implementation requirements and calibrated levels of funding. Subsidies could be provided to help offset costs of planning, implementation, and equipment purchases based on certain milestones e.g., participating in TA Program, capturing back-of-house prep waste, converting to durable or compostable service ware, capturing front-of-house organics, and tracking and reporting metrics.
- **Residential (In-Home Bins and Backyard Composting Equipment):** A major barrier to residential organics collection is overcoming the “ick” and odor factor. Many government-sponsored residential collection programs provide households with small bins to collect kitchen scraps which is emptied into a large container or bucket to be taken to a drop-off site or placed out for curbside collection. In the absence of mandated

residential service, governments could provide in-home bins at a reduced price to residents. Similarly, many backyard composting programs provide outdoor composting units for free (e.g., for participating in a training program) or at a reduced price.

- Special Events: the total budget for Sustainability Incentives was \$30,000 which could be increased so that large incentives could be provided especially for Level 3 and Level 4 activities.

6.5 Business Certification Program

A distinct niche exists for environmentally and socially conscious businesses and institutions who promote their practices to their customers. This niche is not exclusive, a broad range of customers respond favorably to businesses that care for the environment. A certification program could establish several tiers of certification covering a full spectrum of sustainability practices, including organics recovery.²¹ Certified businesses would be provided with information to advertise and promote their status.

6.6 Grant Funding

Grants are available from many sources and can be instrumental across the organics recovery system. RREO grants have been a major source of funding for public and private sector applicants. Grants could help cover the cost of bear-resistant carts for organics collection. YVSC's project to assist restaurants implement organics recovery was funded by a Sierra Club grant. For special events, grants could be used to increase the inventory of materials and supplies that can be rented at low cost and potentially increase the number zero waste events. Grants could also help fund development of farm-based composting capacity. RREO grants awarded over \$1.2M for FY2023 most of which focused on composting facility infrastructure (both Cowgirl and Twin Enviro have received RREO funding in recent years). Grants can help reduce composters' risk exposure to increase organics recovery in the absence of mandates and/or governmental engagement in collection and composting.

6.7 Government Resources

Given the broad range and scope of improvement options discussed above, it is expected that dedicated local government staffing would be needed for a wide range of activities: PEO and TA program development and implementation, management of subsidy and funding initiatives, staffing or contract management for drop-off centers, data analysis, etc. Likewise, a comprehensive organics recovery program in government buildings requires staff and resources for program management, logistics coordination, employee awareness and training, monitoring cleaning services, etc. By making the commitment to support its own collection program, government can lead by example.

²¹ YVSC's has recently partnered with the Colorado Department of Public Health & Environment to implement a local version of the state's Green Business Program. This Routt County version is under development.

Tier 2: Collection Service Requirements

6.8 Residential Pay-As-You-Throw

The PAYT system has been implemented in nearly 8,000 communities across the U.S. including several mountain ski towns in Colorado. It is widely acknowledged to be one of the most effective mechanisms for increasing diversion and recovery in the residential sector. PAYT gives residents a range of trash cart size and pricing options such that they pay less if they have less trash (or divert more materials); it effectively incentivizes waste diversion. Moving to a PAYT system was a key recommendation in the City’s 2021 Recycling Study – but has not yet been approved for implementation.

If Routt County governments implement PAYT in the future²², they will likely:

- Increase the number of residents separating both recyclables and organic materials (even if organics collection is not included in the bundle)
- Encourage Cowgirl (which collects only food waste from a limited number of households) to partner with a waste and recycling hauler to expand its collection in terms of both residents and materials
- Increase food waste brought to both Twin Enviro and Cowgirl processing facilities and encourage site expansion, equipment investment and scaled operations - it would also increase revenue from tip fees and compost sales and potentially improve economies of scale
- Support expanding the PAYT system to include organics collection as a core service in the future

6.9 Equal Space Requirement for Recycling and Organics Recovery

The purpose of an equal space requirement is to ensure that MFU and CI properties have enough space for short-term storage of diverted recyclables and organics prior to hauler collection. Typically applied to new or significantly renovated buildings, it addresses the tendency to minimize waste storage space in favor of parking or other property needs.²³

Existing City of Steamboat Springs’ code currently requires developers of newly constructed MFU and CI buildings to provide “sufficient” space for trash, recycling and organics, but that sufficiency is not defined. The City’s 2021 Recycling Study recommended that:

- Minimum exterior recycling storage capacity be defined as equal to trash storage capacity
- That applicability be expanded to major renovations that expand any property by 25% or more

²² While PAYT is not regularly seen in small communities or in unincorporated counties in Colorado, it is not unheard of: Frisco (population 3,000) and Pitkin County have both PAYT and mandatory recycling for MFU/CI sectors (Summit County is currently working to pass similar policies).

²³ The Cities of Aspen, Boulder, Broomfield and Fort Collins all have equal space requirements for recyclables; Aspen and Boulder’s code requires the same for organic materials.

- Technical assistance be provided to both developers and the City's Planning and Community Development Department (responsible for enforcing these rules through the permitting process)

These recommendations have not yet been approved by the City or considered by other local governments. It should be noted that this type of policy takes several years to have an impact. Regardless of timing, compliance can be a challenge in crowded commercial or resort areas where space constraints are especially severe.

6.10 Revised Cleaning Service Contracts for Government Buildings

This option would entail researching best practices and developing standardized language for all cleaning services to include internal collection and placement of organics in outside containers provided they are located within a specified distance. In this way, provisions and pricing can be established and then implemented at a later date when outside collection logistics can be worked out. Collection services should address the range of generation points in the building (e.g., desks, break rooms, kitchen areas, etc.) as well as establish provisions regarding the types of containers to be utilized and collection frequency. A spin-off benefit of doing this work for government buildings is that sample language could be made available publicly for other CI generators to utilize and adapt.

Tier 3: Mandates and Bans

Please note that while the following options are effective, they require the availability of compost processing facilities with adequate capacity. Therefore, it would likely be necessary to undertake at the same time government-sponsored activities to ensure to handle collected organics (see Tier 4).

6.11 Mandatory Organics Collection

6.11.1 Residential

The City of Steamboat Springs currently requires haulers to provide recycling service to residential trash customers, and to charge bundled rates such that recycling is not a separate, additional cost. The other Routt County governments have no foundational recycling requirement upon which to build at this time.

Mandatory organics collection is typically added to an existing recycling program – e.g., PAYT can be expanded to include the collection of trash, recycling and organics. Clearly this would entail significant additional hauler investment in collection containers and vehicles, which would be reflected in customer rates. If implemented in coordination with PAYT, customers would potentially have the opportunity to minimize the cost impact by down-sizing their trash cart service.

While these programs have been shown to drive more materials recovery than trash and recycling only, they are not yet common in Colorado's mountain ski communities where

voluntary curbside collection, drop-off and backyard composting are the norm for organics diversion.²⁴

6.11.2 MFU and CI

A pivotal recommendation in the City's 2021 Recycling Study was new policy that requires haulers to provide their MFU (greater than 2 units) and CI customers with recyclables collection service equal to at least one-half of their trash service (on a capacity basis). This policy has been approved by City Council and is expected to be implemented in 2023. It may encourage more organics recovery (mostly from food-waste generators in the CI sector); alternatively, organics recovery requirements could be added to this policy. The cost of MFU/CI organics collection costs are difficult to predict as they vary widely depending on location, quantities, container sizes, collection frequency, etc. None of the other local governments have undertaken recycling requirements for these generators.

In the CI sector, mandatory food waste recovery could be limited to those businesses and institutions that generate significant food waste (see Table 3.2). Phased implementation for these businesses is typical with large generators having the earliest compliance date, followed by medium and small generators. However, space for adding new organics containers will be a challenge where space is limited. Similar mandates are not yet common for mountain ski communities in Colorado.

6.12 Collection or Disposal Bans

An alternative to requiring haulers to provide expanded service to their trash customers is to impose a ban on the collection and disposal of organics materials by generators, effectively putting the responsibility on residents, MFUs and CIs themselves.²⁵ This option requires adequate collection (curbside or drop-off) or onsite composting or other management. It also requires some level of tracking and enforcement, which can be a challenge for local governments.

Tier 4: Government-Sponsored Infrastructure

6.13 City Community Collection Enclosures

The City of Steamboat Springs has already launched an initiative to establish several dumpster enclosures in downtown that will be available for use and subscription basis. They will help address the lack of adequate space that many CI generators experience and potentially provide a more affordable and convenient collection alternative for small businesses with low waste generation. Depending on where located, enclosures would also provide a convenient option for special events.

²⁴ The City of Boulder currently requires all residents, MFU and CI generators to divert food and yard waste organics. The City of Fort Collins is working in 2022 to require all residents to obtain curbside collection of yard waste in its PAYT system. Both the City of Northglenn and the City of Glenwood Springs are currently exploring the ability to offer subscription-based curbside organics collection to residents as an alternative to a mandate.

²⁵ The City of Aspen currently has a yard waste disposal ban and is evaluating expansion to include food waste.

The design and construction of these enclosures needs to ensure that they can be used for three-streams (recyclables, organics, and trash) to support current and future efforts to maximize recovery. It would be possible to require organics separation as a prerequisite to using the enclosures. If the shared enclosure system works, the City should consider expanding beyond downtown to provide recovery options for small CI generators elsewhere. The currently planned enclosures are to be placed on City property. In a future phase, it may be feasible to collaborate with commercial properties owners to increase the number of community enclosures.

6.14 Organics Drop-off Centers

Local government has limited options to improve organics recovery without becoming involved in providing collection services or actively involved in a composting facility. As described in the case studies, government-sponsored drop-off centers for organics are an integral part of most programs. A key benefit of these facilities is the common practice of operating at no- or low-cost to users and the ability to encourage material recovery without collection or material separation mandates.

Given the size of Routt County, multiple facilities will likely be needed to adequately serve generators. Such a system could include permanent sites in or near each population center or mobile operations that serve all communities on a rotating basis. Fortunately, drop-off center systems present a relatively straight-forward opportunity for local governments, non-profits, and private haulers to collaborate.²⁶

6.14.1 Facility Siting

Government-sponsored drop-off centers for organics could be designed to serve both residents, MFUs and CIs. Site design would need to account for differences in the types of incoming vehicles and size of materials. Drop-off centers would be best located in proximity to populated areas so that they are convenient and readily accessible closer to where organics are generated than compost processing facilities. Ideally, these facilities would be located on available public property and any site development would be conducted by government labor and equipment.

6.14.2 Operations

While many drop-off centers are provided as a free or low-cost service to users, operating costs incurred by government owners include both staffing (which is critical for ensuring appropriate segregation and minimal contamination) and hauling of collected materials to compost processing facilities (hauling is often conducted under contract to a private company). These costs will vary as a function of users served, quantities received, distance from processors and hours of operation.²⁷

²⁶ Summit County operates several drop-off centers that accept residential food waste at no cost. The City of Glenwood Springs accepts food-contaminated paper for composting at its drop-off center at no cost.

²⁷ For reference, the City's 2021 Recycling Study estimated that operating costs for a drop-off center for the collection of recyclables could range from \$70,000 to \$86,000 per year.

6.15 Government Role in Compost Processing Facility(s)

Local government can also take a more active and direct role to ensure that sufficient composting capacity exists to achieve high recovery rates. As noted previously, such an initiative would need to be undertaken in coordination with Tier 3 activities so that organics collection and processing capacity are synchronized. This could be achieved by either contracting with private composting facilities to accept organics from the mandated services or government developing compost processing capacity of its own through a public-private partnership. However, because all City and County collection services are open-market subscription and neither entity controls solid waste processing or disposal infrastructure, local government does not control any of the waste and is thus not able to establish and control contracts or facilities to process organics.²⁸

²⁸ Alternatives include public partnerships with one or more haulers and/or establishment of flow control policy to require organics collected within a jurisdiction be hauled to a processing facility identified by that government. While both provide control over waste materials, neither is likely to be politically acceptable in Routt County in the near future.

7 Summary, Recommendations and Next Steps

7.1 Summary

The following bullets consolidate key observations developed in preceding sections.

- Recovery rates for food waste and yard waste are very low with limited opportunities existing for collection and composting them. Overcoming these limitations represents the most significant opportunity to increase organics diversion from MSW.
- Food rescue and animal feeding are well established but could also be further expanded.
- Recovery rates appear to be high for spent grains, wood waste, and biosolids. However, in-County wood waste recovery relies on informal, unreliable channels and service providers could benefit from having composting facilities with the capacity to handle their material.
- Onsite composting is limited to generators willing to take on the responsibility and who have suitable space to do so.
- Recovery rates are low for certain sector-specific organics (government buildings, special events, marijuana waste, and animal wastes). However, it is noted that these represent a very small fraction of MSW and so should be considered as niche opportunities, rather than primary focal points.
- Without PAYT, organics collection mandates, and/or disposal bans, strong drivers and incentives do not exist for generators to separate organics and haulers and composters to invest in services and infrastructure.
- Existing and potential market demand will not be limiting factors affecting expansion of composting capacity; markets can be developed for the potential compost production.
- Other Western Slope resort communities have demonstrated that multi-faceted organics recovery systems have political and economic viability and achieve high diversion rates.

The overarching conclusion based on the LBA Team's experience and assessment of the MSW management system in the City and County is that organics recovery will not increase notably beyond current levels without Tier 2, 3 and 4 actions that significantly increase source-separated organics collection (in particular food waste) and composting facility capacity. The County will not achieve its CAP goals (85% landfill diversion by 2050) unless such actions are actively pursued.

7.2 Recommendations

Table 7-1 (next page) provides a high-level, qualitative assessment of the improvement options described in Section 6 using similar ranking criteria as the Recycling Study. The purpose of the comparison is to identify priority options for implementation.

Table 7-1: Qualitative Assessment and Prioritization of Improvement

IMPROVEMENT OPTION	RANKING CRITERIA						Overall Priority
	Diversion & GHG Reduction Impact	Ability to Change Behavior	Ease of Government Implementation	Ease of Private Sector Implementation	Affordability to Residence or Business	Integration with Priority Recycling Improvements	
	L = Low ; M = Medium; H = High; n/a = not applicable						
Tier 1	PEO Program	L	H	H	n/a	H	H
	TA Program	L	H	H	n/a	H	H
	Improved Data Collection	L	L	H	M	H	H
	Generator Subsidies & Incentives	L	M	H	n/a	L	M
	Business Certification	L	L	H	M	L	L
	Grant Funding	M	L	M	M	L	M
	Government Resources	L	M	M	n/a	H	H
Tier 2	Pay-As-You-Throw	H	H	M	L	H	H
	Equal Space Requirement	L	L	M	L	H	M
	Clean Service Contracts	L	L	M	M	M	L
Tier 3	Mandatory Organics Collection	H	H	M	L	H	H
	Collection or Disposal Bans	H	H	L	M	M	M
Tier 4	Community Collection Enclosures	M	H	H	n/a	H	H
	Organics Drop-Off Sites	M	M	M	n/a	H	H
	Government Role in Compost Facility(s)	M	H	L	M	n/a	L

Recommended high-ranking improvement options and the core rationale for that ranking are summarized in the following bullets.

- **PEO Program:** a PEO program establishes overall branding and uniform messaging for a comprehensive recovery that addresses all materials including recyclables and organics, all generator types, and all steps in the waste management hierarchy.
- **Technical Assistance Program:** a TA program is essential to achieving sustainable MFU and CI sector recyclables and organics recovery. Common methods are employed for both streams and can be addressed efficiently in an integrated manner (audits, internal collection planning, employee training, cost-benefit analysis, metrics tracking, etc.).
- **Improved Data Collection:** The City is already moving forward with strengthening hauler reporting. Without reliable information regarding the services being provided, number of customers receiving recycling and organics collection, quantities of materials, etc. it is not possible to manage and improve the existing recovery system.
- **Government Resources:** The City and County will not increase recovery significantly or be able to manage the wide range of improvement options unless they commit the needed money and staffing. Given the overlap between recycling and organics initiatives recommended in this and the City's 2021 Recycling Study, the City and County can expect economies of scale in implementation. For example, the budget and staffing required for comprehensive PEO or full-service drop-off centers will not be twice that of doing the same for recycling only.
- **Pay-As-You-Throw:** PAYT is widely proven to be an effective driver to increase recovery. With a financial incentive, more residents recycle, more consistently, and achieve high capture rate of recyclables and organics.
- **Mandatory Organics Collection:** When undertaken in coordination with PAYT, organics collection can lead to significantly higher recovery due the combined impact of the PAYT pricing incentive and the requirement that customers must be provided organics collection service. As noted in Section 6, a CI organics mandate would be focused on those with a high percentage of organics in their waste.
- **City Community Collection Enclosures:** Large amounts of trash, recyclables, and organics are generated in dense areas posing a major recovery barrier for many CI and MFU generators as well as special events. The City is in the process of implementing enclosures and should address all three waste streams.
- **Organics Drop-off Centers:** Drop-offs increase convenience community-wide by providing another way to divert materials in addition to curbside collection. Drop-off centers configured to handle recyclables and organics are only incrementally more expensive to develop and operate than sites for recyclables only.

7.3 Next Steps

Recommended options represent all four Tiers of government engagement so that when implemented over time they will comprise a comprehensive organics recovery program that can significantly increase organics recovery. Several recommendations are already underway in the City (e.g., PEO, Improved Data Collection, Mandatory Organics Collection, and Community Enclosures) but need to be expanded to fully address organics recovery.

With input and guidance from City and County leadership, it is recommended that City and County staff first prepare a comprehensive waste recovery plan in 2023. This plan should establish a road map that integrates all waste diversion initiative including both recyclables and organics into a coordinated, sequenced implementation scheme. This plan would more specifically define procedures, schedules, staffing and budgetary requirements, work activities for each improvement action, supporting work (feasibility studies, stakeholder engagement, market assessments, etc.), milestones, and metrics for evaluation necessary for successful implementation.

Organics recovery should be implemented in two phases whereby Phase 1 lays the groundwork for Phase 2 that significantly ramps up organics recovery, but which takes more time for stakeholder engagement, political decision-making, financial commitment, implementation, and expansion of organics collection services and composting capacity.

Phase 1 (proposed for 2024 – 2026): Implement New / Expand On-Going Tier 1, 2 & 3 Actions:

- PEO Program
- TA Program
- Improved Data Collection
- Government Resources
- Mandatory Organics Collection
- Community Enclosures (City only)

Phase 2 (proposed for 2027 – 2030): Implement New Tier 3 & 4 Actions

- PAYT
- Organics Drop-Off System