



CONSULTING GROUP, INC.

RESOURCES • RESPECT • RESPONSIBILITY

**FINAL REPORT**

## **Regional Wasteshed Planning Study**



**SUBMITTED TO:**

## **The North Front Range Wasteshed Planning Coalition**

July 15, 2016

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July 15, 2016

North Front Range Wasteshed Planning Coalition  
C/O Mr. Honoré Depew  
Environmental Planner  
Environmental Services Department  
City of Fort Collins  
215 North Mason Street, 1<sup>st</sup> Floor  
Fort Collins, Colorado 80524

**Subject: North Front Range Regional Wasteshed Planning Study Final Report**

Dear Mr. Depew:

R3 Consulting Group, Inc. (R3) is pleased to submit the attached Final Report of our Wasteshed Planning Study for the North Front Range Regional Wasteshed Planning Coalition.

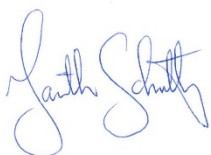
We wish to thank Coalition member staff from Larimer County, the Town of Estes Park, the City of Loveland, the City of Fort Collins for information and insights in support of this Study. We also wish to thank and recognize staff participation from other key members of the Wasteshed's overall solid waste infrastructure, including Gallegos Sanitation, RAM Waste Systems, Waste Management, A-1 Organics, and many others who provided information and insights during the course of conducting this Study.

\* \* \* \* \*

We appreciate the opportunity to be of service to the North Front Range Regional Wasteshed Planning Coalition. We look forward to staying in touch with the Coalition as it takes the next steps in its planning process, and welcome updates and additional communications as the process unfolds. Please don't hesitate to contact me by phone at (510) 292-0853 or by email at [gschultz@r3cgi.com](mailto:gschultz@r3cgi.com) with any updates, comments, or questions.

Sincerely,

**R3 CONSULTING GROUP**



Garth Schultz | Principal

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# 1 Executive Summary

This North Front Range Regional Wasteshed Planning Study (Study) was commissioned by the City of Fort Collins on behalf of the North Front Range Regional Wasteshed Planning Coalition (the Coalition). The Coalition is comprised of the City of Fort Collins, the City of Loveland, the Town of Estes Park, and Larimer County. The Coalition is organized into technical and policy committees.<sup>1</sup> The term “wasteshed” is used to describe an area where waste, much like water or air, does not adhere to boundaries. The regional wasteshed of Colorado’s North Front Range (Wasteshed) is an area in and around Larimer County consisting of all solid waste generated by cities, towns and unincorporated areas and handled by publicly and privately operated solid waste infrastructure.

One of the primary key infrastructure elements within the Wasteshed is the Larimer County Landfill, which will close due to lack of additional capacity around the year 2025. The Coalition Technical Advisory Committee (TAC) has been working since May 2015 to outline a long-term planning process for the Wasteshed that will help the regional community achieve new levels of responsible materials management. The Coalition engaged R3 Consulting Group, Inc. (R3) to supplement its Wasteshed planning efforts via this Study, with the specific objectives of:

- Describing current solid waste handling conditions, policy, collection operations and infrastructure for transferring, disposing and processing solid waste materials;
- Quantifying the amount of solid waste currently handled and projecting the amount of each solid waste type that will need to be handled in the future;
- Identifying the gaps between how much waste will be generated in the future and how much waste current infrastructure can handle;
- Identifying and describing the feasible options that the Coalition might consider as opportunities for future handling of solid waste; and
- Describing the various funding approaches that could be considered for funding capital and operating expenses for additional solid waste infrastructure.

This Study includes detailed sections that address each of these objectives, and describe R3’s approach and analysis relating to each. General methodology for conducting the Study is included as Appendix A. Main findings are summarized below.

## Current Conditions

The Wasteshed includes infrastructure for collection (or “hauling”) of solid waste (from residents, businesses, and industry) to transfer stations, recycling and organics processing

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<sup>1</sup> The Technical Advisory Committee (TAC) is a planning group comprised of staff from each Coalition member agency that meets regularly to address options for the future solid waste management and resource recovery opportunities within the Wasteshed. The Policy Advisory Committee (PAC) is comprised of elected officials from each Coalition member agency for the purpose of providing policy direction and recommendations on regional solid waste planning and operations.

Section 1

Executive Summary

facilities and several landfills<sup>2</sup> including the Larimer County Landfill. Solid waste streams handled by these infrastructure elements include:

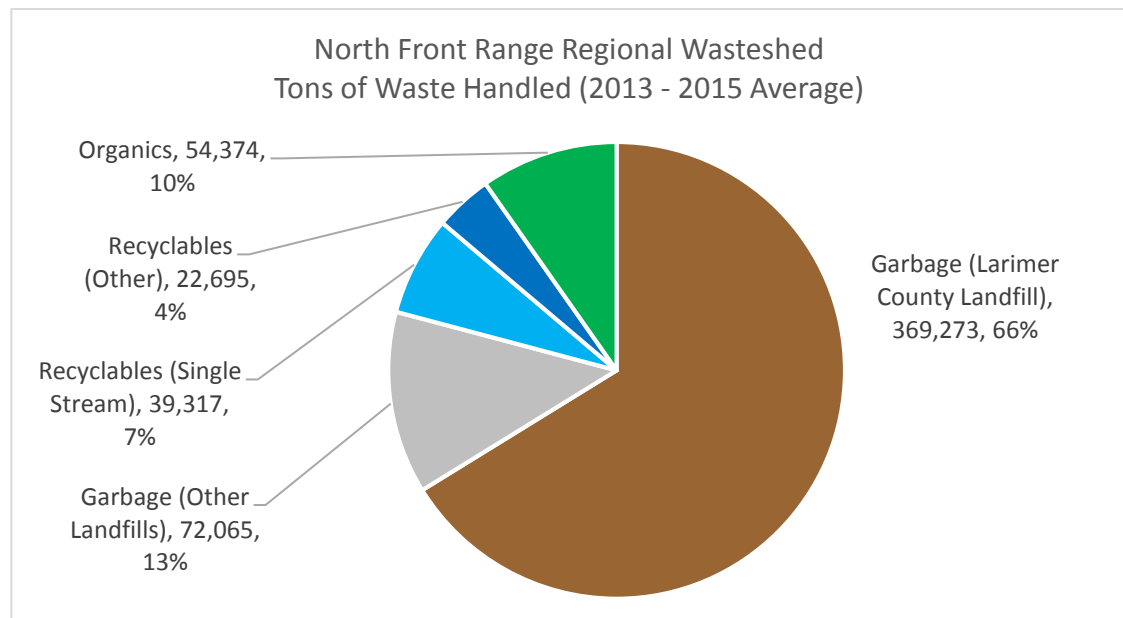
- Recyclables that can be manufactured into new products or product feedstocks;
- Organics, which includes yard wastes, wood waste, and food wastes, that can be composted, mulched or used for energy production;
- Construction and demolition (C&D) materials that can be recycled and reused; and
- Garbage, which includes those materials that do not fit into the above categories and/or are disposed of in landfills.

Solid waste collectors (“haulers”) operate in a market system wherein customers choose their own collector, or may choose to self-haul their solid waste (residents in Loveland automatically receive service from the City). Collectors choose which solid waste facilities to use, including those that are in Larimer County and outside of it. Coalition members have, to varying degrees, implemented policies and practices that aim to increase diversion of solid waste from landfills.

**Current and Future Waste Handling**

Between 2013 and 2015, solid waste infrastructure in the Wasteshed handled over 550,000 tons of solid waste per year.<sup>3</sup> The vast majority of this material was landfilled garbage, with most of that garbage being landfilled at the Larimer County Landfill, as shown in Figure 1.

**FIGURE 1**



<sup>2</sup> There are at least three private landfills (located in neighboring Weld County) used by haulers in the region, in addition to the Larimer County Landfill.

<sup>3</sup> This figure does not include concrete, asphalt and rock, and other materials handled by the City of Fort Collins’ Hoffman Mill Road Crushing Facility and other similar facilities in the Wasteshed, as the infrastructure for these materials is robust and with high economic demand for those services and materials. This Study focuses on the materials generated by homes and businesses.

Between 2013 and 2015, approximately 80% of the solid waste handled in the Wasteshed was landfilled as garbage, 10% of it was collected as recyclables, and another 10% as organics. Currently, 60% of the solid waste that is collected as garbage and disposed of at the Larimer County Landfill is comprised of recyclables, organics and mixed C&D materials that could be diverted from landfill disposal and recovered for other purposes. Future amounts of solid waste generated and handled in the Wasteshed are projected to increase significantly, in proportion to projected population growth. By 2040, the amount of garbage, recyclables, organics and mixed C&D solid waste is projected to be over 800,000 tons annually, with between 560,000 and 650,000 tons estimated for landfill disposal.

### Opportunities Assessment

Current solid waste infrastructure is generally sufficient to meet the current waste handling needs in the Wasteshed. However, upon closure of the Larimer County Landfill around 2025, solid waste infrastructure will need to handle approximately 20% more solid waste than it does now and, additionally, will need an alternative for the roughly 415,000 to 440,000 tons of waste that would otherwise be disposed of at the County landfill. There is significant opportunity for developing infrastructure in the Wasteshed for all solid waste streams.

### Feasible Options

Feasible options for future waste handling include taking no action and using other area infrastructure (with likely increases in collection and disposal costs), or developing one or more infrastructure elements in the Wasteshed, potentially including:

- Central Transfer Station
- New Landfill
- Materials Recovery Facilities
- Organics Composting Facility
- C&D Processing Facility
- Waste-to-Energy Facilities

These alternatives can be combined to varying degrees; some can be implemented as standalone activities or in combination with other options.

### Funding Approaches

There are a variety of potential funding approaches available to the Coalition for financing the costs of new infrastructure; however, as a result of current open market conditions, several of these possibilities involve higher levels of risk than others. The available funding alternatives for consideration include:

- Fees
- Taxes
- Public-Private Partnerships
- Regional Solid Waste Agency

Variables that could affect the necessary funding amounts for Wasteshed solid waste infrastructure in the future include, but are not limited to:

- The timing of solid waste infrastructure construction;
- Locations and property ownership for future solid waste infrastructure;
- Size and scale of the facilities chosen for consideration;
- Potential future increases in garbage disposal or processing fees; and
- Other possible changes to disposal or processing fees for recycling and organics.

Section 1

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Executive  
Summary

## 2 Current Conditions

This section describes current solid waste handling conditions, solid waste policy, collection operations and infrastructure for transferring, disposing and processing waste materials in the Wasteshed.

### 2.1 Wasteshed Overview

The North Front Range Regional Wasteshed in Larimer County, Colorado straddles the eastern Rocky Mountains along the foothills and the beginning of the Great Plains, combining rural mountainous terrain with lower lying urban and suburban environments. Populations are concentrated in Loveland and Fort Collins, and distributed sporadically across unincorporated Larimer County and Estes Park. As the gateway to Rocky Mountain National Park, the Town of Estes Park sees up to 4 million visitors per year. As a result of these geographic and demographic differences, the Wasteshed's solid waste handling systems, including its collection, transfer, disposal and processing elements, are also varied in their application. This presents particular challenges and opportunities with respect to regional development of solid waste infrastructure.

Collection infrastructure for residential, commercial and industrial solid waste collection services are primarily provided by private hauling companies that operate within each city, town, and the County (with the exception of Loveland, which operates a municipal collection service for its residents). All solid waste haulers operate in a market system wherein customers may choose their own hauler, or may choose to self-haul their solid waste. While the open market system fosters price and service competition among haulers, it also means that these companies can make their own choices in terms of where they bring the materials they collect for disposal or processing. As a result, regional planning entities like the Coalition have no guarantee that haulers will use any new solid waste infrastructure, which could make it difficult to finance that infrastructure.

Politically speaking, each member agency is diverse and varies from urban to rural, creating some differences in approach to policy and planning. The more urban communities of Fort Collins and Loveland have adopted policies and/or programs that increasingly foster non-landfill alternatives including diversion of recyclables and organics. However, due in part to the relatively low cost of landfilling in Colorado (\$18-\$25/ton) those types of policies and programs are less efficient, more expensive, and not as well supported in the more rural portions of the County. Additionally, a lack of state-wide diversion goals makes it difficult to establish diversion from landfills as a priority or requirement. The State of Colorado is currently developing an Integrated Solid Waste and Materials Management Plan<sup>4</sup> for the purpose of assessing and planning for solid waste and diversion over the next twenty years.

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<sup>4</sup> An overview of the State's Integrated Solid Waste and Materials Management Plan, and the full Plan, can be found online at: <https://www.colorado.gov/pacific/cdphe/integrated-solid-waste-management-plan>

## Section 2

Current  
Conditions

## 2.2 Existing Transfer, Disposal and Processing Infrastructure

The Wasteshed utilizes a variety of transfer stations, landfills, recycling processing facilities and organics processing facilities to transfer, dispose and recover solid waste. A map of current conditions, on the following page 7, shows the existing facilities used for transfer, processing and disposal of each of the main solid waste streams including garbage, recyclables, and organics from Fort Collins, Loveland, Estes Park, unincorporated Larimer County and the other municipalities in the Wasteshed. A detailed list of current facilities is included as Appendix B.

### Landfills

#### Larimer County Landfill

The Larimer County Landfill is centrally located between the geographic centers of Coalition members, being eight miles from Fort Collins, 34 miles from Estes Park and nine miles from Loveland. The ownership of the land under operation is split between jurisdictions with Fort Collins owning 50%, Loveland owning 25% and Larimer County owning the remaining 25%.

All development on the land is owned solely by the County, which also owns an adjacent, undeveloped parcel south of the active landfill. The landfill opened in the 1960's and the County of Larimer took over operations of the Landfill in 1973. Since its opening, there have been three vertical expansions to the landfill's height that increased its capacity. It is currently anticipated to be full in approximately ten years and no further expansions are possible at the current landfill location. Gas produced by the landfill is captured and flared, and may potentially be connected to pipelines and used as an energy source in the future.

In 2015, the landfill received 378,000 tons of garbage for disposal. The landfill receives between 500 and 900 vehicles per day and estimates that 10-20% of garbage comes from out-of-County. According to the 2006 Waste Characterization Study commissioned by the County (Appendix C), waste self-hauled to the landfill accounts for 7% of incoming volume, but accounts for a large proportion of the daily vehicle traffic to the landfill. As further discussed in Section 3 of this report, the 2006 study also found that 60% of waste disposed at the landfill could be diverted and recovered via existing programs for recyclables and organics in the region.<sup>5</sup>

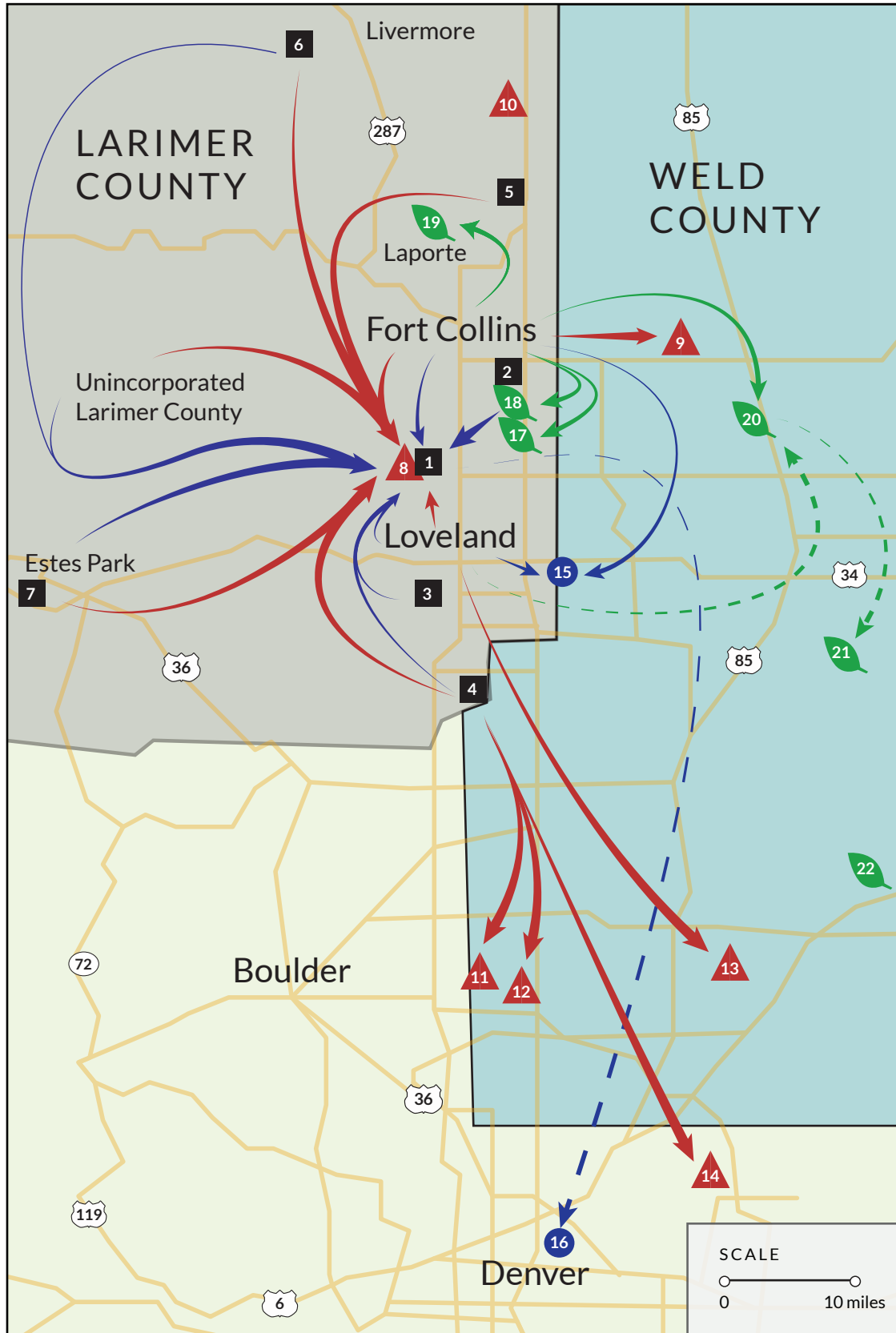
The landfill also includes a household hazardous waste (HHW) drop-off facility and a recycling transfer station (Recycling Station) operated by Waste Management, Inc. (WM). WM has plans to install additional equipment in 2016 to allow for some recyclable materials to be delivered directly to market rather than to the Denver WM materials recovery facility (MRF).

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<sup>5</sup> The County is currently in the process of conducting a new waste characterization study, the results of which are anticipated to be available by the end of 2016. It is understood that the 2016 study will compare and analyze changes in the composition of waste accepted at the Larimer County Landfill between 2006 and 2016. R3 anticipates that while individual categories and types of waste may change slightly, there will likely not be significant changes to the main waste categories (garbage, recyclables, organics and C&D) assessed via this Wasteshed Planning Study. Any difference can be analyzed and reviewed once the 2016 characterization is completed, though significant changes to the projections included in this Study are not anticipated.

# NORTH FRONT RANGE WASTESHED FACILITY MAP

## Current Conditions



### MAP KEY

- Garbage
- Recyclables
- Organics
- - - Long-Haul Truck

#### ■ TRANSFER STATIONS

- 1) Larimer County Recycling Center
- 2) Fort Collins Timberline Recycling Center
- 3) Loveland Recycling Center / Green Waste Drop-off
- 4) Berthoud Transfer Station
- 5) Wellington Transfer Station
- 6) Red Feather Transfer Station
- 7) Estes Park Transfer Station

#### ▲ LANDFILLS

- 8) Larimer County Landfill
- 9) North Weld Landfill
- 10) Larimer County North Landfill (undeveloped)
- 11) Front Range Landfill
- 12) Denver Regional Landfill
- 13) Buffalo Ridge Landfill
- 14) Tower Road Landfill

#### ● RECYCLING PROCESSING FACILITIES

- 15) Waste-Not Recycling
- 16) Franklin Street MRF

#### ● ORGANICS PROCESSING FACILITIES

- 17) Drake Water Reclamation Facility
- 18) Hageman's Earth Cycle Inc.
- 19) Local Dairies
- 20) A-1 Organics (Eaton)
- 21) Heartland Biogas Facility
- 22) A-1 Organics (Rattler Ridge)

#### SCALE

0 10 miles

## Section 2

Current  
ConditionsNorth Weld Landfill

Waste Management of Northern Colorado owns and operates the North Weld Landfill in Ault, 15 miles east of Fort Collins, 30 miles northeast of Loveland and 55 miles northeast of Estes Park. The landfill currently disposes of garbage from Fort Collins, other jurisdictions in Larimer and Weld Counties, and jurisdictions in the State of Wyoming. The North Weld Landfill has the capacity to accept all garbage generated within the Wasteshed. Landfill gas is not captured for recovery or flaring and the facility does not include HHW collection, recycling or other diversion functions.

Denver Regional Landfill

Waste Connections, Inc. owns and operates the Denver Regional Landfill located in Erie, approximately 50 miles south of Fort Collins, 35 miles south of Loveland and approximately 50 miles southeast of Estes Park. Due to its close proximity to the Front Range Landfill, it does not normally service garbage from the North Front Range. There are no plans to expand this landfill as the surrounding environment will not allow for it.

Front Range Landfill

Waste Connections, Inc. also owns and operates the Front Range Landfill, also located in Erie, which reportedly does not currently accept much or any waste from communities in the Wasteshed. The landfill has an annual capacity of 1.5 million tons and disposes of approximately 140,000 tons a month of mixed solid waste, C&D material and soils. The current closure date is projected to be between 2046 and 2056. Waste Connections is expecting to update this landfill's permit to allow for an inbound capacity of 3 million tons of material annually, which would likely shorten the lifespan of the landfill.

Buffalo Ridge Landfill

Waste Management, Inc. owns and operates the Buffalo Ridge Landfill located in Keensburg, 55 miles southeast of Fort Collins, 60 miles southeast of Estes Park and 43 miles southeast of Loveland. Currently, this site does not report to be a destination for garbage generated in the Wasteshed.

Tower Road Landfill

Located near Denver International Airport, in Commerce City, the Tower Road Landfill is operated by Republic Services and accepts garbage from the public. The City of Loveland periodically utilizes the Tower Road Landfill for disposal at times when they cannot dispose of garbage at the Larimer County Landfill due to wind closures.

**Transfer Stations/Drop-Off Facilities**Timberline Recycling Center

The Timberline Recycling Center in Fort Collins provides a drop-off recycling site available for residents and local businesses to use at no charge. Annually, 1,440 tons of recyclables are received at this recycling center. In addition, for \$5 per visit, people can bring a variety of "hard-to-recycle" materials and place them into appropriate containers for recycling in an adjacent, staffed area.



### Loveland Recycling Center and Green Waste Drop-off

The City of Loveland Recycling Center, located at the Loveland Municipal Services Center campus, offers recycling and green waste drop off to all Loveland residents free of charge, and to residents from neighboring jurisdictions for a fee. This facility receives approximately 2,000 tons of recyclables per year. Green waste is also accepted and approximately 26,000 tons of compostable material is received annually. The City hires A-1 Organics to chip these materials on site and transport them to the company's Eaton location for composting.

### Estes Park Transfer Station

The Estes Park Transfer Station, operated by Larimer County, accepts garbage and recyclables from residents and four waste haulers (WM, Doering Disposal, Atlas Disposal, and a new recycling hauler). The facility, which does not accept organic waste, transfers between one and two trucks of garbage per day to the Larimer County Landfill (three to four loads of garbage during the summer months), and one load of recyclables every two days. Overall, approximately 12,000 tons of solid waste are transferred per year. During the months of October through April, the facility is open three days a week. From May through September the hours of operation are increased to accommodate summer visitors. The facility has the ability to handle up to 20,000 tons per year.

### Larimer County Drop-off Transfer Stations

Larimer County operates three convenient drop-off locations in Wellington, Berthoud and Red Feather where local residents and others can drop-off garbage for a fee. These drop-off stations are open and limited at varying times throughout the year, and accept bagged waste from the public. Waste that is accepted from the public is placed into large containers, which are periodically transported via truck to the Larimer County Landfill. The Berthoud and Red Feather locations also accept recyclables, which are handled and transported via similar methods, with the contents delivered to the Larimer County Recycling Station.

## **Recyclables Processing Facilities**

### Hoffman Mill Road Crushing Facility<sup>6</sup>

The City of Fort Collins' Hoffman Mill Road Crushing Facility processes approximately 100,000 tons per year of material, which includes porcelain toilets, asphalt, concrete and pit run. The Crushing Facility does not contain a processing line and does not accept mixed material or garbage. It is operated as an enterprise fund with no disposal or processing fee for accepted materials. Finished product is sold to public and private customers.

### Waste Management/Recycle America Franklin Street Materials Recovery Facility

This Denver-area materials recovery facility (MRF) operated by WM accepts mixed "single-stream" recyclables from throughout Denver and surrounding communities, as well as the Wasteshed. All single-stream recyclables and many other recyclables collected in the Wasteshed are long-hauled via transfer trucks from the Larimer County Recycling Station to the Franklin Street MRF. At the MRF, materials are sorted via a variety of mechanical and manual means to separate various recyclable commodities (e.g., paper, cardboard, glass,

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<sup>6</sup> Per City of Loveland Staff, there are three or more other facilities in the Wasteshed, in Fort Collins and in Loveland, that also handle, process and recycle concrete and asphalt. Information for those facilities will be included in the Final Report.

## Section 2

Current  
Conditions

plastic, metals, etc.) from one another and then baled or otherwise stored for transport. Materials are then marketed to buyers and shipped offsite for remanufacturing.

#### Waste-Not Recycling, Inc.

The Waste-Not Recycling facility in Johnstown processes commercial recyclable material from Fort Collins and Loveland, and currently processes roughly 1,000 tons a month, mostly of cardboard. Other materials processed include aluminum, tin, paper and plastic. The facility also processes source-separated C&D material for recovery.

#### Loveland Concrete and Asphalt Recyclers

In addition to the Hoffman Mill Road Crushing Facility in Fort Collins, there are also three privately owned concrete and asphalt recycling operations located in the City of Loveland. Jake Kaufman and Son, Inc. accepts broken asphalt and concrete (without rebar), as does Ward Construction. Coulson Excavating Co. accepts broken asphalt.

### **Organics Processing Facilities**

#### Drake Water Reclamation Facility

The City of Fort Collins' primary wastewater treatment plant currently has four anaerobic digesters and treats the majority of the wastewater from the municipality. The facility currently processes approximately 37 tons of food waste per day (13,000 tons of food waste per year) and has additional food waste capacity. The City uses biogas produced on site from anaerobic digestion to heat the plant in winter and is enhancing capacity to use the gas for combined heat and power as a strategy to further reduce greenhouse gas emissions. The digestate byproduct is land applied on a 25,000 acre City-owned ranch as a means of landfill diversion and soil enhancement.

#### Hageman's Earth Cycle, Inc.

Hageman's Earth Cycle in Fort Collins accepts grass clippings, garden waste, leaves, branches, sod and soil, cedar shingles and rock and gravel. Hageman's acts as an organics transfer station for yard trimmings and also collects/processes clean wood into wood chips. Organics received by Hageman's Earth Cycle are transferred to local and regional organics processing facilities for composting and other beneficial uses. Hageman's Earth Cycle accepts approximately 20,000 tons per year of organic material.

#### Doug Weitzel, Inc.

Weitzel's, in Fort Collins, accepts grass clippings, leaves and branches from the public for composting. The facility receives approximately 1,000 cubic yards per year of material, which is transported and composted off-site at the company's compost yard.

#### A-1 Organics, Inc.

A-1 Organics owns and operates three facilities in Weld County and Adams County. These facilities accept wood waste, green waste, food waste, animal waste and packaged food waste. The facility closest to the Wasteshed is the Eaton location, which has the ability to accept between 500 and 600 tons of material per day for windrow composting. A-1 also provides source materials for the Heartland Biogas Facility, which processes organic materials for energy production. Overall, A-1 reports that they are able to handle more organic waste than what is currently being processed at their facilities. Challenges include contamination and fluctuating end market prices.

### Local Dairies

Some dairies in the Wasteshed are permitted to compost on-site, however they are not currently processing material from the Wasteshed. Some private haulers reported using other local dairies as outlets for green waste collected from residents.

## 2.3 Current Diversion Practice and Policy

A variety of solid waste policies and practices have been adopted by the Coalition’s member agencies. Fort Collins has an established diversion goal, ordinances to ban certain materials from disposal, and incentives for changing behavior from a disposal-first to diversion-first mindset. Loveland, although without a specific diversion goal, achieves high diversion rates as a result of high participation in recyclables and organics programs. Estes Park, despite being very rural and fairly remotely situated in mountainous terrain, operates a recycling drop-off facility at the transfer station, year round. Solid waste collectors in rural Larimer County provide limited curbside recycling collection services, but some drop-off and transfer station locations are available for recyclables throughout the County. Despite the member agencies’ differences politically, geographically and logistically, they have all made considerable strides towards diversion of materials from landfills.

### **City of Fort Collins**

#### Pay-As-You-Throw (PAYT) Ordinance

Fort Collins’ PAYT Ordinance requires waste haulers to provide a “variable can rate” (i.e., the customer rate varies based on the size of garbage can) to customers as an economic incentive for diverting recyclable and compostable material.

#### Cardboard Ordinance

In 2013, Fort Collins passed an ordinance that requires residents, businesses and industrial operations to divert cardboard from landfill disposal by disallowing the material to be placed in trash containers.

#### Electronic Waste (E-Waste) Ordinance

Fort Collins’ ordinance, passed in 2007, bans the landfilling of electronics and was followed by State legislation passed in 2013 that makes it illegal to landfill electronics anywhere in Colorado.

#### Construction and Demolition Debris

The Construction and Demolition (C&D) Debris building code in Fort Collins requires the diversion of concrete, wood, metals and cardboard from all new residential and non-residential construction projects.

#### Zero Waste Goals

In 2013, the Fort Collins City Council unanimously adopted the following Zero Waste goals:

- 2020 Goals: 75% of waste diverted from landfills and a target of 3.5 pounds per person per day of garbage generation
- 2025 Goals: 90% of waste diverted from landfills and a target of 2.8 pounds per person per day of garbage generation

Section 2

Current  
Conditions

- 2030 Goal: Approaching Zero Waste

The Zero Waste goals establish diversion as a priority and demonstrate potential political support for diversion facilities that help to decrease landfilling of recyclable and compostable material.

**City of Loveland**

Loveland operates its own trash collection utility for residents and has a PAYT Ordinance similar to that of Fort Collins, which provides an economic incentive for diversion to its customers. The City also has a hard-to-recycle material management program, educational programs, curbside recycling and curbside organics collection. Loveland is successful at diverting waste and in 2015 had a diversion rate of 61% of total collected material, which includes residential, some multifamily, roll off and hard-to-recycle waste.

**Larimer County and Town of Estes Park**

Larimer County has a PAYT Ordinance, which preceded the Fort Collins Ordinance, and similarly requires waste haulers to provide a “variable can rate” to customers as an incentive to divert waste.

Estes Park residents actively use their drop-off facility for recyclables and many residents and businesses subscribe to curbside recycling collection programs offered by local haulers. Solid waste collectors operating in unincorporated Larimer County offer curbside recycling to some customers. Additionally, the County operates three transfer stations (two of which accept recyclables) located throughout the County, as well as the recyclables and HHW drop-off facility and recyclables transfer station adjacent to the Larimer County Landfill.

## 3 Current and Future Waste Handling

This section quantifies the amount of solid waste currently handled in the Wasteshed (inclusive of the four primary waste streams of garbage, recyclables, organics, and C&D) and projects the amount of each solid waste that will need to be handled in the Wasteshed in the future.

### 3.1 Current Waste Handling in the Wasteshed

Each Wasteshed Coalition member tracks the amounts of solid waste “handled” in the region in different ways. Loveland and Fort Collins track amounts of solid waste *collected* by some or all solid waste haulers, who pick up solid waste from residents, businesses or industrial customers. Larimer County tracks the amounts of solid waste *received* from solid waste haulers and those residents, businesses or industrial customers who choose to self-haul their solid waste. Estes Park does not separately track the amount of solid waste from its community, but most of Estes Park’s tonnage is assumed to be included in the information tracked by Larimer County.

Because of the difference in how data is tracked and managed, the amount of waste generated within the Wasteshed cannot be derived as a function of the total amount collected or the total amount received, since accurate totals for either do not exist. For this reason, the information presented in this section refers to solid waste handled in the Wasteshed as data that combines two different sets of information. The solid waste tracking abilities of each of the Coalition members are described below, followed by estimates of the current amount of solid waste handled in the Wasteshed for the three-year period from 2013 to 2015.

#### Larimer County Landfill and Recycling Station

Larimer County tracks the amount of garbage and recyclables received by the Larimer County Landfill and Recycling Station, but does not track data regarding the origin of those materials. As a result, the County’s data pertaining to the amount of garbage received for landfilling and the amount of recyclables received at the Recycling Station for transfer to the WM Franklin Street MRF include any and all materials delivered by all parties using County facilities, including the other Coalition members (e.g., Estes Park, which does not separately track amounts of solid waste). The County’s data also includes waste received from other Larimer County cities, towns and unincorporated areas, and waste from neighboring counties and states; however, amounts of waste from these sources are included in the aggregate data tracked by the County, and are not identifiable by community or source.

Table 1, on the following page, details the amount of garbage and recyclables received by the Larimer County Landfill and Recycling Station from the Loveland, Fort Collins, Colorado State University (which delivers all garbage and recyclables to the County facilities) and all other sources. The amount of garbage received from the cities of Fort Collins and Loveland is only 25% of the total amount landfilled, while the amount of recyclables received from those sources is almost 60% of the total amount recycled. Additionally, it is estimated by Fort Collins’ licensed haulers that on average, only about 50% of the garbage collected in Fort Collins is received at the Larimer County Landfill (the remaining amount is received at the North Weld Landfill).

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Current and Future Waste Handling

**TABLE 1**

<b>Larimer County Landfill and Recycling Center</b>					
Tons of Waste Received 2013 to 2015					
Waste Stream		Year			3-Year Average
		2013	2014	2015	
Garbage	Loveland	19,952	21,548	21,780	21,093
	Fort Collins	63,319	62,217	85,750	70,428
	All Other Sources	253,225	309,382	270,647	277,752
	<b>Subtotal</b>	<b>336,496</b>	<b>393,146</b>	<b>378,177</b>	<b>369,273</b>
Recyclables	Loveland	5,673	5,622	5,600	5,632
	Fort Collins	15,990	17,412	15,715	16,373
	All Other Sources	16,975	16,690	18,273	17,313
	<b>Subtotal</b>	<b>38,638</b>	<b>39,724</b>	<b>39,589</b>	<b>39,317</b>
<b>Larimer County Total</b>		<b>375,135</b>	<b>432,870</b>	<b>417,766</b>	<b>408,590</b>

**City of Loveland**

The City of Loveland tracks the amount of garbage, recyclables and organics collected via its City-run residential curbside and drop-off programs, and also tracks the amount of solid waste handled by other haulers operating within the City. Because the City of Loveland conducts an upwards of 95% of residential solid waste collection, the City’s data is considered to be largely representative of the actual amount of waste that is generated by Loveland’s residential sector. Nearly all commercial and industrial waste generated in Loveland is handled by other private haulers who provide reports of tonnages collected to the City.

All garbage collected by the City is disposed at the Larimer County Landfill (and thus included in Larimer County’s data) and all curbside recycling is delivered to the Recycling Station for transfer and delivery to the WM Franklin Street MRF. Recycling collected via drop-off at the Loveland Recycling Center and Green Waste Drop-Off is either delivered to the County Recycling Station or is shipped directly to other local or regional recycling processors. Organics collected by the City via curbside and drop-off programs are ground on-site at the Loveland Recycling Center and Green Waste Drop-Off and then hauled by A-1 Organics to their facilities. Table 2 below details the amount of garbage, recyclables and organics collected by the City of Loveland and reported by private haulers. It should be noted that the organics tons include an unknown amount of organics that were collected from outside the City.

**TABLE 2**

<b>City of Loveland</b>				
Tons of Waste Collected 2013 to 2015				
Waste Stream	Year			3-Year Average
	2013	2014	2015	
Garbage	54,370	57,305	58,497	56,724
Recyclables	10,934	12,293	11,006	11,411
Organics	22,241	18,960	26,374	22,525
<b>Loveland Total</b>	<b>87,545</b>	<b>88,558</b>	<b>95,877</b>	<b>90,660</b>



**City of Fort Collins**

The City of Fort Collins tracks the amount of garbage, recyclables, and organics collected and reported by all licensed haulers operating in the City per the City’s PAYT Ordinance. The City also collects data from other recycling businesses on a voluntary basis. In 2015, 29 licensed haulers (of which only three provide residential collection service) provided reports to the City of the amounts of solid waste they collected in Fort Collins during that year. These reports include specific information about the amounts of garbage, recyclables, and organics collected from single-family residential, multi-family residential, commercial and industrial solid waste generators. The amounts of C&D material collected by licensed haulers are included in their reported amounts of recyclables (for materials such as metals, concrete, asphalt, rock, brick, stone, etc.) and organics (for materials such as clean wood).

In their reports, licensed haulers are required to document the amount of garbage delivered to landfills in the region, including the Larimer County Landfill, the North Weld Landfill, the Denver Regional Landfill and the Front Range Landfill. Licensed haulers are not required to report destination facilities for their recycling. However, the Larimer County Recycling Center is the primary destination facility for “single-stream” recycling in the Wasteshed (a mix of paper, cans, bottles, cardboard, plastics, etc.). Other “source-separated” recyclables collected in the City, including via the City’s Timberline Recycling Center, are also mostly taken to the Larimer County Recycling Station.

Similarly, licensed haulers do not include destination facilities for their organics, with the exception of a few hundred tons that are reported as delivered to Hageman Earth Cycle. The larger haulers interviewed during the course of this Study stated that they deliver their organics to A-1 Organics, the City of Loveland, and to local dairies who use the organics as bedding for cattle (in the case of yard waste), feed for pigs (in the case of a food scraps pilot project), and other beneficial uses. Some food scraps from Colorado State University are also delivered to the City’s Drake Water Reclamation Facility for digestion along with sewage.

Table 3 details the amount of garbage, recycling and organics reported to the City of Fort Collins.

**TABLE 3**

<b>City of Fort Collins</b>				
<b>Tons of Collected Waste Reported 2013 to 2015</b>				
<b>Waste Stream</b>	<b>Year</b>			<b>3-Year Average</b>
	<b>2013</b>	<b>2014</b>	<b>2015</b>	
Garbage	139,600	138,416	149,465	142,493
Recyclables	50,166	50,483	51,153	50,601
Organics	29,503	31,282	34,761	31,849
<b>Fort Collins Total</b>	<b>219,269</b>	<b>220,180</b>	<b>235,379</b>	<b>224,943</b>

**Overall Waste Handling in the Wasteshed**

Providing an overall summary of the amount of waste handled and tracked by Coalition members in the Wasteshed is not a straightforward exercise. Amounts of solid waste are tracked differently by each Coalition member, an unknown amount of solid waste is “imported” from other areas outside the Wasteshed, and an unknown amount of solid waste is similarly “exported” to other destination facilities outside the Wasteshed. As a result, the



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Current and Future Waste Handling

amounts listed in Tables 1-3 cannot simply be added together to yield a total for the Wasteshed because certain amounts of waste are double-counted in each table.

Table 4 accounts for those differences (where the differences are known), and yields an overall total amount of waste handled in the Wasteshed. This includes all tons received at the Larimer County Landfill and Recycling Station, some of which are understood to come from outside the County. This analysis does not include tons for any Larimer County cities or towns (with the exception of Fort Collins) that are exported out-of-county, as those data were not available for this Study. For the same reason it does not include tonnages for the other various private waste handlers, recyclers, organics processors, or reuse facilities in the Wasteshed for which data were not available. While these parties are important and valuable parts of the overall solid waste infrastructure in the Wasteshed, they typically handle much smaller portions of the waste stream than are detailed in Table 4.

Based on available data, an average of 558,000 tons of solid waste is handled in the Wasteshed per year, inclusive of garbage, recyclables and organics.

**TABLE 4**

<b>North Front Range Regional Wasteshed</b>				
<b>Current Tons of Waste Handled</b>				
<b>Waste Stream</b>	<b>Year</b>			<b>3-Year Average</b>
	<b>2013</b>	<b>2014</b>	<b>2015</b>	
Garbage (Larimer County Landfill)	336,496	393,146	378,177	369,273
Garbage (Other landfills)	76,281	76,199	63,715	72,065
Recyclables (Single-stream)	38,638	39,724	39,589	39,317
Recyclables (Other)	22,462	23,052	22,571	22,695
Organics	51,744	50,242	61,135	54,374
<b>Wasteshed Total</b>	<b>525,622</b>	<b>582,363</b>	<b>565,187</b>	<b>557,724</b>

**Waste Handling vs. Waste Generation**

An important consideration regarding the amount of solid waste in the Wasteshed is the amount of waste generated by residents, businesses and industry, as compared to the amount of waste “handled” as reported in Table 4 above. Given the available data, the best means of estimating the overall amount of waste generated in the Wasteshed is to estimate the amount of waste generated per capita within the Wasteshed, and then multiply that figure by the population in the Wasteshed.

Using the amount of solid waste handled within and reported to the City of Fort Collins and the City of Loveland, we can estimate the amount of solid waste generated within the region in terms of pounds per person per day (PPD). On average in those two cities between 2013 and 2015, there were approximately 315,000 tons of solid waste collected from residents, businesses and industry (not including concrete, asphalt, rock, etc.). When divided by an estimated population of those two cities at 231,000 in 2015, that yields approximately 1.4 tons per person per year, or about 7.5 pounds per PPD. Multiplying those figures by the total County population of approximately 330,000 yields approximately 450,000 tons of solid waste currently generated per year in the Wasteshed. This figure is somewhat less than the amounts listed in Table 4, which is the result of solid waste being imported into the Wasteshed from





other areas. Table 5, below, details the projected tons of waste generation in Larimer County resulting from this analysis.

**TABLE 5**

<b>Projected Larimer County Waste Generation (Tons)</b> Based on Fort Collins and Loveland Per Capita Figures	
Fort Collins and Loveland Reported 2015 Solid Waste Tons	315,603
Fort Collins and Loveland 2015 Population	231,094
Tons per Person per Year	1.4
Pounds per Person per Day	7.5
Larimer County Wasteshed Population	329,559
<b>Larimer County Waste Generation</b>	<b>450,075</b>

### 3.2 Future Waste Handling in the Wasteshed

In order to project the amount of waste that will need to be handled by the Wasteshed in the future, subsequent to the closure of the Larimer County Landfill (around 2025), the following must be considered:

- The amount of waste currently handled in the Wasteshed (from Table 4);
- The degree to which that amount of waste will change over time, which is generally a function of future changes in population (Table 7); and
- The degree to which recovery (e.g., recycling, composting, or other means) of currently-landfilled waste may change over time (Table 8).

This section details each of these variables and provides projections of the future amounts of garbage, recyclables, organics and mixed C&D that may be handled by the Wasteshed.

#### Population and Waste Handling Growth

As shown in Table 6 and Figure 2, and based on population projection information published by the State of Colorado<sup>7</sup> and the City of Loveland (for Loveland’s population only, a 2.6% increase per year), the population of Larimer County is projected to increase 47% by 2040.

**TABLE 6**

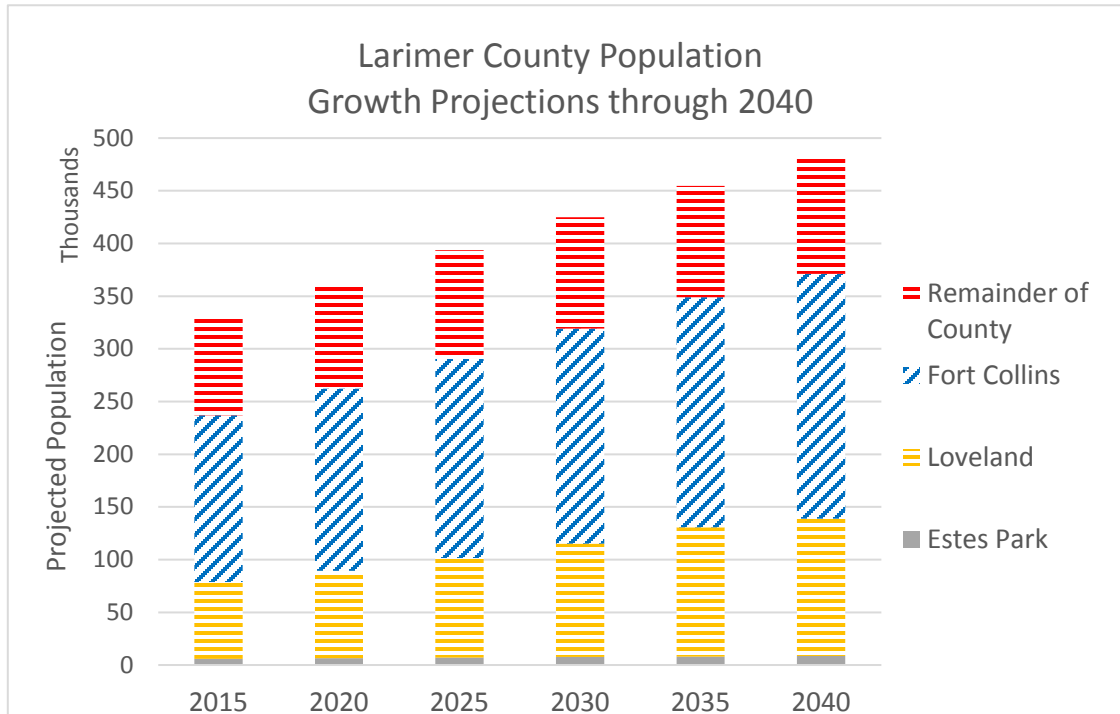
<b>Larimer County Population</b> Growth Projections through 2040						
<b>Community</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>
Estes Park	5,858	6,407	6,995	7,552	8,081	8,591
Loveland	72,794	82,924	94,463	107,608	122,581	130,328
Fort Collins	158,300	173,131	189,022	204,088	218,359	232,159
Remainder of County	92,607	97,973	103,038	105,634	105,573	112,245
<b>Total</b>	<b>329,559</b>	<b>360,434</b>	<b>393,517</b>	<b>424,882</b>	<b>454,593</b>	<b>483,322</b>
<b>Cumulative Percent Increase</b>	<b>NA</b>	<b>9%</b>	<b>19%</b>	<b>29%</b>	<b>38%</b>	<b>47%</b>

<sup>7</sup> [https://dola.colorado.gov/demog\\_webapps/dashboard.jsf?county=69](https://dola.colorado.gov/demog_webapps/dashboard.jsf?county=69)

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FIGURE 2



Applying the projected amount of growth (47%) to the 3-year average amount of waste handled in the Wasteshed (Table 4) yields over 800,000 tons of waste handled by the year 2040, as shown in Table 7.<sup>8</sup>

TABLE 7

Wasteshed Handling Projected Tons through 2040						
Waste Stream	3-Year Average	2020	2025	2030	2035	2040
Garbage	441,338	482,686	526,990	568,994	608,782	647,255
Recyclables	62,012	67,821	74,047	79,948	85,539	90,945
Organics	54,374	59,468	64,926	70,101	75,003	79,743
C&D (Mixed)	0	0	0	0	0	0
<b>Total</b>	<b>557,724</b>	<b>609,975</b>	<b>665,963</b>	<b>719,043</b>	<b>769,324</b>	<b>817,943</b>

It is important to note that the modelling used in Table 7 assumes that the Wasteshed will continue to landfill garbage and divert recyclables and organics in the same proportions that were averaged between 2013 and 2015, which may not be the case.

<sup>8</sup> It should be noted, however, that population is not a driver for predicting the amount of waste originating from Estes Park. The population figures do not reflect the visitation of tourists, only residents. In 2015 Rocky Mountain National Park had 4.1 million visitations, the third most visited park in the nation; waste disposed of by visitors is handled via the Wasteshed solid waste systems.

It is possible, as a result of continued diversion policy, programs and new initiatives undertaken by Coalition members, that waste currently sent to landfills may be diverted in greater amounts in the future. This potential is analyzed and discussed in the following section.

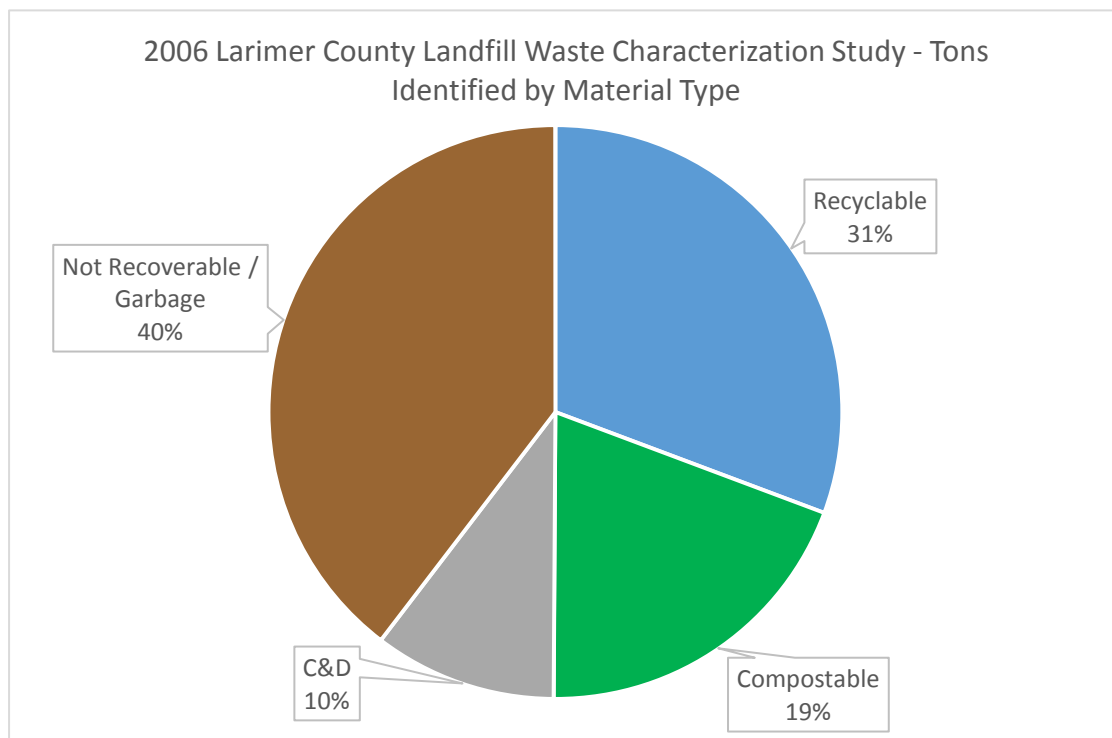
**Composition of Landfilled Waste**

In 2006, Larimer County commissioned a Waste Composition Study of incoming solid waste at the Larimer County Landfill. That study provided information about the types and quantities of garbage that the landfill receives, and found that of the garbage received by the landfill in 2006:

- 31% could have been recycled by existing recycling programs in the Wasteshed;
- Over 13% was food waste and another 5% was compostable paper, each of which could have been composted or otherwise diverted;
- Over 6% was yard waste, which could have been composted or diverted; and
- 10% was C&D materials (clean wood and block/brick/stone), which could have been recycled.

As such, over 50% of the garbage received at the landfill could have been conceivably diverted from landfills via existing recycling, organics and C&D programs. Figure 3, shows the overall results of the 2006 study. 60% of the materials that were received for disposal at the Larimer County Landfill were characterized as recoverable via recycling, composting, or C&D recovery, with the remaining 40% more suitable for landfilling given the existing recycling, composting and recovery infrastructure in the Wasteshed. This suggests that, even without new types of infrastructure, there is potential for future capture or additional recycling of materials that are currently landfilled and categorized as garbage.

**FIGURE 3**



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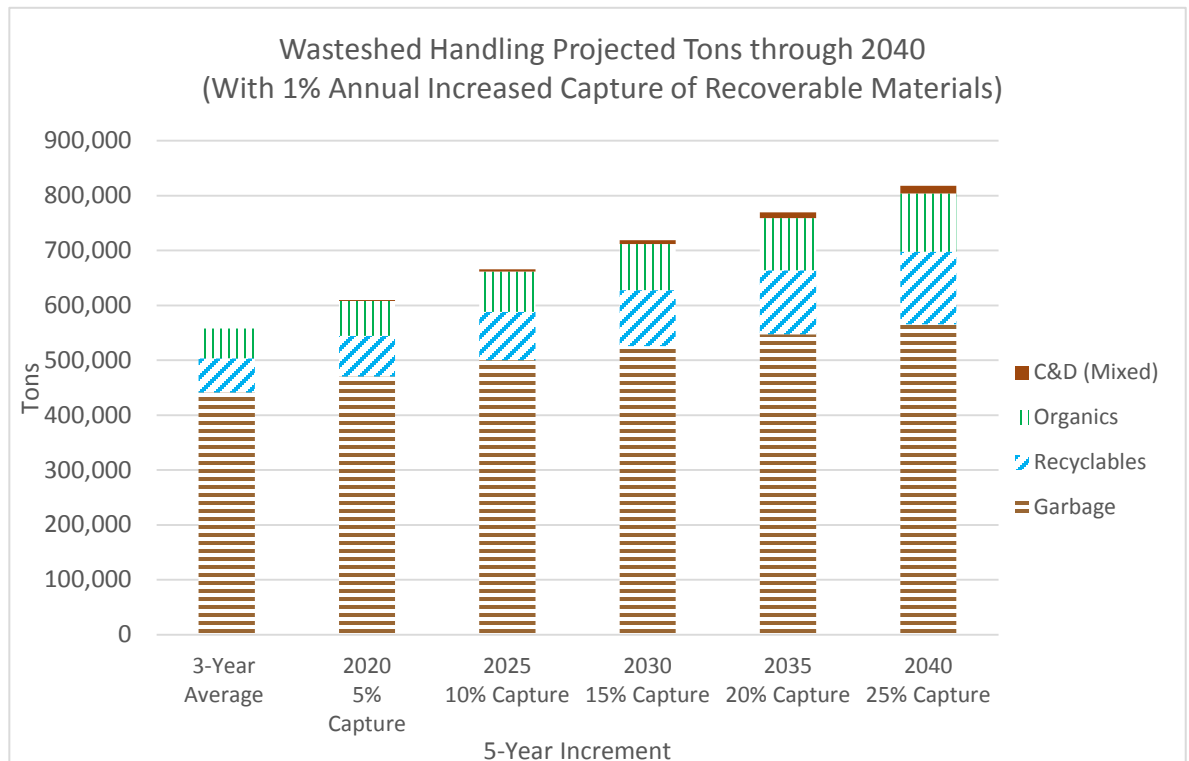
**Projected Waste Handling with Increased Landfill Diversion**

Table 8 and Figure 4 show how the amounts of waste, by waste stream, would change if policies, programs and new infrastructure were effective at incrementally capturing 5-25% of the 60% of recoverable materials (i.e., materials with the potential to be collected as recyclables, organics or C&D) that are currently disposed of as garbage at the Larimer County Landfill. Capturing additional divertible materials could decrease the amount of needed landfill capacity by over 80,000 tons in 2040 (a 13% reduction over the status quo scenario presented in Table 7). However, this would necessitate a corresponding increase in infrastructure for recyclables, organics and C&D diversion capacity (a 46% increase in capacity for those waste streams overall).

**TABLE 8**

Wasteshed Handling Projected Tons through 2040 (With 1% Annual Increased Capture of Recoverable Materials)						
Waste Stream	3-Year Average	2020 5% Capture	2025 10% Capture	2030 15% Capture	2035 20% Capture	2040 25% Capture
Garbage	441,338	470,489	500,358	525,860	547,249	565,479
Recyclables	62,012	74,021	87,583	101,872	116,815	132,510
Organics	54,374	63,385	73,480	83,955	94,767	106,009
C&D (Mixed)	0	2,080	4,542	7,355	10,493	13,945
<b>Total</b>	<b>557,724</b>	<b>609,975</b>	<b>665,963</b>	<b>719,043</b>	<b>769,324</b>	<b>817,943</b>

**FIGURE 4**



## 4 Opportunities Assessment

This section identifies the gaps between future waste generation and the ability of current infrastructure to handle and process that amount of waste, subsequent to the closure of the Larimer County Landfill.

### 4.1 Ability of Current Infrastructure to Meet Future Waste Handling Needs

Current infrastructure for garbage, recyclables, and organics is generally sufficient to meet the current waste handling needs in the Wasteshed. However, upon closure of the Larimer County Landfill around 2025, not only will the solid waste infrastructure need to handle the 20% increase in solid waste from population growth, but it will also need an alternative place to take the waste that would otherwise have been disposed of at the Larimer County Landfill (roughly 415,000 to 440,000 tons annually). This section describes whether and how each main element of the current infrastructure in the Wasteshed can meet waste handling needs in 2025 and beyond.

#### Transfer Stations

Current infrastructure for transferring solid waste from collection and self-haul vehicles is limited and, even assuming the County retains its transfer station after landfill closure, will not be sufficient to handle the Wasteshed's future waste streams.

All of the garbage transfer stations (Estes Park, Berthoud, Wellington and Red Feather Lakes) are small and set up to direct waste to the Larimer County Landfill, not away from it. Recycling transfer stations (including the above and the Fort Collins' Timberline Recycling Center and Loveland Recycling Center, and the larger transfer station at the Larimer County Recycling Station) could potentially handle slightly greater amounts of recyclables, but are not designed to handle much more volume or handle recyclables from private haulers (except for the Larimer County Recycling Station).

There are three organics transfer stations operating in the Wasteshed: Loveland's drop off facility, which is operating near maximum capacity, Weitzel's and Hageman's Earth Cycle, none of which have potential for significant expansion. There is currently no transfer station capacity for C&D materials in the Wasteshed, and there is no known transfer capacity for any of these streams within a reasonable distance outside of the Wasteshed.

#### Processing Infrastructure

While regional landfill infrastructure (one active landfill in Larimer County and four in neighboring counties) could be sufficient to handle future amounts of garbage generation in the Wasteshed, current recyclables and organics processing infrastructure is limited and there is no infrastructure for processing of mixed C&D materials.

Of the three primary recycling processing facilities in or near the Wasteshed, Waste-Not-Recycling has some additional capacity to process additional recyclables. There is also some additional processing capacity being added to the County Recycling Station that would allow on-site separation and marketing of cardboard and other fiber materials, but this does not add

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to that facility’s capacity for accepting a greater amount of recyclables. Overall, none of the recycling facilities are currently set up or designed to accept significant increases in the amount of recyclables they could accept.

Organics processing in the region is similarly limited with few recognized organics processing facilities operating in the Wasteshed. The City of Fort Collins’ Drake Water Reclamation Facility has the ability to accept source-separated food scraps, and could potentially increase the amount of food scraps accepted in the future, for anaerobic digestion. There are a few local dairies and farms that currently are permitted by the State to compost, and some that take green waste from solid waste collectors. However, none of these are known to have significant opportunities for expansion or increased acceptance of organics. Organics processing facilities operating in nearby Weld County could accept significantly more material, most notably A-1 Organics in Eaton and the Heartland bio-digester facility, southeast of Greeley.

## 4.2 Opportunities for Additional Infrastructure

By 2040, unless all solid waste collectors direct-haul their solid waste to other regional landfills, there will likely be a significant need for more facilities to handle solid waste in the Wasteshed. Overall, by 2040, even if 25% more garbage were shipped to other area landfills, there will likely be an opportunity to provide for handling of approximately 475,000 tons per year of garbage. Similarly, assuming that current transfer and processing infrastructure for recyclables and organics could enhance handling and processing capacity by 25%, there will likely be a need for additional recyclables and organics transfer and processing capacity in 2040.

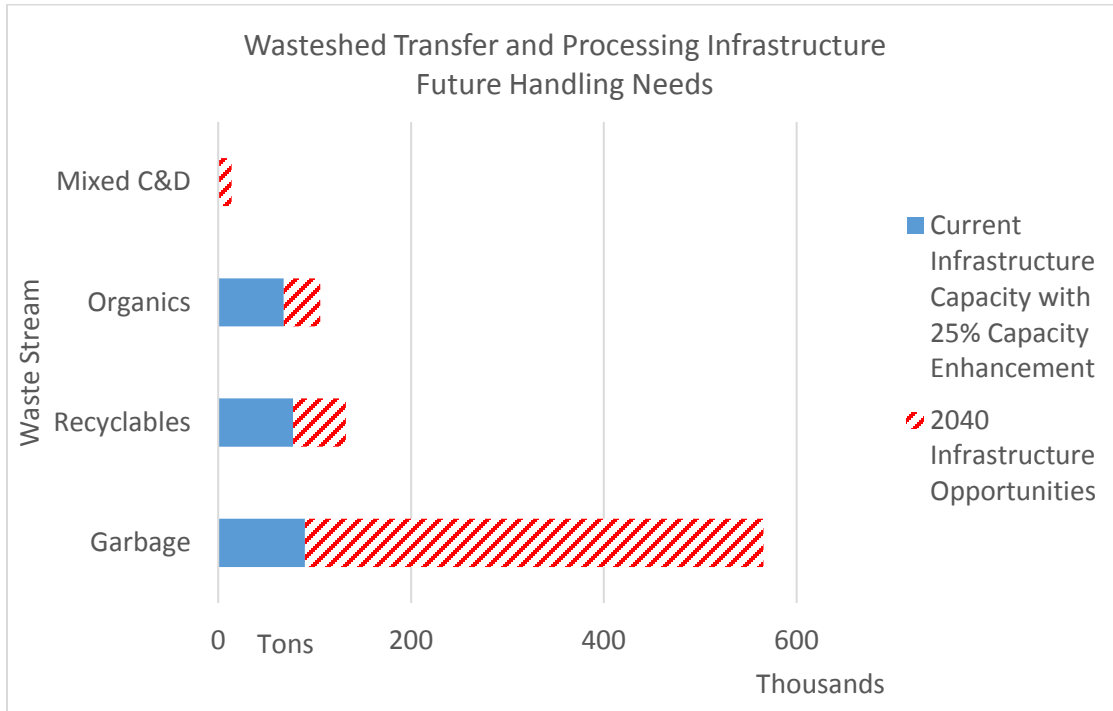
In all, there is an opportunity in the Wasteshed for additional transfer and other solid waste infrastructure to handle approximately 582,000 tons per year across all waste streams in 2040, even if current infrastructure increases its handling capacity as noted above. This is summarized in Table 9, below, which shows the estimated difference between the Wasteshed’s 2040 handling needs and the ability of current infrastructure (with 25% enhancements) to meet those needs.

**TABLE 9**

<b>Wasteshed Transfer and Processing Infrastructure</b> Estimated Annual Capacity (Tons)				
<b>Waste Stream</b>	<b>Current Infrastructure (Excluding Larimer County Landfill)</b>	<b>Current Infrastructure Capacity with 25% Capacity Enhancement</b>	<b>2040 Future Handling Needs</b>	<b>2040 Infrastructure Opportunities</b>
Garbage	72,065	90,081	565,479	475,397
Recyclables	62,012	77,515	132,510	54,995
Organics	54,374	67,967	106,009	38,042
Mixed C&D	0	0	13,945	13,945
<b>Total</b>	<b>188,451</b>	<b>235,563</b>	<b>817,943</b>	<b>582,380</b>

Figure 5 further illustrates the gap between the ability of current solid waste infrastructure (with 25% enhancement in capacity) to meet the Wasteshed’s 2040 solid waste handling needs.<sup>9</sup> The red (diagonal pattern) portions of each bar represent the overall level of opportunity to provide additional local transfer, processing and disposal infrastructure within the Wasteshed.

**FIGURE 5**



<sup>9</sup> These calculations are based on the assumption that not all solid waste collectors will direct-haul garbage to other area landfills and that recovery rates of recyclable, organic and C&D materials will increase by approximately 1% per year, achieving up to 25% recovery of currently landfilled (but recoverable) materials by 2040.

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Opportunities  
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## 5 Feasible Options

This section identifies and describes the feasible options that the Coalition might consider for future handling of solid waste in its planning for the closure of the Larimer County Landfill.

### 5.1 Overview

The North Front Range Regional Wasteshed Coalition has a variety of disposal and diversion-based solid waste management options when the Larimer County Landfill closes. Provided in this section are alternatives for disposal, transfer and processing facility infrastructure elements that could be feasibly implemented within the Wasteshed. In defining these alternatives, R3 assessed the following considerations:

- Estimated costs for implementing strategies that involve the development of infrastructure, including initial capital, operating expenses, and potential changes in monthly solid waste rates paid by residents;
- Policy foundations needed to implement each;
- Benefits and drawbacks that the Coalition may expect to encounter as a result of pursuing each alternative;
- Changes in greenhouse gas emissions resulting from solid waste transportation and diversion of solid waste materials; and
- Other considerations.

#### Options Can Be Iterative

The options described below are able to be combined to varying degrees; some can be implemented as standalone activities (most notably the Central Transfer Station and New Landfill alternatives) or in combination with others. It should be noted that most of these undertakings would benefit from implementation of a Central Transfer Station. If the Coalition chooses to pursue a Central Transfer Station, other options could be considered, funded, and implemented iteratively as determined to be feasible. Construction of a Central Transfer Station in the near term could lengthen the remaining life of the Larimer County landfill, and could provide contingency capacity as needed (e.g., in the event of additional debris from flooding, or delays in developing other infrastructure).

#### Cost Estimate Disclaimer

Cost estimates provided in this section are not quotes but rather are estimates based on the professional experience of R3 and sub-consultant Sloan/Vazquez/McAfee. Actual costs will vary depending on facility scale, scope, design, and timing of construction. Operating costs stated below are inclusive of annual amortization of financing amounts for initial capital investments as well as annual operating costs (but not depreciation/replacement costs of new facilities). Projections of monthly cost per household are range estimates based on the assumption that households will bear the cost of 25-50% of the new infrastructure (in proportion to their total share of the waste stream compared to business and industry) with those costs being distributed evenly among 136,000 households.

## 5.2 Status Quo (No Action Taken Upon Closure of County Landfill)

### Description

In this scenario, no decisions are made to change the current trajectory of the solid waste landscape in the Wasteshed, the Larimer County Landfill closes, as projected, and no additional County facilities, including a new landfill, are built. In this case, the Wasteshed's garbage would most likely be directed by solid waste collectors and self-haulers to one of the nearest alternative landfills (North Weld Landfill, Denver Regional Landfill, Front Range Landfill, Buffalo Ridge Landfill, or Tower Road Landfill). Altogether these landfills have adequate available capacity to accept garbage generated in the Wasteshed.

### Estimated Costs

For the status quo, there would be no cost of constructing or operating additional infrastructure in the Wasteshed. However, there would be increased costs of transportation for some or all solid waste collectors operating in the Wasteshed, as well as potential increased costs of disposal at other area landfills. These values have not been estimated by this Study, as current solid waste collector costs are not known, and it is not possible to predict the future cost of landfilling after the Larimer County Landfill closes. As such, it is important to recognize that, because the cost of collection and landfilling are likely to increase under this scenario, monthly customer rates will almost certainly increase. As the Coalition further considers future Wasteshed infrastructure needs, it may wish to consider a cost study to specifically evaluate these potential increases as a baseline against which the cost of new infrastructure can be measured and explained to the community.

### Benefits

In the event that no action is taken and the Larimer County Landfill closes, land already purchased by Larimer County could become available for other uses.

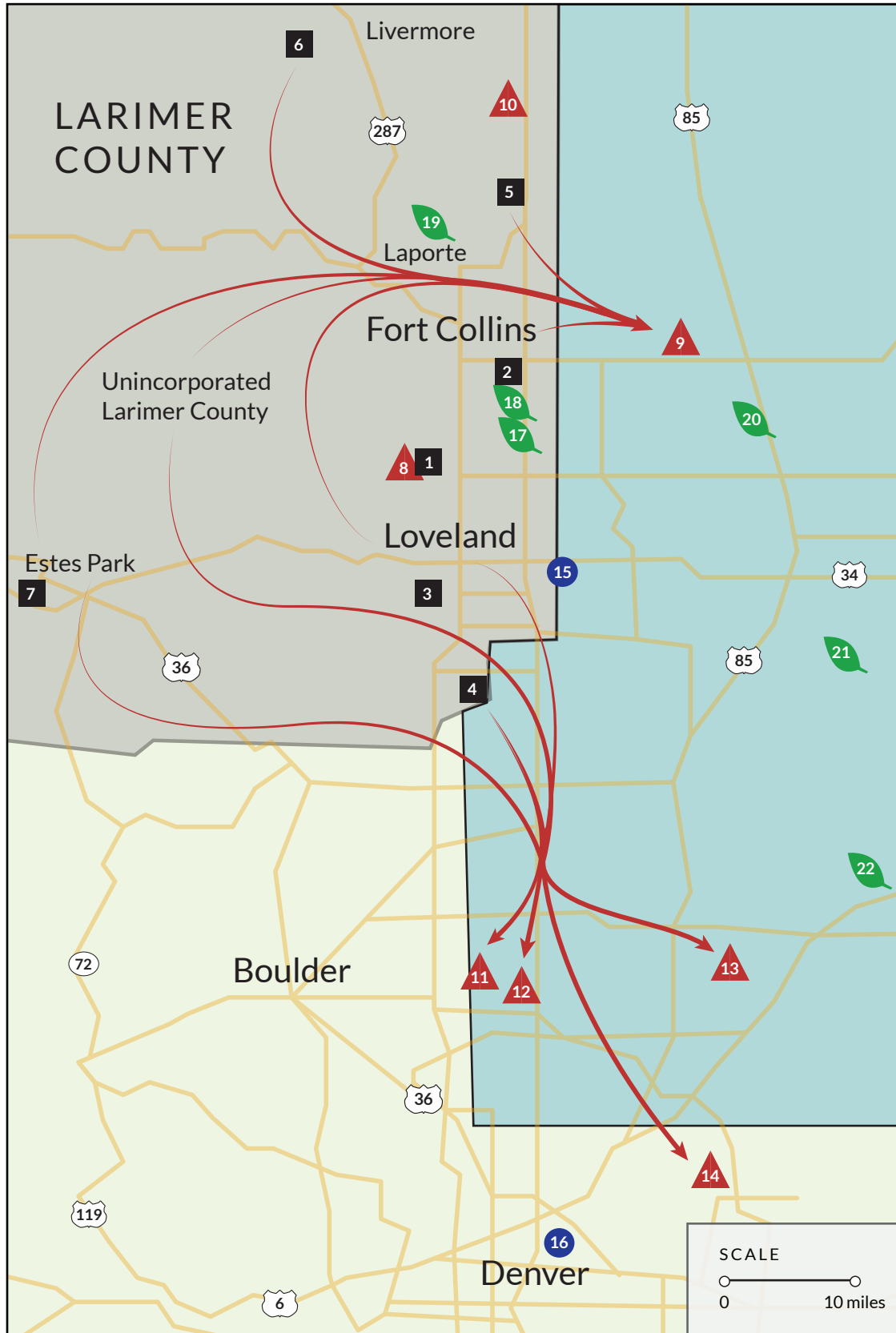
### Drawbacks

Choosing to do nothing, including not building a new landfill, may lead to increasing the cost of disposal fees at other landfills, due to lack of competition from the current low-cost Larimer County Landfill. In the event of natural disasters (such as the flood in 2013 which generated a large volume of contaminated organic waste), the Coalition may be faced with expensive disposal fees if the only choices for disposal are private landfills. Due to the increased travel distance for transporting more solid waste to North Weld Landfill, an *additional* 6,000 metric tons of carbon dioxide equivalent (CO<sub>2</sub>E) would be emitted into the atmosphere, the equivalent of an additional 1.2 million cars on the road per year.<sup>10</sup> Additionally, landfill gases are not captured by the North Weld Landfill, which would increase greenhouse gas (methane) emissions from waste landfilled at that location, although this impact was not quantified for this Study.

<sup>10</sup> CO<sub>2</sub>E impacts developed in keeping with the Environmental Protection Agency (EPA) Waste Reduction Model (WARM). Equivalent impacts of CO<sub>2</sub>E based on 211 cars per year per metric ton of CO<sub>2</sub>E (MTCO<sub>2</sub>E), and are rounded to the nearest thousand.

# NORTH FRONT RANGE WASTESHED FACILITY MAP

Status Quo - No Action Taken Upon Closure of County Landfill



## MAP KEY

- Garbage
- TRANSFER STATIONS
  - 1) Larimer County Recycling Center
  - 2) Fort Collins Timberline Recycling Center
  - 3) Loveland Recycling Center / Green Waste Drop-off
  - 4) Berthoud Transfer Station
  - 5) Wellington Transfer Station
  - 6) Red Feather Transfer Station
  - 7) Estes Park Transfer Station
- ▲ LANDFILLS
  - 8) Larimer County Landfill
  - 9) North Weld Landfill
  - 10) Larimer County North Landfill (undeveloped)
  - 11) Front Range Landfill
  - 12) Denver Regional Landfill
  - 13) Buffalo Ridge Landfill
  - 14) Tower Road Landfill
- RECYCLING PROCESSING FACILITIES
  - 15) Waste-Not Recycling
  - 16) Franklin Street MRF
- ORGANICS PROCESSING FACILITIES
  - 17) Drake Water Reclamation Facility
  - 18) Hageman's Earth Cycle Inc.
  - 19) Local Dairies
  - 20) A-1 Organics (Eaton)
  - 21) Heartland Biogas Facility
  - 22) A-1 Organics (Rattler Ridge)

## 5.3 Central Transfer Station

### Description

The Coalition may consider building a regional transfer station, adjacent to the existing Larimer County landfill, for the purpose of accepting garbage, recyclables, organics and C&D material. Although there are small-scale drop-off facilities in Estes Park, Loveland, Fort Collins, and at Waste-Not Recycling, the Wasteshed currently lacks large-scale regional transfer capacity for garbage, organics and C&D material, and has only one medium-scale transfer station for single-stream recyclables, located at the current Larimer County Landfill site.

One possible design for a transfer station would be to provide a one-stop location for all four commodity types, with distinct staging areas for unloading and briefly storing separated material. The material would then be loaded into long-haul vehicles and delivered to a processing facility for recovery, or to a disposal facility. This alternative could direct waste materials to other landfills, recycling and organics facilities in and outside of the Wasteshed. It could be built before the closure of the Larimer County Landfill, which would provide additional options for collecting waste and help extend the life of the current Larimer County Landfill. A map on page 30 illustrates the potential flow of waste that could result from constructing a Central Transfer Station.

### Estimated Costs

A new transfer station located adjacent to the current Larimer County Landfill site, if designed to transfer the approximately 720,000 tons per year<sup>11</sup> that are estimated for 2040, would have an initial capital cost of nearly \$20,000,000 and an annual operating cost (which for all estimates in this section includes amortization of capital costs) of over \$15,000,000. Please note that the 720,000 tons per year figure is in keeping with the projected 2040 tons values listed in Tables 7 and 8 on pages 18 and 20, but assumes that approximately 100,000 tons of garbage generated within the Wasteshed would be directed to other area landfills (in keeping with current trends. The same is true of the other facility capacity projections in this Study.

Per ton fees to cover the costs of the facility are estimated to be \$22 per ton, which would be in addition to fees charged at receiving landfills, or recycling, composting and/or C&D facilities. The estimated monthly cost per household in Larimer County (not including additional fees for landfilling and diversion processing) would be approximately \$2-\$5 per month. This amount would need to be added to the landfill or processing amounts for the total impact to households.

### Benefits

- A central transfer station would allow convenient delivery and drop-off of material by self-haul customers as well as commercial collection vehicles;
- Could facilitate increased diversion by providing more choices for garbage, recyclables, organics and C&D;

<sup>11</sup> Tonnage capacity or “throughput” estimates for all facilities are based on future waste handling needs and assume modest increases in the amounts of materials diverted from landfills. All throughput estimates used are rounded to the nearest ten thousand. Throughput estimates for all options listed in this section are included in Table 10.

- Would allow usage by more types of waste hauler vehicles (i.e., “split” vehicles for collection of more than one type of commodity in each truck);
- Would potentially provide for more consistent collection routes for waste haulers, as they could choose to send all trucks to one centralized facility;
- Long-haul vehicles are able to be loaded to maximum capacity, which reduces vehicle miles traveled fuel costs, and greenhouse gas (GHG) emissions; and
- Would *reduce* CO2E emissions by an estimated 48,000 metric tons per year, which is the equivalent of taking 10 million cars off the road each year.

### Drawbacks

- Directing four types of solid waste to one location requires additional vehicles for both inbound and outbound tonnage, which could create heavy vehicle traffic and require upgrades to roads, throughways and intersections; and
- Transferring heavy, bulky C&D material damages waste hauling trucks, significantly shortening their useful life and increasing maintenance costs in comparison to hauling non-C&D materials.

### Other Considerations

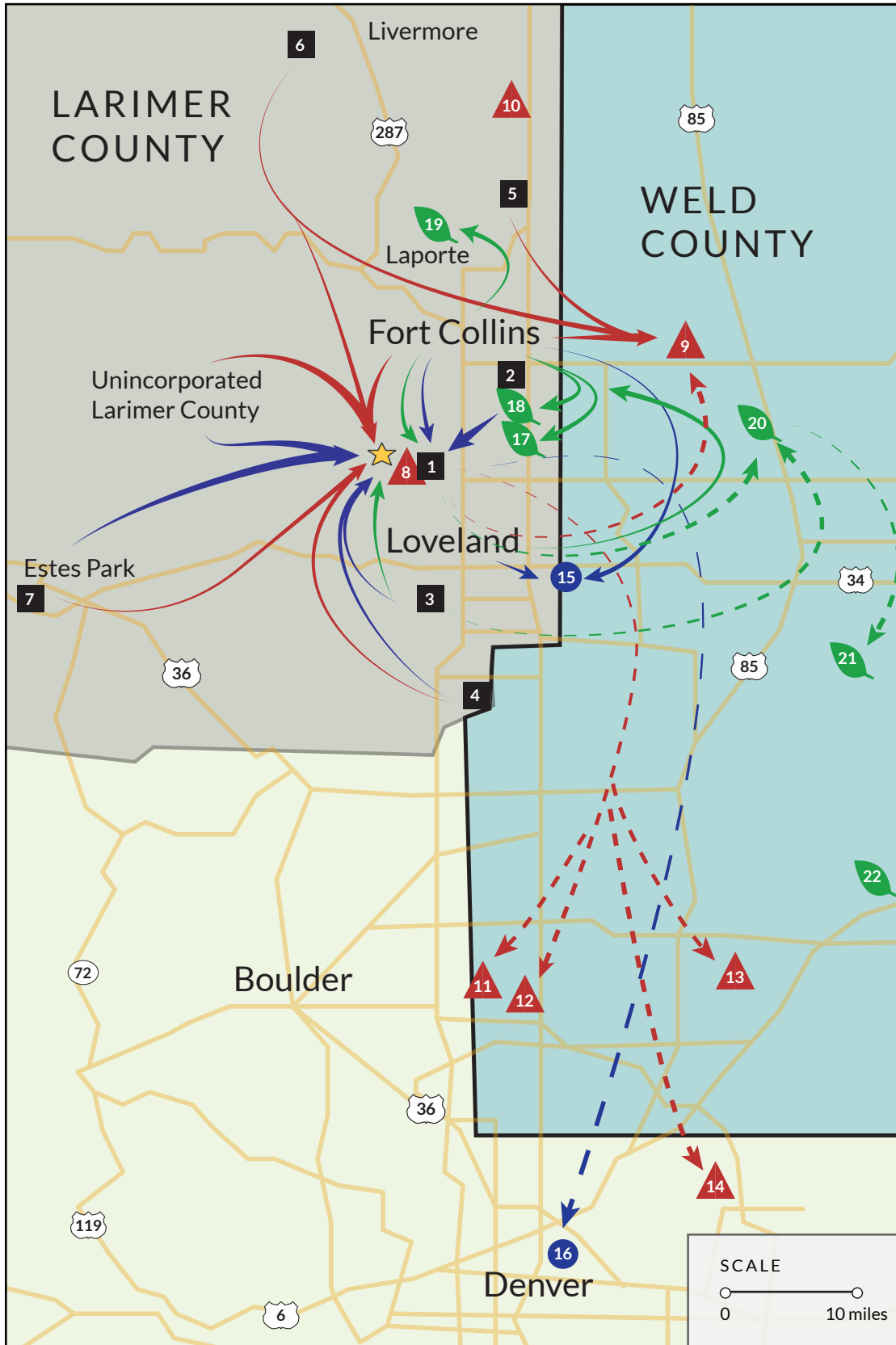
The current County landfill location is desirable for a transfer station due to its centralized location between Fort Collins, Loveland, Estes Park and unincorporated Larimer County. The Larimer County Landfill site is already home to the Recycling Station. The site may require infrastructure improvements to accommodate increases in traffic from self-haul customers and commercial waste trucks transporting additional materials. The current landfill is a convenient location: waste haulers and self-haul customers already deliver material there, which reduces the chance of losing customers due to relocation. Any transfer station would need to contain a large covered and paved space for separated materials.

*The photo below depicts a “pit” style transfer station where waste is unloaded by self-haulers and waste hauler trucks, emptied into various pits and then delivered by long-haul trucks to final processing facilities.*



# NORTH FRONT RANGE WASTESHED FACILITY MAP

## Central Transfer Station



### MAP KEY

- Garbage
  - Recyclables
  - Organics
  - Long-Haul Truck
  - ★ New Potential Central Transfer Station
- TRANSFER STATIONS**
- 1) Larimer County Recycling Center
  - 2) Fort Collins Timberline Recycling Center
  - 3) Loveland Recycling Center / Green Waste Drop-off
  - 4) Berthoud Transfer Station
  - 5) Wellington Transfer Station
  - 6) Red Feather Transfer Station
  - 7) Estes Park Transfer Station
- ▲ LANDFILLS**
- 8) Larimer County Landfill
  - 9) North Weld Landfill
  - 10) Larimer County North Landfill (undeveloped)
  - 11) Front Range Landfill
  - 12) Denver Regional Landfill
  - 13) Buffalo Ridge Landfill
  - 14) Tower Road Landfill
- RECYCLING PROCESSING FACILITIES**
- 15) Waste-Not Recycling
  - 16) Franklin Street MRF
- ORGANICS PROCESSING FACILITIES**
- 17) Drake Water Reclamation Facility
  - 18) Hageman's Earth Cycle Inc.
  - 19) Local Dairies
  - 20) A-1 Organics (Eaton)
  - 21) Heartland Biogas Facility
  - 22) A-1 Organics (Rattler Ridge)

## 5.4 New County Landfill

### Description

This option involves the County, potentially with other Coalition members, building a regional landfill on County-owned land north of Fort Collins that was specifically purchased by Larimer County in 2006 to accommodate the future disposal needs of the Wasteshed. A new regional County landfill would have the potential to service Fort Collins, Estes Park, Loveland, unincorporated Larimer County and other jurisdictions in Colorado and Wyoming. It could also potentially facilitate additional functions such as a transfer station or material recovery facility (MRF). A map of the possible flow of waste to this new landfill location is included on page 33.

### Estimated Costs

A new landfill at the northern location already owned by the County, designed to accept the 460,000 to 540,000 tons of solid per year estimated for in-County disposal for 2040, would have an initial capital cost of \$15,000,000 and an annual operating cost of over \$10,000,000. Per ton disposal fees to cover the costs of the facility are estimated to be \$20 per ton at the facility (not including costs to transfer or transport garbage to the landfill). The estimated monthly cost per household in Larimer County would be approximately \$2-\$3 per month.

### Benefits

- Would provide waste haulers and customers with more choices for garbage disposal, thus maintaining landfill competition and potentially helping to keep disposal fees low;
- A County-owned landfill would allow for adequate solid waste tracking and monitoring, and ensure that the waste disposal is well-managed in a way that considers the best interests of the community;
- Could provide continued financial benefits to the County, especially in the event of a natural disaster that causes a large volume of material to be disposed;
- Would keep revenue generated from disposal fees in-county; and
- Could be designed to include additional diversion elements, such as a composting facility.

### Drawbacks

- There is no guarantee that material will be directed to a new County Landfill by waste haulers, especially considering that the location of County-owned property near the Town of Wellington is equidistant to the Front Range Landfill from Loveland and Estes Park, and farther than the North Weld Landfill from these communities.
- A new landfill alone (without additional diversion elements) does not facilitate increases in the diversion of recoverable materials; and
- Due to the longer distances from some communities in the Wasteshed, could *increase* CO2E emissions by 1,000 metric tons per year, which is the equivalent of an additional 210,000 cars on the road each year.

Section 5

Feasible  
Options

**Other Considerations**

In 2006 Larimer County purchased a 640-acre section at the intersection of County Roads 76 East and 11 North. This potential site for a new landfill near the Town of Wellington and north of Fort Collins has relatively few neighbors in the surrounding area. The low water table at this site would meet state and federal regulations. Access to county roads is reasonably good. Other locations could be considered, but finding a location that meets these requirements and is not yet developed or privately purchased may be difficult.

A new County landfill could expand the lifespan of the current Larimer County Landfill if built and operating prior to its closure. However, due to the planning horizon needed to design and build a new landfill (five to ten years), and the uncertainty around design, planning and permitting processes, it is possible that a new landfill might not be operational before the current landfill closes.

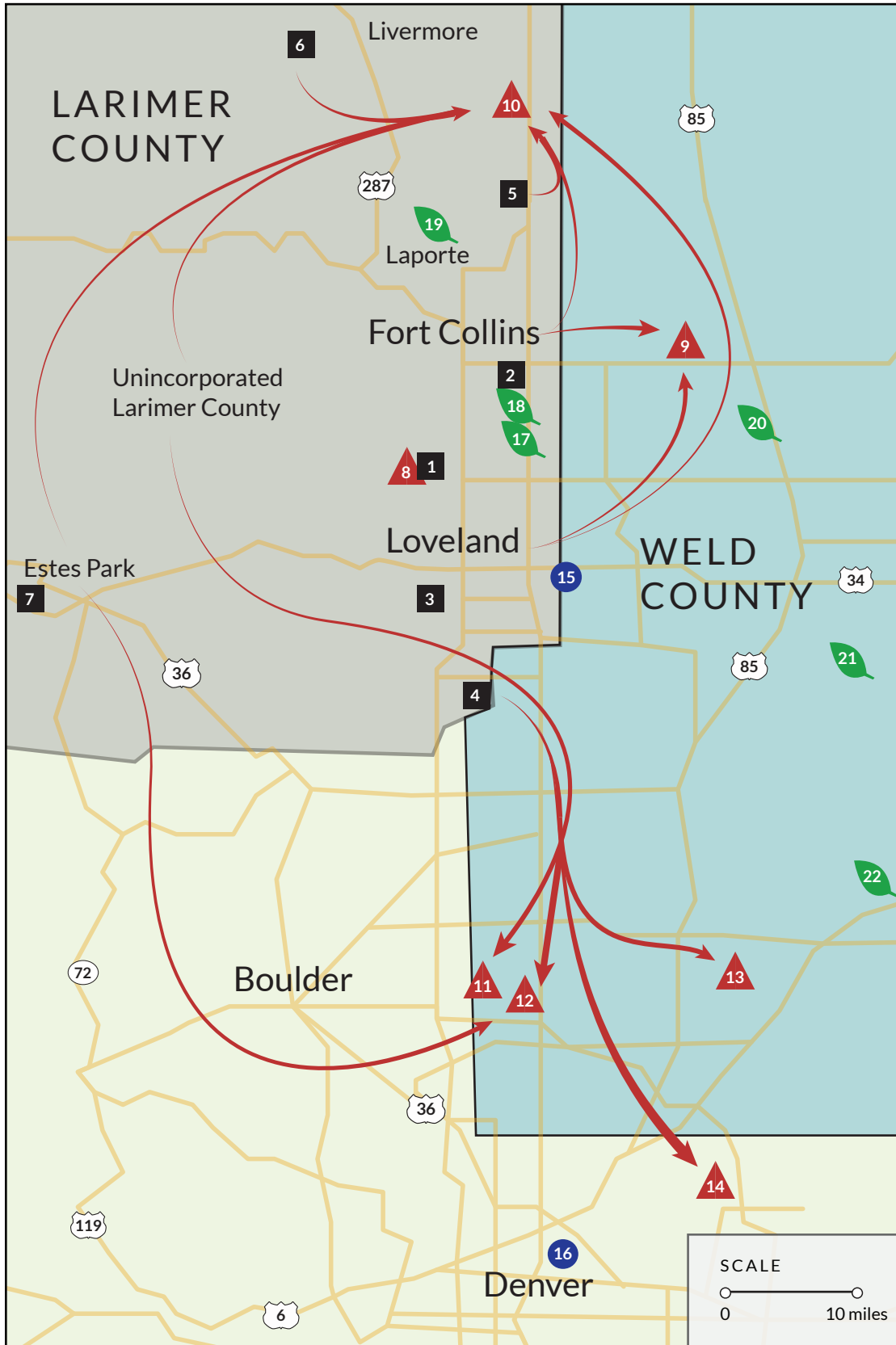
*The photo below depicts the actual property owned by the County as the potential site for a new County landfill. The site is bisected by high-tension power lines, is bordered by roads on all sides, and has relatively few neighbors.*





# NORTH FRONT RANGE WASTESHED FACILITY MAP

## New County Landfill



### MAP KEY

— Garbage

#### TRANSFER STATIONS

- 1) Larimer County Recycling Center
- 2) Fort Collins Timberline Recycling Center
- 3) Loveland Recycling Center / Green Waste Drop-off
- 4) Berthoud Transfer Station
- 5) Wellington Transfer Station
- 6) Red Feather Transfer Station
- 7) Estes Park Transfer Station

#### LANDFILLS

- 8) Larimer County Landfill
- 9) North Weld Landfill
- 10) Larimer County North Landfill (undeveloped)
- 11) Front Range Landfill
- 12) Denver Regional Landfill
- 13) Buffalo Ridge Landfill
- 14) Tower Road Landfill

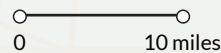
#### RECYCLING PROCESSING FACILITIES

- 15) Waste-Not Recycling
- 16) Franklin Street MRF

#### ORGANICS PROCESSING FACILITIES

- 17) Drake Water Reclamation Facility
- 18) Hageman's Earth Cycle Inc.
- 19) Local Dairies
- 20) A-1 Organics (Eaton)
- 21) Heartland Biogas Facility
- 22) A-1 Organics (Rattler Ridge)

#### SCALE



## Section 5

Feasible  
Options

## 5.5 Materials Recovery Facility (MRF)

### Description

This option involves building and operating a new regional materials recovery facility, which may be built in conjunction with other alternatives. The purpose of this facility would be to process recyclable material from the Wasteshed as the final contact point before sending it out to end markets. A materials recovery facility could be designed to accommodate mixed loads of recyclables (e.g., “single-stream” from curbside collection routes) or to process combined loads of mixed solid waste, inclusive of garbage, recyclables and organics. A map of the possible flow of waste to a MRF is included on page 36.

#### Single-Stream Processing Facility (“Clean” MRF)

A “clean” MRF could be built to almost any size specification for accepting and processing commingled or source-separated recyclables from curbside collection programs, drop-off sites or transfer stations. A small MRF has the ability to process 50 tons of recyclables per day whereas larger facilities process between 200 and 300 tons of recyclable material per day. A clean MRF can recover up to 90 percent of recyclable material.

The Recycling Station at the current landfill site was originally built as a MRF but was transitioned into primarily serving as a transfer station by WM. It was transitioned to a transfer station in 2003 in order to facilitate handling and processing of single-stream recyclables.

#### Mixed-Waste Processing Facility (“Dirty” MRF)

A “dirty” MRF has the potential to process between 200 tons of mixed solid waste per day for smaller facilities, up to 700 tons of material per day for larger facilities. Average recovery rates for a dirty MRF are between 5% and 45% of incoming material, meaning that 55%-95% of material does not get diverted.

### Estimated Costs

A clean MRF designed to process the 91,000 to 132,000 tons of “conventional” recyclables per year that are estimated for 2040 would have an initial capital cost of nearly \$30,000,000 and an annual operating cost of over \$10,000,000. Per ton disposal or processing fees to cover the costs of the facility, including the processing costs, are estimated to be \$95 per ton. The estimated monthly cost per household in Larimer County would be approximately \$2-\$3 per month.

A dirty MRF designed to process the nearly 700,000 tons of mixed solid waste per year that are estimated for 2040, would have an initial capital cost of nearly \$85,000,000 and an annual operating cost of over \$60,000,000. Per ton disposal or processing fees to cover the costs of the facility are estimated to be \$87 per ton, which also includes all processing costs. The estimated monthly cost per household in Larimer County would be approximately \$9-\$19 per month.

### Benefits

- Would provide an increase in recyclable material recovery infrastructure, which would increase diversion;

- Would keep revenues/costs in-county by capturing the recyclable material commodities, rather than delivering them for private MRF processing;
- May be able to tailor sorting and acceptable materials to benefit local end markets (i.e., support a local circular economy with recovered materials remanufactured locally); and
- Estimated to *reduce* CO2E emissions up to 48,000 metric tons per year, which is the equivalent of taking approximately 10 million cars off the road each year.

### Drawbacks

- Lack of transportation infrastructure would make delivering recyclable material to end markets difficult (i.e., there is no rail for delivering by train, one-lane roads could cause slow delivery, Wasteshed not located near a port, etc.);
- Processing recyclable material is generally a more expensive operation than landfilling, especially for a dirty MRF; and
- Fluctuating commodity prices/demand would make it difficult to predict return-on-investment and brings a larger element of risk.

### Other Considerations

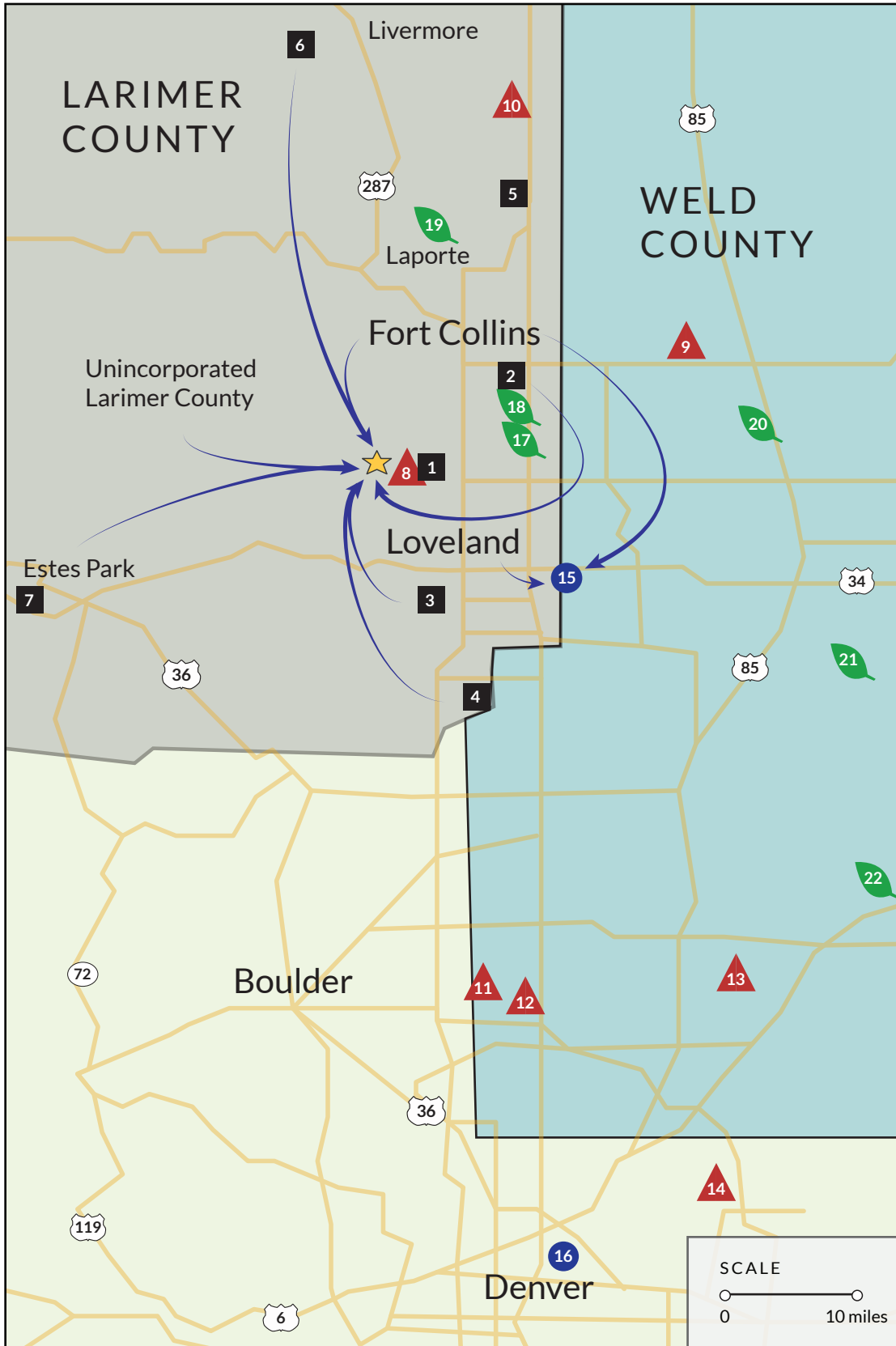
The County's current landfill is a viable site for a MRF due to its central location and some existing equipment for "baling" recyclables. If the Coalition was to consider this location, infrastructure improvements would be necessary, such as road expansions, adding new intersection traffic control lights, and possibly building a rail line for shipping final material to end markets.

*Below is a photo of a typical "clean" MRF sorting line, where recyclable material is sorted out by type and then baled or consolidated for shipping to market.*



# NORTH FRONT RANGE WASTESHED FACILITY MAP

## Materials Recovery Facility



### MAP KEY

- Recyclables
- ★ New Potential County MRF
- TRANSFER STATIONS
  - 1) Larimer County Recycling Center
  - 2) Fort Collins Timberline Recycling Center
  - 3) Loveland Recycling Center / Green Waste Drop-off
  - 4) Berthoud Transfer Station
  - 5) Wellington Transfer Station
  - 6) Red Feather Transfer Station
  - 7) Estes Park Transfer Station
- ▲ LANDFILLS
  - 8) Larimer County Landfill
  - 9) North Weld Landfill
  - 10) Larimer County North Landfill (undeveloped)
  - 11) Front Range Landfill
  - 12) Denver Regional Landfill
  - 13) Buffalo Ridge Landfill
  - 14) Tower Road Landfill
- RECYCLING PROCESSING FACILITIES
  - 15) Waste-Not Recycling
  - 16) Franklin Street MRF
- ORGANICS PROCESSING FACILITIES
  - 17) Drake Water Reclamation Facility
  - 18) Hageman's Earth Cycle Inc.
  - 19) Local Dairies
  - 20) A-1 Organics (Eaton)
  - 21) Heartland Biogas Facility
  - 22) A-1 Organics (Rattler Ridge)

## 5.6 Organics Composting Facility

### Description

Although the Wasteshed currently has a variety of organics processing facilities, a new, centralized organics composting facility is an alternative for the regional Coalition to consider. A compost facility may be used in conjunction with a waste-to-energy site, such as the recently-opened Heartland facility, in central Weld County. This new anaerobic digestion (AD) system processes food waste into pipeline-ready biogas, which is purchased by a Sacramento, CA utility company, on a 20-year contract. Other options include an “aerated static pile” compost facility, which takes between three and six months for material to break down into compost. “Aerated windrow” composting is another method used to process high volumes of mixed organics material. A map of the possible flow of waste to this new composting facility location is included on page 39.

### Estimated Costs

A new compost processing facility designed to compost the 80,000 to 106,000 tons of organic material per year that are estimated for 2040 would have an initial capital cost of \$4,000,000 and an annual operating cost of nearly \$5,000,000. Per ton disposal or processing fees to cover the costs of the facility are estimated to be \$52 per ton. The estimated monthly cost per household in Larimer County would be approximately \$1 per month.

### Benefits

- Would increase waste diversion from landfills by providing a processing facility to handle large volumes of organics;
- Would establish the infrastructure necessary for possible future diversion policy, such as requiring curbside or commercial organics to be collected separately;
- Could allow revenue to be kept in-county by recovering, processing and delivering organics to end markets as compost products;
- Would provide an end-market product beneficial to the region’s farmers, gardeners and landscapers as soil enhancement, as well as for road projects and natural area restoration;
- Could accept digestate from waste-water treatment plants;
- Would provide a closer, more convenient location for local waste haulers to deliver organics, including the City of Loveland;
- Could motivate other Larimer County communities and haulers to start organics collection/drop-off programs; and
- Estimated to *reduce* CO2E emissions by 4,000 metric tons per year, which is the equivalent of taking nearly 850,000 cars off the road each year.<sup>12</sup>

<sup>12</sup> It should be noted that the EPA WARM model may under-represent the amount of CO2E emission reductions that could be realized from diverting and composting organic materials. Future updates to the EPA WARM model are expected to yield different results that may indicate a greater emissions reduction than stated here.

## Section 5

Feasible  
Options**Drawbacks**

- There is adequate organics processing capacity currently, thus making an organics processing facility not entirely necessary to meet current supply levels; and
- Would be in direct competition with regional compost processing facilities such as A-1 Organics and organics transfer operations such as Hageman's Earth Cycle and Weitzel's.

**Other Considerations**

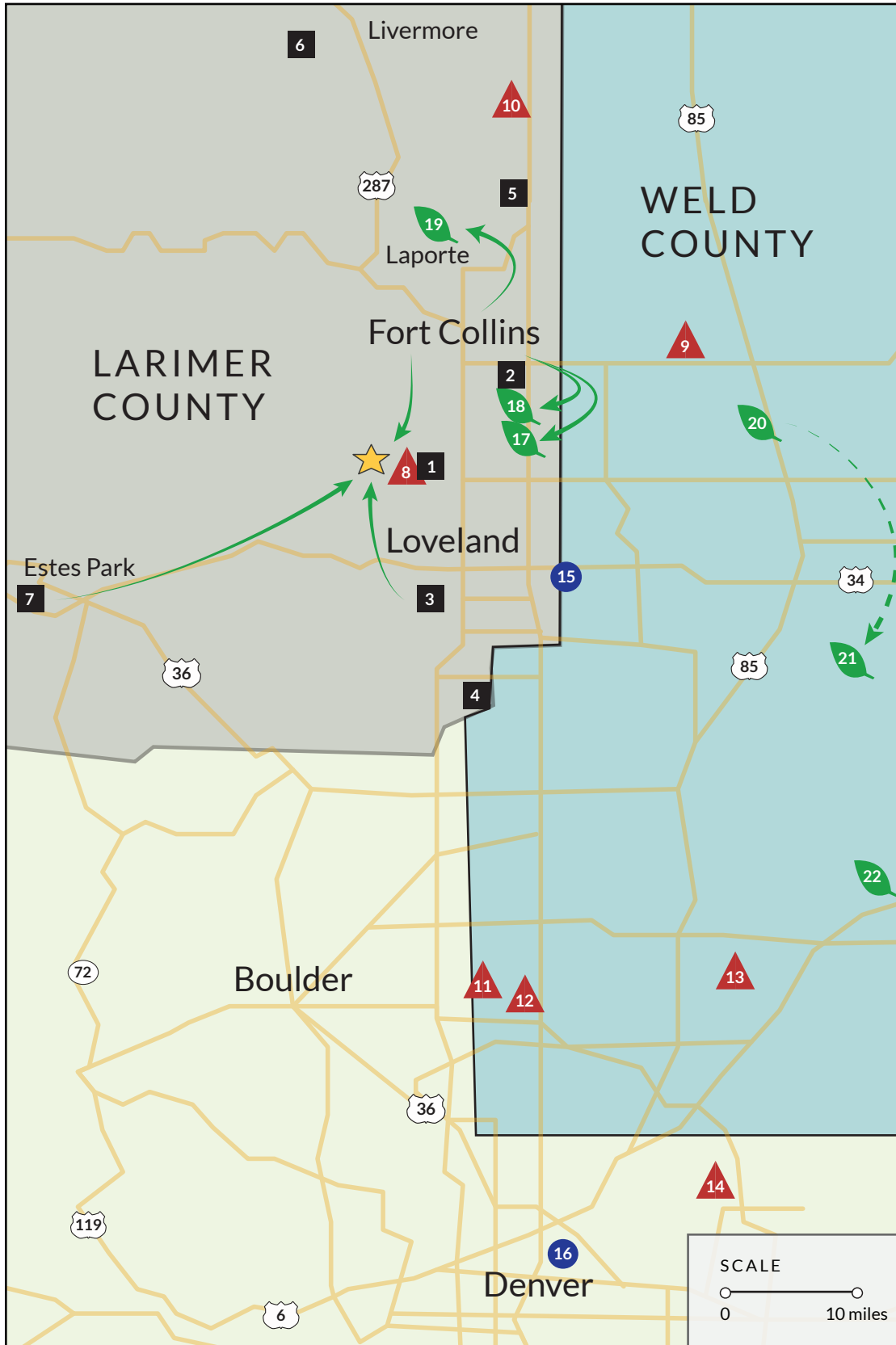
The County's current landfill is a viable location for a compost processing facility due to its centralized location and ample space. Limiting factors include the proximity to neighbors, who may object to odors that are a result of compost activities. Additionally, potential water runoff issues may affect neighbors' water supply, as the location has low water tables. There is also the potential for a compost facility to be sited at the same location as a new landfill.

*The photo below depicts an example of a large-scale composting facility operating on the top of a closed landfill. This composting facility processes mixed loads of residential, commercial, and industrial organics including green waste and food waste. The resultant compost is used in landscaping and for agricultural amendments.*



# NORTH FRONT RANGE WASTESHED FACILITY MAP

## Organics Processing Facility



### MAP KEY

- Organics
- ★ New Potential County Organics Processing Facility
- TRANSFER STATIONS
  - 1) Larimer County Recycling Center
  - 2) Fort Collins Timberline Recycling Center
  - 3) Loveland Recycling Center / Green Waste Drop-off
  - 4) Berthoud Transfer Station
  - 5) Wellington Transfer Station
  - 6) Red Feather Transfer Station
  - 7) Estes Park Transfer Station
- ▲ LANDFILLS
  - 8) Larimer County Landfill
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  - 16) Franklin Street MRF
- ORGANICS PROCESSING FACILITIES
  - 17) Drake Water Reclamation Facility
  - 18) Hageman's Earth Cycle Inc.
  - 19) Local Dairies
  - 20) A-1 Organics (Eaton)
  - 21) Heartland Biogas Facility
  - 22) A-1 Organics (Rattler Ridge)

## Section 5

Feasible  
Options

## 5.7 C&D Processing Facility

### Description

This option involves building and operating a construction and demolition (C&D) processing facility to receive and process source-separated or mixed loads of C&D material. With the exception of the large amounts of concrete, asphalt and aggregate recycled at local operations in Fort Collins and Loveland (such as the City of Fort Collins' Hoffman Mill Road Facility), much of the Wasteshed's C&D material is currently landfilled. There is currently no regional facility for separating mixed loads of C&D. A C&D processing facility would allow for material from construction and demolition sites to be diverted from landfills by providing a staging area and/or sorting line, either indoors or outdoors, to recover certain materials. Due to weather conditions in the region, an outdoor processing line may be difficult to operate year-round.

The City of Fort Collins currently has a building code that requires four materials to be diverted from landfills (wood, metal, cardboard, and aggregates). Requiring construction projects to meet certain diversion requirements may provide a greater supply of mixed C&D material loads to a processing facility.

Constructing a C&D facility may occur in conjunction with other alternatives, such as locating it at a transfer station. This would allow material to be processed in place rather than transferring it or redirecting the material to a landfill. A C&D processing facility that doesn't require the material to go through a transfer station prior has the potential to keep costs at a minimum. This is an additionally valuable option to the Coalition considering the recent and continued commercial and residential growth in the region.

### Estimated Costs

A new C&D processing facility located adjacent to the current Larimer County Landfill if designed to process the 14,000 (or more) tons per year of C&D material that are estimated for 2040, would have an initial capital cost of nearly \$4,000,000 and an annual operating cost of approximately \$1,000,000. Per ton disposal or processing fees to cover the costs of the facility are estimated to be \$52 per ton. The estimated monthly cost per household in Larimer County is less than \$1 per month.

### Benefits

- Would provide a unique avenue for C&D mixed-material processing, which is currently nonexistent in the Wasteshed;
- Would increase diversion of solid waste from landfills;
- Would enable haulers to provide an additional service to their commercial customers – collection and diversion of mixed C&D material from building projects;
- Recycled C&D material can provide a benefit to the community by providing a generally cheaper choice than using virgin materials for building projects;
- Would establish the infrastructure necessary for possible future diversion policy, such as requiring diversion from C&D projects, and would allow builders to more easily comply with ordinances in some jurisdictions; and



- Is estimated to *reduce* CO2E emissions by 1,000 metric tons per year, which is the equivalent of taking nearly 210,000 cars off the road each year.

### Drawbacks

- This facility is unlikely to be profitable enough to attract strong public-private partnerships. As such, this facility ought to be considered as an ancillary facility to one of the others listed above.

### Other Considerations

If a C&D processing facility was built within the next five years it could extend the lifespan of the landfill. C&D makes up a large portion (by volume) of what is disposed in the Larimer County Landfill and a processing facility has the ability to capture and divert much of that material. The Larimer County Landfill is a viable location for a regional C&D processing facility due to its central location and its close proximity to a large portion of the commercial and residential development in the region.

*The photo below shows a mobile C&D processing facility where mixed loads are dumped on the ground, loaded onto a conveyor, and hand sorted into separate bins by sorters.*



## 5.8 Waste-to-Energy Facilities

Constructing a waste-to-energy (WTE) facility would allow the Coalition to (potentially) gain revenue for garbage material by capturing, processing and selling or using the energy released during the “conversion process.” A regional WTE facility may produce energy to be used within the Wasteshed by the Platte River Power Authority, or to be sold to out-of-county companies. More information about WTE facilities, in a 2012 report commissioned by the City of Fort Collins, is provided in Appendix E.

### Anaerobic Digestion (AD)

Anaerobic digestion is the biological breakdown of organic materials in the absence of oxygen, which allows methane and carbon to be captured and used as a fuel to generate energy. As a result of this process, a digestate material is produced that can be used as a soil amendment or composted. This option is less feasible for the processing of municipal solid waste than other compost processes due to its expensive capital costs and unreliable operating variables such as quality of feedstock, end markets, etc.

### Biomass Conversion

Biomass conversion is the controlled combustion of wood, when separated from other solid waste, for producing electricity or heat. Non-woody materials such as those in garbage and recyclables and non-wood organics tend to produce a lot of ash in a biomass burner and are not considered to be desirable feedstock.

### Pyrolysis<sup>13</sup>

Pyrolysis systems use thermal energy to break down solid waste in the absence of oxygen. This process is used for the production of fuel liquids or pyrolysis oils. It also produces certain gases and a solid “biochar” product that can be used directly as a soil amendment or refined for other uses. Some pyrolysis products may be toxic or corrosive. Both pyrolysis and gasification produce a significant volume of byproduct, which must be disposed of in landfills.

### Gasification

Gasification is the thermal decomposition of solid waste material (primarily woody materials or others such as tires) through the application of heat with the partial addition of extra air or oxygen, which produces a gaseous, fuel-rich product that contains carbon monoxide, hydrogen, methane and other lighter hydrocarbons. It also produces liquids such as tars or oils and soil amendments like biochar and ash. The gases are combusted to produce steam or electricity for power generation. Bio-gasification is the same process as gasification, without adding heat to the garbage; however, it is less efficient than thermal gasification. The high quality of gaseous outputs and the lower facility costs makes gasification a more viable alternative than anaerobic digestion for managing the disposal of municipal solid waste.

### Estimated Costs

Annual operating costs for a new WTE facility designed to process approximate 50,000 tons per year of wood or other appropriate WTE source material “feedstock” are estimated to be

<sup>13</sup> R3’s research indicates that pyrolysis may not yet be viable for many large scale applications.

\$20,000,000 to \$25,000,000, depending on the type and amount of feedstock, and a number of other factors not evaluated as part of this Study.<sup>14</sup>

### Benefits

- WTE facilities would provide potential for diversion by reducing the amount of organic material sent to landfills;
- Would allow the Coalition to generate energy from garbage;
- Some WTE facilities (pyrolysis) produce energy considered to be “renewable” under Colorado’s Renewable Energy Standard;
- WTE could lower greenhouse gas emissions by displacing fossil fuel emissions and capturing carbon in the waste, which would have otherwise been released into the atmosphere as carbon dioxide from composting or as methane from landfilling;
- The biochar product resultant from pyrolysis and the digestate from AD processes may provide beneficial soil amendments to farms and backyard gardens; and
- WTE processes break down material, which would reduce the volume of garbage and thus help extend the lifespan of local landfills.

### Drawbacks

- WTE facilities require an extremely high initial capital investment and typically are most successful when built at a large scale;
- AD facilities may not be necessary considering the current regional AD capacity for processing organic material, which includes the Heartland Biodigester in Weld County and the Drake Water Reclamation Facility in Fort Collins;
- The success of WTE is somewhat unpredictable in the long-term, as it is contingent on the quantity and quality of feedstock, energy prices and end-markets; and
- WTE facilities can’t be turned off and on or scaled back – they must run 24/7 and may compete with other end markets for valuable resources.

### Other Considerations

A reimbursement policy could allow energy customers to take advantage of electricity or fuel that comes from WTE facilities and help offset the high initial cost of construction. Establishing such a “solid waste stabilization account” could incentivize customers to opt for electricity that came from these facilities rather than from fossil fuels.

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<sup>14</sup> Factors critical to the operating costs of WTE facilities include suitability of feedstock the cost of energy, federal and state grant funding, and others factors that were not the focus of this Study. As such, these estimates are based on research of operating costs of other facilities, and are reported as conservative estimates for a rough comparison of order of magnitude only.

Section 5

Feasible Options

## 5.9 Summary of Options

Tables 10 (below) and 11 (on the following page) summarize the costs and other considerations for the materials management options discussed in previous sections of this Study. As stated at the beginning of Section 5, cost estimates provided herein are not quotes, they are estimates based on the professional experience of R3 and sub-consultant Sloan/Vazquez/McAfee. Estimates provided should be used for comparison between options listed.

Actual costs – including initial capital cost, operating cost, and estimated monthly household cost – for each type of facility will vary depending on a variety of factors including but not limited to:

- Size of facility;
- Scope, design, location, and timing of construction;
- Amount of material handled as compared to the design efficiency for the facility;
- The value of the materials resulting from materials recovery processes (e.g. compost, metals, paper, plastics, etc.);
- Operator profit margin (if any);
- Government fees (if any); and
- The amount that haulers charge their customers for the cost of transfer, transport, and disposal/processing services, which can vary between residential, commercial and industrial accounts.

**TABLE 10**

Summary of Estimated Costs for New Infrastructure Options						
Facility Option	Estimated Capacity (Tons)	Initial Capital Cost	Operating Cost per Ton	Annual Operating Cost	Estimated Monthly Household Cost (Range)	
Central Transfer Station	720,000	\$19,200,000	\$22	\$15,840,000	\$3	\$5
New County Landfill	500,000	\$15,000,000	\$20	\$10,000,000	\$2	\$3
Clean MRF	110,000	\$29,700,000	\$95	\$10,450,000	\$2	\$3
Dirty MRF	700,000	\$83,500,000	\$87	\$60,900,000	\$10	\$20
Organics Composting Facility	90,000	\$4,000,000	\$52	\$4,680,000	<\$1	\$1
C&D Processing Facility	20,000	\$3,700,000	\$52	\$1,040,000	<\$1	\$1
Anaerobic Digester*	50,000	UNKNOWN	\$400*	\$20,000,000*	\$3*	\$7*
Biomass Conversion*	50,000	UNKNOWN	\$400*	\$20,000,000*	\$3*	\$7*
Gasification/Pyrolysis*	50,000	UNKNOWN	\$500*	\$25,000,000*	\$4*	\$8*

Annual operating cost estimates are inclusive of annual amortization of financed funding for initial capital investments as well as annual operating costs, but not depreciation/replacement costs of new facilities. Likewise, per ton operating costs assume that facilities will process the number of estimated tons listed – processing fewer tons would increase the per ton cost in order to cover fixed costs of operation.



Waste-to-energy (WTE) facility cost estimates (marked with “\*”) are based on research that yielded only operating costs per ton, which theoretically include operational costs, capital amortization, and revenue elements. Cost estimates for WTE facilities are dependent on an even larger number of factors than other types of facilities, including suitability of source material, the cost of energy, federal and state grant funding, and additional factors that were not the focus of this Study. As such, these estimates are reported as conservative estimates for a very rough comparison only.

Estimates of monthly costs per household are based on the assumption that households will bear the cost of 25-50% of the new infrastructure (in proportion to their total share of the waste stream compared to business and industry) with those costs being distributed evenly among an estimated 125,000 households across Larimer County.

**TABLE 11**

Summary of Benefits and Drawbacks for Feasible Options In Ascending Order of Estimated Monthly Household Cost						
Facility Option	Estimated Capacity (Tons)	Estimated GHG Emissions Increase (Reduction) (MTCO2E)	Potential for Additional Diversion	Potential to Extend life of Current Landfill	Estimated Monthly Household Cost (Range)	
Status Quo	-	6,000	None	None	UNKNOWN	
C&D Processing Facility	20,000	(1,000)	Medium	Medium	<\$1	\$1
Organics Composting Facility	90,000	(4,000)	Medium	Low	<\$1	\$2
Clean MRF	110,000	(45,000)	High	Medium	\$2	\$3
New County Landfill	500,000	1,000	None	None	\$2	\$3
Central Transfer Station	720,000	(48,000)	Low	High	\$3	\$5
Anaerobic Digester	50,000	UNKNOWN	Medium	None	\$3*	\$7*
Biomass Conversion	50,000	UNKNOWN	Medium	None	\$3*	\$7*
Gasification/Pyrolysis	50,000	UNKNOWN	Medium	None	\$4*	\$8*
Dirty MRF	700,000	(48,000)	High	Low	\$10	\$20

It is important to note that the actual monthly rates paid by solid waste customers are inclusive of the costs for several solid waste system components, namely:

- Collection;
- Transfer (if applicable);
- Transportation (if applicable); and
- Disposal and/or processing.

The estimated monthly household costs listed in Tables 10 and 11 are only representative of the costs related to operation of the facility options discussed in this Study. All but one of these options address the disposal/processing component of the solid waste system, with the only exception being the Central Transfer Station (which, as the name suggests, addresses the transfer component). Cost estimates for these facilities are not inclusive of the costs related to the other components of the solid waste system.

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For example, costs and impacts for the New County Landfill option represent the estimated cost of disposal at that facility, but do not include any potential additions to the cost of collection, transfer or transport, which could increase fees charged by haulers. As another example, the monthly household costs for the Central Transfer Station do not include the cost per ton “tipping fees” charged at destination facilities, which could range from \$20 to \$95 per ton or more depending on the waste stream (as shown in Table 10). As such, the *total* estimated monthly cost for routing solid waste through a Central Transfer Station would need to include collection costs, transfer costs, and disposal/processing costs in addition to those listed above.

One way to view the estimated monthly household costs listed in Tables 10 and 11 is like a menu; the costs for the Central Transfer Station, New County Landfill, Clean MRF, Organics Processing Facility and C&D Processing Facility can all be added together to provide a rough estimate of the total cost to solid waste customers for the construction and operation of those facilities. However, it would not be accurate to add the estimated monthly household costs to the total monthly rates currently paid by solid waste customers because current rates *already include* costs for collection, transfer, transport and disposal/processing of the solid waste collected by haulers.

For a more accurate measure of how monthly rate payer costs would change as a result of new solid waste infrastructure, the portion of the current rates that cover the costs of collection operations<sup>15</sup> would need to be revised to reflect changes in facility locations. That would be added to the costs corresponding to the estimated monthly household costs listed in Tables 10 and 11, for applicable facilities. However, current costs of collection – and potential changes to them related to potential new facility locations – were not evaluated in conjunction with this Study, as collection operations were not its focus and those data were not available. Future analysis could seek to estimate the total rate impact of collection costs plus the costs of new facilities, once specific facilities and locations are identified for closer study.

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<sup>15</sup> Which is the total monthly rate less amounts that are currently related to transfer, transport and disposal/processing.

## 6 Funding Approaches

This section describes various approaches that could be considered for funding capital and operating expenses if the Coalition decides to investigate additional solid waste infrastructure such as those identified in Section 5 of this report.

Estimates of costs in this report are planning level estimates intended only for the purposes of comparing alternatives. They do not represent specific quotes for building or operating new systems or infrastructure.

Variables that could affect the necessary funding amounts for Wasteshed solid waste infrastructure in the future include, but are not limited to:

- The timing of solid waste infrastructure construction (current pricing estimates are in 2016 dollars);
- Locations and property ownership for future solid waste infrastructure;
- Size and scale of the facilities chosen for consideration;
- Potential future increases in garbage disposal or processing fees as the Larimer County Landfill closes and landfill price competition in the region decreases; and
- Unknown changes to disposal or processing fees for recyclables and organics, as markets for both are currently fluctuating (current recycling markets are at their lowest point since the Great Recession).

### 6.1 Fees

#### Benefits of Using Collection and Disposal or Processing Fees

Solid waste handling fees, either for customer collection rates or on each incoming unit of solid waste into a facility, represent one potential means of funding the capital and operating expenses related to development of new solid waste infrastructure. They allow the owner and operator of new infrastructure to fund initial capital expense and operating costs by recovering revenue directly from users of that infrastructure (i.e., solid waste customers and/or haulers). Initial capital costs are typically amortized over a period of 20 to 30 years for large solid waste infrastructure, with ongoing operating costs also recovered via the fees.

For example, a central transfer station with a capital expense of \$20,000,000 (amortized over 20 years) and annual operating expenses of \$15,000,000 would need to generate \$16,000,000 annually via fees to cover the \$1,000,000 in initial capital plus the \$15,000,000 for operation.

#### Barriers to Using Collection Fees

Using collection fees to finance new solid waste infrastructure may be challenging in the Wasteshed's open market solid waste collection system. Charging fees on individual private (and Loveland's public) haulers would require each Coalition member agency to regulate haulers operating in their community. Agencies would use this authority to assess, collect and remit collection fees to the owner and operator of the new solid waste infrastructure. However, challenges to applying new waste-collection fees include the sheer number of haulers operating in the region and the lack of current frameworks for assessing, collecting and

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remitting such fees. One approach could be to create a regional agency to set, assess, and collect fees from each of the region’s haulers. (This alternative is discussed in more detail below).

### Barriers to Using Disposal or processing Fees

There are also challenges to collecting fees on tons or cubic yards delivered to any new solid waste infrastructure in the Wasteshed. Overall, the process is much simpler than charging fees on solid waste collection because the owner and operator of the infrastructure would assess the fee on all incoming units without the need for regulatory oversight or new systems. The risk is that incoming tonnage into the facility would not be sufficient to cover capital amortization and annual operating costs, thus resulting either in deficits or disposal or processing fees so high that customers will choose to use other facilities.

Currently, private haulers in the Wasteshed are free to choose the facilities to which they deliver their solid waste, and unless the Coalition were to regulate and require those haulers to direct their solid waste materials to the new infrastructure (i.e. “flow control”), there would be no guarantee of incoming material on which the owner and operator could collect revenue to fund the operation. As in the prior example, the Coalition could potentially change these conditions by creating a regional agency that would regulate the region’s private haulers and require them to direct their solid waste “flow” to the new infrastructure.

Certain types of new infrastructure in the Wasteshed could be favorable enough to private haulers that, at per unit fees below a certain amount, they would voluntarily use that local infrastructure in lieu of other regional alternatives. A cost-effective central transfer station, for example, could improve operational routing and create other efficiencies for solid waste collectors, who then might use it even if the total cost per ton were higher than would be charged at other, more distant facilities.

## 6.2 Taxes

### Benefits of Using Voter Approved Taxes

Voter approved taxes, such as parcel taxes, sales taxes, or taxes on solid waste collectors could be used as a means of financing new infrastructure capital and operating costs. Financing all or a portion of the solid waste infrastructure via taxes would help ensure funding of ongoing expenses regardless of the amount of waste handled. This would decrease (or eliminate, in the case of full funding with taxes) the risk that new infrastructure might not be financially viable. It would also help keep solid waste collection and disposal or processing costs low, by shifting the cost of new infrastructure from solid waste customers to tax payers.

Boulder County has applied a solid waste tax since 1994 that generates approximately \$1.8 million per year. It is charged to residential and commercial customers by waste collectors and passed through to the County as an “occupation tax” that funds waste reduction efforts.

### Barriers to Using Voter Approved Taxes

In order to finance all or a portion of the costs of new infrastructure for the entire Wasteshed, the Coalition would likely need to introduce a County-wide ballot initiative. Though Coalition members could potentially run separate but coordinated ballot efforts to achieve the same



aim, such an effort could result in inequities in the amounts and levels of funding paid by taxpayers in different communities.

## 6.3 Public-Private Partnerships

### Benefits of Public-Private Partnerships

Other funding methods discussed in this section generally assume that Coalition member agencies in the Wasteshed would wholly own and operate new solid waste infrastructure elements. However, that doesn't have to be the case. The County currently contracts with Waste Management to operate the Recycling Station for transfer and processing of recyclables, and similar relationships could be developed for future infrastructure. The Coalition could contract with private solid waste companies to build and operate new infrastructure on publicly owned property, such as the County-owned potential landfill site north of Fort Collins, or the current landfill location. Such an approach could eliminate some or all of the financial risk that the Coalition would otherwise bear if it owned and operated the infrastructure itself.

### Drawbacks of Public-Private Partnerships

Although strong public-private partnerships could reduce financial risk, they also provide the Coalition with less control over factors such as pricing, materials handled and other operational concerns. For such a partnership to be attractive to private companies, they would need a level of assurance that they could set per-ton prices that would cover the cost of operations, which could negate some of the benefits of public ownership (i.e., keeping disposal or processing costs low).

## 6.4 Regional Solid Waste Agency

Regardless of which funding approaches the Coalition might choose to finance new infrastructure, the Coalition may wish to consider forming a regional solid waste agency to formalize its role in solid waste management for the Wasteshed. In the most basic sense, such an agency could consist of an intergovernmental agreement to which each of the current (and future) Coalition members would be a party. The agreement could define the mission and function of the agency, and address how to implement funding measures discussed in this section (e.g., setting collection or disposal or processing fees, implementing a County-wide solid waste tax, etc.).

Forming a regional solid waste agency for the Wasteshed could help ensure that any new regional infrastructure is developed and managed to best fit the needs of each Coalition member, as well as the Wasteshed as a whole. Additionally, the agency could serve as a platform for the development and implementation of region-wide solid waste policies and programs. Finally, a regional solid waste agency could provide the opportunity to control the flow of solid waste in the Wasteshed (and thereby mitigate some of the challenges and risks to financing new infrastructure). A "flow control" policy would guarantee that a certain amount of solid waste tonnage is delivered to potential new facilities, thus making the initial capital investment easier to finance as a sufficient supply of solid waste would be assured.

However, solid waste agencies can be time-consuming and difficult to create (or dissolve) and are generally most effective when they have a stable and secure funding source to achieve a

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specific mission or purpose (e.g., to construct new regional solid waste infrastructure). Even the most streamlined agencies can be costly to operate because they require their own administrative infrastructure to operate, such as staff time, convening a board of directors, and other overhead costs.

For the Coalition, depending on the type and location of desired regional solid infrastructure and the means of financing it, a regional solid waste agency may or may not be necessary. For example, a regional agency might not be necessary if the Coalition were to decide to build and operate a central transfer station at the site of the current landfill, with public ownership of the infrastructure and private operation funded by disposal fees. In this case, the existing arrangement between Larimer County and the cities of Fort Collins and Loveland for the ownership and operation of the Larimer County Landfill and Recycling Station could be expanded to include the new transfer station. The three parties would still share ownership of the underlying land, and the County could arrange for the building, financing, and operations of the transfer station in much the same way that it does now for the Larimer County Landfill and Recycling Station.