King County
Department of
Natural Resources and Parks
Solid Waste Division

Draft Comprehensive Solid Waste Management Plan

January 2018

King County
Department of
Natural Resources and Parks
Solid Waste Division

DRAFT Comprehensive Solid Waste Management Plan

January 2018

Alternate formats available
206-477-4466; TTY relay: 711
www.kingcounty.gov/solidwaste

1202 M

Acknowledgements

Prepared by
King County Solid Waste Division
Department of Natural Resources and Parks
201 South Jackson Street, Suite 701
Seattle, WA 98104-3855
kingcounty.gov/solidwaste

In collaboration with
Solid Waste Advisory Committee
Metropolitan Solid Waste Management Advisory Committee

Contents

Chapter 3 - Forecasting and Data

Chapter 4 - Sustainable Materials Management

Chapter 5 - Solid Waste Transfer and Processing

Chapter 6 - Landfill Management and Solid Waste Disposal

Chapter 7 - Solid Waste System Finance

Acronyms and Abbreviations, and Common Terms

Acronyms and Abbreviations

2001 Plan	2001 Comprehensive Solid Waste Management Plan
AD	anaerobic digestion
ADC	alternative daily cover
AMR	advanced materials recovery
BEW	Bio Energy Washington LLC
C&D	construction and demolition debris
CERP	Capital Equipment Recovery Program
dBA	decibel
DNRP	Department of Natural Resources and Parks
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EECBG	Energy Efficiency and Conservation Block Grant Program
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
HDPE	plastic high-density polyethylene plastic
HHW	household hazardous waste
ILA	interlocal agreement
ITSG	Interjurisdictional Technical Staff Group
KCC	King County Code
LDPE	plastic low-density polyethylene plastic
LEED	Leadership in Energy and Environmental Design
LHWMP	Local Hazardous Waste Management Program
LRF	Landfill Reserve Fund
MFS	Minimum Functional Standards for Solid Waste Handling
MRF	materials recovery facility
MSWMAC	Metropolitan Solid Waste Management Advisory Committee
MTCO2e	metric tons of carbon dioxide equivalent
MW	megawatt
NWPSC	Northwest Product Stewardship Council
PET	plastic polyethylene terephthalate plastic
PSCAA	Puget Sound Clean Air Agency
PSRC	Puget Sound Regional Council
Public Health	Public Health – Seattle & King County
PVC plastic	polyvinyl chloride plastic
RAS	recycled asphalt shingles
RCW	Revised Code of Washington
SAC	Siting Advisory Committee
SEPA	State Environmental Policy Act
Site Development Plan	Cedar Hills Regional Landfill Site Development Plan

SWAC . . . . . Solid Waste Advisory Committee
SWIF. . . . . Solid Waste Interlocal Forum
Transfer Plan . . . . . Solid Waste Transfer and Waste Management Plan
UASI. . . . . Urban Area Security Initiative
WAC. . . . . Washington Administrative Code
WPR. . . . . waste prevention and recycling
WUTC. . . . . Washington Utilities and Transportation Commission

Common Terms

alternative daily cover – Cover material other than earthen material which is placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.

basic fee – the per-ton fee charged to customers disposing of municipal solid waste at transfer facilities.

clean wood – Unpainted and untreated wood, including pallets and wood from construction and demolition projects.

commercial collection company (hauler) – a private-sector company that collects garbage, recyclables, and organics from residents and businesses.

compost – the product resulting from the controlled biological decomposition of organic waste, including yard waste, food scraps, and food-soiled paper, which is beneficial to plant growth when used as a soil amendment.

construction and demolition debris (C&D) – Recyclable and non-recyclable materials that result from construction, remodeling, repair or demolition of buildings, roads or other structures, and requires removal from the site of construction or demolition. Construction and demolition debris does not include land clearing materials such as soil, rock, and vegetation.

climate change – changes in the long-term trends in average weather patterns of a region, including the frequency, duration, and intensity of wind and snow storms, cold weather and heat waves, drought, and flooding; climate change is attributed primarily to the emission of greenhouse gases, including such compounds as carbon dioxide and methane.

debris management site – temporary site where debris can be taken after a major emergency, such as flood, windstorm, or earthquake, until it can be sorted for recycling or proper disposal.

diversion – any practice or program that diverts solid waste from disposal in the landfill.

drop box – scaled-down transfer facility, designed to provide cost-effective convenient drop-off services for garbage and recycling primarily for self-haulers in the rural areas of the county.

equity – when all people have an equal opportunity to attain their full potential. Inequity occurs when there are differences in well-being between and within communities that are systematic, patterned, unfair, and can be changed; they are not random, as they are caused by our past and current decisions, systems of power and privilege, policies, and the implementation of those policies.

G-certificate – a permit granting commercial solid waste hauling companies authority to operate in a specific area. The permit is issued by the Washington Utilities and Transportation Commission.

green building – the practice of creating and using healthier and more resource-efficient methods of construction, renovation, operation, maintenance, and demolition of buildings and other structures.

greenhouse gas – any gas that contributes to the "greenhouse effect" such as carbon dioxide, methane, nitrous-oxide, chlorofluorocarbons, chlorodifluoromethane, perfluoroethane, and sulfur hexafluoride.

host city – a city that has a county transfer facility within its incorporated boundaries.

industrial waste stabilizer – material which is mixed with industrial ash to structurally stabilize the ash. King County designates the use of construction and demolition debris residuals for industrial waste stabilizer as disposal.

interlocal agreement – an agreement between a city and the county for participation in the King County solid waste system.

landfill gas – gas generated through the decomposition of waste buried in the landfill, which consists of about 50 to 60 percent methane and about 40 to 50 percent carbon dioxide, with less than 1 percent oxygen, nitrogen, and other trace gases.

leachate – water that percolates through garbage at the landfill and requires collection and treatment before being sent to a wastewater treatment plant.

Leadership in Energy and Environmental Design (LEED) – a recognized standard for measuring building sustainability; the rating system evaluates buildings in six areas: sustainable site development, water savings, energy efficiency, materials and resources selection, indoor environmental quality, and innovation and design.

municipal solid waste or MSW – includes garbage (putrescible wastes) and rubbish (nonputrescible wastes), except recyclables that have been source-separated; the residual from source-separated recyclables is MSW.

non-residential generator – businesses, institutions, and government entities that generate solid waste.

organics – yard waste, food scraps, and food-soiled paper.

product stewardship or producer responsibility – an environmental management strategy whereby manufacturers take responsibility for minimizing a product's environmental impact throughout all stages of a product's life cycle, including end of life management.

regional direct fee – a discounted fee charged to commercial collection companies that haul solid waste to Cedar Hills from their own transfer stations and processing facilities, thus bypassing county transfer stations.

self-hauler – anyone who brings garbage, recyclables, and/or yard waste to division transfer facilities except a commercial collection company.

social justice – encompasses all aspects of justice, including legal, political, and economic; it demands fair distribution of public goods, institutional resources, and life opportunities.

solid waste – all materials discarded including garbage, recyclables, and organics.

special waste – nonhazardous wastes that have special handling needs or have specific waste properties that require waste clearance before disposal. These wastes include contaminated soil, asbestos-containing materials, wastewater treatment plant grit, industrial wastes, and other wastes.

standard curbside recyclables – glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard.

sustainability – an approach to growth and development that balances social needs and economic opportunities with the long-term preservation of a clean and healthy natural environment. This approach to action and development integrates environmental quality, social equity, fiscal responsibility, and economic vitality.

tipping fee – a per-ton fee charged to dispose waste at solid waste.

waste conversion technologies (WCT) – non-incineration technologies that use thermal, chemical, or biological processes, sometimes combined with mechanical processes, to convert the post-recycled or residual portion of the municipal solid waste stream to electricity, fuels, and/or chemicals that can be used by industry.

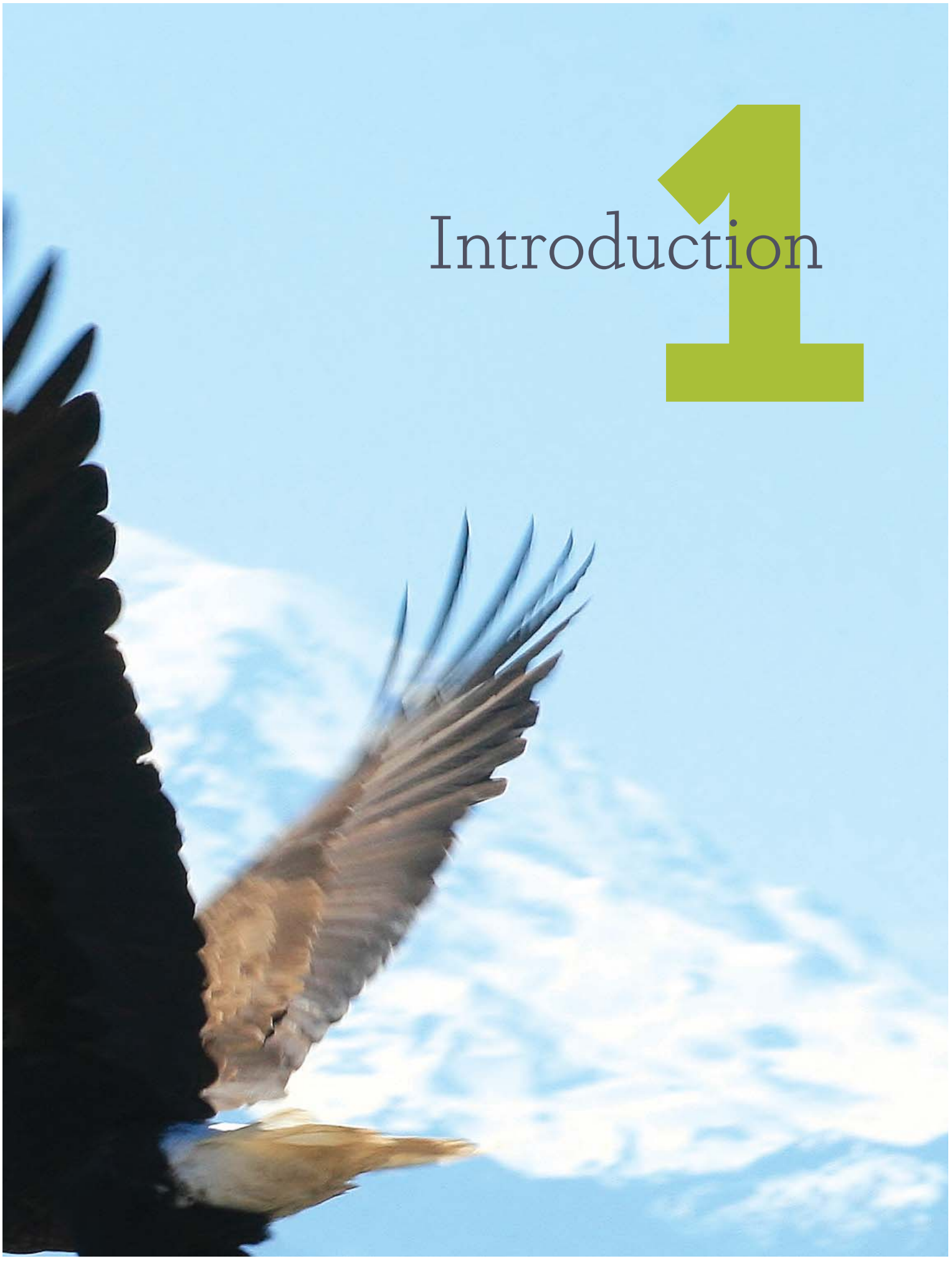
waste generation – waste disposed plus materials recycled.

waste prevention – the practice of creating less waste, which saves the resources needed to recycle or dispose of it.

waste-to-energy technologies (WTE) – recover energy from municipal solid waste and include both waste conversion technologies and incineration with energy recovery, such as mass burn waste-to-energy, refuse derived fuel, and advanced thermal recycling.

zero waste of resources or zero waste – a planning principle designed to eliminate the disposal of materials with economic value. Zero waste does not mean that no waste will be disposed; it proposes that maximum feasible and cost-effective efforts be made to prevent, reuse, and recycle waste.

1 Introduction



Introduction

This Draft *Comprehensive Solid Waste Management Plan* (Plan) proposes strategies for managing King County's solid waste over the next 6 years, with consideration of the next 20 years. The Plan was prepared by the Solid Waste Division (the division) of the Department of Natural Resources and Parks in accordance with the Revised Code of Washington (RCW) 70.95. This Plan revises the 2001 *Comprehensive Solid Waste Management Plan* (2001 Plan), and builds upon the 2007 *Transfer and Waste Management Plan* (Transfer Plan).

With this Plan, the division embraces the Department of Natural Resources and Park's mission to foster sustainable and livable communities by focusing on these critical areas: environmental quality, equity and social justice, fiscal responsibility, and economic vitality. The division is building upon past and current efforts to increase waste prevention and recycling while advancing green building practices in the region's communities and within its own operations. The division continues to refine operational practices and facility designs in ways that further reduce its carbon footprint and promote the greening of natural and built environments. The participants in the countywide solid waste management system – from the 37 cities within the county's borders to the private-sector collection and processing companies to individual businesses and residents – are contributing to these vital efforts in their own operations and practices.

Since its inception in 1969, the core mission of the division has been to ensure that residents and businesses in the county have access to safe, reliable, efficient, and affordable solid waste handling and disposal services. The last few decades have brought about significant developments in the management of solid waste, stemming not only from advances in technology and the changing marketplace, but from a widespread recognition of the importance of waste prevention, resource conservation, sustainable development and environmental stewardship.

Over time, the management of solid waste has evolved from a relatively simple system of garbage collection and disposal to a much more complex network of collection, transportation, and processing for garbage, recyclables, organics (yard waste and food scraps), and construction and demolition debris. This integrated network combines the infrastructure and services of both the public and private sectors to provide long-term capacity for solid waste management in the region.

Summary of the Plan Organization

This Plan is organized to guide the reader through the major elements of the solid waste system. Within each chapter are elements as described below:

Goals reflect the long-term outcomes and aspirations for the regional system. Goals should not change through the life of the Plan.

Policies provide broad direction and authorization for services and system priorities. Policies should not change through the life of the Plan.

Actions are targeted, specific, and time-based to implement policies and could include: programs, studies, infrastructure improvements, and regulations. Actions may be updated to adapt to changing conditions. The Summary of Recommended Actions table in each chapter includes a page number to indicate where information can be found in that chapter.

Following the table of contents is a list of acronyms, abbreviations, and common terms used throughout the Plan. A list of the documents referenced in the Plan is provided in Chapter 8. Website addresses are provided for documents that were prepared by or for the division.

Five appendices are provided with the Plan:

- Appendix A is a cost assessment, as required by the Washington Utilities and Transportation Commission (WUTC)
- Appendix B includes the six-year capital improvement plan required to be included in the Plan
- Appendix C is the Amended and Restated Solid Waste Interlocal Agreement (ILA)
- Appendix D shows assumptions used in the Waste Reduction Model (WARM) model of greenhouse gas emissions
- Appendix E will include the division's responses to the comments and questions received during the public review period; the full text of each comment will be available on the division's website after the public comment period is complete

Review Process

The division is seeking comments on this draft Plan. Copies of the Plan have been provided to King County cities, Community Service Areas, and the King County Council and will be available for public review at all King County libraries. The plan is also available on the division's website at https://your.kingcounty.gov/solidwaste/about/planning/comp-plan.asp for review by the public and other stakeholders. Beginning January 8, 2018, the division will be taking comments on the Plan via e-mail, letter, or a comment form available at libraries and on the website. The comment period extends through March 8, 2018.

Comments by e-mail can be sent to SWD.CompPlan@kingcounty.gov.

Letters should be addressed to:

Draft Solid Waste Plan Comments
King County Solid Waste Division
201 S. Jackson St., Suite 701
Seattle, WA 98104-3855

State law delegates authority to the county to prepare a comprehensive solid waste management plan in cooperation with the cities within its boundaries. An ILA is required for any city participating in a joint city-county plan (RCW 70.95.080(3)). This Plan was prepared in cooperation with 37 King County cities with which the county has ILAs (all cities in the county except for Seattle and Milton).

Participants in development of the Plan included the division's two advisory committees – the Solid Waste Advisory Committee (SWAC) and the Metropolitan Solid Waste Management Advisory Committee (MSWMAC). The planning process is discussed in more detail in Chapter 2, The Existing Solid Waste System.

This Plan builds upon the 2001 Plan and the Transfer Plan that was approved by the King County Council in December 2007. This Plan presents draft goals, policies, and actions in the following areas: the existing solid waste system, forecasting and data, sustainable materials management, the transfer and processing system, landfill management and solid waste disposal, and system financing.

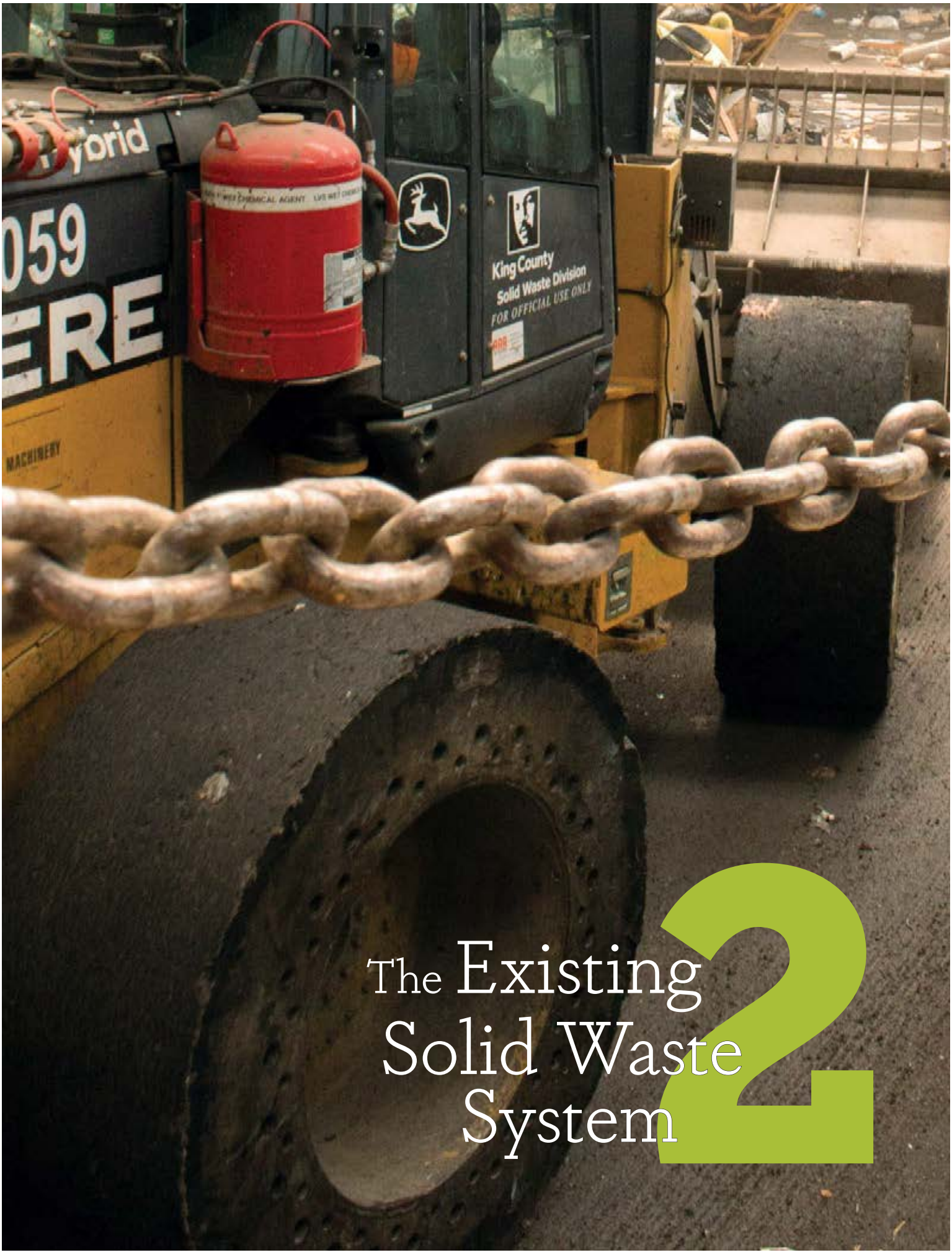
An Executive-Proposed Plan will be released after consideration of comments, preliminary review by the Washington State Department of Ecology (Ecology), review by the Washington Utilities and Transportation Commision (WUTC), and completion of an environmental review under the State Environmental Policy Act (SEPA) requirements. The Executive-Proposed Plan must be adopted by:

- Cities representing three-quarters of the total population of the cities that act on the plan during the 120-day adoption period;
- The Regional Policy Committee acting as the Solid Waste Interlocal Forum (SWIF); and
- The King County Council.

After adoption and completion of SEPA review, the County/City-Approved Plan will be submitted to Ecology. The County/City-Approved Plan becomes final upon Ecology's approval.

Following is the draft schedule for completion of the Plan review and adoption process:

Approximate dates	Action
January 8 - March 8, 2018	Release Draft Plan and Draft Environmental Impact Statement (EIS) for 60-day public review and comment
January 8 - May 7, 2018	Submit Draft Plan and Draft EIS to Ecology and WUTC for up to 120-day review and comment
May 2018	Revise the Draft Plan and Draft EIS to incorporate Ecology's, WUTC's, and public comments and the King County Executive's recommendations
Mid 2018	Submit the King County Executive's Proposed Plan with Final EIS to the King County Council (including the Regional Policy Committee) for adoption
Late 2018	Submit County-approved Plan with Final EIS to the cities for adoption (120-day adoption period)
Mid 2019	Submit County/City-approved Plan with Final EIS to Ecology for final approval (45 day period)



2 The Existing Solid Waste System

Policies

ES-1 Maintain a public and private mix of solid waste transfer and processing facilities.

ES-2 Work with the division's advisory committees, the cities, and the Solid Waste Interlocal Forum on solid waste management planning and decisions.

ES-3 Incorporate principles of equity and social justice into solid waste system planning.

ES-4 Consider climate change impacts and sustainability when planning for facilities, operations, and programs.

The Existing Solid Waste System

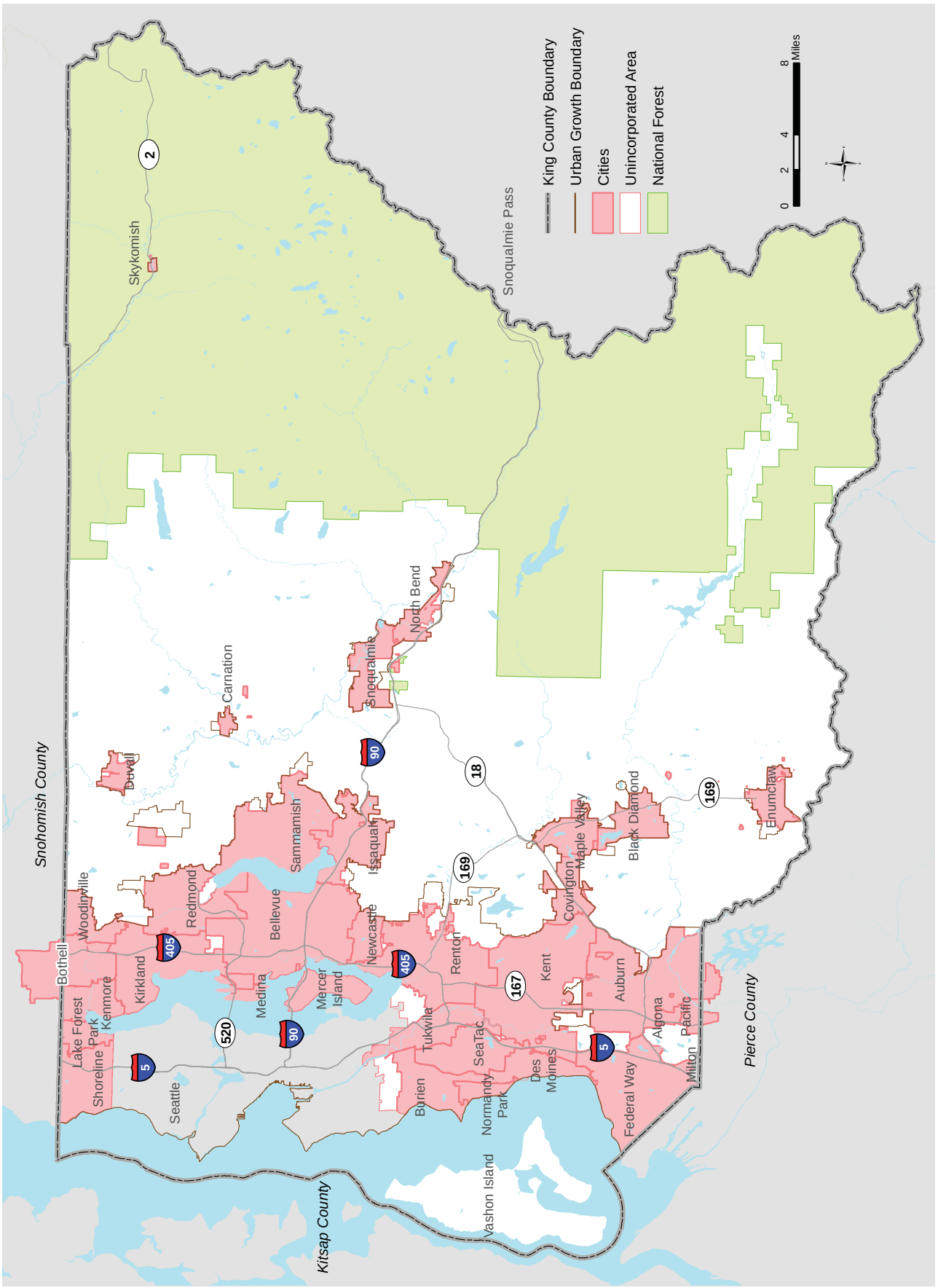
The solid waste management system has evolved from a relatively basic system of garbage collection and disposal to a much more complex network of collection, sorting, salvage, reuse, recycling, composting, and disposal managed by the county, area cities, and private-sector collection and processing companies. Initial improvements to solid waste facilities and operations have developed further to incorporate waste prevention and recycling programs that strive to balance resource use and conservation with production and consumption.

Sign at Bow Lake Transfer Station encourages customers to recycle more

One of the early influences in the evolution of the system was the sweeping environmental legislation of the 1960s and 1970s, beginning in 1965 with the federal Solid Waste Management Act, which established strict regulatory standards for landfills and other solid waste facilities. Washington State subsequently passed its own waste management act, codified in Revised Code of Washington (RCW) 70.95, and established Minimum Functional Standards for Solid Waste Handling in the Washington Administrative Code (WAC) 173-304. In 1976, the federal Resource Conservation and Recovery Act set even more stringent standards for environmental protection, including requirements for the use of impermeable bottom liners and daily cover at landfills. In response to the more stringent regulations, the county began closing the unlined community landfills across the region, replacing many of them with the more environmentally protective and geographically dispersed transfer facilities that are still in operation today. With the development of the transfer network (eight transfer stations and two drop boxes) and technological advances at the county-owned Cedar Hills Regional Landfill (Cedar Hills), division facilities and operations were brought into compliance with the new environmental standards, and a safe, efficient, and sustainable system of solid waste management was created. The standards have continued to evolve over time, and transfer facilities and landfills now operate in accordance with the Solid Waste Handling Standards (WAC 173-350) and Criteria for Municipal Solid Waste Landfills (WAC 173-351).

Thirty-seven of the 39 cities in King County (all but the cities of Seattle and Milton) and the unincorporated areas of King County participate in the solid waste system. In all, the county's service area, shown in Figure 2-1, covers approximately 2,050 square miles. There are over 1.4 million residents and more than 716,000 people employed in the service area. Through this system, in 2016 over 922,000 tons of garbage was disposed at Cedar Hills. In addition, almost 870,000 tons of materials were recycled, and about 310,000 tons of construction and demolition materials were recycled or reused. Studies show that even more can be done to reduce disposal through waste prevention, reuse, and recycling.

Figure 2-1. King County service area



The Solid Waste System

Figure 2-2 provides a general overview of the collection, transfer, transportation, processing, and disposal systems for garbage, recyclables, organics, and construction and demolition debris. Garbage is transported to Cedar Hills for disposal, while recyclables, organics, and most construction and demolition materials are taken directly to processing or compost facilities where materials are prepared for sale to manufacturers and other users. As shown, these recycled or composted products eventually return to the market for consumer purchase.

As can be seen in Figure 2-2, this multi-faceted system uses the combined resources of the public and private sectors. Regulations and systems for collection, transfer, transport, processing, and disposal that come into play are complex, involving state, county, city, and private-sector responsibilities.

Collection of Solid Waste and Recyclables

In accordance with state law RCW 81.77.020 and 36.58.040, counties are prohibited from providing curbside garbage collection services. Legal authority for regulating collection is shared primarily between the state – acting through the Washington Utilities and Transportation Commission (WUTC) – and the cities. The WUTC sets and adjusts rates and requires compliance with the state and local adopted solid waste management plans and related ordinances. RCW 81.77 also includes a process for allowing cities to opt out of the WUTC regulatory structure and either contract directly for solid waste collection or provide city-operated collection systems.

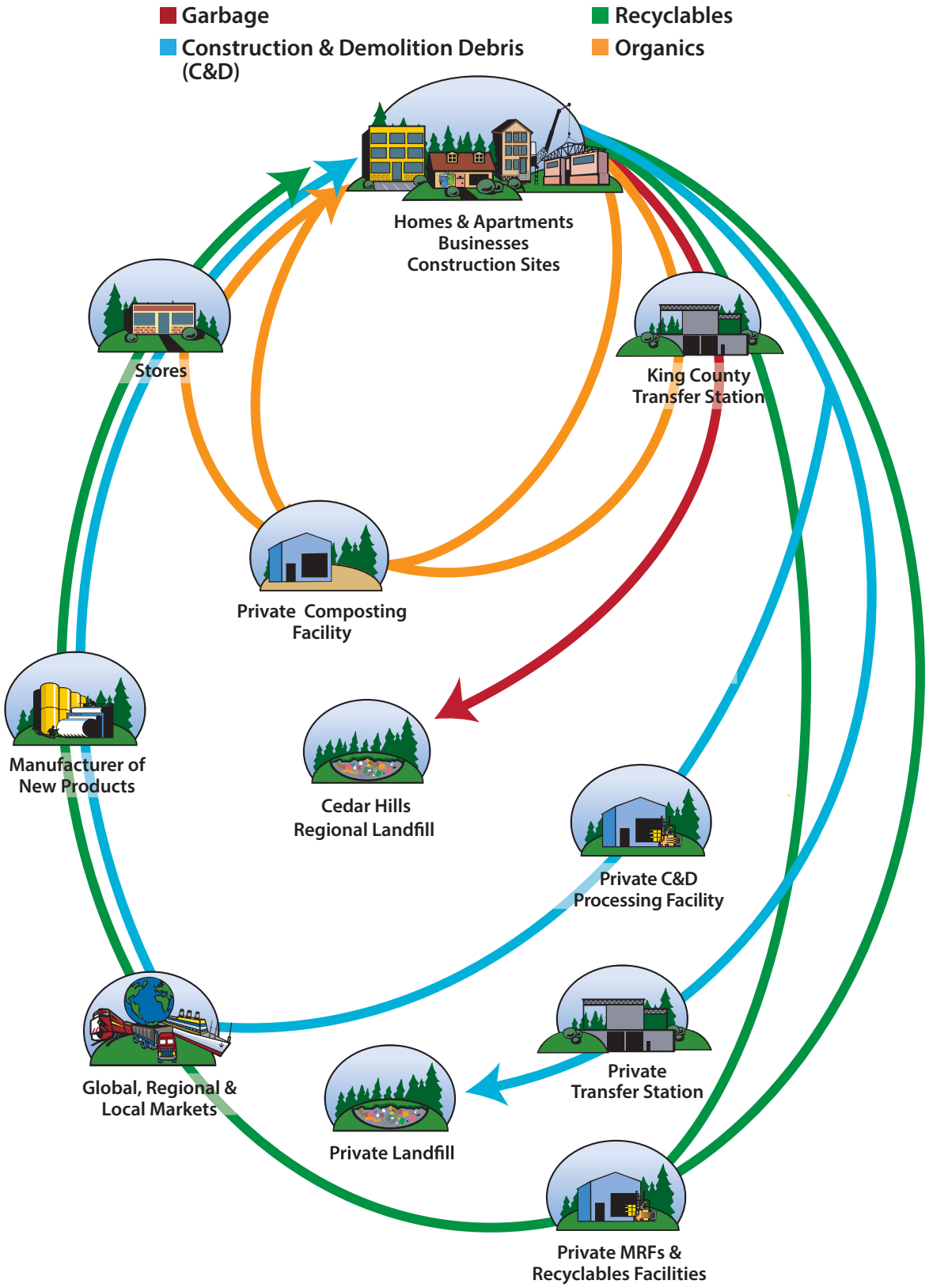
Most of the garbage, recyclables, and organics collection is provided by the private sector

The county's 2001 *Comprehensive Solid Waste Management Plan* (2001 Plan) specifies that recycling should be included as part of the basic garbage rate for residents in most of King County. King County enacted a service-level ordinance (King County Code (KCC) 10.18) that includes this requirement for unincorporated areas, except Vashon Island, Skykomish, and Snoqualmie Pass. The WUTC then required collection companies to develop tariffs that spread the cost and availability of recycling to all residential garbage customers. These tariffs and service-level requirements also apply to cities that have not opted out of the WUTC regulatory structure.

Most of the garbage, recyclables, and organics collection in the county's service area are provided by four private-sector companies – Recology CleanScapes, Inc., Republic Services, Inc. (formerly Allied Waste, Inc.), Waste Connections, Inc., and Waste Management, Inc. Except for Recology CleanScapes, which only provides contracted services, these companies operate both through the WUTC and service contracts with individual cities. Most of the 37 cities in the service area contract directly with one or more of these private companies for collection services. Eight cities (Beaux Arts, Black Diamond, Covington, Hunts Point, Kenmore, Medina, Woodinville, and Yarrow Point) and all of the unincorporated areas receive collection services from these private companies operating under certificates issued by the WUTC. Two cities – Enumclaw and Skykomish – provide municipal collection services within their own jurisdictions. Enumclaw collects garbage, recyclables, and organics; Skykomish collects only garbage.

There is a fundamental difference in how the WUTC regulates residential and non-residential collection of recyclable materials. The Federal Aviation Administration Authorization Act of 1994 prohibits regulation of price, route, or service

Figure 2-2. System Graphic



of any motor carrier transporting property. While this provision does not apply to collection of garbage and recyclable materials from residents, recyclable materials generated by the non-residential sector are considered to be property and are subject to a different regulatory structure. King County cannot enact ordinances that require commercial garbage collectors to include recyclables collection as part of the non-residential collection service. Cities, on the other hand, may include recyclables collection as part of their non-residential collection service, but cannot prohibit businesses and other non-residential entities from choosing other vendors for this service.

Revenue Sharing Provides Incentive for Collection Companies to Enhance Recycling

In 2010, the state legislature amended statute RCW 81.77.185, allowing solid waste collection companies regulated by the WUTC to retain up to 50 percent of the revenue paid to them for the recycled materials they collect from households (the statute does not apply to collection in cities with contracts for recyclables collection). The purpose of the statute is to provide collection companies with a financial incentive to enhance their recycling programs. Formerly, all revenues from the sale of residential recyclables were passed back to the households as a credit on their garbage bills.

To qualify for the revenue sharing, collection companies must submit a plan to the WUTC that has been certified by King County as consistent with the current comprehensive solid waste management plan. The Solid Waste Division Director has authority to make this certification.

To qualify for certification, the collection company's plan must:

- Be submitted annually for approval
- Demonstrate how proposed program enhancements will be effective in increasing the quantity and quality of materials collected
- Demonstrate consistency with the minimum collection standards
- Incorporate input from the Solid Waste Division
- Be submitted to the Solid Waste Division with sufficient time to review prior to WUTC deadlines

Since January 2013, all WUTC-regulated areas of King County, except Vashon Island, have certified revenue sharing agreements in place.

Curbside Collection in Rural Areas

When curbside recycling was initiated in King County in the early 1990s, the collection companies (operating under WUTC certificates) serving unincorporated areas were required to provide curbside recycling services as specified in KCC 10.18 for most of the county. These requirements, consistent with the 1989 *Comprehensive Solid Waste Management Plan*, stated that curbside recycling would be offered to all households as part of the basic garbage service and that yard waste service would be available to all households as a subscription service. However, some rural areas were exempted from these requirements because their low population density or lack of participation in garbage collection services suggested that curbside recycling might not be cost effective.

Currently, three unincorporated areas are not included in the county's collection service-level standards as specified in KCC 10.18:

Vashon/Maury Island – Historically, a comparatively high percentage of Vashon/Maury Island residents have chosen to self-haul garbage and recyclables to the division's Vashon Recycling and Transfer Station; however, the number of households subscribing to garbage service has increased over time. Waste Connections, Inc., the company providing garbage collection service on Vashon/Maury Island, also offers subscriptions to recyclables collection services. From a survey of Island residents (KCSWD 2016c), about 17 percent currently subscribe to curbside recycling services. Organics curbside collection is not available.

Skykomish Area – The area around Skykomish is remote and sparsely populated. Residents of Skykomish and some residents in surrounding unincorporated areas receive curbside garbage collection service from the Town of Skykomish. Skykomish does not collect curbside recyclables or organics. Customers may self-haul garbage and recyclables to the division's drop box facility located in Skykomish; however, separate organics collection is not provided at the facility.

Snoqualmie Pass – The Snoqualmie Pass area is also very sparsely populated. Residential garbage collection is available from Waste Management, Inc. of Ellensburg in Kittitas County. Curbside recycling is not available; however; the division does provide collection bins for the standard curbside recyclable materials. Organics collection is not available.

Transfer

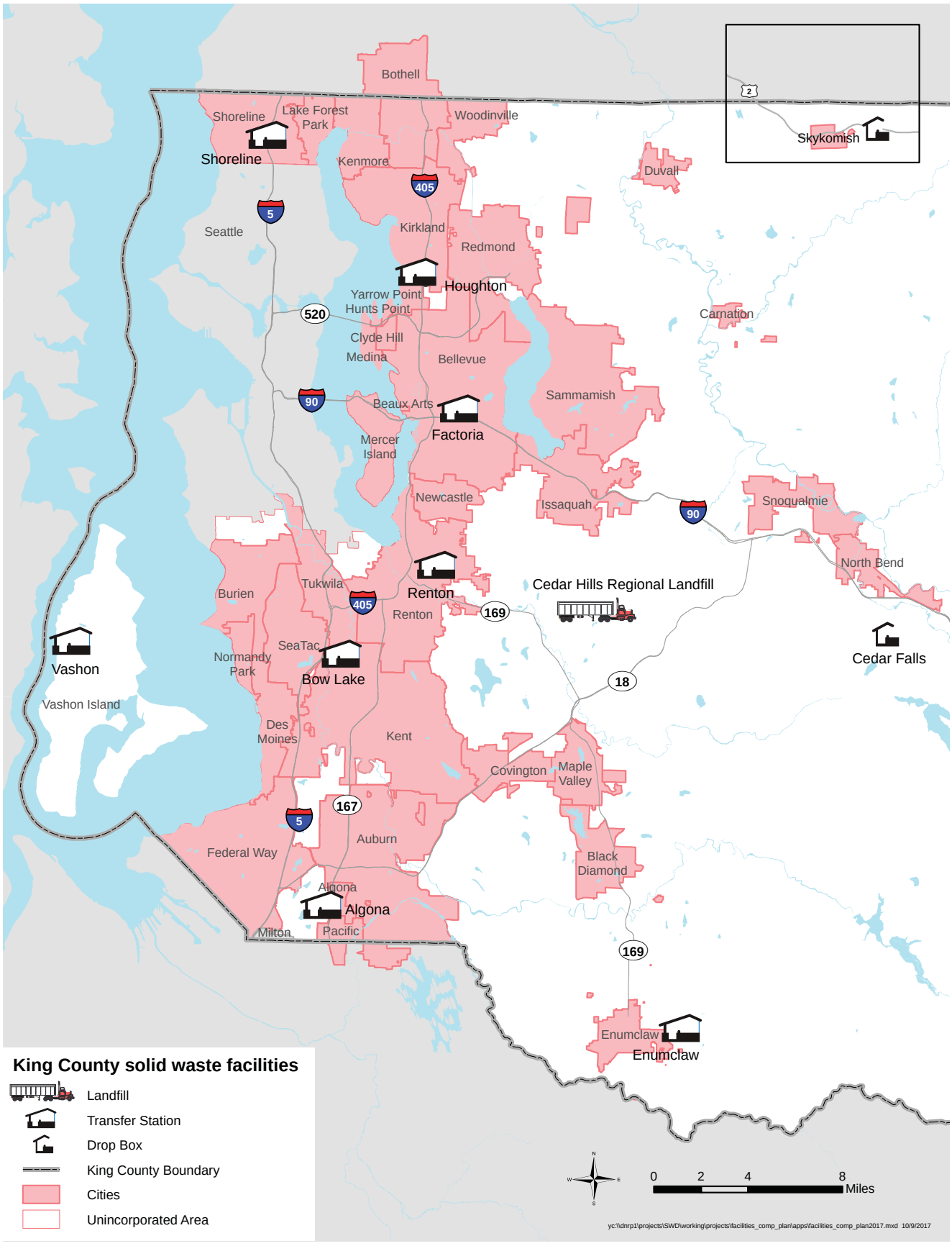
The division operates eight transfer stations and two rural drop boxes in the urban and rural areas of the county (Figure 2-3). In addition to meeting standards for the safe and environmentally sound transfer of solid waste, the transfer network reduces the amount of truck traffic on the highways by providing geographically dispersed stations where garbage collected throughout the region can be consolidated into fewer loads for transport to the landfill. Transfer facilities are the public face of the solid waste system. In 2016, county transfer facilities received about 914,600 tons of garbage and recyclables, through more than 952,000 customer visits.

Garbage and, at most facilities, recyclable materials from business and residential self-haulers are accepted at the transfer station and drop box facilities. The transfer stations also provide accessible drop-off locations for garbage picked up at the curb by the commercial collection companies. From these geographically dispersed transfer stations, garbage is consolidated in transfer trailers and taken to the county-owned Cedar Hills Regional Landfill in the Maple Valley area. Recyclable materials are transported to processing facilities throughout the region.

Entrance of Algona Transfer Station

Public Health – Seattle & King County (Public Health) is the primary regulatory and enforcement agency responsible for issuing operating permits for both public and private solid waste handling facilities. This includes solid waste, recycling, and composting facilities. Solid waste handling regulations are codified in

Figure 2-3. Map of transfer station locations



the Code of the King County Board of Health, Title 10. The permitting process is the vehicle by which Public Health enforces the state's Solid Waste Handling Standards (WAC 173-350) and Criteria for Municipal Solid Waste Landfills (WAC 173-351). Public Health inspects solid waste handling facilities and has the authority to take corrective action for noncompliance.

Processing of Commingled Recyclables

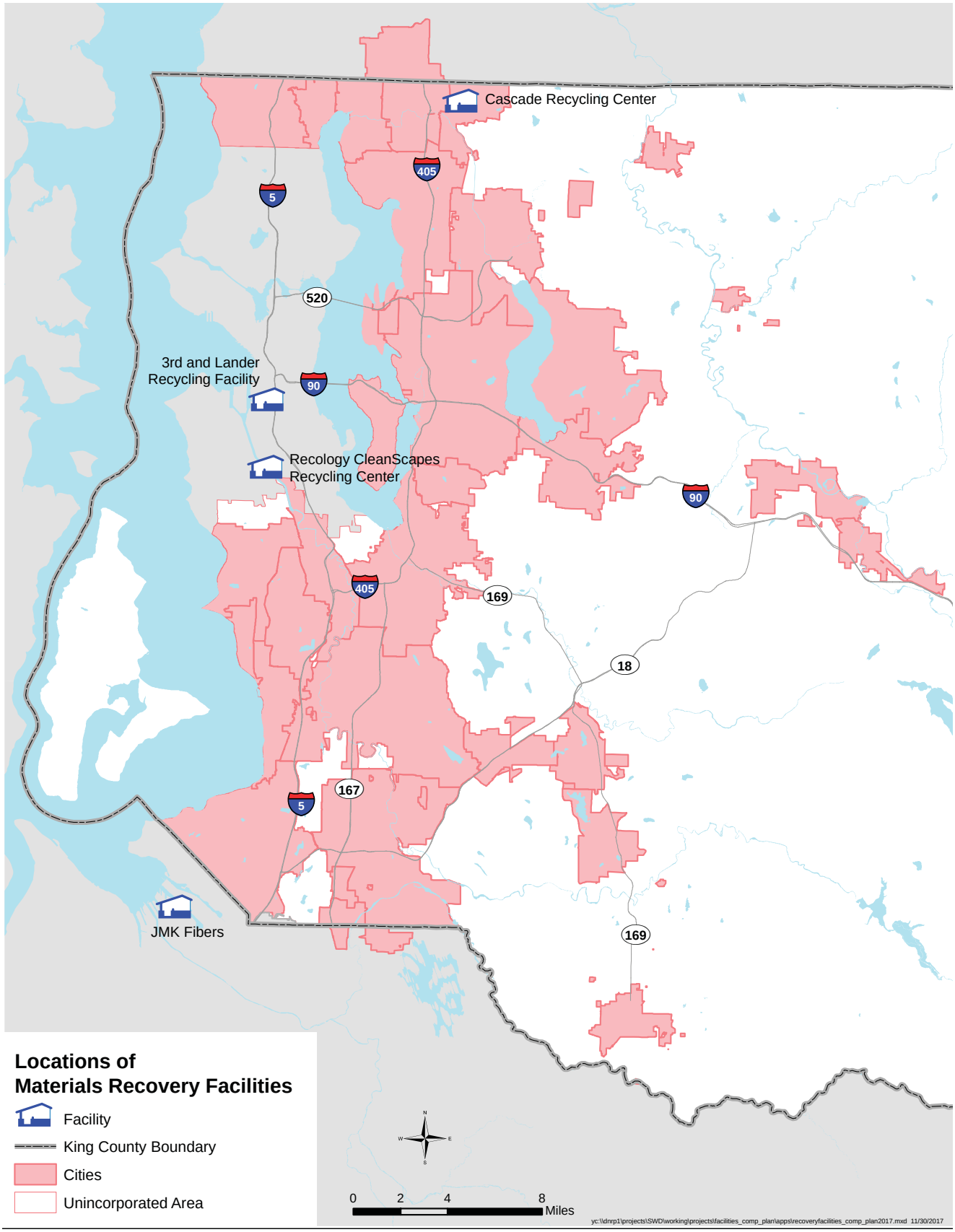
While garbage picked up at the curb goes to the county's solid waste system, the collection companies take the recyclable materials picked up at the curb to their own facilities for processing. The processing of recyclable materials into new commodities begins at a materials recovery facility. Materials recovery facilities receive material loads from collection trucks, remove contaminants from the loads, sort materials to meet the specifications of the end users or markets, and compact or bale the material for efficient shipping. As the residential collection system has moved to commingled collection, materials recovery facilities in the region have upgraded their facilities to improve their ability to remove contaminants and sort materials into marketable commodity grades. Any residuals, or non-recyclable waste products, from materials recovery facilities within the King County service area must be disposed of at a King County solid waste facility.

Recology CleanScapes materials recovery facility

The processing of recyclables throughout the Pacific Northwest is currently handled through the private sector. Companies that collect recyclables curbside are required by contract or ordinance to deliver them to recycling facilities. Local facilities receive recyclable materials from the region as well as from other areas of the United States. These private-sector facilities have made necessary upgrades over time to expand processing capacity to meet demand. The three largest collection companies in King County – Recology CleanScapes Inc., Republic Services, Inc., and Waste Management Inc., each own a material recovery facility located within the county to process most of the recyclable materials they collect. Recology CleanScapes' material recovery facility in south Seattle opened in 2014. Republic's 3rd and Lander Recycling Center in south Seattle was substantially redesigned in 2007 to improve its ability to sort commingled materials and in 2008 was upgraded to expand capacity. Waste Management's Cascade Recycling Center in Woodinville opened in 2002 and was recently upgraded with a new sort line. Curbside recyclables collected on Vashon Island are processed at Waste Management JMK Fibers' Port of Tacoma facility, which was upgraded substantially in 2013.

Facilities that process mixed recyclables in King County are subject to regulation by Public Health under the Code of the King County Board of Health Title 10.12, which adopts the standards of WAC 173-350.

Figure 2-4. Locations of materials recovery facilities



Disposal

Solid waste generated in King County's service area is disposed at the Cedar Hills Regional Landfill – the only active landfill in the county. Located on a 920-acre site in the Maple Valley area, Cedar Hills has provided safe and efficient disposal of the county's solid waste since 1965. In 2016, the landfill received about 922,000 tons of municipal solid waste.

Cedar Hills was originally permitted in 1960, at a time when there were few regulations in place to govern the design and operation of landfills. Since then, environmental regulations have become increasingly rigorous, requiring the placement of an impermeable, high-density polyethylene liner and clay barrier at the bottom of the landfill, daily cover (using soil or other approved materials) over the waste, and frequent environmental monitoring, among other requirements.

Over time, Cedar Hills has been developed in sequential stages (or refuse areas) in accordance with the most current Site Development Plan. The division has invested considerable effort and resources to upgrade older areas of the landfill, while designing and operating new areas to meet or exceed regulatory requirements. Figure 2-5 shows the layout of the landfill, including the boundaries of the past and active refuse areas as currently permitted. As shown, Area 7 is the currently active refuse area, and is expected to operate through 2018 or early 2019. At that time, operations will transition to the newest refuse area, Area 8.

The landfill is bordered to the east by Passage Point, a transitional housing development, residentially zoned property on the east, north, and west, and by property to the south that is zoned for mining, other resource extraction, and similar uses. State regulation WAC 173-351-140(3)(b) requires a 250-foot buffer between the active area and residentially zoned property, and a 100-foot buffer between the active area and non-residentially zoned property. However, a special permit, approved by the King County Board of Commissioners in 1960, specified that a 1,000-foot buffer be established around the landfill and left in its natural condition. Use of this buffer zone is currently limited to site access and other approved uses not directly related to land-filling operations, such as environmental monitoring and activities at Passage Point.

A bulldozer compacts waste at the Cedar Hills landfill

The landfill has received national recognition for its operations and environmental control systems. The environmental control systems, for both older and newly developed areas, are operated and maintained to meet or exceed the highest federal, state, and local standards for protection of public health and the environment. This complex network of environmental controls includes a collection of pipes, culverts, holding ponds, and other equipment to manage water and landfill gas, as described in more detail below.

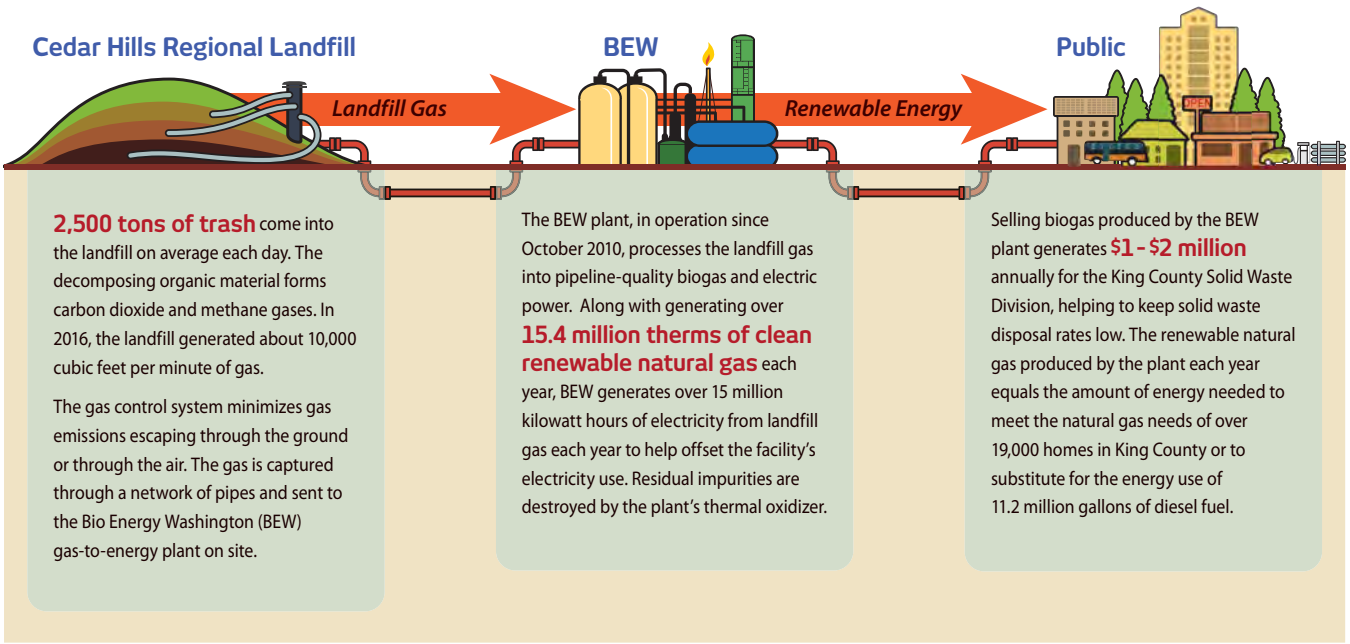
Water at the landfill is separated into two categories for treatment. These are: 1) clean stormwater, and 2) contaminated stormwater, which includes leachate and other water that has potentially come into contact with garbage. Leachate is produced when water percolates through the garbage; it is collected in pipes within the landfill and diverted to lined on-site ponds. In the ponds, the leachate is aerated as a preliminary treatment before being sent to the King County South Wastewater Treatment Plant in Renton.

Figure 2-5. Current layout of the Cedar Hills Regional Landfill

The bottom liner and clay barrier beneath the landfill prevent leachate from seeping into the soil or groundwater. Stormwater that runs off the surface of active landfill areas is also potentially contaminated. It is collected in lined ponds before moving on to the treatment system. Clean stormwater is diverted to detention or siltation ponds to control flow and remove sediment, and is then discharged to surface water off-site.

Landfill gas is generated through the decomposition of waste buried in the landfill. The gas consists of about 50 percent to 60 percent methane, with the remainder made up of carbon dioxide and trace amounts of oxygen, nitrogen, and other gases. Landfill gas from Cedar Hills is collected by using motor blowers to create a vacuum in perforated pipes within the solid waste. The gas used to be routed to high-temperature flares, where it was burned to safely destroy any harmful emissions. In a public/private partnership, Bio Energy Washington LLC, began operating a landfill gas-to-energy facility at the landfill in 2010. The facility runs landfill gas through a series of processors that remove and destroy the harmful components and convert the methane portion of the gas into pipeline-quality natural gas. The clean gas is routed through a nearby gas line into the Puget Sound Energy grid and is also used to power the facility (Figure 2-6). Other uses for the gas, such as producing compressed natural gas for operating vehicles, may also be possible. The flare system is kept in standby mode; during maintenance of the energy facility or in the event of an emergency, the flare system can be activated to manage the gas. Air emissions from the flare system are tested regularly and meet or exceed all applicable environmental regulations.

Figure 2-6. Landfill gas-to-energy process



The gas collected from the landfill is sent to the Bio Energy Washington plant to be processed into pipeline quality gas.

Solid Waste System Planning

In addition to regulating solid waste handling and disposal, state law also established a framework for planning, authorizing counties to prepare coordinated comprehensive solid waste management plans in cooperation with the cities within their borders. While cities can choose to prepare their own plans, all of the incorporated cities within King County, except for Seattle and Milton, have chosen to participate in the development of this single, coordinated

regional plan for the incorporated and unincorporated areas of King County. Since July, 1988, cities have entered into interlocal agreements (ILAs) with the county that establish the Solid Waste Division as the lead planning agency. By the time the first comprehensive solid waste management plan was adopted by the Metropolitan King County Council in 1990, there were 29 incorporated cities participating in this coordinated effort. Since then, eight new cities have incorporated and joined the King County system – for a total of 37 cities.

To make sound planning decisions, it is important to understand how the solid waste system operates today and to identify changes that might affect it in the future. This information is critical to ensuring that plans for facilities, services, and programs meet the needs of the region in the years to come. Because the system is a combination of public and private entities, working with stakeholders in the early stages of system planning is essential. In addition to working with local jurisdictions and the private-sector collection companies, the division works closely with its two advisory committees – the Solid Waste Advisory Committee (SWAC) and the Metropolitan Solid Waste Management Advisory Committee (MSWMAC). For the preparation of this Plan, the division collaborated with the advisory committees through a process of presentations and discussions.

The next section identifies the participants in the planning process and describes the stakeholder process that guided the development of this plan. Also included is a brief description of the state, county, and city responsibilities in planning the solid waste system.

A Regional Approach

As partners in a regional system, cities share in the costs and benefits of King County's transfer and disposal system. The regional solid waste system was formally established in King County when the county and cities entered into the original Solid Waste Interlocal Agreement of 1988. In 2013, the county worked with the cities to amend the original ILA. The *Amended and Restated Solid Waste Interlocal Agreement* (Amended and Restated ILA) extends the original ILA by 12.5 years, from June 2028 through December 2040 (the full text of the ILA can be found in Appendix C). The longer term will keep rates lower by allowing for longer-term bonding for capital projects. Thirty-three cities have signed the Amended and Restated ILA and Clyde Hill, Hunts Point, Medina and Yarrow Point are expected to sign in late 2017 or early 2018. Cities in the regional system include:

Algona	Des Moines	Maple Valley	Sea Tac
Auburn	Duvall	Medina	Shoreline
Beaux Arts	Enumclaw	Mercer Island	Skykomish
Bellevue	Federal Way	Newcastle	Snoqualmie
Black Diamond	Hunts Point	Normandy Park	Tukwila
Bothell	Issaquah	North Bend	Woodinville
Burien	Kenmore	Pacific	Yarrow Point
Carnation	Kent	Redmond	
Clyde Hill	Kirkland	Renton	
Covington	Lake Forest Park	Sammamish	

The Amended and Restated ILA includes several enhancements to the original ILA, including provisions for insurance and a potential reserve for environmental liabilities. Other changes include:

- Commitment to the continued involvement of the cities advisory group (to be renamed the Metropolitan Solid Waste Advisory Committee or MSWAC)
- An expanded role for cities in system planning, including planning for long-term disposal alternatives and in establishing financial policies
- A dispute resolution process, which includes non-binding mediation
- Mitigation provisions for host cities and neighboring cities

Issues specific to individual jurisdictions, such as the city of Bothell annexing areas in Snohomish County, may require an amendment to the ILA that addresses that particular concern.

Both the original and the new ILA assign responsibility for different aspects of solid waste management to the county and the cities. The county is assigned operating authority for transfer and disposal services, is tasked with providing support and assistance to the cities for the establishment of waste prevention and recycling programs, and is the planning authority for solid waste. Each city is designated the authority for collection services within their corporate boundaries and agrees to direct solid waste generated and/or collected within those boundaries to the King County transfer and disposal system.

Cooperation between the county and the 37 cities in a regional system of solid waste management has allowed us to achieve economies of scale that translate into lower fees for system ratepayers. A significant benefit is the savings realized by being able to extend the life of the in-county landfill for solid waste disposal as a result of improved recycling rates. Economies of scale will continue to be beneficial once the Cedar Hills landfill reaches capacity and closes, and the region transitions to a new method of solid waste disposal. The benefits also extend to the network of recycling and transfer stations that provide convenient, geographically dispersed transfer points around the county. A regional system can operate with fewer transfer facilities than an aggregation of separate, smaller systems. The regional system also allows use of individual stations to be balanced to reduce over- or under-use of any one station. Examples of ways the division may influence station use are: 1) reader boards located at each transfer station that show what the wait times are at the two nearest stations and 2) the online information available for each station showing a picture of the inbound queue and the average disposal time after weigh-in at each station.

Regional Authorities and Roles

As defined in RCW 70.95.030, solid waste handling includes management, storage, collection, transportation, treatment, utilization, processing, and final disposal. Responsibility for solid waste handling in Washington is divided among the state, counties, jurisdictional health departments, and the cities, as delineated in various legislation, regulations, and agreements. Table 2-1 lists the responsibilities for each entity, its role, and the guiding legislation.

As shown in the table, the state establishes authorities, minimum standards, and planning requirements, and delegates responsibility for implementation to the counties and cities.

Table 2-1. Roles in regional planning and administration

Entity	Role	Guiding Legislation, Regulation, or Agreement
Washington State Department of Ecology	Establish solid waste regulations for management, storage, collection, transportation, treatment, utilization, processing, and final disposal	Revised Code of Washington (RCW) 70.95
	Delegate authority to the counties to prepare joint comprehensive solid waste management plans with the cities in their boundaries, and review and approve those plans	RCW 70.95
	Set Minimum Functional Standards (MFS) for implementing solid waste laws and establishing planning authorities and roles	Washington Administrative Code (WAC) 173-304, 173-350, and 173-351
Washington Utilities and Transportation Commission	Review the cost assessment prepared with the comprehensive solid waste management plan	RCW 70.95.096
	Regulate solid waste collection services and rates in unincorporated areas and in cities that choose not to contract for solid waste collection services	RCW 81.77
Washington State Department of Agriculture	Review the preliminary draft plan for compliance with RCW 17.24 and the rules adopted under that chapter	RCW 70.95.095 and RCW 17.24
Public Health - Seattle & King County (as authorized by the King County Board of Health)	Permit solid waste handling facilities, including permit issuance, renewal, and, if necessary, suspension (handling facilities include landfills, transfer stations, and drop boxes)	Code of the King County Board of Health, Title 10
	Make and enforce rules and regulations regarding methods of waste storage, collection, and disposal to implement the state's MFS	Code of the King County Board of Health, Title 10
	Perform routine facility inspections	Code of the King County Board of Health, Title 10
Puget Sound Clean Air Agency	Issues air operating permits and enforces permit compliance	RCW 70.94, WAC 173-401 and PSCAA Regulation 1, Article 7
Solid Waste Interlocal Forum (SWIF)	The Regional Policy Committee convenes as the SWIF to advise the King County Council, King County Executive, and other jurisdictions, as appropriate, on all policy aspects of solid waste management and planning, and to review and comment on alternatives and recommendations for the comprehensive solid waste management plan and other planning documents	King County Code (KCC) 10.24.020C, and Interlocal Agreements

Entity	Role	Guiding Legislation, Regulation, or Agreement
King County Solid Waste Division	Provide transfer and disposal services for unincorporated King County and the 37 cities with Interlocal Agreements. Lead the development of waste prevention and recycling programs	Interlocal Agreements
	Prepare the comprehensive solid waste management plan and associated cost assessment	RCW 70.95.080, KCC Title 10, and Interlocal Agreements
	Establish disposal fees at the landfill, transfer stations, and drop boxes to generate necessary revenue to cover solid waste management costs, including: • Facility operation • Capital improvements • Waste prevention and recycling programs • Grants to cities for recycling programs and special collection events • Self-haul and rural service • Administration and overhead	RCW 36.58.040, KCC Title 10, and Interlocal Agreements
	Establish level of service and hours of operation for all King County transfer and disposal facilities	KCC Title 10.10
	Amend hours at transfer facilities, as necessary	KCC 10.10.020 and 10.10.025
	Designate minimum service levels for recyclables collection in urban and rural areas	RCW 70.95.092, KCC Title 10.18
	Review impacts of the comprehensive solid waste management plan on solid waste and recycling rates	RCW 70.95
Cities	Participate in the planning process and jointly implement the Plan with the county, provide collection services and waste prevention and recycling programs	RCW 70.95.080 and Interlocal Agreements
Solid Waste Advisory Committee	Advise the county in the development of solid waste programs and policies, provide feedback on proposed council actions involving solid waste issues, and comment on proposed solid waste management policies, ordinances, and plans prior to adoption	RCW 70.95.165 and KCC 10.28
Metropolitan Solid Waste Management Advisory Committee	Advise the Executive, SWIF, and County Council in all matters related to solid waste management and participate in the development of the solid waste management system and waste management plan	KCC 10.25.110 and Interlocal Agreements

Stakeholder Involvement in the Planning Process

In the development of the comprehensive solid waste management plan, the division seeks participation and input from many sources, including the cities, the division's advisory committees, the Community Service Areas (unincorporated area community councils), commercial collection companies, the County Council, division employees, labor unions, and the public.

In 2004, the Metropolitan King County Council adopted Ordinance 14971 to establish a process for the 37 cities in the county's service area to collaborate with the division in the early stages of long-term planning and policy development. It set the stage for creation of MSWMAC, which consists of elected officials and staff from participating cities.

A joint meeting of the MSWMAC and SWAC committees

MSWMAC and the long-standing SWAC, mandated by RCW 70.95.165, have been instrumental in the development of policies, goals, and recommendations presented in this Plan. SWAC has been an advisory group to the division since 1985, with a membership that is geographically balanced and includes King County residents and representatives from public interest groups, labor unions, recycling businesses, the marketing sector, agriculture, manufacturing, the waste management industry, and local elected officials.

Both SWAC and MSWMAC have been working with the division to create the building blocks that form the basis for this Plan. Collaborative efforts that have helped shape the Plan include:

- Establishing progressive goals for waste prevention and recycling that will further reduce solid waste disposal
- Conducting in-depth analyses and evaluations of the solid waste transfer system that resulted in the development and adoption of a major renovation and replacement plan for the transfer system network
- Conducting subsequent in-depth reviews of the renovation and replacement plan for the transfer network
- Evaluating strategies for extending the life of Cedar Hills and beginning to explore viable options for waste disposal once the landfill closes

For the current planning cycle, the division met with SWAC and MSWMAC regularly to discuss their issues and concerns, and hear their perspectives on system planning. The contributions of these committees have been instrumental in developing the comprehensive solid waste management plan. The division's SWAC and MSWMAC websites contain background on the committees as well as minutes from their meetings with the division (http://www.kingcounty.gov/depts/dnrp/solid-waste/about/advisory-committees.aspx).

Trends in Solid Waste Management

Leading the Way in Waste Prevention, Recycling and Product Stewardship

King County continues to gain distinction as a leader in waste prevention and recycling. Together, the division and the cities work with collection and processing companies and local, state, and national businesses and organizations to develop the innovative programs and services that give the county its leading edge. Some key program developments include:

- The addition of acceptable recyclable materials for collection at the curb and at division transfer stations
- Growing markets for a wider array of materials for recycling and reuse
- Successful promotions that encourage waste prevention
- An increase in product stewardship, whereby manufacturers and retailers are assuming responsibility for recycling their products through take-back programs at selected collection sites across the region
- Advances in the green building industry, including a focus on creating sustainable housing in affordable communities
- An increase in the number of organizations that accept materials for reuse, such as clothing and textiles, edible food, and reusable building materials

With this Plan, the division and its advisory committees set goals to reduce, reuse, and recycle by focusing on specific waste generators and particular materials or products that remain prevalent in the waste stream. The division is also moving toward a sustainable materials management approach as a way to reduce harm to the environment and climate effects of materials while strengthening the economy. This approach emphasizes the importance of looking at the full life cycle of materials: design and manufacture, use, and end-of-life.

Washington's legislated system for managing unwanted electronic products and mercury-containing light bulbs and tubes illustrates the successes that can be achieved when manufacturers, retailers, local governments, and nonprofit organizations work together on a major initiative. State legislation was passed in 2006 that requires manufacturers of computers, monitors, and televisions – referred to as e-waste – to provide for the recycling of these products beginning in January 2009. As a member of the Northwest Product Stewardship Council, the division helped draft the model legislation that led to formation of the E-Cycle Washington program, which implements this recycling service at no cost for Washington residents, small businesses, small governments, nonprofit organizations, and school districts. The division assisted businesses throughout the county to become authorized e-waste collection sites. Approximately 175,000 tons of e-waste has been collected since the program's inception. Likewise, the LightRecycle WA program went into effect in 2015.

Expanding the Collection of Recyclable and Compostable Materials

A change in the collection of curbside recyclables has been the transition to commingled (or single-stream) collection. With this system, all recyclables can be placed in a single, wheeled cart rather than the smaller, separate bins often used in the past. The single cart system not only makes recycling easier and more convenient for the customer, it is more efficient for the companies that provide collection service.

In addition, the division and cities have worked with the commercial collection companies to implement curbside collection of food scraps and food-soiled paper in the yard waste (organics) container. About 99 percent of single-family customers with curbside garbage collection have access to organics (yard waste and food scraps) collection service. Only Vashon Island and the Skykomish and Snoqualmie Pass areas, which house less than one percent of the county's residents, do not have this service. Studies estimate that over 50 percent of those who set out organics carts recycle some of their food scraps. The combined food scraps and yard waste are taken to processing facilities that turn the materials into nutrient-rich compost used to enrich soils.

Building a New Generation of Transfer Stations

Since the approval by the King County Council in 2007 of the *Solid Waste Transfer and Waste Management Plan* (Transfer Plan), the division has been moving forward on the renovation and replacement of the division's urban transfer stations to update technology, incorporate green building features, increase recycling services, and achieve operational efficiencies. New recycling and transfer stations include a flat tipping floor, areas for the collection of a wide array of recyclables, design features that reduce water and energy use, and solid waste compactors. By compacting garbage prior to transport for disposal, up to 30 percent fewer truck trips are required to haul the same amount of garbage.

Solar panels on the south roof of the Shoreline Recycling and Transfer Station, one of the many green features of the building.

In 2008, the division opened the first of five new state-of-the-art transfer stations – the Shoreline Recycling and Transfer Station. The station has exceeded all expectations for environmental excellence with its innovative design and green building features. It received the highest possible honor from the U.S. Green Building Council with a Leadership in Energy and Environmental Design (LEED) Platinum certification. The station has also been the recipient of 15 recognition awards from national, regional, and local organizations, including the Solid Waste Association of North America, the American Institute of Architects, the American Public Works Association, and the Northwest Construction Consumer Council.

Public involvement was a crucial component of the successful design and construction of the Shoreline station. Throughout the process, the division worked closely with the City of Shoreline, neighboring communities, environmental groups, and local businesses and citizens to obtain their input on the project.

The facility design and public process for the Shoreline station have set the bar high for the other recycling and transfer stations approved for construction during this planning period, reflecting:

- How to approach the planning process – incorporating early community involvement
- How to build them – using the greenest elements possible
- How to operate them – pursuing operational efficiencies that reduce fuel, energy, and water use; and increasing recycling opportunities

Following the success of the Shoreline Recycling and Transfer Station, construction began on the new Bow Lake Recycling and Transfer Station. The design of the new Bow Lake Recycling and Transfer Station builds upon the environmental achievements of Shoreline, with compactors for improved efficiency, water re-use, energy efficient lighting, and solar panels. Providing capacity for about one third of the system's garbage, Bow Lake also offers expanded recycling opportunities. The new recycling and transfer station was completed in 2013 and also earned a Platinum LEED certification, as well as other awards of excellence.

The most recent station to be completed, the Factoria Recycling and Transfer Station – opened in late 2017. This same year, a site was selected for the South County Recycling and Transfer Station (SCRTS) after completion of a Final Environmental Impact Statement. The selected site is just north of the existing station. Design and construction of the station will take place over the next several years, with an anticipated station opening in 2022.

The new Factoria Recycling and Transfer Station opened in late 2017.

All new recycling and transfer stations will meet green building, safety and environmental standards; accommodate projected growth in the region; incorporate best practices in transfer and transport operations; and offer a wide variety of recycling opportunities for residential and business customers.

Managing Solid Waste Disposal with an Eye to the Future

Cedar Hills is the only landfill still operating in King County. Because use of the county landfill is currently the most economical method for disposal of the region's wastes, the division has been extending its useful life. This strategy, recommended in the Transfer Plan, was approved by the County Council in 2007. In December 2010, the County Council approved a Project Program Plan enabling the division to move forward with further development of Cedar Hills. As approved in the Project Program Plan, a disposal area covering approximately 56.5 acres is being developed – this will extend the life of the landfill to about 2028 depending on a variety of factors, including tonnage received.

The 2001 Plan directed the division to "contract for long-term disposal at an out-of-county landfill once Cedar Hills reaches capacity and closes." With this Plan, the division is exploring a range of options for future disposal to compare next to waste export. Emerging technologies for converting solid waste to energy or other resources, such as fuels, are in various stages of development and testing in U.S. and international markets. Some of the technologies are capable of processing the entire solid waste stream, while others target specific components, such as plastics or organics. Regardless of which long term disposal option is selected, the transfer system will still be needed to efficiently consolidate loads. The division will continue to monitor emerging technologies and advances in established disposal methods, recycling, and waste prevention.

Financing the Solid Waste System for the Long Term

As the division continues to modernize the transfer system, keeping fees as low and stable as possible is a fundamental objective.

While division revenues rely primarily on fees for garbage disposal, the current priorities are to increase recycling and prevent waste generation. Reductions in tonnage due to waste prevention and recycling have been gradual, and the system has adjusted accordingly. However, further reductions will continue to affect system revenues. The division will continue to identify new revenue sources, such as the sale of landfill gas from the Cedar Hills landfill and greenhouse gas offsets from this and other potential sources, and will explore sustainable financing options. The division will also work with its advisory committees and others to develop and/or revise financial policies, including policies that address rate stabilization and cost containment. Policies, actions and more discussion can be found in Chapter 7, *Solid Waste System Finance*.

Protecting Natural Resources through Environmental Stewardship

Environmental stewardship means managing natural resources so they are available for future generations. It also involves taking responsibility – as individuals, employees, business owners, manufacturers, and governments – for the protection of public health and the environment.

Building an environmentally sustainable solid waste management system in King County takes a coordinated, region-wide effort. The division, the cities, and the collection and processing companies in the region are making concerted efforts to help make this happen.

The division provides cleanup assistance for illegal dumping

Waste prevention and recycling is just one of the ways in which the division and others are working to reduce wastes, conserve resources, and protect the environment. Other innovations and well-established programs that support environmental stewardship include collecting and selling landfill gas to be converted to pipeline quality gas and providing cleanup assistance for illegal dumping.

Additional Planning Considerations

Climate Change

Climate impacts are considered by the division when planning for future programs, facilities, and operations, in accordance with the state's Beyond Waste project and the county's Strategic Climate Action Plan (King County. 2015b). Climate change is manifest in the long-term trends in average weather patterns, including the frequency, duration,

King County – Cities Climate Collaboration (K4C)

King County and thirteen cities — Bellevue, Burien, Issaquah, Kirkland, Mercer Island, Normandy Park, Redmond, Renton, Sammamish, Seattle, Shoreline, Snoqualmie, and Tukwila — are collaborating through the King County-Cities Climate Collaboration (K4C) to coordinate and enhance the effectiveness of local government climate and sustainability action. Through K4C, county and city staff are partnering on: outreach to engage decision makers, other cities, and the general public; coordination of consistent standards, benchmarks, and strategies; sharing solutions; funding; and shared resource opportunities.

All King County cities are encouraged to join this effort, which is supporting and enhancing projects and programs in focus areas such as green building, using and producing renewable energy, sustainability outreach and education, and alternative transportation.

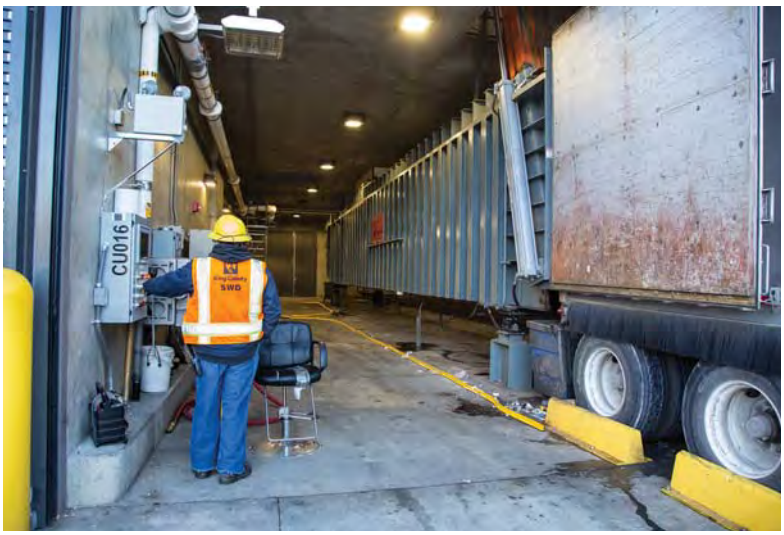
and intensity of wind and snow storms, cold weather and heat waves, and drought and flooding. Climate change is attributed primarily to the emission of greenhouse gases (GHG), including such compounds as carbon dioxide and methane. Planning for climate change means taking into account both how we might reduce our effects on the climate, today and in the future, and how changes in climate might affect our facilities and operations.

Against a baseline set in 2007, the Growth Management Planning Council adopted a Countywide Planning Policy that targets a reduction in countywide sources of GHG emissions of 25 percent by 2020, 50 percent by 2030, and 80 percent by 2050. King County will be responsible for assessment and reporting.

At a regional level, the division and its planning participants continue to strengthen and broaden waste prevention and recycling programs to continually improve our long-term, positive effects on the environment (discussed in detail in Chapter 4, *Sustainable Materials Management)*. As discussed in Chapter 4, the benefits are tangible in terms of reductions in GHG emissions, resource conservation, and energy savings.

Considerations of how division activities and operations might affect climate change involve both positive and negative impacts on GHG emissions. If areas where GHG emissions can be expected to occur are identified, strategies to mitigate those emissions can be developed, for example:

- The division contracts with Bio Energy Washington LLC to turn landfill gas into pipeline-quality natural gas for the energy market.
- The division builds facilities (such as the Shoreline, Bow Lake, and Factoria Recycling and Transfer Stations) that are more energy efficient to meet LEED standards. As previously noted, two of the facilities have earned a Platinum rating.



Compactors at the Factoria Recycling and Transfer Station compact trash, reducing the number of trips that county transfer trucks make to Cedar Hills

- Garbage compactors, both for solid waste and recyclables, are being installed at all new urban stations, which will decrease truck trips by up to 30 percent, saving fuel and decreasing emissions.
- In day-to-day operations, the division looks for ways to reduce resource use and increase the use of environmentally friendly products. Examples of operational practices that reduce greenhouse gas emissions include the use of compaction to reduce truck trips, reducing idling time, and exploring the use of compressed natural gas and other low-emitting technologies in trucks and equipment.
- The Food: Too Good to Waste program also helps curb the effects of climate change. Uneaten food accounts for 23 percent of all methane emissions – a potent climate change contributor. When food is thrown away, all the water and energy used to produce, package and transport that food is also wasted. The program educates people about how to plan and prepare meals to decrease the amount of wasted food.
- The division teamed up with the City of Seattle to produce Greenhouse Gas Emissions in King County (Stockholm Environment Institute 2012), a report that looked at greenhouse gas emissions from several different perspectives including undertaking a consumption-based inventory. The inventory offers a more complete picture of the County's environmental footprint, taking into account emissions associated with the production and consumption of food, goods, and services. The report's research shows that efforts such as reducing food waste or purchasing sustainable and low-impact products can help to create a broader and deeper impact on global greenhouse gas emissions.
- The division has planted deciduous and evergreen trees on the Duvall and Puyallup/Kit Corner closed landfills to create a carbon "sink" by capturing carbon dioxide through the process of photosynthesis.

The division also looks at the potential impacts of climate change on facilities and operations and determines strategies for adapting to those impacts. For example, the division is using more drought-tolerant plants in facility landscapes and identifying alternate transportation routes to avoid areas where there may be an increase in seasonal flooding.

King County – Climate Change

Proper solid waste management plays a significant role in reducing GHG emissions. That role is recognized by both state and local governments in Washington. In 2015, the Washington State Department of Ecology (Ecology) issued its Moving Washington Beyond Waste and Toxics Plan (Ecology 2015), which presents a long-term strategy for systematically eliminating wastes and the use of toxic substances. The *2015 King County Strategic Climate Action Plan* (King County 2015b) synthesizes and focuses King County's most critical goals, objectives, and strategies to reduce GHG emissions and prepare for the effects of climate change. It provides "one-stop-shopping" for county decision-makers, employees, and the general public to learn about the county's most critical climate change actions. As documented in the *2011 King County Sustainability Report* (King County 2011), GHG emissions from county operations (for sources other than transit) have stabilized and begun to decline. Building on these successes, achievement of the county's long-term targets is ambitious, but achievable.

King County's overarching targets:

- Communitywide: King County shall partner with its residents, businesses, local governments, and other partners to reduce countywide greenhouse-gas emissions at least 80 percent below 2007 levels by 2050.
- County operations: King County shall reduce total greenhouse gas emissions from government operations, compared to a 2007 baseline, by at least 15 percent by 2015, twenty-five percent by 2020, and 50 percent by 2030.
- Department of Natural Resources and Parks Carbon Neutral Commitment: The Department became Carbon Neutral in 2016. Both the Solid Waste Division and the Wastewater Treatment Division must be Carbon Neutral by 2025.

Throughout this Plan, ways to reduce impacts on the climate and adapt to changes that occur are noted. These actions are grouped in three primary strategies:

Mitigation – directly or indirectly reducing emissions. Examples include reducing energy use at division facilities, reducing fuel use, using hybrid vehicles, and promoting waste prevention and recycling to reduce the mining of virgin resources and emissions from manufacturing and processing activities. Another example is the conversion of gas collected at the county's landfill into pipeline-quality natural gas.

Adaptation – modifying facilities and operations to address the effects of climate change. Examples include designing facilities for more severe weather systems (e.g., roofs designed for greater snow loads), using more drought-tolerant plants in facility landscapes, and identifying alternate transportation routes to avoid areas where there may be an increase in seasonal flooding.

Sequestration – removing carbon dioxide from the atmosphere and depositing it back into natural "sinks," such as plants and soils. Examples include planting more trees around facilities to remove carbon dioxide through photosynthesis and using compost to replenish depleted soils and promote plant growth.

Factoria drought-tolerant plants and permeable pavement

Gas collection pipes at the Cedar Hills landfill.

Equity and Social Justice

King County is committed to ensuring that equity and social justice are considered in the development and implementation of policies, programs, and funding decisions. **Equity** is achieved when all people have an equal opportunity to attain their full potential. Inequity occurs when there are differences in well-being between and within communities that are systematic, patterned, unfair, and can be changed. These differences are not random; they are caused by our past and current decisions, systems of power and privilege, policies, and the implementation of those policies. **Social justice** encompasses all aspects of justice, including legal, political, and economic; it demands fair distribution of public goods, institutional resources, and life opportunities.

In solid waste system planning, the division examines ways that we may affect equity and social justice through our programs and services.

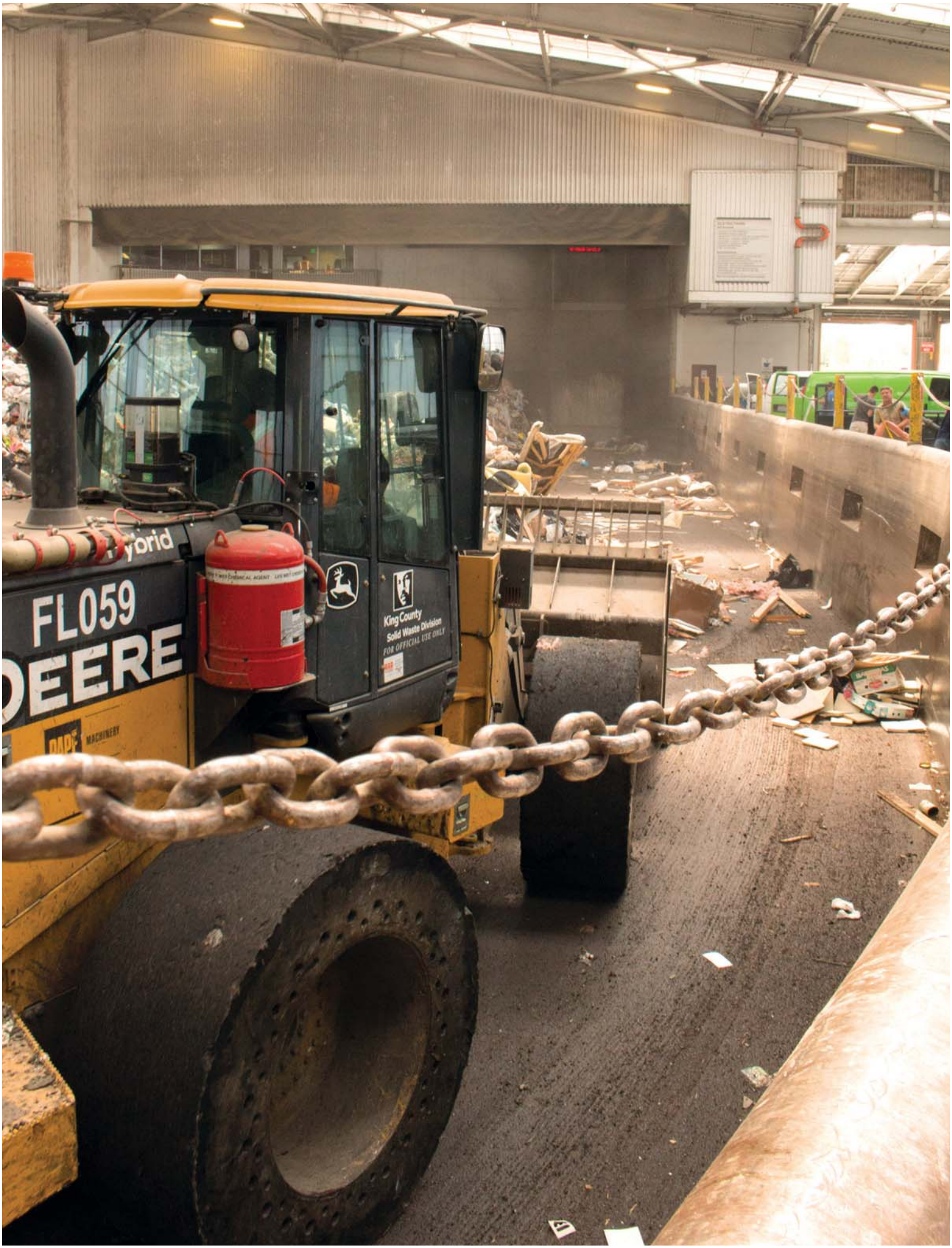
- Fair distribution of transfer facilities and division resources, such as the community litter cleanup, school education, and green building programs, helps ensure that everyone has access to services that create safer and healthier communities.
- The division provides technical assistance to ensure that the benefits of green building strategies, such as lower energy costs and improved indoor air quality, are available to residents of affordable housing developments.
- In siting new transfer facilities, the division engages communities to ensure equal opportunity for involvement in the siting process. The division uses demographic data to ensure that these essential public facilities are distributed equitably throughout the county and that any negative impacts of the facilities do not unfairly burden any community.
- In addition to translating materials into multiple languages, the division has added a Spanish-language component to its comprehensive outreach programs. Rather than simply translate existing materials, the division has worked directly with the local Spanish-speaking communities to create new programs and materials in Spanish that respond to the questions and needs of the community.

Green Building and Equity

The goal of the county's Equity and Social Justice Ordinance is for all King County residents to live in communities of opportunity. To reach this goal, all communities must be equipped with the means to provide residents with access to a livable wage, affordable housing, quality education, quality health care, and safe and vibrant neighborhoods. Green building can play an important role in providing safe, healthy, and affordable housing, public infrastructure, and commercial facilities, which have historically not been built to the highest green standards.

There are a variety of equity and social justice opportunities on any project including: education, training, apprenticeship, procurement, material selection, contracts, public outreach, public service, community amenities, communication, indoor and outdoor air quality, economic development, job creation, and more.

King County's Sustainable Infrastructure Scorecard, the green building rating system used for county-owned projects not qualified for the Leadership in Energy and Environmental Design certification, includes a Social Equity Credit as an opportunity to address equity and social justice issues. The county's Green Building Team is also working on additional guidance for capital projects to utilize an equity impact review tool. This tool helps project teams to evaluate how people and places are impacted by an action and to take into consideration distributional, process, and cross-generational equity.


FL059
King County
Solid Waste Division
FOR OFFICIAL USE ONLY

3 Forecasting and Data

Policies

FD-1 Monitor and report the amount, composition, and source of solid waste entering the transfer and disposal system.

FD-2 Update the solid waste tonnage forecast to support short- and long-term planning and budgeting for facilities and operations.

FD-3 Monitor and report waste prevention and recycling activity, including the amount of materials recycled, programmatic achievements, and the strength of commodity markets.

FD-4 Continue to monitor new and emerging technologies to identify opportunities for their use in managing solid waste and recyclables.

Summary of Recommended Actions

The following table includes a menu of recommended actions that the county and the cities should implement. Under the responsibility column, the entity listed first has primary responsibility for the action, bold indicates that the entity has responsibility for the action, and a star (*) indicates that the action is a priority. If the responsibility is not in bold, it indicates that the action is optional for the entity to implement.

Responsibility	Action	Detailed Discussion
1-fd Cities, county, collection companies	Standardize the sampling methodology and frequency in tonnage reports submitted to the division and the cities by the collection companies to improve data accuracy.	Page 3-11
2-fd County	Perform solid waste, recycling, organics, and construction and demolition characterization studies at regular intervals to support goal development and tracking.	Page 3-12
3-fd County	Monitor forecast data and update as needed.	Page 3-1

Forecasting and Data

The monitoring of solid waste disposal, recycling, and waste prevention, and the forecasting of future trends are fundamental to system planning. The division routinely collects data about the amount and composition of waste and recyclable materials in the system, tracks demographic and economic trends that will affect the amount of solid waste generated in the future, and conducts focused studies to address specific topics, such as markets for recyclable materials, industry trends, and new technologies.

Forecasts are used to estimate the amount of material expected to be disposed and recycled in the coming years, incorporating expected growth in population and other demographic and economic trends. This information can be used to estimate the necessary capacity of division transfer facilities and associated private-sector recycling facilities and markets.

Existing data and forecasts form the basis for discussions with cities and other stakeholders about options for the future, answering questions such as:

Division staff review plans

- How much waste are system users currently generating and expected to generate in the future?
- How can waste generation be reduced?
- What materials can be separated from the disposal stream and turned into a resource through reuse and recycling?
- Who uses the solid waste facilities and curbside services, how do they choose those services, how often do they use those services, and what influences their choices?
- What is the best method to provide these services?
- What changes in markets and technologies need to be incorporated into our analysis of options for the future?

Forecasts, planning data, and studies used in the development of this Plan are discussed in the following sections.

Forecasting

The division uses a planning forecast model to predict future waste generation over a 20-year period. Waste generation is defined as waste disposed plus materials recycled. The forecast is used to guide system planning, budgeting, rate setting, and operations. The primary objectives of the model are to: 1) estimate future waste disposal and 2) provide estimates of the amount of materials expected to be diverted from the waste stream through division and city waste prevention and recycling programs. The planning forecast model relies on established statistical relationships between waste generation and various economic and demographic variables that affect it, such as population, employment, and income.

In late 2007, a nationwide financial crisis severely compromised the division's ability to forecast short-term trends in the economy. With the collapse of large financial institutions, a downturn in the stock market, a drop in housing prices and personal income, a jump in the unemployment rate, and a general slump in overall economic activity, the recession led to many business bankruptcies and home foreclosures. The effects of these dramatic events touched every sector of the economy including the solid waste industry.

In 2007, garbage tons received at Cedar Hills surpassed the one million mark, due primarily to steady economic growth and population increases in the region over the previous few decades. Between December 2007 and December 2012, however, garbage tons disposed at Cedar Hills declined 20 percent overall. Garbage tons dropped eight percent in 2008 alone. The City of Seattle, surrounding counties, and jurisdictions in Oregon and California reported similar or greater declines in tonnage, as did regional recycling firms.

The recession created a great deal of unpredictably in variables used in the division's forecast model to predict the short-term (one- to five-year) trends in solid waste generation. To respond to this uncertainty, the division has adjusted its approach to forecasting, using a more flexible system of ongoing monitoring. This evolving forecast method involves:

- Monitoring solid waste tons delivered to division transfer stations and the Cedar Hills landfill on a daily basis;
- Regularly checking regional and state-wide economic forecasts (local economic forecasts by the firm Dick Conway and Associates, King County's economic forecast, and forecasts by the Washington State Economic and Revenue Forecast Council);
- Monitoring state-wide tax revenue streams, particularly in the home improvement sector, furniture store sales, clothing sector, and other key markets; and
- Communicating regularly with other jurisdictions about the trends in their service areas.

This information has been used to forecast short-term tonnage and subsequent revenues for use in critical budgeting, expenditure control, and management of capital projects over the three- to five-year period. The division is working on updating its forecast model by using demographic (population and employment), economic (income and tax revenues), financial (tip fees, inflation), and environmental (recycling rate) information variables.

The division periodically updates its long-term, 20-year forecast for use in planning. As mentioned previously, to predict solid waste generation over the long term, the planning forecast model relies on established statistical relationships between waste generation and various economic and demographic variables that affect it, such as:

- Population of the service area
- Employment
- Household size in terms of persons per household
- Per capita income (adjusted for inflation)
- Per capita tax revenues, minus tax revenues from auto sales (adjusted for inflation)

Increases in population, employment, and per capita income and decreases in household size typically lead to more consumption and hence more waste generated. Studies indicate that for the long-term planning forecast through 2040, the following trends are expected:

- Population[1] is expected to grow at a steady rate of one percent per year. Population growth is directly correlated with the amount of waste generated, i.e., more people equal more waste generated. See Figure 3-1 for estimates of population growth in each transfer station service area and Figure 3-2 for the projected share of population growth in each service area.

1 Projections for population, employment, and household size are based on 2015 data from the Land Use Vision 1 model developed by the Puget Sound Regional Council (PSRC). Data provided by PSRC are based on U.S. Census and other data sources and developed in close cooperation with the county and the cities.

Figure 3-1. Transfer Station Service Areas Population 2025-2040

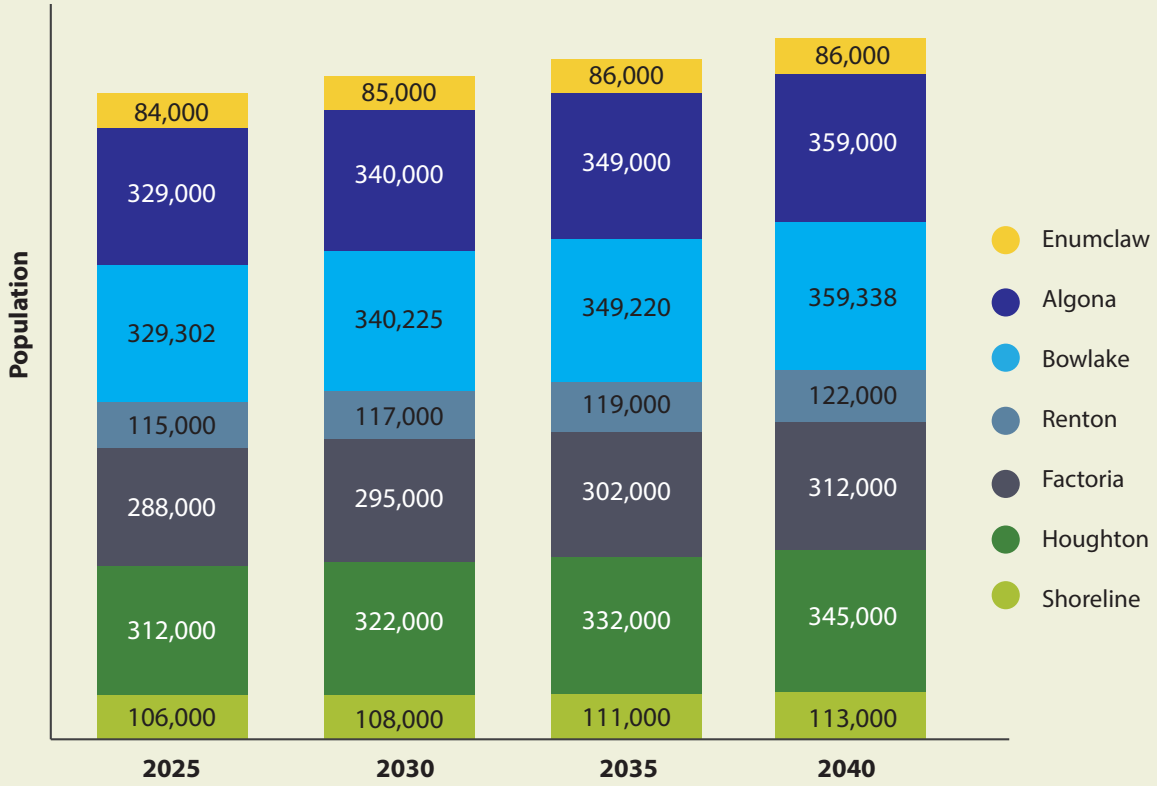
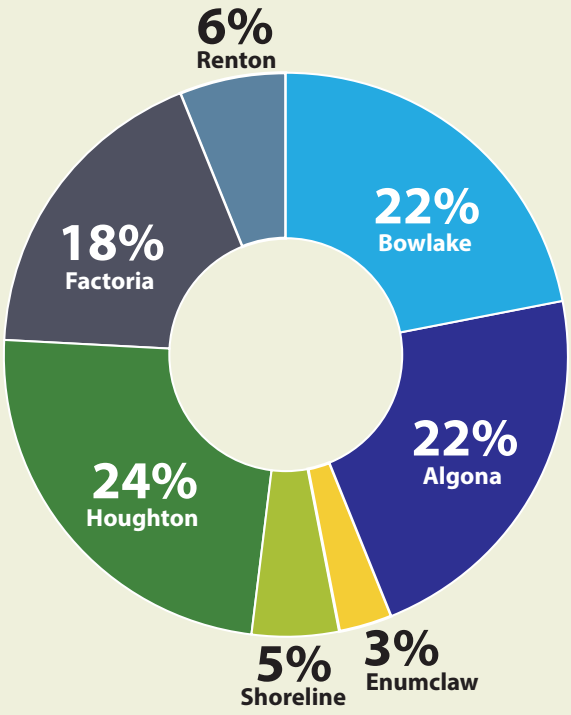


Figure 3-2. Estimated Share of Population Increase 2025 - 2040 for Transfer Station Service Areas

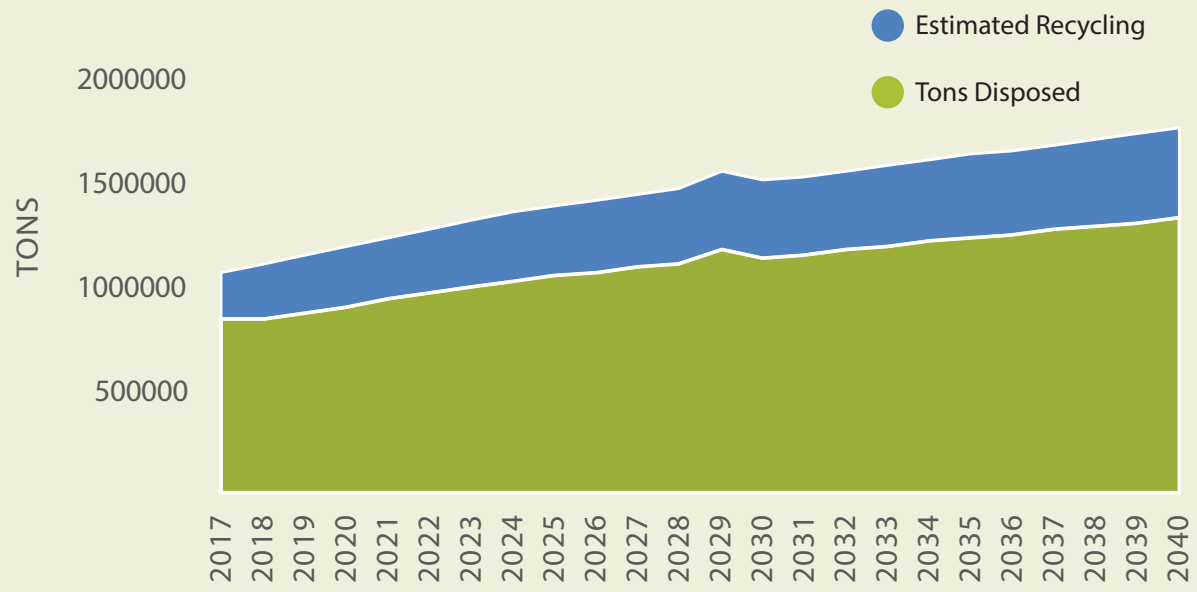


- Employment is expected to increase at an annual rate of two percent. Increased employment activity typically leads to an increase in consumption and waste generation.
- Household size is expected to decrease from an average of about 2.6 persons per household to 2.4 persons per household. The trend in household size reflects a nationwide move toward smaller family size and an aging population. Because a "household" implies a certain level of maintenance, mail, purchasing, and so on, a decrease in household size tends to increase waste generation per capita.
- Per capita income[2] is expected to grow by about three percent per year through 2040, before inflation. As with employment activity, increases in income typically lead to an increase in consumption and waste generation.

Developing the tonnage forecast is a multi-step process, in which waste disposal and waste diversion are calculated separately. In the first step, an econometric model is used to relate historical data for waste disposal and recycling to past demographic and economic trends in the region. Once these relationships are established, the model can be used to project future waste generation based on expected trends over the planning period, in this case to 2040. This first step produces a baseline disposal forecast, which assumes that the percentage of waste recycled remains constant.

In the second step, the future goals for waste prevention and recycling, incorporating additional programs and strategies for increasing waste diversion (discussed in Chapter 4), are used to calculate how much additional material is expected to be diverted from disposal given the same demographic and economic trends. This information is used to adjust the baseline forecast. Data on tons of materials recycled are provided by the curbside collection companies, division data from transfer facilities, and survey data collected annually by Ecology.

Figure 3-3. Projection of solid waste recycled and disposed 2017 - 2040



The projections shown in Figure 3-3 are based on a forecast developed in 2016. The projection assumes a starting recycling rate of 52 percent in 2016, increasing to 57 percent in 2018 and maintained into future years. The tonnage forecast will be routinely adjusted to reflect factors that affect waste generation, such as the success of waste prevention and recycling programs and future events that affect economic development.

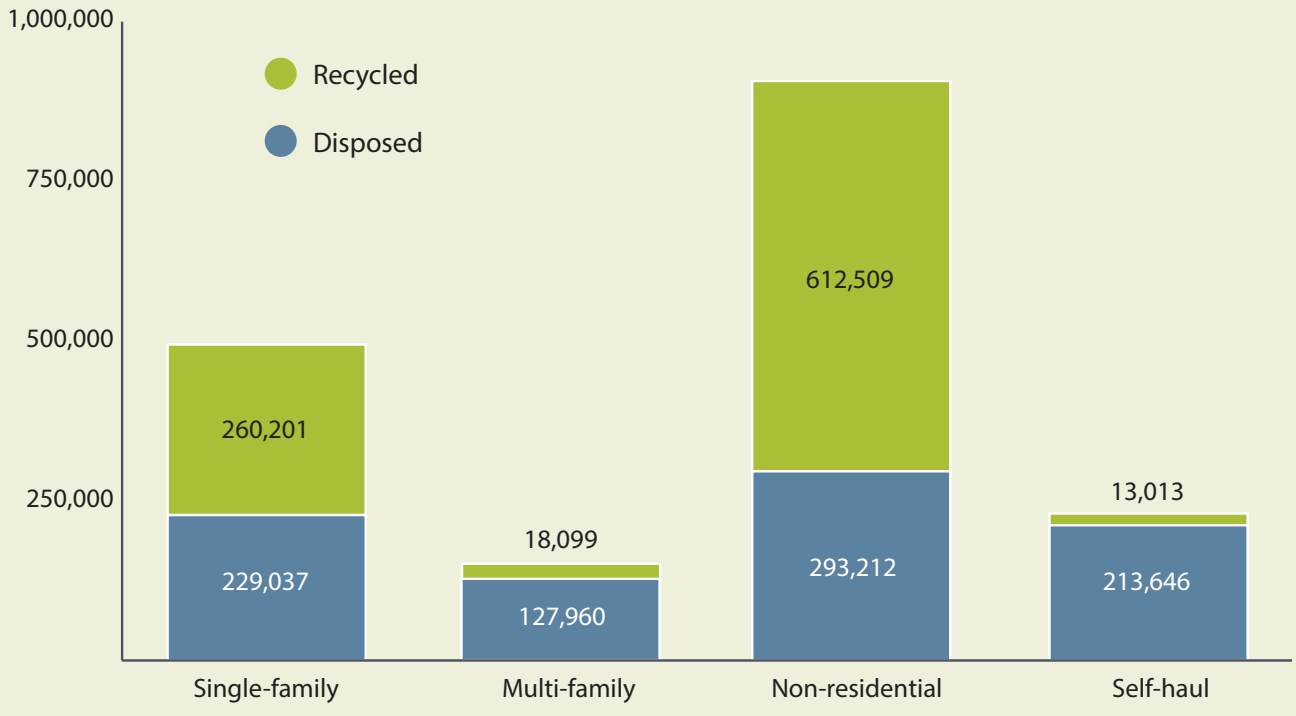
2 *The income data is from Conway & Petersen (Annual Forecast June 2017)*

Current Data on Regional Waste Generation, Recycling, and Disposal

Measuring the results of waste prevention and recycling efforts is a complex process. Discussions and data often focus on recycling and recycling rates, when in fact waste prevention is the number one priority. While programmatic successes for waste prevention can be assessed qualitatively, it is difficult, to measure directly how much waste is "not created" in terms of tons or percentages. What can be measured more accurately is recycling and disposal activities. Data for these activities are available through division tonnage and transaction records, reports from the curbside collection companies and the Washington State Department of Ecology (Ecology), and the division's waste characterization studies. Using data on the types and amounts of materials recycled, combined with measures of waste disposed, the division can evaluate its success in reaching the goals established with each successive comprehensive solid waste management plan.

Figure 3-4 shows the tons of materials recycled and disposed in 2014 (most recent data from Ecology) by category of waste generator – single-family residents; multi-family residents; non-residential customers such as businesses, institutions, and government entities; and self-haulers who bring materials directly to the division's transfer stations. More specific information on each generator type (including generators of construction and demolition debris for recycling and disposal) follows. Recycling data comes from numerous external sources. These are described in more detail in the section *Tracking Our Progress*. Note that the scale on each figure varies.

Figure 3-4. 2014 recycling and disposal by generator type



While there has been considerable progress in waste prevention and recycling over the years, there is still room for improvement. As Figure 3-4 illustrates, the non-residential sector provides the greatest opportunity to divert materials from disposal, with about 273,000 tons of materials disposed in 2014. Single-family residents are recycling more than

one-half of their waste, but division studies indicate that a large portion of the disposed materials could be recycled or reused (as discussed in the next section). The multi-family sector generates the least amount of garbage and recycling of all sectors, but shows a need for improvement in recycling.

The data shows that self-haulers as a group are recycling the smallest fraction of their waste. That may be because at many of the older transfer stations there is limited or no opportunity to recycle. At this time, however, two of the division's urban stations are undergoing or are being considered for renovation. A major goal of the renovation plan is to add space for collection of more recyclables and to build flexibility into the design to allow for collection of additional materials as markets develop. Adding space for collection of greater amounts and a wider array of materials is expected to result in higher recycling rates at the transfer stations.

With studies indicating that 70 percent of the waste that reaches the landfill could have been recycled or reused, and specific data on what those materials are, we can focus on areas that will have substantial influence on the region's per capita disposal rate. The following sections address each category of generator and identify some of the more significant areas for improvement.

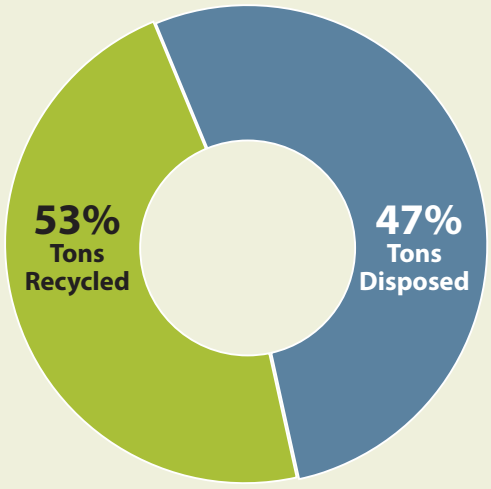
Single-Family Residents

Sixty-five percent of the households in the division's service area are single-family homes. In 2014, these single-family households recycled on average about 51 percent of their waste. Ninety-six percent of the yard waste and 75 percent of the paper were recycled by this sector in 2014 (Figure 3-5). While food scraps and food-soiled paper made up over 32 percent of the waste disposed by single-family residents in 2014, recycling of these materials has increased as participation in the curbside collection program for these materials continues to grow. Considerable amounts of the standard curbside recyclables – glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard – while easily recyclable, are still present in the waste disposal stream.

Figure 3-5. 2014 Recycling and disposal by single-family residents

Material	Tons Recycled	
Containers[a]	10%	19,594
Plastic bags & Wrap	1%	2,791
Mixed paper, newspaper, cardboard	27%	71,367
Food scraps & food-soiled paper	4%	10,569
Yard waste	57%	148,123
Scrap metal	1%	1,329
Other materials	0%	0

Tons Recycled: 260,201



Total Tons Generation: 489,238

Material	Tons Disposed	
Containers[a]	5%	11,756
Plastic bags & Wrap	8%	19,178
Mixed paper, newspaper, cardboard	9%	23,524
Food scraps & food-soiled paper	32%	79,677
Yard waste	3%	6,558
Scrap metal	1%	2,777
Other materials	42%	103,137

Tons Disposed: 229,037

[a]Tin, aluminum, glass, and recycled plastic

Recommendations for improving and standardizing curbside collection for single-family residents are discussed in Chapter 4, *Sustainable Materials Management*. Other recyclables found in the single-family waste stream in smaller amounts include scrap metal, textiles, plastic bags and plastic wrap, and some construction and demolition debris, such as clean wood and gypsum wallboard.

If all recyclable materials were removed from the single-family waste stream, nearly one-third of the remaining, non-recyclable materials would be disposable diapers and pet wastes.

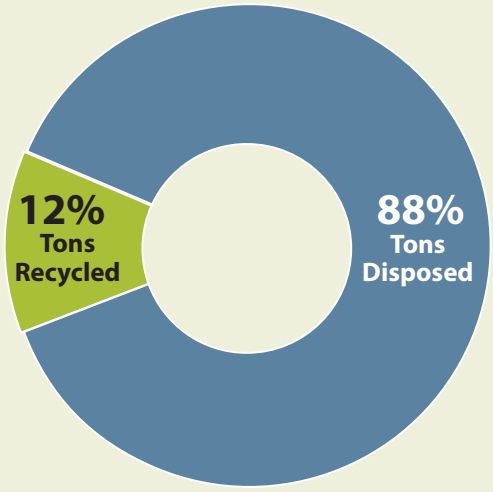
Multi-Family Residents

Thirty-five percent of the households in the service area are in multi-family complexes. In 2014, the average multi-family recycling rate in the county's service area was 12 percent. While this rate is considerably lower than the single-family rate, overall generation and disposal from multi-family residences is lower and the difference from single-family recycling rates is less when yard waste (which is minimal for multi-family) is removed from the calculation. As with single-family residents, the primary areas of opportunity are in recycling food scraps and food-soiled paper and the standard curbside recyclables, including paper and cardboard (Figure 3-6).

Figure 3-6. 2014 Recycling and disposal by multi-family residents

Material	Tons Recycled	
Containers[a]	19%	3,482
Plastic bags & Wrap	3%	496
Mixed paper	70%	12,758
Food scraps & food waste	0%	-
Yard waste	6%	1,127
Scrap metal	1%	236
Other materials	0%	-

Tons Recycled: 18,099



Total Tons Generation: 146,059

Material	Tons Disposed	
Containers[a]	6%	7,998
Plastic bags & Wrap	6%	8,252
Mixed paper	13%	17,144
Food scraps & food waste	32%	40,866
Yard waste	2%	2,892
Scrap metal	2%	2,931
Other materials	37%	47,877

Tons Disposed: 127,960

[a]Tin, aluminum, glass, and recycled plastic

Other materials present in the multi-family waste stream, both recyclable and non-recyclable, are similar to those found in the single-family waste stream.

It is difficult to track multi-family recycling rates because of: 1) the varied nature of multi-family complexes, 2) the growth in construction of mixed-use buildings that contain both residential and non-residential units, and 3) the varied levels of recycling services provided. What is clear is the need to provide adequate space for garbage and recyclables collection at these complexes and to standardize collection across the county.

A detailed discussion of ways to improve recycling at multi-family and mixed-use complexes is provided in Chapter 4, *Sustainable Materials Management*.

Non-Residential Generators

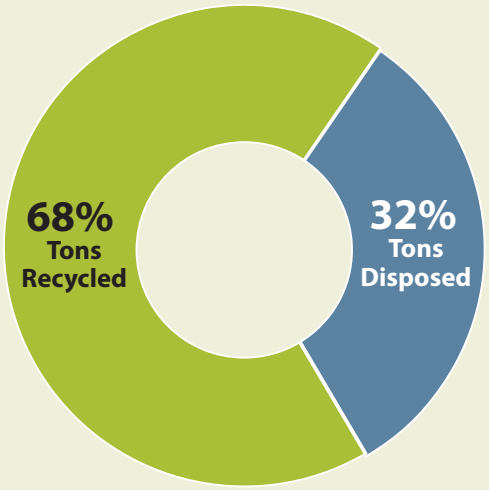
Nonresidential generators – businesses, institutions, and government entities – recycled an estimated 71 percent of their waste in 2014. Despite having the highest recycling rate of any sector, non-residential generators present the greatest opportunity for increasing King County's overall recycling rate (Figure 3-7). There are an estimated 716,000 employees in the service area working at an estimated 49,000 businesses and organizations. The make-up of the non-residential sector ranges from manufacturing to high-tech and retail to food services. The recycling potential for any particular business or industry varies depending on the nature of the business. For example, restaurants and grocers are the largest contributors of food waste, while manufacturers may generate large quantities of plastic wrap and other packaging materials. Because of the diversity of business and industry in the region, a more individualized approach is needed to increase recycling in this sector.

There are significant opportunities in the non-residential sector to increase the diversion of food scraps and food-soiled paper. The largest increase will be realized as more restaurants and grocers contract with private-sector companies to collect their food scraps for composting and more cities begin to offer commercial organics collection.

Figure 3-7. 2014 Recycling and disposal by non-residential generators

Material	Tons Recycled	
Containers[a]	6%	37,647
Plastic bags & Wrap	1%	8,103
Mixed paper, newspaper, cardboard	42%	254,996
Food scraps & food-soiled paper	19%	116,424
Clean wood	5%	32,344
Yard waste	9%	52,478
Scrap metal	9%	56,213
Carpet and pad, furniture, mattresses	0%	0
Other materials	9%	54,304

Tons Recycled: 612,509



Total Tons Generation: 905,721

Material	Tons Disposed	
Containers[a]	4%	13,006
Plastic bags & Wrap	8%	23,809
Mixed paper, newspaper, cardboard	14%	41,757
Food scraps & food-soiled paper	25%	74,273
Clean wood	5%	14,969
Yard waste	3%	8,614
Scrap metal	4%	12,327
Carpet and pad, furniture, mattresses	3%	8,428
Other materials	33%	96,029

Tons Disposed: 293,212

[a]Tin, aluminum, glass, and recycled plastic

Another opportunity for reducing overall disposal is with commercially generated paper. While large amounts of paper are being recycled, almost 42,000 tons of recyclable paper was disposed by businesses in 2014. Paper may also provide an opportunity for waste prevention – not just moving from disposal to recycling, but aiming to reduce the generation of waste paper.

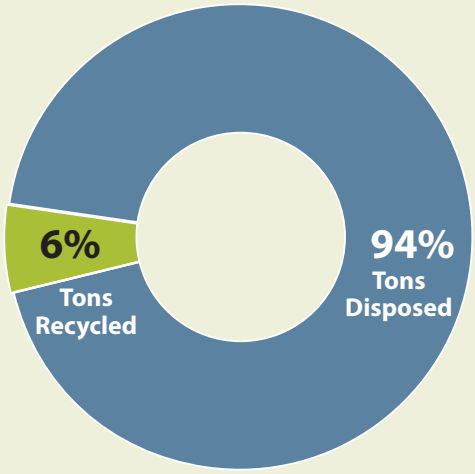
Self-haulers

Self-haulers are residential and non-residential customers who choose to bring garbage and recyclables to the transfer facilities themselves. According to on-site surveys conducted as part of the division's waste characterization studies, the two most common reasons given for self-hauling are: 1) having a large quantity of waste or large or bulky items to dispose, and 2) wanting to avoid the cost of commercial collection. About 40 percent of the materials disposed by self-haulers have the potential for recycling, most significantly clean wood, yard waste, scrap metal, and paper (Figure 3-8).

Figure 3-8. 2014 recycling and disposal by transfer facility self-haulers

Material	Tons Recycled	
Curbside recyclables[a]	23%	2,960
Food scraps & food-soiled paper	0%	0
Clean wood	10%	1,252
Yard waste	52%	6,707
Scrap metal and appliances	16%	2,094
Carpet and pad, furniture, mattresses	0%	0
Other materials	0%	0

Tons Recycled: 13,013



Total Tons Generation: 226,659

Material	Tons Disposed	
Curbside recyclables[a]	8%	17,431
Food scraps & food-soiled paper	3%	5,675
Clean wood	18%	39,230
Yard waste	8%	16,306
Scrap metal and appliances	5%	9,950
Carpet and pad, furniture, mattresses	13%	28,766
Other materials	45%	96,287

Tons Disposed: 213,646

[a]Glass and plastic containers, tin and aluminum cans, mixed paper, newspaper, and cardboard

At the older stations and drop boxes where space is limited, the division provides collection containers for the standard curbside recyclables, which include glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard. No recyclables are collected at the Algona Transfer Station. At the stations that have been renovated and there is more space, additional materials such as textiles, scrap metal, used bikes and appliances are also collected. Other materials will be collected as markets develop. There are a number of materials still prevalent in the self-haul waste stream for which there are currently insufficient or no recycling markets, such as treated and painted wood.

Generators of Construction and Demolition Debris

In 2014, nearly 900,000 tons of construction and demolition debris were generated in King County. Debris from the construction, remodeling, repair, or demolition of buildings, other structures, and roads includes clean wood,

painted and treated wood, dimensional lumber, gypsum wallboard, roofing, siding, structural metal, wire, insulation, packaging materials, and concrete, asphalt, and other aggregates.

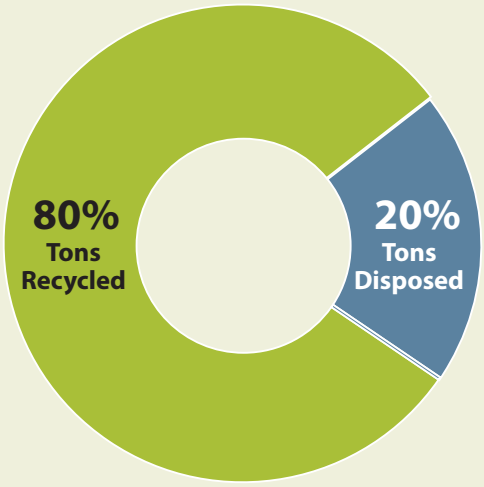
Clean wood makes up about 24 percent of the construction and demolition debris that is being disposed. Other recyclable construction and demolition materials that are being disposed include scrap metal, clean gypsum, and asphalt shingles.

Figure 3-9 shows the composition of construction and demolition materials diverted and disposed in 2014 based on reports from private processing facilities, Ecology data, and waste monitoring at the division's transfer stations (Cascadia 2012a). Most concrete, asphalt, and aggregates are source separated for recycling at jobsites and are not reflected in these numbers. For more information on construction and demolition debris collection and recycling see Chapter 4, *Sustainable Materials Management*.

Figure 3-9. 2014 Construction and demolition materials diverted and disposed

Material	Tons Recycled	
Clean wood	8%	57,536
Asphalt roofing	0%	1,466
Clean gypsum	6%	43,685
Metals	7%	53,724
Aggregates[a]	76%	545,723
Other recyclable materials[b]	1%	5,128
Materials with low recycling potential[c]	2%	11,532

Tons Recycled: 718,794



Total Tons Generation: 896,290

Material	Tons Disposed	
Clean wood[a]	24%	42,599
Asphalt roofing	17%	29,820
Clean gypsum	6%	10,117
Metals	4%	6,922
Aggregates[a]	6%	11,537
Other recyclable materials[b]	15%	26,269
Materials with low recycling potential[c]	28%	50,231

Tons Disposed: 177,496

[a]Diverted total includes only aggregate material (asphalt/concrete, brick and masonry) processed at mixed construction and demolition debris processing facilities; it does not include aggregate materials that are source separated at jobsites, which comprise approximately 450,000 tons of asphalt/concrete
[b]Includes glass, yard waste, carpet and pad, textiles, plastics, and paper
[c] Includes painted and treated wood, painted/demolition gypsum, plastics, and other mixed construction and demolition debris

Tracking Progress

The division uses a wide range of available data, both qualitative and quantitative, to evaluate the success of waste prevention and recycling efforts. Over the years, the division has developed a robust collection of surveys and data from a variety of sources to track progress. In most cases, more than one source of data is needed to accurately quantify how well the region is doing in diverting materials from the waste stream. For example, to track progress toward a target of 4.1 or fewer pounds of waste per employee per week, the number of employees in the service area for a given year is divided into the annual tons of garbage generated by the non-residential sector, as reported

in customer surveys conducted at transfer stations and information submitted to the division by the collection companies. Using these data, pounds per week can be calculated. The targets are tracked using aggregate data for the service area, rather than using data by individual city or unincorporated area.

The following subsections provide information on the types of data collected, how those data are calculated, and how reliable the data are, as well as recommendations on how the data might be improved.

Tonnage and Transaction Data

An automated cashiering system is used to track data on the tons of garbage received and number of customer visits at division transfer facilities. In-bound and out-bound scales weigh loads for all vehicles except sedans, which are charged a minimum fee that assumes a weight of 320 pounds or less. These data are used to track overall garbage tonnage and transactions at individual stations. Data for recyclables accepted for a fee, such as yard waste, are also tracked by the cashiering system. For recyclables collected at no charge, data are provided to the division by the hauling company that is contracted to collect them.

Reports from the Commercial Collection Companies

The private-sector companies that provide curbside collection of residential garbage and recyclables throughout most of King County submit monthly tonnage reports to the division. These reports are also provided to the cities. Data for single-family households are the most complete, providing the following monthly information for each city and for unincorporated areas operating under a Washington Utilities and Transportation Commission tariff:

- Tons of garbage disposed
- Tons recycled by material type
- Tons of organic materials recycled (yard waste, including food scraps for most areas)
- Number of garbage, recycling, and organics collection customers

Generally, customer counts and tonnage numbers for single-family garbage, recycling, and organics are the most reliable because they are based on weights measured at the entrance scale of either county transfer stations (for garbage) or material recovery facilities (for recyclables). To estimate the tons of individual materials (such as newspaper, aluminum cans, and so on), collection companies take periodic random samples and determine the percentage of each material present in the loads. As overall recycling tonnage is weighed, tons for individual materials are allocated based on the percentages obtained in the random sampling. The county has worked with the haulers to develop and implement a standard protocol for sampling in order to provide reliable estimates of the component recyclables and contaminant materials.

The same information provided for single-family residents is provided for multi-family residents and nonresidential generators; however, the per capita data are less accurate because the number of apartment units and business customers is not provided. In some cases, the same truck collects multi-family and nonresidential wastes, so collection companies must estimate how much waste comes from each generator type. Even though some waste may be allocated to the wrong generator type, overall changes in recycling and disposal are reflected in tonnage totals, thereby providing a reasonable indicator of change.

Since non-residential recycling collection is open-market and because many companies besides the large hauling companies provide commercial recycling services, a non-residential recycling rate cannot be calculated from the collection company data. This means that an overall system-wide recycling rate cannot be calculated using these data alone.

Ecology Survey Data

Data on the total tons recycled come from the annual statewide survey of recycling companies conducted by Ecology. These data supplement curbside collection data by including recyclables collected by private sector companies across the region. Recycling companies are required by state law to report tonnage data on the survey, which asks for tons by material type, by generator type (residential or non-residential), and by the county in which the materials were generated. For King County, companies are also asked if materials were generated in the City of Seattle.

The division uses the Ecology survey data to estimate both non-residential and overall recycling rates. All of the recycling tonnage reported by Ecology is counted as non-residential except for tonnage that was included in residential collection company reports and recycling tonnage from transfer stations. Use of this accounting method means that recyclables taken by residents to privately owned drop boxes or recycling centers are included in the non-residential recycling tonnage. Ecology survey data are also used to estimate construction and demolition debris diversion.

While the Ecology data provide the status of statewide efforts, there are some limitations to the usefulness of the data for local planning and evaluation, including the following:

- Because data from Ecology is not immediately available, there is about a three-year lag before the county is able to finalize annual recycling rates
- Data are self-reported by recycling companies, with few resources available to Ecology for checking accuracy
- Companies make unverified estimates about the county in which the recyclables were generated, and the reporting for data between King County and the City of Seattle has been inconsistent, resulting in tonnage variations from year to year which seem unlikely
- City-specific information, other than for the City of Seattle, is not available
- The identification of residential versus non-residential sources is not reliable
- The identity of some companies that report data is confidential, limiting the ability to verify the quantities reported, and some of the companies with confidential data report only statewide totals, which requires the county to estimate allocation based upon population percentages
- Significant amounts of metal are reported; it is difficult to determine how much of this metal should be counted as municipal solid waste, how much as construction and demolition debris, and how much as auto bodies, which the county does not include in its waste generation or recycling totals

Improving the reliability of recycling data would greatly benefit our ability to evaluate progress in reaching our recycling goals. The division will work with Ecology and the cities to develop voluntary agreements with recycling companies that will improve data reporting and resolve data inconsistencies.

Waste Characterization Studies

Since 1990, the division has conducted a Waste Monitoring Program to understand who uses solid waste system facilities, what materials they bring to the stations, how and why they use our facilities, and how satisfied they are with the services provided. To answer these questions, the division retains consultants to conduct both waste characterization studies and customer surveys that analyze the municipal solid waste received at county facilities

for disposal at Cedar Hills. For these studies, the waste stream is examined by collecting and sorting sample loads delivered to transfer facilities in King County. These studies help the county and the cities understand the composition of both the overall waste stream and what is received from different types of generators, such as residents of single-family homes and apartments, non-residential customers, and self-haulers. Separate analyses are conducted of the construction and demolition debris and organics waste streams.

The waste characterization studies are designed to provide a statistically valid picture of what is being disposed by the different generator types. Samples are taken over the course of a full year to account for seasonal variations. The sampling method is designed to ensure that all generator types and geographical areas are sufficiently sampled. The studies provide a high level of confidence of what is in the waste stream. Each study, described below, is conducted by the division as necessary to provide up-to-date information for planning purposes.

Solid Waste Characterization Studies

The most recent study of solid waste destined for Cedar Hills was conducted in 2015 (Cascadia 2015a). For this study, 421 samples were collected on 28 sampling days. The waste stream was separated into 97 categories of material. For each material and generator classification, the study was designed to achieve a 90 percent confidence interval for the amount of waste disposed countywide. In other words, the study tells us that we can be 90 percent sure that the amount of cardboard disposed in 2015 was 3.1 percent (26,112 tons) of the total waste stream, plus or minus 0.3 percent.

These waste characterization studies are not designed to characterize each city's waste stream. However, based on sampling done in a variety of communities, the types of materials disposed by residents are similar, while the amounts may differ. For example, jurisdictions with food waste collection programs will have lower percentages of food in their garbage than those without. These differences are reflected in the recycling rates and pounds disposed per household for each jurisdiction.

Garbage at the Bow Lake Recycling and Transfer Station

In-person surveys are also administered to customers bringing materials to transfer facilities (Cascadia 2015a). Customers are asked about the types of wastes they are bringing, the origin of those wastes, reasons for self-hauling (rather than using curbside collection services), how often waste is self-hauled, and willingness to separate out various recyclable materials. These surveys provide a better understanding of the customers who visit the stations and, in turn, provide the proper levels of service. The surveys are also useful in informing programmatic decisions.

Customer satisfaction surveys are also conducted at the stations to evaluate the level of satisfaction with customer service and the disposal and recycling services provided at division facilities (Cascadia 2016). The division uses this information to monitor its performance and identify areas where improvements can be made.

Organics Characterization Studies

Curbside yard waste collection services throughout King County accept food waste (food scraps and food-soiled paper), and the division is now working to measure how much food waste is actually collected from residential sources. Reports from the collection companies provide information about total tons of organics delivered to compost facilities, but do not differentiate between yard waste tons and food scrap tons. The solid waste characterization studies described above measure decreases of food scraps and food-soiled paper in the waste stream, but not whether the decreases result from curbside collection or from other diversion, such as home composting.

To improve our ability to measure progress in organics recycling and establish achievable goals, the division is conducting periodic characterization studies of organics collected at the curb from single-family households. The division conducted its fourth organics waste characterization in 2017 (Cascadia 2017b) and plans to conduct studies every two to three years. The study looked at total organics generation, assessing how much food scraps were disposed in the organics cart and the garbage can. The division has started planning for discussions with stakeholders to ensure there is adequate organics processing capacity for the materials now being disposed to be processed more sustainably in the future.

Construction and Demolition Debris Characterization Studies

In 2001, the division began to conduct periodic characterization studies of construction and demolition debris disposed at select private facilities by commercial and self-haulers, as well as small quantities delivered to division transfer stations by self-haulers. The studies measure the composition of construction and demolition debris that continues to be disposed instead of recycled. Three studies have been conducted to date, with the last study completed in 2011 (Cascadia 2012a). Information from the waste composition helped to inform what materials would be designated as readily recyclable under the new construction and demolition debris recycling ordinance (see Chapter 4, *Sustainable Materials Management* for more information).

Planning Tools

To support overall system planning and determine appropriate rates, the division conducts focused studies to evaluate elements of the solid waste system and its operations, emerging technologies and industry challenges, and private-sector markets for recycling and reuse. The division will conduct additional planning studies as needed to explore a variety of topics including best practices in solid waste management, alternative disposal technologies, and sustainable financing.

Major studies used in development of the Plan are listed on the next page. (plans or studies approved by Council action are noted).

Plans and Studies

- *2001 Comprehensive Solid Waste Management Plan* (KCSWD 2002) - This is the last adopted plan. The 2001 Plan was approved by the King County Council in 2002.
- *Solid Waste Transfer and Waste Management Plan* (KCSWD 2006b) – Provides recommendations to guide the future of solid waste management, including the renovation of the urban transfer system and options for extending the life of the Cedar Hills Regional Landfill. The plan was approved by the King County Council in December 2007.
- *Solid Waste Transfer and Waste Management Plan Review* (KCSWD 2013) - The division conducted this review in response to a budget proviso in Ordinance 17619. The purpose of the review was to assess transfer station options and resulting impacts to cost, service and the environment. The recommendations helped inform changes to the plans for the Factoria, South County, and Northeast County recycling and transfer station projects.
- *Solid Waste Transfer and Waste Management Plan Review Part II* (KCSWD 2015) - In response to Council Motion 14145, the division, in collaboration with stakeholders, continued to evaluate a mix of capital facilities and operational approaches to address system needs over time, including potential demand management strategies (such as peak hour pricing or controlled access hours) that could motivate changes in how customers use transfer stations, thereby potentially reducing the need for added transfer station capacity in the northeast county.
- *Sustainable Solid Waste Management Plan* (KCSWD 2014) - Evaluates operational and strategic planning options and provides recommendations on implementation approaches. The study focuses on five areas: resource recovery at division facilities; construction and demolition debris management; organics processing; disposal alternatives and technologies; and sustainable system financing.
- *Project Program Plan: Cedar Hills Regional Landfill 2010 Site Development Plan* (KCSWD 2010b) – Summarizes the preferred alternative for development of the landfill based on environmental review, operational feasibility, cost, stakeholder interest, and flexibility to further expand landfill capacity if future circumstances warrant. The plan was approved by the County Council in December 2010.
- *Final Environmental Impact Statement for the Cedar Hills Regional Landfill 2010 Site Development Plan* (KCSWD 2010a) – Identifies development alternatives for the landfill, outlines the environmental impacts of each alternative, and identifies potential mitigation measures, and recommends a preferred alternative.
- *DRAFT 2013 Comprehensive Solid Waste Management Plan* (KCSWD 2013c). The draft update of the 2001 Comprehensive Solid Waste Management Plan was used as the basis for this Plan update.

Division staff review plan for centralized project management unit.

- *Cedar Hills Site Development Alternatives Final Report, Volumes 1 and 2* (KCSWD 2017a) - Summarizes the options for continued development of the landfill based on operational feasibility, cost, stakeholder interest, and flexibility to further expand landfill capacity if future circumstances warrant.
- *Executive Proposed Solid Waste Disposal Fees 2017-2018* (KCSWD 2016) – Rate study that examines four key inputs that determine solid waste disposal fees – financial assumptions, tonnage forecast, revenue and expenditures projections, and required target fund balance. Fees are calculated to ensure that revenues are sufficient to cover the costs of operations and services; funds are available for landfill closure and maintenance and capital investment projects for the transfer and disposal system; and a reserve Operating Fund balance is maintained. The 2017-2018 Proposed Solid Waste Disposal Fees were approved by the King County Council in September 2016.

Evaluation of Technologies

- *Comparative Evaluation of Waste Export and Conversion Technologies Disposal Options* (R.W. Beck 2007) – Provides a planning-level assessment and comparison of various solid waste conversion technologies and waste export.
- *2006 Material Recovery Facility Assessment* (Cascadia 2006a) – Provides an assessment of four materials recovery facilities where commingled recyclables collected at the curb are sorted and processed. The purpose was to quantify and characterize materials processed at the materials recovery facilities. Materials recovery facilities activity and capacity will continue to be tracked as necessary to monitor the need for improvements and to ensure there is processing capability for additional materials diverted from disposal in the future.
- *King County Waste to Energy Study* (Normandeau 2017) – Evaluates waste-to-energy technologies and recommends the technology that best matches King County's circumstances.
- *Anaerobic Digestion Feasibility Study* (HDR 2017) – Assesses the viability of several different scenarios using anaerobic digestion to process organic materials collected in King County.

Cedar Hills Regional Landfill

Waste Prevention and Recycling Studies

- *Sustainable Curbside Collection Pilot* (KCSWD et al. 2008b) – Presents results of a pilot study to test the feasibility and public acceptance of every-other-week curbside garbage collection. Conducted in the City of Renton, the pilot study was performed in conjunction with Public Health – Seattle & King County and Waste Management, Inc.

- *Greenhouse Gas Emissions in King County: An Updated Geographic-plus Inventory, a Consumption-based Inventory, and an Ongoing Tracking Framework* (King County 2012) - Presents results from two different, but complementary, inventories of GHG emissions associated with King County, Washington.
- *Optimized Transfer Station Recycling Feasibility Study* (KCSWD 2013) - Evaluates methods to optimize County resources being dedicated to recycling activities at division transfer facilities.
- *Waste Monitoring Program: Market Assessment for Recyclable Materials in King County* (Cascadia 2015a) – Helps identify opportunities and establish priorities for market development and increased diversion of recyclable materials from the waste stream. Data from the market assessment are used to guide the direction of future recycling programs and services recommended in this Plan.

Other Plans Considered

The comprehensive solid waste management plan is just one component of regional planning for land use, development, and environmental protection in King County. The division considers plans developed by the state, the county, and the City of Seattle in its own planning process to ensure consistency with other planning efforts in the region. The following list was used in the development of this Plan; in future planning efforts, the division will refer to the newest version of these plans.

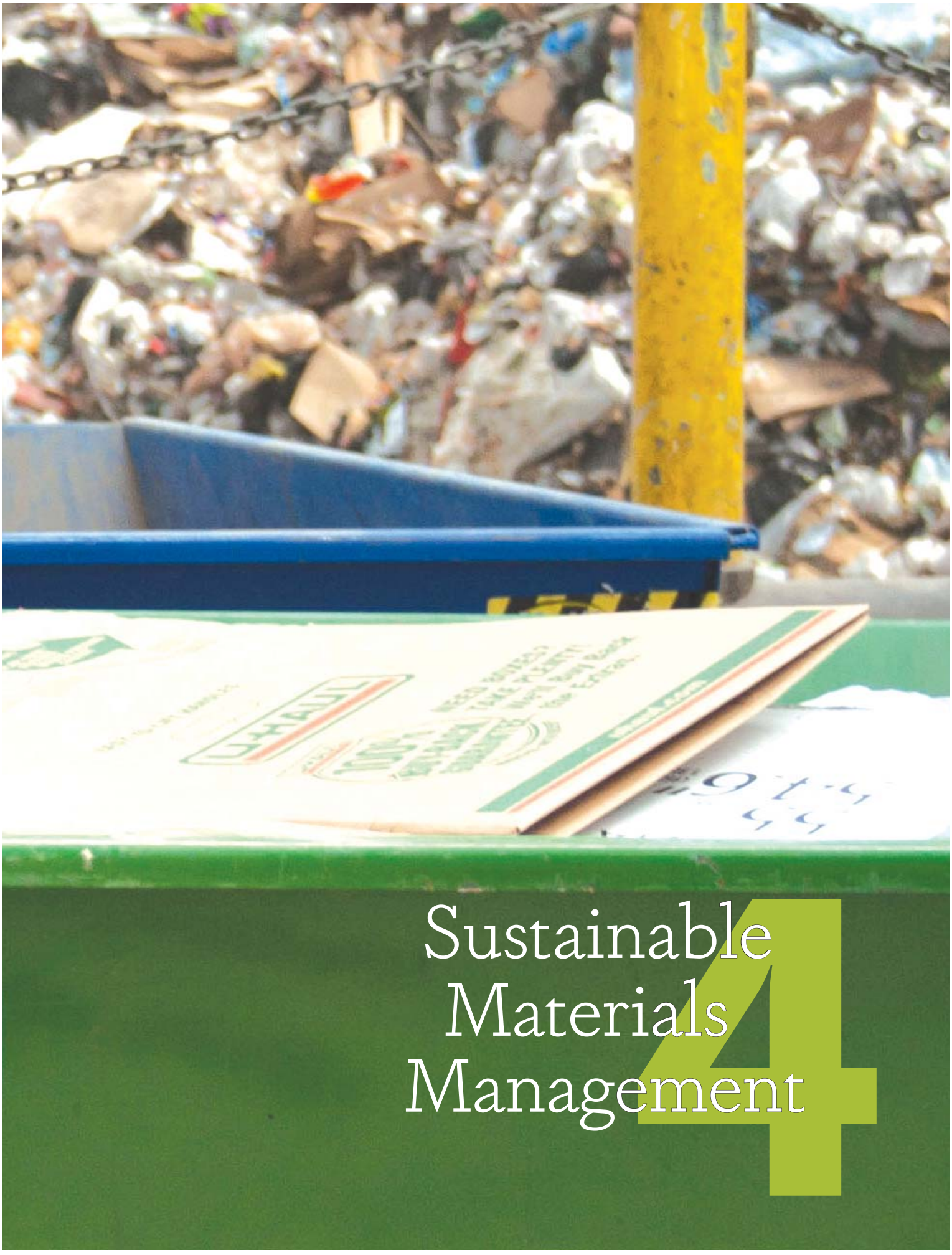
- *The State Solid and Hazardous Waste Plan: Moving Washington Beyond Waste and Toxics* 2015 Update (Ecology 2015) – Presents the state's long-term strategy for systematically eliminating wastes and the use of toxic substances. The plan includes initiatives that focus on expanding the recycling of organic materials and advancing green building practices.
- *Strategic Climate Action Plan* (King County 2015) – Synthesizes King County's most critical goals, objectives, strategies and priority actions to reduce greenhouse gas emissions and prepare for the effects of climate change. It provides a single resource for information about King County's climate efforts.
- *2016 King County Comprehensive Plan (2016 Update)* (King County 2016a) – The guiding policy document for all land use and development regulations in unincorporated King County, as well as for establishing the establishment of Urban Growth Area boundaries and regional services throughout the county, including transit, sewers, parks, trails, and open space. Updates to the 2016 plan were adopted by the County Council in December, 2016.

Division staff conducting sampling

- *King County Strategic Plan* (King County 2015b) – Presents countywide goals for setting high standards of customer service and performance, building regional partnerships, stabilizing the long-term budget, and working together as one county to create a growing economy and sustainable communities. This Plan supports each of the primary goals of the King County Strategic Plan, with particular emphasis on environmental sustainability and service excellence.

- *On the Path to Sustainability and 2011 Plan Amendment-Picking Up the Pace to Zero Waste* (City of Seattle 1998/2011) – The City of Seattle's solid waste management plan, including goals for recycling and waste prevention.
- *2010 Local Hazardous Waste Management Plan Update* (Watson et al. 2010) – Presents plans for managing hazardous wastes produced in small quantities by households and businesses and for preventing these wastes from entering the solid waste stream.
- *King County Equity and Social Justice Strategic Plan 2016-2022* (King County 2016b) - The county's blueprint for change that will guide policies and decision-making, design and delivery of services, and workplace practices in order to advance equity.


331
331
King County
DEPARTMENT OF
NATURAL RESOURCES AND PARKS
Solid Waste Division
FOR OFFICIAL USE ONLY



Sustainable Materials Management

4

Policies

Goal Achieve Zero Waste of Resources – to eliminate the disposal of materials with economic value – by 2030, with an interim goal of 70 percent recycling through a combination of efforts in the following order of priority:

a. Waste prevention and reuse
b. Product stewardship
c. Recycling and composting
d. Beneficial use

S-1 Set achievable targets for reducing waste generation and disposal and increasing recycling and reuse.

S-2 Enhance, develop, and implement waste prevention and recycling programs that will increase waste diversion from disposal using a combination of tools:

a. Infrastructure
b. Education and promotion
c. Incentives
d. Mandates
e. Enforcement
f. Partnerships

S-3 Advocate for product stewardship in the design and management of manufactured products and greater responsibility for manufacturers to divert these products from the waste stream.

S-4 Prevent waste generation by focusing on upstream activities, including encouraging sustainable consumption behaviors, such as buying only what one needs, buying durable, buying secondhand, sharing, reusing, repairing, and repurposing.

S-5 Work with regional partners to find the highest value end uses for recycled and composted materials, support market development, and develop circular supply loops to serve production needs.

S-6 Strive to ensure that materials diverted from the King County waste stream for recycling, composting, and reuse are handled and processed using methods that are protective of human health and the environment.

Policies

S-7 Provide for efficient collection of solid waste, recyclables, and organics, while protecting public health and the environment, promoting equitable service, and maximizing the diversion of recyclables and organics from disposal.

S-8 Promote efficient collection and processing systems that work together to minimize contamination and residual waste, and maximize diversion from disposal.

Summary of Recommended Actions

The following table includes a menu of recommended actions that the county and the cities should implement. Under the responsibility column, the entity listed first has primary responsibility for the action, bold indicates that the entity has responsibility for the action, and a star (*) indicates that the action is a priority. If the responsibility is not in bold, it indicates that the action is optional for the entity to implement.

Responsibility	Action	Detailed Discussion
1-s Cities, county	Lead by example by improving waste prevention and recycling in public-sector operations, facilities, and at sponsored events, as well as through the purchase of sustainable products.	Page 4-2
2-s County, cities, and other stakeholders*	Provide regional education outreach support and incentive programs to overcome barriers for residents and businesses to effectively prevent waste. Emphasize the primary importance of purchase and product use decisions that prevent waste, and secondary importance of recycling items/materials that couldn't be prevented. Work in partnership with other governments, non-governmental organizations, and the private sector to maximize the effectiveness of these efforts.	Page 4-8
3-s County	Provide waste prevention and recycling education programs in schools throughout the county, and help schools and school districts establish, maintain, and improve the programs.	Page 4-11
4-s County, in partnership with the Northwest Product Stewardship Council, cities, Department of Ecology, local businesses, and other stakeholders*	Pursue product stewardship strategies through a combination of voluntary and mandatory programs for products that contain toxic materials, are difficult and expensive to manage, and/or need sustainable financing, including, but not limited to, paint, carpet, fluorescent bulbs and tubes, mercury thermostats, batteries, unwanted medicine, mattresses, e-waste, paper and packaging, plastic bags and film, and sharps. Strategies may include Right to Repair legislation and framework legislation for addressing producer responsibility.	Page 4-12
5-s Cities, county	Evaluate options to transition away from recycling collection events as enhanced recycling services are provided at renovated transfer stations, improved bulky item collection becomes available and cost effective curbside, and product stewardship programs emerge.	Page 4-17

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
6-s County, cities	Work with food producers, grocers, restaurants, and schools to prevent food waste and to increase food recovery through donation of surplus meals and staple food items to local food banks.	Page 4-11
7-s County	Provide technical assistance and promote proper deconstruction, building reuse, and reuse of building materials.	Page 4-35
8-s Cities, county	Reduce consumer use of common single-use items – for example, promote reusable shopping and produce bags.	Page 4-10
9-s County	Provide information and technical assistance to external agencies, such as local governments, schools, colleges, and other public and private organizations to increase their purchase of sustainable products. Support implementation of the county's Sustainable Purchasing Policy through waste reduction, recycling, use of recyclable products, and green building.	Page 4-20
10-s Cities, county	Adopt green building policies and regulations that support the design of buildings and structures that are carbon neutral, are energy efficient, and use recycled materials.	Page 4-1
11-s County	Assist cities in developing green building policies and practices; encourage green building through Leadership in Energy and Environmental Design (LEED), Built Green™, Living Building Challenge, and other certification programs.	Page 4-32
12-s County	Continue to support the cities' implementation of the Plan through the county waste reduction and recycling grant program and allocation of Local Solid Waste Financial Assistance funds from the Washington State Department of Ecology. The county should strive to maintain the level of funding to cities, increasing waste reduction and recycling grant amounts as Local Solid Waste Financial Assistance funding decreases; and should revise or amend grant criteria to reflect priority Comprehensive Plan actions.	Page 4-17
13-s County	Work collaboratively with cities and other stakeholders to develop a new competitive grant program funded from the tip fee that would be available to private entities, non-profits, and cities to support innovative programs that help meet plan goals.	Page 4-18

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
14-s County*	Increase regional capacity for recycling of construction and demolition materials through education and enforcement of construction and demolition debris recycling requirements.	Page 4-35
15-s County*	Ensure that construction and demolition debris is managed in an environmentally sound manner by privately owned landfills via enforcement of construction and demolition debris handling requirements contained in county code.	Page 4-35
16-s County, cities*	Work collaboratively with cities to implement building codes that require compliance with construction and demolition debris recycling and handling requirements contained in county code. The county will provide outreach/promotion for city permitting and enforcement staff.	Page 4-35
17-s County	Continue to explore options to increase the diversion of construction and demolition debris from disposal, particularly for wood, metal, cardboard, asphalt shingles, carpet, and gypsum wallboard.	Page 4-35
18-s County*	Work with public and private partners to support the development of reuse and recycling value chains, including markets, for target products and materials. Employ incentives and material-specific projects that reduce or eliminate barriers to reuse and recycling.	Page 4-18
19-s County	The County should use the following targets to measure the progress toward the goal of zero waste of resources. These targets should be evaluated at least every three years when data becomes available from the waste monitoring studies. 1. Generation rate target: • Per capita: 20.4 pounds/week by 2030 • Per employee: 42.2 pounds/week by 2030 2. Recycling rate target: Interim goal of 70 percent 3. Disposal rate target: • Per capita: 5.1 pounds/week by 2030 • Per employee: 4.1 pounds/week by 2030	Page 4-5
20-s County	Develop a target for reducing greenhouse gas emissions from disposed waste by 2030, with 2007 emissions used as a baseline for comparison.	Page 4-12

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
21-s County, WUTC	Involve the Vashon/Maury Island community and service providers to develop the appropriate type of recycling services provided curbside and at the transfer station. Include Vashon in the county's collection service standards for curbside services.	Page 4-21
22-s Cities, county	Explore options to increase the efficiency and reduce the price of curbside and multi-family collection of bulky items, while diverting as many items as possible for reuse or recycling.	Page 4-28
23-s Cities, county*	Increase education outreach and promotion to single-family, multi-family, and non-residential customers to encourage recycling and reduce waste.	Page 4-20
24-s Cities, county*	Continue to develop infrastructure and increase regional and local educational outreach, incentives and promotion to increase recycling of food scraps and food-soiled paper. These efforts should target single-family and multi-family residential developments, as well as non-residential buildings such as schools, institutions, and businesses.	Page 4-15
25-s Cities, county*	Adopt the single and multi-family minimum collection standards.	Page 4-30 & 4-31
26-s County, cities	Develop a process and criteria to amend the designated recyclables list if conditions warrant adding or removing recyclables.	Page 4-14
27-s County, cities	Update and enforce building code requirements to ensure adequate and conveniently located space for garbage, recycling, and organics collection containers in multi-family, commercial, and mixed-use buildings.	Page 4-30
28-s Cities, county, collection companies	Continue to educate customers on proper recycling techniques to reduce contamination of recyclables and organic feedstocks going to the material recovery facilities and compost facilities.	Page 4-8
29-s County, WUTC	Consider improvements to single-family collection services in the unincorporated area to increase the recycling rate.	Page 4-28

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
30-s Cities	Include non-residential recycling services in city contracts (consistent with state law).	Page 4-33
31-s Cities	Consider implementing an incentive-based rate structure for non-residential garbage customers to encourage recycling.	Page 4-33
32-s County, cities	Assess and develop options if selected actions are not enough to achieve an overall 70 percent recycling rate.	Page 4-3
33-s County, cities	Increase single-family food scrap recycling through a three-year educational cart tagging program.	Page 4-15
34-s County, cities	Make recycling at multi-family complexes convenient by implementing best practices.	Page 4-30
35-s County, cities	Develop a list of effective waste prevention and recycling efforts that can be implemented using existing and new grant funds.	Page 4-17

Sustainable Materials Management

In 1989, the state adopted the Waste Not Washington Act, making waste prevention and recycling the preferred method of managing solid waste and requiring jurisdictions to provide curbside recycling services to all residents living in urban areas. In King County, the division, cities, Washington Utilities and Transportation Commission (WUTC), and solid waste collection companies worked together to launch a coordinated system for curbside collection of recyclables throughout the region. Working together over the last almost 30 years, both the public and private sectors have taken the region well beyond curbside recycling by creating myriad programs and services that foster the recycling and reuse of materials that might otherwise be thrown away and, more importantly, that prevent waste from being created in the first place

Since the *2001 Comprehensive Solid Waste Management Plan* was adopted, the collection system in the region has evolved significantly. The number of materials that can be recycled or processed for recycling and reuse has increased, technologies for collecting materials have improved, and participation in curbside recycling has continued to climb.

Two key developments have added to the success of single-family residential curbside recycling in the region. First is the transition to commingled (or single-stream) collection. Since 2001, the collection companies have transitioned to commingled recycling, whereby all the recyclable materials are placed in one large cart for curbside pickup.

A second development is the addition of food scraps and food-soiled paper to yardwaste collected curbside. In 2001, the division began working with cities and collection companies to phase in curbside collection of food scraps and food-soiled paper in the yard waste (organics) cart. Compostable food scraps and food-soiled paper, which currently make up about one-third of the waste disposed by single-family residents, include all fruit, vegetable, meat, dairy products, pastas, grains, breads, and soiled paper used in food preparation or handling (such as paper towels). Food and yard waste, either separated or commingled, are referred to as organics. Nearly 100 percent of single-family customers who subscribe to garbage collection now have access to curbside food scrap collection. Only Vashon Island and the Skykomish and Snoqualmie Pass areas, which house less than one percent of the county's residents, do not have this service.

In addition to these major developments, programs such as Leadership in Energy and Environmental Design (LEED) and Built Green™ are encouraging the building community to focus on waste prevention, recycling, and reuse of construction and demolition debris and helping to stimulate markets for the recycling and reuse of construction and demolition materials.

Food scraps can be collected in small containers lined with compostable bags to make it easier to recycle

In the 1980s, projections indicated that with the growing population and economy in the region, the amount of garbage that residents of King County would throw away would continue to climb steeply. Through the efforts of the county and area cities, businesses, and individual citizens, the amount of garbage disposed per resident per week dropped from 35 pounds in the 1980s to 15.2 pounds in 2014–a reduction of almost 57 percent. This reduction in disposal has contributed to extending the life of the Cedar Hills Regional Landfill (Cedar Hills) by more than 20 years.

Yet even with the increased recycling and waste prevention seen over the years, recent waste characterization studies conducted by the division indicate that about 70 percent of all materials disposed in the landfill are resources that could have been recycled or reused. As discussed in this chapter, identifying what these materials are and who generates them can help us determine where future efforts should be focused to achieve ongoing improvements.

Concentrating efforts on a particular class of waste generator (e.g., residential or business) or commodity type can yield measurable results. Four categories of information, discussed in detail herein, can be used to evaluate the current status of waste prevention and recycling efforts and help develop strategies that will lead to future improvements:

1. Waste prevention programs achieving results in the region

2. Recycling and disposal rates by type of waste generator (discussed in Chapter 3, *Forecast and Data*), including:
   - Single-family (up to 4 units) and multi-family residents (in some cities may include townhomes)
   - Non-residential generators, such as businesses, institutions, and government entities
   - Self-haulers, both residents and businesses, who bring materials to division transfer facilities
   - Generators of construction and demolition debris

3. Types and quantities of recyclable or reusable commodities that remain in the waste stream, such as food scraps, clean wood, metals, and paper

4. The status of markets for recyclable materials, availability of take-back options for used products, and opportunities to partner with private-sector businesses, national coalitions, and other jurisdictions to effect change

Information from these four categories was used to shape the goals and recommended actions presented in this chapter. To set the stage, this chapter begins with a description of the benefits of recycling and a discussion of our regional goals for the future. From there the focus moves to ways to sustain the momentum by looking at additional waste prevention, resource conservation, recycling, and product stewardship opportunities. The chapter concludes with a discussion of the status and challenges of collection by customer type.

Benefits of Recycling Efforts

The regional commitment to recycling has many benefits–financial, social, and environmental. Financial benefits are probably the most immediate for many county residents and businesses. Convenient recycling services not only provide an alternative to the higher cost of disposal, but also provide a long-term significant cost savings for ratepayers by increasing the lifespan of Cedar Hills. As discussed in Chapter 6, *Landfill Management and Solid Waste Disposal*, Cedar Hills landfill is a more cost-effective means of disposal than the other disposal alternatives currently available. After Cedar Hills reaches capacity and closes, minimizing the amount of waste that requires disposal will translate directly into lower fees for King County ratepayers.

The social benefits of recycling can be described in terms of economic growth and job creation. Materials diverted from Cedar Hills for recycling must be sorted, processed, and transported. The 2016 Recycling Economic Information

(REI) Report (EPA, 2016) includes information about the recycling jobs, wages, and tax revenue benefits. The report shows that recycling and reuse of materials creates jobs, while also generating local and state tax revenues. In 2007, recycling and reuse activities in the United States accounted for:

- 757,000 jobs
- $36.6 billion in wages; and
- $6.7 billion in tax revenues

This equates to 1.57 jobs for every 1,000 tons of materials recycled. Construction and demolition debris recycling provides the largest contribution to all three categories (job, wage, and tax revenue), followed by ferrous metals and non-ferrous metals such as aluminum.

The Recology Store is a place to both recycle items and to purchase items made from recycled materials. (Photo courtesy of Recology CleanScapes)

The positive environmental benefits of recycling are local and ultimately global. Environmental benefits are focused in two primary areas, both of which have wide-reaching and long-term impacts. First, the release of pollutants emitted during the production and disposal of products is decreased, reducing the potential for harm to human health and the environment. Second, savings in energy use and associated reduced greenhouse gas emissions will result from decreased demand to process virgin materials into products, which also contributes to a healthier planet. Figure 4-1 illustrates a circular supply loop. The figure graphically shows the opportunities, values, and benefits of organics recycling in King County.

Goal and Targets

The goal and targets for waste prevention and recycling were established through extensive discussions with the division's advisory committees: the Solid Waste Advisory Committee (SWAC) and the Metropolitan Solid Waste Management Advisory Committee (MSWMAC). The countywide goal and targets are intended to improve the effectiveness of established waste prevention and recycling efforts. The recommended actions for implementation presented at the beginning of this chapter were developed to provide general strategies for meeting the goal and targets and to identify the agency or agencies that would lead those efforts. The recommended actions are intended to serve as a guideline for the county and cities. They do not preclude other innovative approaches that may be implemented to help achieve the goal and targets.

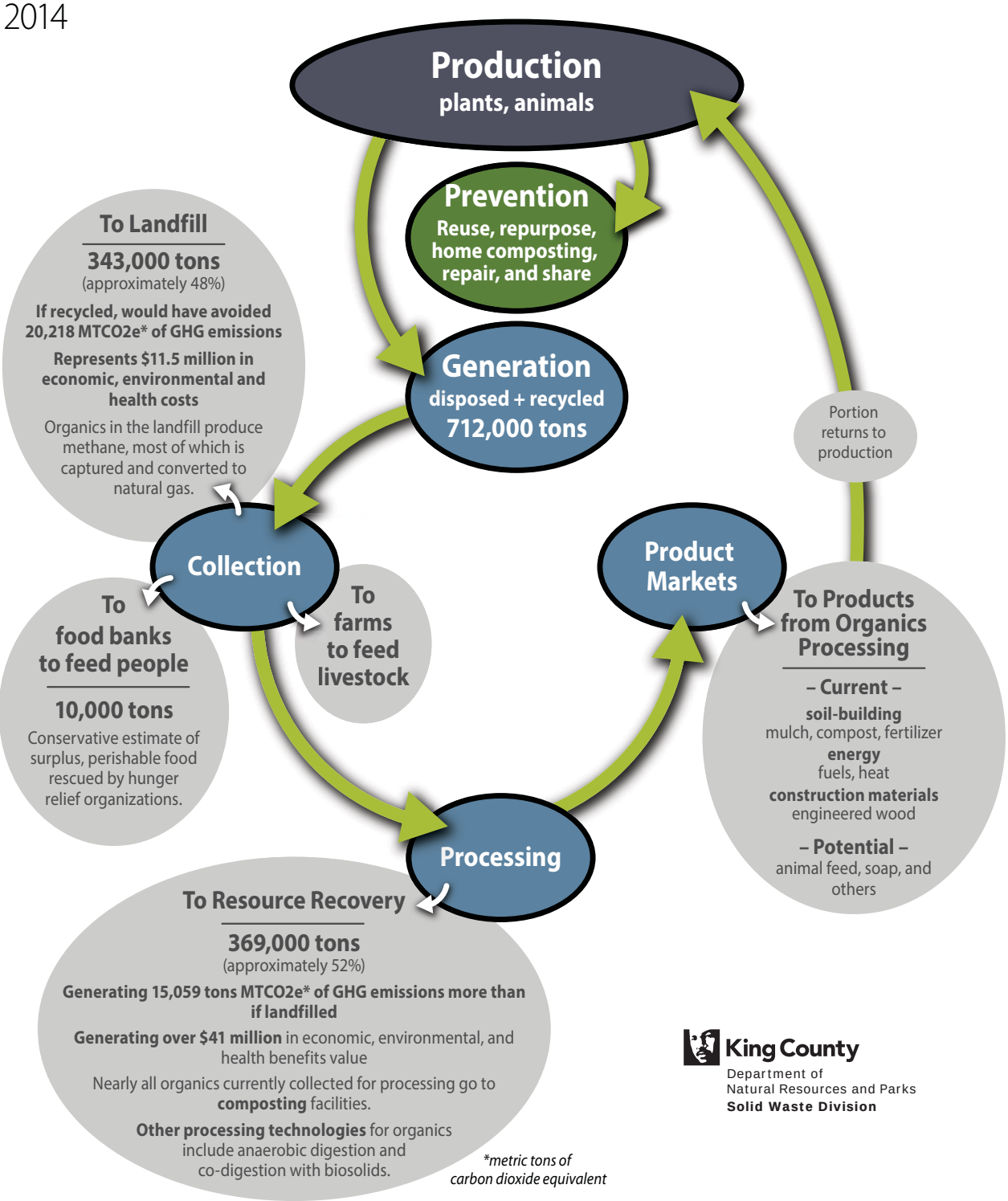
Factors other than waste prevention and recycling programs and services can increase or decrease the overall amount of waste generated. For example, the 2007 economic recession resulted in significant, unanticipated reductions in garbage collected, stemming primarily from the drop in consumer spending and business activity in the region. As can be seen in Figure 4-2, the recycling rate has stalled, even as waste generation has increased in recent years. When establishing the goal and targets and measuring success in meeting them, it is important to consider the economy, policy changes, and other factors that may be in play.

Figure 4-1 Organics: Opportunities, values, and benefits in King County

Food, yard, and wood wastes: Opportunities, values, and benefits in King County

2014

Organics recycling retains useful materials in the economy, creates new job opportunities, converts a would-be waste into beneficial, marketable products for farmers and gardeners, reduces the need for petroleum-based chemicals and fertilizers, improves nutrient recycling, and reduces the impacts from disposal.



Waste Prevention and Recycling Goal and Targets

Overall Waste Prevention and Recycling Goal

Achieve Zero Waste of Resources – i.e., eliminate the disposal of materials with economic value – by 2030 through a combination of efforts in the following order of priority: waste prevention and reuse; product stewardship, recycling, and composting, and beneficial use.

Waste Prevention Targets

Establishing waste prevention targets and measuring success in achieving them is a challenge, because data quantifying the amount of waste not generated is difficult to obtain. However, by tracking overall waste generation (tons of material disposed + tons recycled) over the years, King County can attempt to identify regional trends in waste prevention. A decline in waste generation means that the overall amount of materials disposed or recycled, or both, has been reduced. The county also uses data from reuse and repair, building salvage, commercial food waste prevention grants, catalog/junk mail/phone book opt-outs, and material efficiencies spurred by product stewardship, to help determine whether waste prevention progress is being made.

Waste generation rates to be achieved by 2030

Per Capita – 20.4 pounds/week
This target addresses residential waste from single- and multi-family homes.

Per Employee – 42.2 pounds/week
This target addresses waste from the non-residential sector.

Waste Disposal Targets to be achieved by 2030

Reductions in disposal over time indicate an increase in waste prevention and/or recycling.
Per Capita – 5.1 pounds/week
This target addresses residential waste from both single- and multi-family homes.

Per Employee – 4.1 pounds/week
This target addresses waste from the non-residential sector.

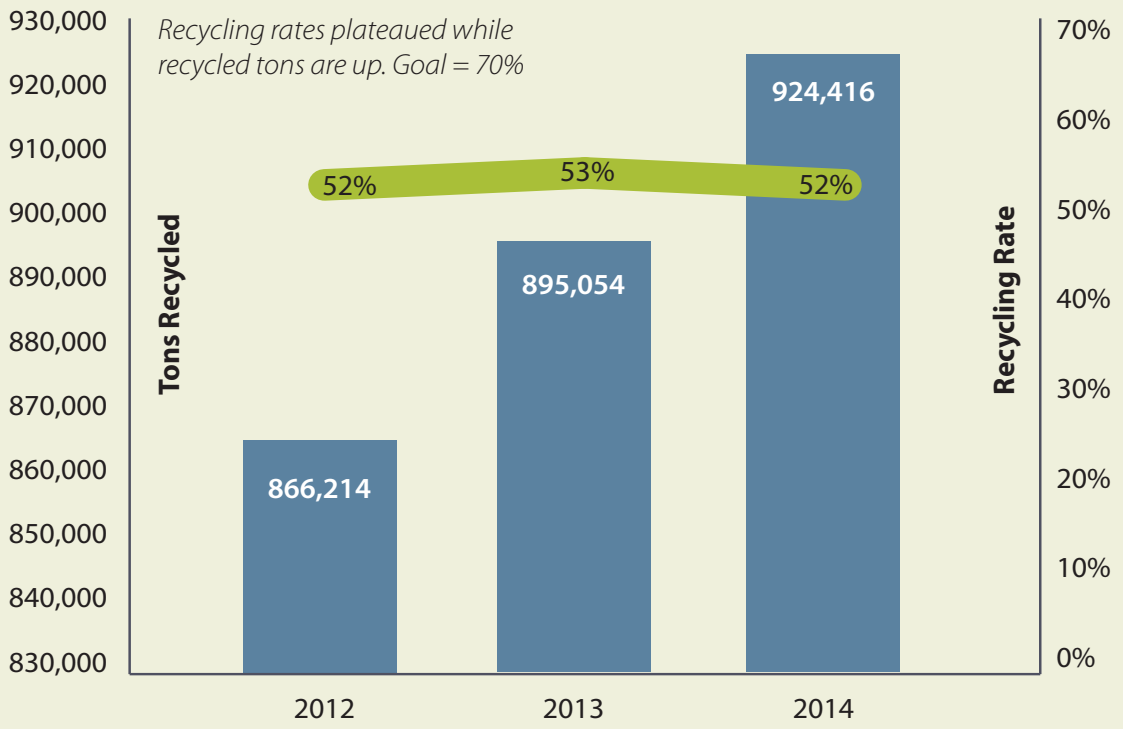
Recycling Target

Recycling will continue to be an important strategy to reduce the disposal of solid waste. The recycling goal combines single-family, multi-family, non-residential, and self-haul recycling activity. It addresses the amount of waste being diverted from disposal at the Cedar Hills Regional Landfill to recycling. It does not include construction and demolition debris (which have separate recycling goals), or other wastes, such as car bodies, which are not typically handled through the county system. In 2014, the overall recycling rate for the county was 52 percent.

The goal for this planning period reflects the estimated recycling rate achievable if the recommended strategies in this plan are fully implemented (see Figure 4-3).

Overall interim recycling goal: 70 percent

Figure 4-2. Recycled tons and recycling rate



The role of individual cities will be critical in reaching our countywide waste prevention and recycling goal and targets. The way in which each city contributes to the overall goal and targets, however, may vary depending on the city's demographic make-up and other factors. For example, a city with a large concentration of apartments and condominiums might focus more efforts on programs for multi-family residents. Communities with primarily single-family homes might focus education and promotion on food scrap recycling for their residents.

Another factor cities may consider is the make-up of their business (or non-residential) sectors. Cities with many restaurants, grocers, or other food-related businesses might look at ways to promote the recycling of food scraps or to partner these businesses with local food banks to donate surplus food to those in need. Similarly, cities with booming construction activity may want to take advantage of markets for the recycling and reuse of construction and demolition materials.

Westwood Help Stop Food Waste campaign

What is Your Recycling Rate? It Depends on What You Count.

Currently, there are no state or national standards for what should be counted in the "recycling rate" for a city or county. As a result, recycling rates reported by various jurisdictions may include different materials. For example, the recycling rate reported by some jurisdictions includes many materials that are not managed as a part of the system, so they are not included in establishing King County's recycling rate. This includes construction and demolition debris, asphalt and concrete, auto bodies, and biosolids. Many of these materials are very heavy and can considerably increase a recycling rate based on tons. In addition, some jurisdictions add percentage points to their recycling rate to account for the estimated success of their waste prevention efforts.

The division has chosen to calculate King County's recycling rate based on the known amount of materials diverted from disposal at the Cedar Hills Regional Landfill. As such, it does not include materials such as construction and demolition debris or car bodies that are handled largely by the private sector. Neither does the division include any estimate of waste prevention, primarily because of the lack of measurable data.

For example, based on the definition above, the county's recycling rate in 2014 was 52 percent. Adding recycled asphalt and concrete would raise the calculated rate to approximately 62 percent. The rate would have been higher still if hard-to-measure materials such as car bodies and land clearing debris were added.

Given the various methods for calculating a recycling rate, it is important to understand what materials are being counted before comparing rates across jurisdictions.

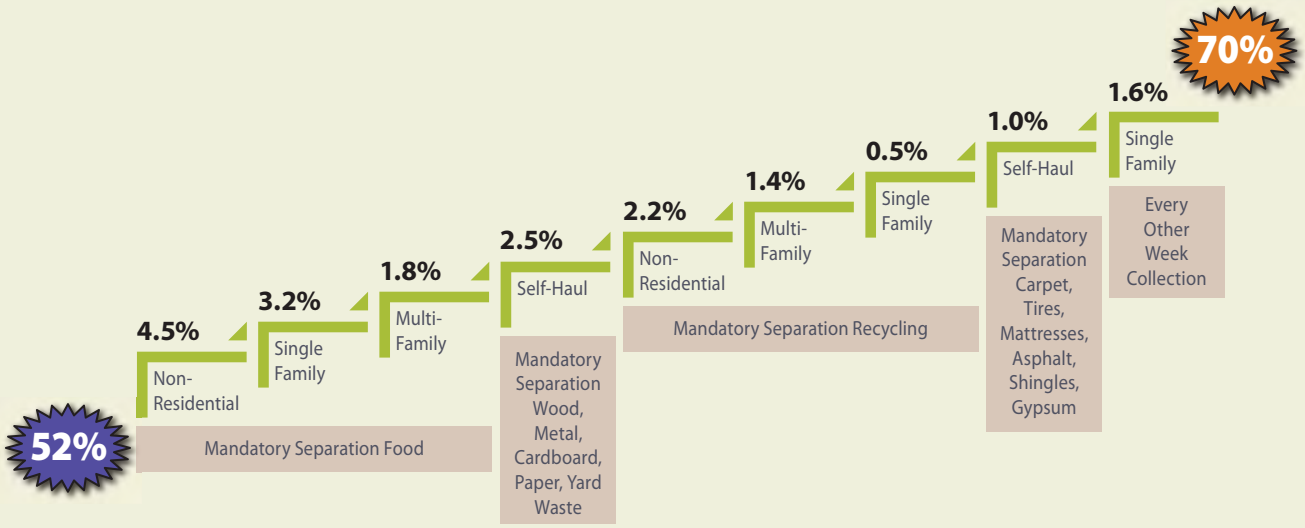
Likewise, the county will consider the make-up of the unincorporated area in which to focus waste prevention and recycling efforts.

The county and the cities lead by example to improve waste prevention and recycling in their respective operations, at their facilities, and at sponsored events, for instance:

- Some cities have held their own zero waste events and picnics
- The county and many cities collect food scraps and food-soiled paper at their offices and associated sites
- The county enacted an ordinance to purchase copy paper that is 100 percent recycled content and reduce paper use by 20 percent

The county continues to play an active role in supporting regional waste prevention and recycling programs. Through programs such as EcoConsumer the division continues to provide education and incentives for consumers across the county. The division's work with area schools is furthering recycling education and supports new and ongoing programs that encourage waste prevention and resource conservation. The division is also working to expand markets for recyclable and reusable materials through programs such as LinkUp, which brings together area businesses, public agencies, and other organizations through seminars, roundtable discussions, demonstrations, online forums, and other events and activities. Ongoing collaboration with the cities and the private-sector collection and processing companies in the region will also continue, with efforts to increase the recycling of food scraps and other materials that have market value.

Figure 4-3. The Road to 70% is Paved with Collective Actions



Tools Used to Meet the Recommended Goal and Targets

The division and the cities have various tools at their disposal to promote waste prevention and increase recycling. Table 4-1 below identifies these tools and cites some of the successes achieved through their use.

Table 4-1

Tool	Application	Successes
Infrastructure	Establishing the collection and processing infrastructure is always the first step. It can be accomplished through enhanced curbside collection services, additional recycling options at transfer facilities, and partnerships with private-sector processing facilities and manufacturers/retailers, e.g., to develop take-back programs.	New transfer facilities are being designed with dedicated areas for recyclable materials such as yard waste, clean wood, and scrap metal. Approximately 99 percent of single-family curbside collection customers have access to collection service for food scraps and food-soiled paper, along with the yard waste. Through E-Cycle Washington electronics manufacturers have developed a statewide network of locations for recycling televisions, computers, and monitors.
Education and promotion	Educational programs and targeted advertising play a key role in initiating new programs and sustaining the momentum of existing programs. These efforts can be tailored to specific waste generators or materials.	The division's Green Tools team provides education, resources, and technical assistance on how to manage construction and demolition debris as a resource rather than a waste. Many cities provide assistance to businesses to establish and maintain recycling programs. EnviroStars Green Business Program is a free program that offers rebates, resources, and incentives to businesses who take action to protect the environment and employee health and safety. Bellevue, Kirkland and King County are founding members.

Tool	Application	Successes
Incentives	Incentives encourage recycling. For example, in a pay-as-you-throw (or variable rate) type program, if a customer generates less garbage, they need a smaller garbage container, which means a lower charge on their garbage bill. Incentives can also take the form of a give-away item that makes waste prevention and recycling easier.	To encourage waste prevention and recycling, curbside garbage collection fees increase with the size of garbage can that customers subscribe to creating a "pay as you throw" (or variable rate) system. In addition, embedding recycling in the rate can also act as an incentive. Some cities provide kitchen containers and sample compostable bags to encourage residents to recycle their food scraps.
Mandates	Mandates that restrict the disposal of specific materials have proven effective in increasing recycling, particularly in instances where there is a viable and developed recycling market for those materials. Mandates can be legislated at the local, state, or federal level, or implemented through city contracts.	In order to discourage disposal of yard waste, its disposal in curbside garbage has been prohibited since 1993. In 2005, fluorescent lights and many electronics were prohibited from disposal at King County transfer stations to encourage the recycling of these items and use of the Take It Back Network http://www.kingcounty.gov/depts/dnrp/solid-waste/programs/take-it-back.aspx. To increase recycling, the division will begin mandatory self-haul recycling requirements at county transfer stations. Starting in 2018, cardboard, metal, yard waste and clean wood will be banned from disposal at transfer stations that provide recycling services for these materials.
Enforcement	Enforcement of program rules ensures that materials are recycled or disposed of properly.	The construction and demolition debris program employs a King County sheriff to enforce the recycling and disposal rules for construction and demolition materials. Outreach and progressive fines are issued to violators to encourage them to learn how the materials should be handled.
Partnerships	Partnerships enable a program to be amplified by bringing in other organizations or agencies to assist with the program	Product stewardship efforts rely on partnerships to implement programs. The division routinely partners with other organizations to further product stewardship goals through the Northwest Product Stewardship Council.

The successful diversion of residential yard waste from disposal exemplifies the effective use of four of these tools. First, an ***infrastructure*** was created to make it easy to separate yard waste from garbage. Curbside collection programs were implemented in phases across the county, easy-to-use wheeled collection containers were provided to residents, and private-sector businesses began turning the collected yard waste into compost for building healthy soils.

Food: Too Good to Waste campaign shares information with consumers about how to purchase and store food to minimize waste

Promotions were used to inform residents of the availability of curbside collection as the service was phased in. ***Educational*** campaigns were launched to teach citizens how to compost yard waste from their own yards for use as a soil amendment. Because the cost of collecting yard waste for composting was less than the cost of disposal in the garbage, residents had an ***incentive*** to subscribe to yard waste collection service. Many cities provided an additional incentive by including yard waste collection as part of their basic package of collection services at the curb. Finally, ***mandates*** were passed by the cities and the county to prohibit residents from disposing of yard waste in the garbage wherever separate curbside yard waste collection was available.

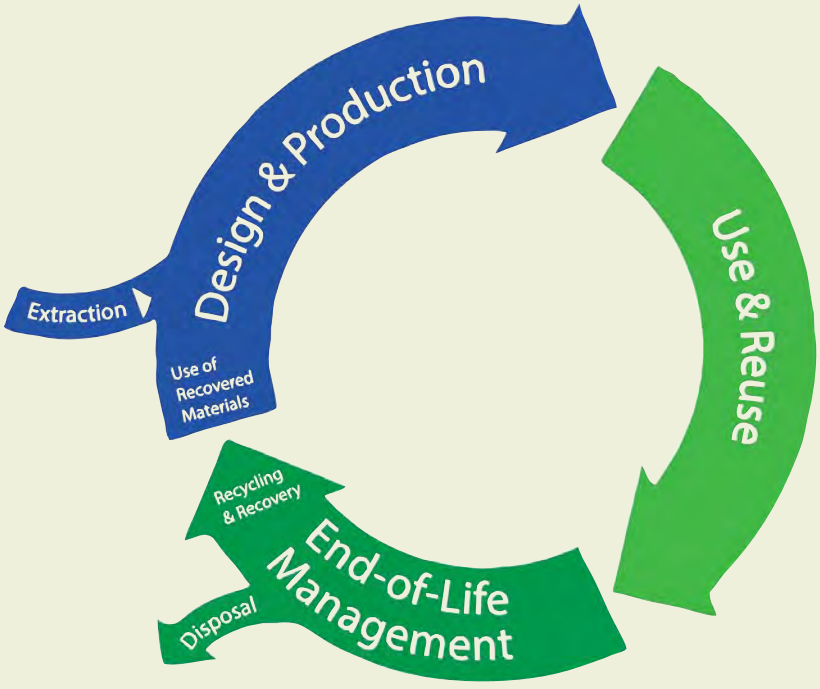
Taking A Sustainable Materials Management Approach

The following discussion describes a different way to look at the waste prevention and recycling programs and activities already in place. It describes the advantages of a sustainable materials management approach that encompasses the full life-cycle of materials: design and manufacturing, use and reuse, and end-of-life.

Figure 4-4 graphically depicts the sustainable materials management approach. This approach has been adopted by the U.S. Environmental Protection Agency (EPA) as well as the Washington State Department of Ecology in the last update of the state solid waste plan (Ecology 2015). Sustainable materials management still focuses on recycling and disposal, but by including production, design, use, and reuse, it provides an opportunity to identify more sustainable ways to design products that prioritize durability and recyclability, and use less energy, water, and toxics.

Figure 4-4. Materials life cycle

Source: Moving Washington Beyond Waste and Toxics, 2015



Decisions to reduce waste can be made at several critical stages in a product's life cycle, helping to develop a circular supply loop:

- When manufacturers decide what goods to produce, how to design them, how to produce them, and how to package them
- When consumers decide whether and what to purchase
- When consumers adopt ways to use and reuse products more efficiently

The following sections provide examples of programs in the different phases of sustainable materials management.

Design and Production:

Food: Too Good to Waste – This program educates consumers on ways to prevent wasting food. When food is wasted, it also wastes all the water and energy used to produce, package and transport it from the farm to table. In addition, about 33 percent of the single-family garbage disposed at Cedar Hills is food, which significantly reduces landfill capacity and life.

Green Schools Food Waste Reduction and Food Share - The King County Green Schools Program assists schools and school districts to reduce wasted food through a number of strategies:

- Encourage students to take what they will eat and eat what they take.
- Set up cafeteria share tables on which students may place or take unopened, packaged foods and drinks from the school lunch program.
- Donate unopened, packaged items and uneaten whole fruits that cannot be re-served to students.

The goals of the School Food Share program are to minimize wasted foods and beverages and safely distribute unwanted items from school lunch programs to local food banks and meal programs.

Use and Reuse:

Threadcycle is a public education campaign sponsored by King County and Seattle Public Utilities that encourages residents to donate used clothing, shoes, and linens for reuse or recycling. Local thrift stores and other organizations are partners in the program and will take all clothing, shoes, and linens regardless of condition (except items that are wet, mildewed, or contaminated with hazardous materials).

Repair Group event provides an opportunity for residents to bring in broken items for repair

The EcoConsumer public outreach program sponsors **Repair Groups** and events. Each repair event or group operates differently, based on the needs of the local community. It might be a one-time event, or they may be held every few months. People can bring to these events household items including small furniture, small appliances, personal electronics, and clothing that need to be repaired. Experienced all-purpose fixers and sewing fixers will work on the items, and can also help residents to learn to do their own repair.

Waste Prevention, Recycling and Climate Change

The purchase, use, and disposal of goods and services by King County residents, businesses, and governments are associated with significant greenhouse gas (GHG) emissions. Emissions can occur at all stages of a product's life – from resource extraction, farming, manufacturing, processing, transportation, sale, use, and disposal. In 2008, consumption-related GHG emissions in King County totaled more than 55 million metric tons of carbon dioxide equivalents (MTCO2e) – more than double the emissions produced within the county's geographic boundaries (King County 2012).

As a major employer and service provider in the region, King County government is also a major consumer of goods and services. These goods and services – especially construction-related services – account for 270,000 MTCO2e, or about 42 percent of the County's operations-related GHG emissions (King County 2012).

Residents, businesses, and governments can reduce GHG emissions associated with goods and services by choosing sustainable options, reducing the amount they purchase, reusing and repairing goods when possible, and recycling after use. King County is involved in these efforts through the solid waste management services and procurement efforts that the county provides, as well as through the county's efforts to educate residents and businesses about ways to use less and recycle more. The county is also taking a number of steps to reduce the environmental footprint of the products used in government operations and to reuse previously wasted resources.

Recycling outreach – The Solid Waste Division's Recycle More – It's Easy to Do campaign promotes basic recycling of curbside materials, food scraps and yard waste. Other programs that support increased recycling and waste prevention include the Green Schools Program, which supports conservation in schools.

Recycling infrastructure – In King County in 2010, about 832,000 tons of recyclable materials were collected by private hauling companies at the curb and about 10,000 tons were collected at King County transfer stations. Turning this waste into resources resulted in the reduction of approximately 1.6 million MTCO2e of GHG emissions.

Reusing resources – King County is helping develop, expand, and support markets for reused and recycled products. The LinkUp program has expanded markets for recyclable and reusable materials such as asphalt shingles, mattresses, and textiles. The EcoConsumer program has expanded reuse by promoting and supporting tool lending library projects in the county.

End-of-Life Management:

Product stewardship is an end-of-life policy approach that is being implemented at the state, national and international levels. In practice, the product manufacturers – not government or ratepayers – take responsibility for their products "cradle to cradle." This means that manufacturers are given the authority to finance and provide for the collection, recycling and/or proper management of their products at the end of the product's life cycle.

The division is on the steering committee of the Northwest Product Stewardship Council (NWPSC) and has been participating in the development of product stewardship strategies for commodities that contain toxic materials or are difficult and expensive to manage, such as paint, carpet, mercury thermostats, rechargeable batteries, mattresses, junk mail, and telephone books.

The division and NWPSC were instrumental in getting state legislation adopted to implement the E-Cycle Washington and LightRecycle Washington extended producer responsibility programs. Both programs provide drop-off sites for consumers to take their electronics and mercury-containing lights. The division also worked to get a secure medicine return program implemented in King County. The program started in February 2017, and has approximately 100 locations where residents can securely dispose of unused medications.

What do I do with. . . .? Hundreds of thousands of visitors use this application annually to find recycling, reuse, and disposal options. Businesses and organizations maintain their listing of the materials and products they recycle, reuse, or dispose of as a requirement of being included as a partner on this high traffic division website. One of the oldest recycling databases in the country, What do I do with…? has evolved over almost twenty years from a printed paper directory to a modern, mobile friendly application. The most searched-for materials are consistently: Appliances, Batteries, Construction / Demolition Debris, Electronics, and Furniture. The division constantly seeks to refine and improve the What do I do with..? website, which currently provides information on over 100 materials.

Turning Wastes to Resources

In 2004, King County adopted "Zero Waste of Resources" as a principle designed to eliminate the disposal of materials with economic value. Zero Waste does not mean that no waste will be disposed; it proposes that maximum feasible and cost-effective efforts be made to prevent, reuse, and reduce waste. The division has been taking steps to eliminate the disposal of materials that have economic value and for which there are viable markets.

King County's list of designated recyclables is defined and updated by Ecology's annual statewide survey of materials that have been recycled in Washington. The current list is shown in Table 4-2:

Recicla Mas Facilitadores or facilitators of recycling teach recycling and composting basics at a community event in King County.

Table 4-2. Designated recyclables

Category	Includes
Carpet and Pad	Carpet and pad remnants
Clean Wood	Unpainted and untreated wood, including wood from construction and demolition projects, and pallets
Construction and Demolition Debris	Recyclable and non-recyclable materials that result from construction, remodeling, repair or demolition of buildings, roads, or other structures and requires removal from the site of construction or demolition. Construction and demolition debris does not include land clearing materials such as soil, rock, and vegetation.
Electronics	Includes audio and video equipment, cellular telephones, circuit boards, computer, monitors, printers and peripherals, computers and laptops, copier, and fax machines, PDAs, pagers, tapes and discs, and televisions
Furniture	Includes mattresses and box springs, upholstered and other furniture, reusable household and office goods
Glass	Clean glass containers and plate glass[1]
Metal	Clean ferrous and non-ferrous metals, including tin-plated steel cans, aluminum cans, aerosol cans, auto bodies, bicycles and bicycle parts, appliances, propane tanks, and other mixed materials that are primarily made of metal
Moderate Risk Waste	Moderate risk waste from households and small quantity commercial generators, including antifreeze, household batteries, vehicle and marine batteries, brake fluid, fluorescent lights, oil-based paint, thermometers and thermostats, used oil, and oil filters
Organics	Food scraps and food-soiled paper; fats, oils, and grease (FOG); biodegradable plastic kitchenware and bags[2]; yard waste, woody materials under 4 inches in diameter; and stable waste (animal manure and bedding)
Other Materials	Includes latex paint, toner and ink cartridges, photographic film, tires, and other materials reported as recycled to the Department of Ecology in response to annual recycling surveys
Paper	All clean, dry paper including printing and writing paper, cardboard, boxboard, newspaper, mixed paper, and aseptic and poly-coated paper containers
Plastic	All clean, single-resin plastic numbers 1 through 7, including containers, bags, and film (wrap)
Textiles	Includes rags, clothing and shoes, upholstery, curtains, and small rugs

1 Plate glass is not accepted in curbside programs.

2 Biodegradable plastic products must be approved by organics processing facility receiving the material.

While the list of recyclable materials is extensive, available markets and infrastructure can vary from region to region. The division prioritizes materials for recycling in King County based on four key factors:

- The amount present in the waste stream
- The ability to handle the material – both collection and processing
- Viable and sustainable markets for the material
- Environmental considerations

These factors are also used to determine the appropriate method for capturing the materials, i.e., through curbside collection or at county transfer facilities. Since the 2001 Comprehensive Solid Waste Management Plan was issued, the list of materials that are being recycled has grown substantially.

In 2016, 922,000 tons of solid waste was disposed at Cedar Hills. As shown in Figure 4-5, at least limited options in the market exist for the recycling of about 70 percent of the materials disposed.

Materials with widely available recycling options include food scraps and food-soiled paper, paper, clean wood, yard waste, metals, tin, aluminum, glass, and many plastic containers. Materials that currently have more limited options include plastic wrap and bags, polystyrene foam and other plastic packaging, gypsum wallboard, and asphalt products. Materials such as treated and contaminated wood and miscellaneous construction and demolition wastes have little or no value in the marketplace at this time.

The following sections describe priority materials identified by the division for recycling through curbside collection and at county transfer facilities.

Priority Materials for Curbside Collection

Over time, new materials that can be efficiently and cost-effectively captured for recycling are added to curbside collection programs. Adding materials for curbside collection requires sufficient infrastructure for collection and processing, and viable and sustainable end use markets. Standardizing the materials collected across the county simplifies recycling education, reduces confusion among consumers as to what is recyclable, and increases collection efficiency. However, all materials listed as priorities are not required to be recycled in all city programs.

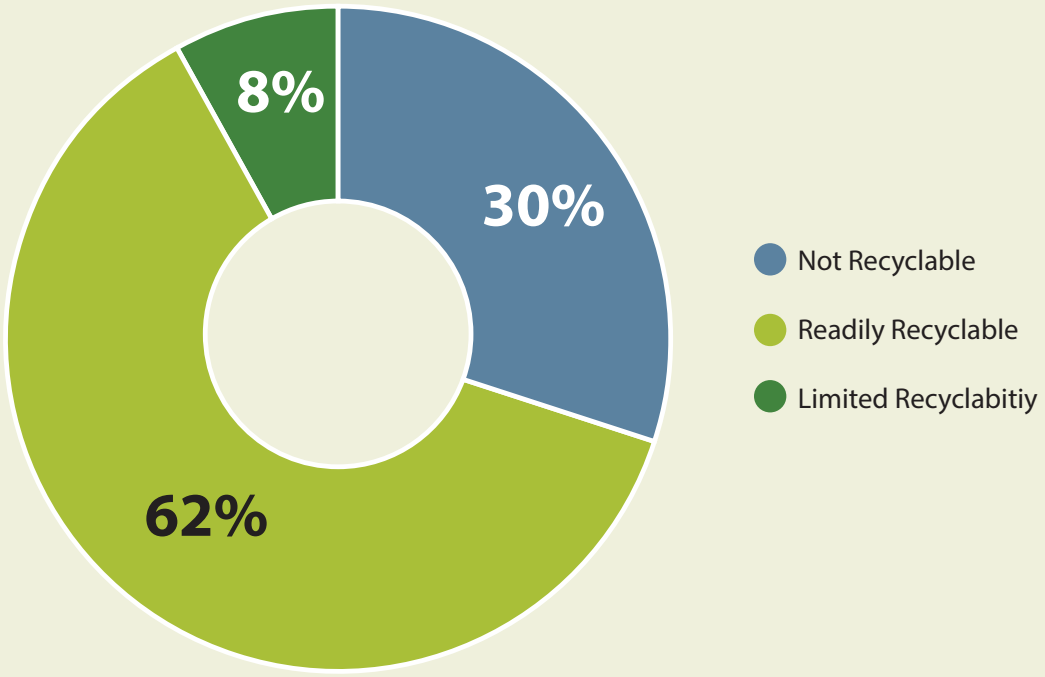
Commingled recyclable materials, the same as are collected at the curb, are also collected at most transfer stations

When the *2001 Comprehensive Solid Waste Management Plan* was adopted, materials collected at the curb included newspaper, cardboard, mixed paper, plastic bottles, tin and aluminum cans, glass bottles and jars, and yard waste. Materials added since that time include food scraps and food-soiled paper; aerosol cans; small scrap metal; plastic jugs and tubs; plastic plant pots, trays, and clamshells; plastic and paper drink cups; and aseptic containers.

Organics

More than one-third of what gets disposed at Cedar Hills landfill is food scraps and food-soiled paper. Collection and processing of these food scraps is critical to meet the County's ambitious waste diversion targets and climate change goals. There is also a growing effort to capture a large portion of the food scraps that are still considered to be edible. A recent division study of service management businesses and restaurants in King County (Cascadia 2017b) estimated that approximately three-quarters of the food scraps these businesses generated was edible food. Significant opportunities remain to reduce and prevent the tons of food scraps that are disposed.

Figure 4-5. Recycling potential of materials disposed in 2015



Commercial haulers throughout King County offer organics collection to both residential and commercial customers. Nearly all single-family households (99 percent) in King County have access to curbside organics collection that includes food scraps and food-soiled paper products. Unpackaged food scraps and approved compostable paper products can be collected along with yard waste in the same containers. King County and many cities have implemented public education and outreach campaigns to promote and increase participation in food scrap diversion through curbside organics collection. The division also funded a grant program to promote commercial food scraps recycling. While participation rates appear to be increasing, there remains room for improvement. Challenges to food scraps collection include customer access (such as at multi-family residential units where organics collection is not required or offered by property management), participation levels in diversion programs, and the level of contamination of the organics collected. As collection of organics increases it will be essential to ensure adequate regional processing capacity and reduced contamination of material. The division is actively working with regional partners to:

- Engage in long-range planning to increase organics processing capacity
- Encourage greater use of compost
- Encourage operational changes at processing facilities to mitigate impacts on the surrounding community

Priority Materials for Collection at King County Transfer Facilities

The division has identified several priority materials to collect at all transfer stations once they are renovated or replaced:

- Organic waste (yard waste, food scraps, and food-soiled paper)
- Cardboard
- Clean wood (not treated or painted)
- Scrap metal

Some materials designated for curbside collection and/or as priority materials for transfer station collection are also collected by private-sector businesses.

Clean wood is collected at the Bow Lake Recycling and Transfer Station

Grants to Cities

Waste Reduction and Recycling Grants

The division provides grant funds and technical assistance to cities to help further waste prevention and recycling programs and services within their communities. In 2016, King County distributed over $1 million in grant funds to cities; these funds are supported by the solid waste tipping fee. All cities in the service area are eligible for the funds. The formula for their allocation includes a base amount plus a percentage based on the city's population and employment.

Currently, much of these grant funds is used by the cities to hold recycling collection events in their communities. The cities and the county may be able to phase out these collection events and use the funds in other ways that support waste prevention and recycling in their communities as enhanced recycling services are added at renovated transfer facilities, curbside collection for bulky items becomes more cost effective and widely available, and product stewardship programs begin to offer more options for recycling. The grant monies can be used to support a number of activities, including:

- Encouraging and promoting waste reduction
- Continuing to implement and improve general recycling programs
- Improving opportunities for the collection of specific commodities, such as paper
- Improving opportunities for the collection and/or composting of organic materials
- Increasing the demand for recycled and reused products
- Fostering sustainable development through the promotion of sustainable building principles in construction projects
- Managing solid waste generated by public agencies in a manner that demonstrates leadership
- Broadening resource conservation programs that integrate waste prevention and recycling programs and messages
- Providing product stewardship opportunities

Local Solid Waste Financial Assistance Grants

Ecology also supports waste prevention and recycling programs in King County through the Local Solid Waste Financial Assistance (formerly known as the Coordinated Prevention Grant) program. Funds are allocated within the county based on population. The division uses funds allocated to the unincorporated areas to support waste

prevention and recycling efforts such as recycling collection events, yard waste and food scrap recycling, and natural yard care education and promotion. The cities also receive funds directly from Ecology to support their own waste prevention and recycling programs (applications are coordinated through the division).

At this time, the status of the Local Solid Waste Financial Assistance program is in question, however. The State Legislature voted to reduce Local Solid Waste Financial Assistance funding for fiscal years 2015-2017 and did not adopt a Capital Budget during the 2017 legislative session, so there are no funds available currently. The Local Solid Waste Financial Assistance budget may be reduced or eliminated in future legislative sessions.

Cities use some of their grant money to hold recycling collection events.

Competitive Grant Program

In 2012, the division worked collaboratively with the cities to develop a new competitive grant program to fund innovative projects and services that further the waste prevention and recycling goals outlined in this plan. Cities, commercial collection companies, and other entities, such as non-profit organizations or schools, would be eligible to apply for the grant program. The program has not been approved by the cities or funded through the solid waste rate yet, but the division will continue to work with the cities to implement the new grant program.

In the meantime, the division has initially funded a small competitive grant program through the Solid Waste Division budget with the focus on commercial food waste. A program funded through the solid waste rate would extend reach and impact. Descriptions of the funded projects can be found online at: your.kingcounty.gov/solidwaste/garbage-recycling/commercial-grants.asp

Markets for Recyclable Materials

LinkUp – Expanding Markets for Recyclable and Reusable Materials

Market development is an important strategy to ensure that recyclable materials are successfully moving from waste to resource. The division is working to expand markets for recyclable and reusable materials and facilitate the infrastructure that supports those markets, through its LinkUp Program. Working with businesses, public agencies, and other organizations, LinkUp develops projects that address specific market barriers (from collection to processing to end-use) that prevent or restrict a material or product from moving up the value chain for ultimate reuse or use as a raw material for manufacturing

Developing markets for asphalt shingles has been one focus of the LinkUp program. Shown here are asphalt shingles used in paving roads.

new products. In recent years, LinkUp has conducted projects to improve markets for asphalt shingles, carpet, mattresses, compost, and textiles. Projects have supported efforts, such as the development of collection and processing infrastructure for asphalt roofing shingles, carpet, and mattresses; establishment of the hot mix asphalt pavement market for asphalt shingles; expansion of the Take it Back Network to include mattresses, and promotion of the network to the public; public education to promote donation of damaged textiles for reuse or recycling; and demonstration of the use of compost for agricultural applications by King County farmers.

2015 and 2017 Market Assessments

In 2015 and 2017, Cascadia Consulting Group conducted market assessments for the division that focused on commingled curbside recyclables, organics, electronics, film plastics, and construction and demolition materials (Cascadia 2015b and Cascadia 2017).

First, Cascadia conducted a preliminary analysis and ranking of potential focus materials. Evaluation metrics included disposed tons, disposed volume, GHG emissions if recycled rather than landfilled, ability to influence the county's recycling rate, and market strength. Table 4-3 shows the results of the preliminary analysis and ranking.

Cascadia then conducted "mini assessments" of the top six ranked materials, combining two categories of electronics, and excluding textiles and mattresses, for which the division already has market support efforts underway. Findings from these assessments, which looked at the material supply for recycling, processing capacity, and current markets, included:

Table 4-3

Overall Ranking	Materials
High	Food and food-soiled paper* Clean wood Textiles* Film plastic (same score as textiles)
Medium	Electronics (covered by E-Cycle) #3-7 plastics Mattresses* (same score as #3-7 plastics) Clean (new) gypsum Electronics (not covered by E-Cycle) Asphalt Shingles* Carpet
Low	Treated wood Painted (demo) gypsum Tires

* Materials for which the division is already engaging in market support through the LinkUp program.

Findings from these studies, which looked at the material supply for recycling, processing capacity, and current markets, included:

- Markets for commingled curbside recyclables, including paper, plastics, glass, and metals were generally stable in 2015, but are likely to be increasingly challenging given expected changes in China's import policies. Food scraps are the biggest contamination challenge in curbside commingled recycling.
- Almost all organic materials collected within the King County system are being converted into compost products, which are primarily used as soil amendments. Anaerobic digestion (a biological process that transforms organic waste into renewable energy, and in some situations, a useable residual by-product) is an emerging processing technology in the region. More organics processing capacity is likely needed if there are to be significant increases in food scraps and food-soiled paper composting in King County and surrounding regions. Market prices and sales of compost products are reported to be stable. Expanding agricultural compost markets is of interest.
- Wood, plastic films, and #3-7 plastics, have significant barriers to successful recycling. Wood markets are stable but weak and highly dependent on use as hog fuel; barriers to plastic film recycling occur at all points of the supply chain; and demand for #3-7 plastics is low and processors are reliant on export.

Sustainable Purchasing

King County is also working to reduce the impacts of its operations by purchasing products that have recycled content and are more resource-efficient and durable. *The Sustainable Purchasing Program* provides county personnel with information and technical assistance to help them identify, evaluate, and purchase economical and effective sustainable products and services.

The division will continue to provide technical assistance to cities by sharing contracts, specifications, and procurement strategies. Many cities in the county have also implemented environmentally preferable purchasing programs.

Another strategy to increase sustainable purchasing is to provide training and education about the benefits of compost applications in parks and landscape projects, topdressing grass in parks, and stormwater management applications.

Collection

The remainder of this chapter looks at the current collection challenges and recommendations for improvement for three sectors of generators – single-family households, multi-family households, and non-residential customers, which include businesses, institutions, and government entities. For each sector, the issues may vary and present different challenges due to collection methods and the regulations by which they are governed. Construction and demolition debris is discussed separately at the end of this chapter because of the unique nature of collecting and processing these materials.

Residential Collection

The residential garbage collection system in King County is a well-established system that serves the region in a safe, efficient, and cost-effective manner. With the shift toward increased collection services for recyclables and organics, customers can choose to subscribe to smaller, less expensive collection cans for their garbage. Container sizes now range from the micro-can at 10 gallons to the mini-can at 20 gallons and on up to the large 90+ gallon cart. The reduced fee for the smaller cans creates an incentive to generate less waste and divert as much material as possible to the recyclables or organics carts.

Throughout King County, individual city contracts for collection of garbage, recyclables, and organics differ in a number of aspects. Cities have entered into contracts with the collection companies at different times and then renewed contracts as they have expired. Each time a contract is negotiated and renewed, the city may make adjustments to their services such as changing the range of materials being collected, the collection frequency, container types or sizes, fee structures, and more. Changes to services may also be negotiated for existing contracts. The varying collection standards among cities that have resulted from these changes over time have led to inconsistencies in regional education and messaging, confusion among customers, and difficulties in measuring and potentially attaining region wide goals.

A truck picks up in a neighborhood (Photo courtesy of Republic Services)

To illustrate the varying collection standards that currently exist, Table 4-4 presents a summary of single-family collection services by city and unincorporated area, showing the types of contracts held, the collection company serving the jurisdiction, container sizes offered, collection frequency, and fee structures. The recycling rates for each jurisdiction and unincorporated area, with and without organic materials, are also presented for comparison. The WUTC cost assessment in Appendix A (Section 3.3) provides additional information about the WUTC-regulated and contracted companies.

Working with the community and the hauler, the division is exploring the inclusion of Vashon/Maury Island in the service level standards, as well as other ways to improve recycling services provided curbside and at the transfer station. Skykomish and Snoqualmie Pass will not be included in the service level standards at this time because of their remote locations and low population densities.

As shown in the table, the single-family recycling rate varies significantly among the cities and unincorporated areas, ranging from 37 to 65 percent (combining organics and the curbside recyclables) with an average of 55 percent. While it would be difficult to identify a single factor or factors that will ensure a higher recycling rate, there are some factors that appear to lead to increased participation and amounts of waste diverted from disposal, as discussed in the following sections.

Table 4-4. Summary of Collection for Garbage, Recycling, and Organics in King County

Jurisdiction or Unincorporated Area	Type of Collection[a]			Cart Size (gallons)[b]		Collection Frequency[c]			Fee Structure		Disposal & Recycling Rates (2016)[d]		
	2016 Collection Company	Contract / WUTC	Mandatory Garbage Collection	Standard Recycling Cart	Standard Organics Cart	2016/17 Frequency of Recycling Collection	2016/17 Frequency of Organics Collection (spring-summer-fall)	2016/17 Frequency of Organics Collection (winter)	Recycling Included in Garbage Fee	Organics Included in Garbage Fee	Garbage Disposal (lbs/cust/wk)	Recycling Rate (including organics)	Recycling Rate (excluding organics)
Cities													
Algona	WM	C	X	64	96	EOW	EOW	EOW	X		40	37%	21%
Auburn	WM	C	X	96	96	EOW	W	W	X		24	49%	28%
Beaux Arts	RS	WUTC		96	96	EOW	EOW	EOW	X		27	59%	42%
Bellevue	RS	C		96	96	W	W	W	X	X	23	65%	39%
Black Diamond	RS	WUTC		96	96	EOW	EOW	EOW	X		32	47%	26%
Bothell[f]	RE	C	X	64	96	W	W	W	X	X	25	62%	37%
Burien[g]	RE	C		96	96	EOW	W	EOW	X	X	24	61%	35%
Carnation	RE	C	X	96	96	EOW	W	W	X		25	60%	27%
Clyde Hill	RS	C		96	96	EOW	W	EOW	X	X	29	63%	39%
Covington	RS	C	X	96	96	EOW	EOW	EOW	X		29	46%	27%
Des Moines	RE	C		96	96	EOW	EOW	EOW	X		27	49%	32%
Duvall	WM	C	X	64	96	W	W	EOW	X		23	56%	33%
Enumclaw	City	City	X	96	96	EOW	EOW	EOW	X		22	55%	29%
Federal Way	WM	C		96	96	EOW	W	W	X		27	50%	28%
Hunts Point	RS	WUTC		96	96	EOW	EOW	EOW	X		34	56%	32%
Issaquah	RE	C		96	96	W	W	W	X	X	20	59%	42%
Kenmore	RS	WUTC		96	96	EOW	EOW	EOW	X		26	55%	33%
Kent	RS	C	X	96	96	EOW	EOW	EOW	X	X	26	51%	29%
Kirkland	WM	C	X	64	96	W	W	W	X	X	20	65%	37%
Lake Forest Park	RS	C		96	96	EOW	EOW	EOW	X	X	23	65%	38%
Maple Valley[j]	RE	C		96	96	EOW	EOW	EOW	X		28	49%	29%
Medina	RS	WUTC		96	96	EOW	EOW	EOW	X		29	61%	34%
Mercer Island	RS	C		96	96	EOW	EOW	EOW	X	X	25	65%	39%
Newcastle	WM	C		96	96	EOW	W	EOW	X		23	51%	32%
Normandy Park	RS	C		96	96	EOW	EOW	EOW	X		28	55%	32%
North Bend	RS	C	X	64	96	W	EOW	EOW	X	X	28	56%	35%
Pacific[e]	WM	C	X	64	96	EOW	EOW	EOW		X	24	49%	26%
Redmond	WM	C		64	96	W	W	W	X	X	21	61%	35%

Jurisdiction or Unincorporated Area	Type of Collection[a]			Cart Size (gallons)[b]		Collection Frequency[c]			Fee Structure		Disposal & Recycling Rates (2016)[d]		
	2016 Collection Company	Contract / WUTC	Mandatory Garbage Collection	Standard Recycling Cart	Standard Organics Cart	2016/17 Frequency of Recycling Collection	2016/17 Frequency of Organics Collection (spring-summer-fall)	2016/17 Frequency of Organics Collection (winter)	Recycling Included in Garbage Fee	Organics Included in Garbage Fee	Garbage Disposal (lbs/cust/wk)	Recycling Rate (including organics)	Recycling Rate (excluding organics)
Cities													
Renton[h]	RS	C	X	96	96	EOW	W	W	X	X	20	60%	36%
Sammamish[l]	RS	C		96	96	W	W	W	X	X	25	58%	35%
SeaTac[i]	RS/RE	C		96	96	EOW	EOW	EOW	X	X	29	53%	30%
Shoreline	RE	C		96	96	EOW	EOW	EOW	X		23	54%	34%
Skykomish	City	City	X	NS	NS	NS	NS	NS					
Snoqualmie	WM	C	X	64	96	W	W	W	X	X	26	53%	35%
Tukwila	WM	C		96	96	EOW	EOW	EOW	X		28	44%	29%
Woodinville	WM	WUTC		96	96	EOW	W	EOW	X		27	54%	32%
Yarrow Point	RS	WUTC		96	96	EOW	EOW	EOW	X		30	52%	34%
Sammamish Klahanie	RS										24	60%	25%
Subtotal Cities											**26**	**55%**	**33%**
Unincorporated Areas													
Northern County	RS WM	WUTC		96	96	EOW	EOW	EOW	X		28	53%	32%
Southern County	RS WM	WUTC		96	96	EOW	EOW	EOW	X		28	46%	29%
Vashon Island	WC	WUTC		4-bin	NS	EOW	NS	NS			31		7%
Snoqualmie Pass	WM	WUTC		NS	NS	NS	NS	NS					
Subtotal Unincorporated Areas											**29**	**49%**	**23%**
Total County											**28**	**52%**	**28%**

a Collection Companies:
RS - Republic Services
RE - Recology / CleanScapes
WC - Waste Connections
WM - Waste Management

b Cart sizes listed are the most commonly distributed; other cart sizes are available in many jurisdictions.

c Collection Frequency:
EOW - every other week
W - weekly
M - monthly
NS -no service

d Recycling and disposal rates include an adjustment to remove estimated contaminant tonnage from recycling totals and add it to disposal totals.

e Pacific's Pierce County and King County areas are served by Waste Management effective October 5, 2015 (update 1/8/16).

f Bothell's primary hauler changed from Waste Management to Recology on January 1, 2015

g Burien's hauler changed from Waste Management to Recology on June 1, 2014; embedded organics was not included before June 1.

h Renton has every-other-week garbage collection in areas served by its primary hauler, Republic Services.

i SeaTac's hauler changed from Republic Services to Recology on June 1, 2014; embedded organics was not included before June 1.

j Maple Valley's primary hauler changed from Waste Management to Recology on September 1, 2014

k Clyde Hill's new contract effective April 1, 2015 includes organics service in the basic garbage fee.

l Annexation areas in Sammamish still follow UTC service levels
Klahanie - Rec (w) Org (W, except for EOW Dec-Feb)
Aldarra-Montaine - EOW Rec and Org
Camden Park & Mystic Lake (WM annexed areas)- Rec (W) Org (W, except for EOW Dec-Feb)

Range of Materials Collected

In addition to the materials identified for curbside collection in the last comprehensive solid waste management plan – newspaper, mixed paper, and cardboard; tin and aluminum cans; plastic bottles; glass bottles and jars; and yard waste – new materials have been added over time. These materials include food scraps and food soiled paper, aerosol cans, small scrap metal, plastic jugs and tubs, plastic plant pots, plastic trays and clamshells, drink/coffee cups, and aseptic cartons/containers (such as juice boxes). Some cities have added other materials for collection, such as electronics, fluorescent bulbs and tubes, and motor oil.

Curbside collection, however, is not necessarily the most efficient and cost-effective way to capture every type of recyclable or reusable product. Some products cause problems for materials recycling facilities because of their size or composition, while others are better candidates for take-back programs by manufacturers and retailers to extract potentially harmful components and recycle other components. Examples of these types of materials and their particular challenges include the following:

- **Plastic bags and plastic wrap** are prevalent in the waste stream, particularly residential. Collection of plastic bags in the recyclables cart creates a nuisance further down the line at the material recovery facilities. As the bags move through the facility they sometimes catch in and jam the sorting machinery, and they can blow around and cause litter problems. For these reasons, curbside collection may not be the best option for plastic bags and wrap at this time. More appropriate options for consideration may be an increased use of reusable shopping bags and the establishment or expansion of take-back programs at the retail level.

- **Electronic Products and Fluorescent Bulbs and Tubes** Collecting these materials at the curb is complicated by the fact that some of them tend to break easily and contain potentially hazardous materials that must be safely disposed. In Washington State, legislation requires manufacturers of computers, monitors, and televisions to provide separate locations for free recycling of these items. Handling electronics through product stewardship ensures that the various components, such as glass, plastic, and metals, are separated and recycled as appropriate and that any potentially hazardous materials are recycled or disposed in a safe and environmentally sound manner. Product stewardship efforts reduce costs to local governments and their ratepayers by eliminating the costs to recycle these products. Take-back programs have also been implemented for fluorescent bulbs and tubes. Cities such as Kent and Shoreline and have contracted with their recycling collection companies to develop a safe, convenient program for collecting fluorescent bulbs and tubes at the curb. The City of Bothell's garbage and recycling collection contract includes curbside collection of electronic products and fluorescent bulbs and tubes as well as collection at the The Recology Bothell store.

Fluorescent tubes are collected at the Factoria Recycling and Transfer Station

Some cities offer collection of small appliances and home electronics not covered by Washington's current product stewardship laws. For appropriately sized products that do not contain hazardous materials, curbside collection is a viable and efficient option.

- **Polystyrene Foam** – One type of plastic that is not recommended for residential curbside collection is expanded polystyrene foam (EPS), known as Styrofoam, which includes clamshell containers for take-out foods and blocks of plastic that are used to package many electronics and other goods. These materials are light and bulky, can break easily into small pieces, readily mix with other materials causing contamination, and are difficult to separate out at the material recovery facilities. In addition, the quantity collected is so small that it takes a long time to collect enough of the material to ship to market. Although there are challenges to collecting EPS packaging curbside, the City of Des Moines began offering its single-family residents this service in 2012. Block EPS (not packing peanuts) is accepted and residents are asked to put the blocks in a clearly labeled plastic bag and place it next to their curbside recycling cart. This allows the EPS blocks to be handled separately from the commingled recyclables. The cities of Issaquah and Seattle have taken another approach and banned the use of EPS containers for take-out foods. Other cities, such as Kirkland and Redmond, have regular or semi-regular collection events to collect expanded polystyrene packaging.

Size of Collection Container

The size of the recycling collection cart can affect recycling success. Larger carts generally lead to higher recycling rates. As more materials are identified for commingled recycling, and food scraps are added to the yard waste cart, recyclables carts are getting larger and the size of garbage can to which customers subscribe should become smaller. Areas where most residential customers use smaller recycling carts have reported lower recycling rates and when larger carts have been provided the recycling rate has increased.

Frequency of Collection

Adjustments to the frequency of curbside collection for garbage, recyclables, and organics can be used to influence recycling and disposal behaviors and reduce collection costs and truck traffic. Garbage collection across King County typically occurs on a weekly basis. This collection schedule has been driven, in part, by the presence of food scraps and other organics in the garbage that rapidly decompose and have the potential to lead to environmental or public health concerns. With separate collection of organics for recycling, there is an opportunity to alter weekly garbage collection to benefit ratepayers and to create a more environmentally sustainable system.

One of the most important factors in determining the appropriate collection frequency for the various material streams, particularly for organics (yard waste and food scraps), is compliance with the public health and environmental standards in Title 10 of the Code of the King County Board of Health. To study the effects of changing the collection method and possibly the frequency of collection, in summer 2007 the division conducted a pilot study in cooperation with the City of Renton, Waste Management (the collection company), and Public Health. The purpose of the study was to explore the public health and environmental impacts, customer responses, and effects on potential waste diversion that would result from changes in collection. In particular Public Health was concerned about the feasibility of collecting meat and bones every other week in the yard waste cart and changing garbage collection to less than weekly. To explore these concerns, approximately 1,500 Renton households participated in the six-month pilot study to look at two different collection schedules:

- Every-other-week collection of all three solid waste streams – garbage, recyclables, and organics
- Every-other-week collection of garbage and recyclables and weekly collection of organics

Regulatory Changes Allow Adjustments in Collection Frequency Schedules

After successful completion of the Renton pilot study, a variance to Title 10 of the Code of the King County Board of Health was approved to allow every-other-week collection of organics (with the yard waste) for single- and multi-family residents, as well as every-other-week collection of residential garbage. The variance applies as long as the following standards (excerpted directly from the variance) are met. During the next review of the Title 10 Health Code, these variances are scheduled to be adopted.

Residential (Single-Family) Garbage Collection

Residential garbage may be collected every other week provided that:

- Garbage is contained in a provided cart.
- A food scrap collection program is available and actively promoted to residents.
- The garbage collection and food scrap collection services are offered on alternating weeks to ensure that customers have access to at least weekly disposal or composting options for problematic compostables.
- Residents are instructed to bag all garbage before placing it in carts to reduce vectors, free liquids, and litter.

Residential (Single- and Multi-family) Organics Collection (with yard waste)

- When mixed with yard debris, residential food scraps may include all vegetative, meat, dairy products, pastas, breads, and soiled paper materials used for food preparation or handling; provided that all collected materials are picked up by haulers which deliver the mixed yard waste to a permitted transfer and/or permitted composting facility for serviced customers.
- Combined food scraps and yard debris shall be collected no less frequently than every-other-week, year-round provided that there are no leachate generation, odor, or vector problems.
- Combined food scraps and yard debris shall be collected in carts. Residents shall be instructed to place food scraps only in the cart provided to them. Any extra customer-provided cans or large paper bags shall contain only yard debris.
- Compostable bags may be used to consolidate food scraps placed in carts if and only if the bags have been approved by the facility receiving the material for composting. Plastic bags shall not be used for yard/food debris.
- Haulers shall make available a cart-cleaning or replacement service for customers with carts which have unacceptable residue or odor levels to avoid improper disposal of rinse water to storm drains, yards, etc., and reduce the need for customers to self-clean their containers.
- Educational and promotional materials from the county, city, and haulers shall inform residents about the benefits of recycling food scraps and soiled paper; and appropriate options for managing it, including the use of approved compostable bags; and appropriate options and restrictions for cleaning carts.

Commercial/Multi-family Food Scraps Collection (without yard waste)

- Food scraps shall be collected in leak-proof, contractor-provided containers with tightly-fitting lids.
- Containers shall be kept clean through the use of contractor-cleaning, compostable bagging, compostable cart lining or boxing, or limiting the types of materials collected from a particular customer.
- Containers shall be cleaned by the customer or the hauler immediately upon the request of City, County, or Public Health personnel.
- Customers shall be informed of container cleaning restrictions (i.e., proper disposal of rinse water and any residues from containers outside of storm drains, landscaping, etc.).
- Customers shall be informed of what is not acceptable in containers and the need to keep container lids closed when not in use and inaccessible overnight.
- Collection of commercial/multi-family food scraps shall occur weekly at a minimum. Any exception to the minimum weekly schedule will have to be justified by information on a particular customer's food scrap composition, where it can be shown that less frequent collection can occur without leachate generation, odor, and vector problems.

The pilot study showed positive results for both collection schedules tested. There were no negative health or environmental impacts observed, and customers were highly satisfied with the collection schedules and the container sizes provided to adjust for the shift in schedule. Study results indicated not only a 20 percent decrease in the amount of garbage disposed, but an overall reduction in the generation of garbage, recycling, and organics. An added benefit was the reduction in truck traffic and transportation costs with the less frequent collection cycles.

As a result, the City of Renton rolled out a citywide program in January 2009 to offer every-other-week collection of garbage and commingled recyclables, with every week collection of organics.

Renton is the first city in King County to provide every-other-week garbage collection as the standard collection service for single family households. By 2013, Renton's disposal per household had dropped by 23 percent. While other factors such as the economic downturn likely played a role in disposal reductions, data from all of King County over the same time period estimated a disposal drop of 8 percent, suggesting that every-other-week garbage is a significant tool to reduce disposal and increase recycling.

Fee Structure

Curbside Recycling Services: In nearly all areas of King County, households paying for garbage collection services also cover the embedded cost of recycling collection services. In most cases, unlimited amounts of recyclables can be set out. In contrast, the fee for garbage service varies depending on the number or size of containers each household sets out. A variation of this pay-as-you-throw system is to couple it with a linear rate structure in which there is no "bulk discount" for having a larger container and the price per gallon is the same across all service levels.

Consequently, King County residents have a clear financial incentive to reduce the amount they dispose and increase the amount they recycle.

Curbside Organics Services: Sixteen cities, comprising about 55 percent of the population in the county, have adopted rate structures that embed the cost of organics collection in the curbside garbage collection fee, providing a further incentive for residents to reduce disposal and maximize use of the recycling options for which they are paying. In 2016, the average pounds of garbage disposed per household in these cities was 12 percent lower than the average for the rest of King County.

Curbside Collection of Bulky Items for Residents

An ongoing issue with collection is finding the most efficient and cost-effective way to handle bulky waste – larger, individual items that do not fit in a garbage can or recycling cart. This type of waste includes recyclable items such as appliances, potentially reusable items such as furniture, and other large items that must be disposed.

Bulky waste collection services are available from collection companies throughout the county; however, these services are not widely used. Residents may not use the service because it is expensive, ranging from $25 to $128 per item, with the possibility of additional charges for travel time and labor. Customers may also be unaware of the collection options available to them. The primary alternatives to bulky curbside collection are self-hauling the materials to transfer stations for disposal or recycling, or taking them to collection events sponsored by the county or the cities. Neither of these self-haul options is an efficient way of handling the materials because of the number of vehicle trips, the increased number of transactions at transfer stations, and the high cost of staging collection events.

Bulky items are taken to a special recycling collection event.

The current recommendation is to work with collection companies and the WUTC to explore options to increase the efficiency and reduce the price of curbside collection of bulky items. For example, the cost would be lower if a small charge were included in the regular garbage fee, and curbside collection days were regularly scheduled and promoted, thereby increasing the efficiency of the collection routes. Collection systems for bulky items should be designed, to the extent possible, to divert reusable items to charitable organizations for resale, reuse community organizations (Green Bee or Buy Nothing community groups), and recyclable items to processing facilities.

Single-Family Residential Minimum Collection Standards

Single-family collection services for garbage, recyclables, and organics are well established. As discussed earlier, however, there are many variations among the cities in the specific methods of collection and rate structures. The division has evaluated the factors that appear to lead to higher recycling rates and an increase in the diversion of

materials from the garbage. Based on this evaluation, it is recommended that minimum collection standards be adopted by the cities and unincorporated areas to provide the optimal service level for reducing waste and increasing the diversion of recyclables and organics from disposal.

Working with the community and the hauler, the division is exploring the inclusion of Vashon/Maury Island in the service level standards, as well as other ways to improve recycling services provided curbside and at the Vashon Recycling and Transfer Station. Skykomish and Snoqualmie Pass will not be included in the service level standards at this time because of their remote locations and low population densities.

Curbside collection (Photo courtesy of Recology CleanScapes)

The minimum collection standards can be implemented as the county updates its service-level ordinance and jurisdictions amend their collection contracts (some of these targeted standards may not require changes to contracts or the county's service-level ordinance). A description of the recommended collection standards follows in Table 4-5.

Continuing education and promotion will also be important for increasing recycling and reducing wastes generated by single-family residents. The cities and the county will increase education and promotion to encourage the recycling of food scraps and food-soiled paper. In concert with the commercial collection companies, the cities and the county will also continue to focus promotions on the proper recycling of the standard curbside materials to increase participation and reduce contamination in the recycling containers. Financial incentives will also be explored through the fee structure for garbage and recyclables and grants to cities.

Table 4-5. Single-Family Minimum Collection Standards

	Garbage	Recyclables	Organics
Required Materials for Collection*	Mixed solid waste	Newspaper, cardboard, mixed paper, and polycoated paper Plastic bottles, jugs, and tubs Tin and aluminum cans Glass bottles and jars Aseptic packaging Small scrap metal	Yard debris Food scraps Food-soiled paper
Container Type	Containers or wheeled carts	Wheeled carts	Wheeled carts
Container Size	Subscriptions available for various sizes	90+ gallon if collected every other week Smaller size if collected more frequently or if requested by customer	90+ gallons if collected every other week Smaller size if requested by customer
Frequency of Collection	Minimum of once a month	Minimum of every other week	Minimum of every other week
Fee Structure	Fee increases with container size	Recyclables collection included in garbage fee Additional containers available at no extra charge	Organics collection included in garbage fee Additional carts may be included in base fee or available at an extra charge Customers requesting smaller carts may be offered a reduced rate

**Subject to status of recyclables on King County's Designated Recyclables List*

Multi-Family Residential Collection

Multi-family recycling has not been as successful as single-family recycling. There are a number of contributing factors, including space constraints for collection containers and a higher turnover of residents and property managers. These factors make it difficult to implement standardized collection services and provide consistent recycling messaging to this diverse sector. Some local progress has been made, however, in developing consistent design standards to accommodate waste in multi-family complexes. In addition, in many areas of the county there is a trend in the construction of mixed-use buildings, which contain retail shops on the lower level and residential units above.

Mixed-use buildings present somewhat similar challenges for recycling, including:

- A lack of space for adequate garbage, recycling, and organics collection (often competing with parking needs and other uses)

- A need for collaborative planning among property developers, garbage and recycling collection companies, and cities early in the development process to ensure that adequate space is designated for garbage, recycling, and organics containers in the building design
- Different customer types, both residents and employees, with different recycling needs

Recycling could be increased substantially at multi-family complexes and mixed-use buildings by adopting minimum collection standards for multi-family collection. The multi-family standards vary somewhat from the single-family standards to account for differences in service structure. To improve recycling at mixed-use buildings, the cities and the county must consider both the multi-family collection standards and the recommendations for non-residential collection. A description of the recommended collection standards follows in Table 4-6.

Table 4-6. Multi-Family Minimum Collection Standards

	Garbage	Recyclables	Organics
Required Materials for Collection*	Mixed solid waste	Newspaper, cardboard, mixed paper, and polycoated paper Plastic bottles, jugs, and tubs Tin and aluminum cans Glass bottles and jars Aseptic packaging Small scrap metal	Yard debris Food scraps Food-soiled paper
Required Informational Labeling	Clearly mark containers indicating materials that are garbage. Information should include pictures	Clearly mark containers indicating materials acceptable for recycling. Information should include pictures.	Clearly mark containers indicating materials acceptable for organics container. Information should include pictures
Container Type	Wheeled carts or dumpsters	Wheeled carts or dumpsters	Wheeled carts or dumpsters
Container Size	Subscriptions available for various sizes	Service equal to garbage service	Subscriptions available for various sizes
Frequency of Collection	Weekly, or more often if needed	Weekly or more often if needed	Weekly or every other week
Fee Structure	Fee based on container size and/or collection frequency	Recyclables collection included in garbage fee Additional containers available at no extra charge	Subscription service available for an added fee

**Subject to status of recyclables on King County's Designated Recyclables List*

Increased education and promotion are needed to improve recycling at multi-family complexes. It will require concerted efforts on the part of many to standardize the collection infrastructure and provide ongoing education and promotion for property managers and residents alike.

To further increase recycling in multi-family and mixed use buildings, the division, in cooperation with other jurisdictions, property managers, and owners of multi-family properties, collection companies and other stakeholders, has conducted several research and pilot studies (KCSWD 2014b and 2016b). The findings from these studies conclude that successful recycling depends on:

Recycling and garbage containers at an apartment complex. The signs detail what should be put in each bin.

- **Collection logistics**: Effective programs place recycling containers for convenience, access, and ease of use; provide sufficient space and capacity for collection both inside and outside of the buildings; provide tools for collection, storage, and transport of recyclables and organics from units to collection points; and clearly label collection containers.
- **Policies and regulations**: Clear policies ensure that recycling is available and addresses issues such as contamination. Examples might be service level ordinances, city contracts that embed recycling in garbage rates, and building code requirements.
- **Education and outreach**: Effective recycling and food waste collection in multi-family buildings hinges on education and outreach. Strategies such as door-to-door outreach, property manager trainings, and onsite assistance have been successful. In addition, education and outreach that addresses non-English speaking communities is crucial.

Improving multi-family recycling will likely require, at a minimum, the following actions:

- **Clarify and strengthen building code requirements** – The division's GreenTools program has been working collaboratively with cities to develop standards that can be used for multi-family buildings. If adopted, these standards will help ensure that enough space is designed to allow for recycling in future construction.
- **Research collection and demographic characteristics, complex by complex** – Planning outreach strategies should begin with a careful look at language and other population demographics, collection infrastructure, tenant turnover rate, and other applicable characteristics of each complex. Outreach strategies must be comprehensive and flexible to fit the complex. Customized combinations of outreach tactics and education reinforcement, designed to address the researched characteristics of that complex, help ensure successful outreach which will increase recycling and decrease contamination.
- **Provide manager and maintenance staff education** – Involvement and support from the property manager and staff is important to the long-term success of multi-family recycling. The institutional knowledge property managers can provide and the role they play in delivering education to each tenant and at each container are important considerations. This function should be supported with training and materials.

- **Provide ongoing recycling education for residents** – Recycling education needs to be provided on a continuing basis because most multi-family complexes have high tenant turnover. Providing education materials with the lease and at least annually coupled with information through newsletters and posters ensure that residents get the message and it is reinforced on a regular basis.
- **Involve collection companies to assist with service improvements and education** – The collection company should be involved to provide insight and information about complexes' recycling infrastructure systems and to help with education outreach and feedback to the tenants about the quality of the recycling and level of contamination. Companies should monitor the recycling performance of the complexes and tag or refuse pickup of loads that are contaminated.
- **Expand organics collection** – Currently, only a few cities are offering collection of food scraps and food-soiled paper to multi-family residents. The cities and the county will need to work with the collection companies to determine what containers and collection methods will work best for multi-family complexes. Education and promotion will be a critical component of the new multi-family food scrap collection programs.

A collection truck picks up garbage at a business (Photo courtesy of Waste Management)

Non-Residential Collection

The non-residential sector comprises a range of businesses, institutions, and government entities from manufacturing to high-tech and retail to food services. This sector has achieved recycling successes in the last few years, with a recycling rate of almost 71 percent in 2014, according to Ecology statewide recycling data.

Unlike the residential waste stream, the types of materials discarded by the non-residential sector differ widely from business to business. Thus, the recycling potential for any particular business or industry can vary greatly. For example, restaurants and grocers are the largest contributors of food scraps, while manufacturers may generate large quantities of plastic wrap and other packaging materials.

Because of the diversity of businesses in the region, a more individualized approach is needed to increase recycling in this sector. One area with significant room for improvement is the diversion of food scraps and food-soiled paper. The largest increase will be realized as more restaurants and grocers contract with private-sector companies to collect their food scraps for composting, and more cities begin to offer embedded commercial organics collection.

Strategies for increasing recycling in the non-residential sector present some of the same challenges as the multi-family sector, including:

- The lack of consistent and/or adequate building standards for locating collection containers.
- The need for financial incentives for business owners, property managers, and tenants to take advantage of recycling services. For example, cities that include recycling services in their garbage rate provide a financial incentive for businesses to recycle.

- A need for consistent and ongoing technical assistance and education. Involvement and support of the business owners and property managers is important to the long-term success of recycling at individual businesses or complexes. Educating building maintenance staff about properly collecting recyclables from building tenants is important to ensure the proper handling of recyclables. Education for employees about proper recycling methods is also crucial.

To assess the relative size of the non-residential waste stream in different jurisdictions, the division looked at the number of jobs located within them. About 94 percent of jobs in the King County service area are located within incorporated cities. More than 73 percent of these jobs are in cities where the garbage collection contracts include recyclables collection in the garbage fee. These contracts typically define the capacity required for recycling collection as 150 to 200 percent of the amount of garbage capacity, and target collection of the same materials as residential curbside programs.

Non-residential customers have the option to take advantage of recyclables collection offered by their service provider or to contract with other collection companies that may pay for the more valuable recyclable materials, such as high-grade office paper. For cities with collection contracts, adding recycling service to their contracts and including the cost of service in the garbage rate does lead to higher non-residential recycling rates and ensure that recycling services are available to all businesses. However, while including recycling service in the rate requires all businesses to pay for the service, it does not require that those businesses use the service that the city contractor provides. Businesses in unincorporated King County and cities with WUTC-regulated collection services can choose from a wide array of recycling service providers in King County for their recycling needs. Promotion of these services by the county and these cities will help increase awareness among businesses of the available options. For example, the county's "What do I do with ...?" website (https://info.kingcounty.gov/Services/recycling-garbage/Solid-Waste/what-do-i-do-with/) is one place businesses can look for a service provider.

Another strategy that might increase recycling for some business customers is to consider a rate structure based on weight or composition of waste, rather than the size of the container. A study was conducted to measure container weights for non-residential wastes on five weekday collection routes in the City of Kirkland over a 12-month period (KCSWD et al. 2008a). This study determined that businesses with large amounts of food scraps generate garbage that is significantly heavier than the garbage generated by businesses without large amounts of food scraps. In Washington, non-residential garbage rates are based on the size of the garbage container. So generators of heavy materials, such as food scraps, pay less than they might if the rates were based on weight, as they are in some jurisdictions across the country. Because a weight-based rate would likely cost more for generators of large amounts of food scraps, it would provide an incentive for increased participation in organics recycling programs. Another strategy is to offer organics collection to businesses at no additional cost or at rates less than garbage.

Food waste comprises a large part of the waste stream at restaurants

Construction and Demolition Materials Collection and Recycling

Construction and demolition debris is from the construction, remodeling, repair, or demolition of buildings, other structures, and roads and accounts for approximately 30 percent of all waste generated in King County. Construction and demolition debris includes clean wood, painted and treated wood, dimensional lumber, gypsum wallboard, roofing, siding, structural metal, wire, insulation, packaging materials, and concrete, asphalt, and other aggregates. The county banned the disposal of large loads of construction and demolition debris at the county-owned transfer stations and Cedar Hills landfill in 1993. In the following years, the division contracted with two private sector companies to manage the majority of the region's construction and demolition debris.

Construction and demolition materials are typically hauled from a job site by: 1) the contractor or individual working at the job site, 2) an independent construction and demolition debris hauler permitted to handle construction and demolition debris for recycling only, or 3) a collection company permitted to haul materials for both recycling and disposal.

Construction and demolition debris processing of recyclable materials occurs using either source-separated or commingled methods. Source-separated processing, which occurs particularly on large projects with adequate space, involves sorting specific types of construction and demolition material on the job site (e.g., metals, concrete, and clean wood) and transporting them to one or more recycling facilities. Commingled processing involves placing all recyclable construction and demolition debris in one container and then transporting the loads to a facility that uses mechanical and manual methods to sort the recyclable materials. Non-recyclable construction and demolition waste should be hauled directly to a construction and demolition debris transfer station where the waste is transferred to rail cars for transport to a landfill.

The division does not accept construction and demolition waste at its transfer stations or Cedar Hills landfill, except for incidental amounts. The King County ordinance requires that construction and demolition waste must be taken to a designated privately-operated construction and demolition debris recycling and/or transfer facility. The division has agreements with the designated facilities that require these facilities to recycle readily recyclable materials. These facilities are banned from landfilling certain materials including: clean wood; cardboard; metal; gypsum scrap (new); and asphalt paving, bricks and concrete. All other construction and demolition waste may be disposed. As markets develop, the division will consider banning other construction and demolition materials as well.

With improvements in the ability of processing facilities to separate materials, the current trend is toward the commingling of recyclable construction and demolition debris. If recyclable construction and demolition debris and garbage are commingled, however, the recyclables are more difficult to extract and the processing facilities end up having lower facility diversion rates. These mixed loads should therefore be disposed of in their entirety.

Container with construction and demolition debris for recycling

Independent construction and demolition debris haulers with commercial permits can transport recyclable construction and demolition materials from job sites to either source-separated or commingled construction and demolition debris processors. These independent haulers cannot, however, transport construction and demolition materials for disposal. Only collection companies permitted by the WUTC to haul solid waste can transport construction and demolition materials for disposal.

The designated facilities listed in Tables 4-6 and 4-7 have agreements with the division and are a part of a network of designated facilities where construction and demolition materials can be recycled and/or disposed. These facilities agree to meet criteria that the division specifies for recycling of construction and demolition materials. The division contracts with the King County Sheriff's department to provide enforcement that helps to ensure that materials are being recycled. Cities are encouraged to adopt regulations that complement the King County ordinance. The division's GreenTools program is available to provide technical assistance to cities and has a model ordinance for cities to use.

Table 4-6. Designated Facilities for Non-Recyclable Construction and Demolition Waste (Sept 2017)

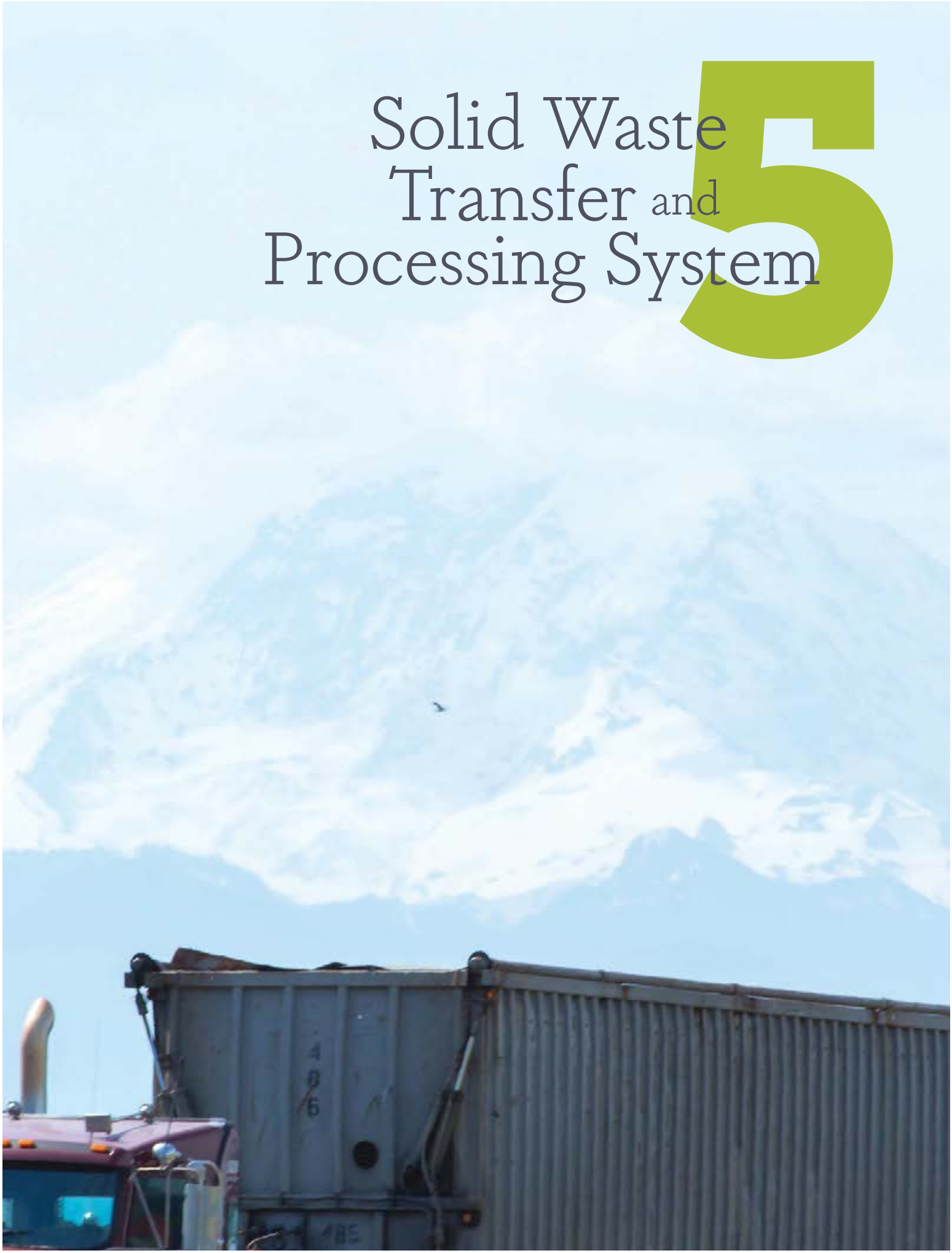
Construction and Demolition Material Facility	Location
Republic Services	
Third & Lander Recycling Center & Transfer Station	2733 3rd Ave South, Seattle
Black River Recycling & Transfer Station	501 Monster Road, Renton
Waste Management	
Eastmont Transfer/Recycling Station	7201 W Marginal Way SW, Seattle
Cascade Recycling Center	14020 NE 190th, Woodinville
Recycling Northwest	701 2nd Street NW, Auburn

Table 4-7. Designated Facilities for Recyclable Construction and Demolition Waste (Sept. 2017)

Construction and Demolition Material Facility	Location
Alpine Recycling	3504 112th St E, Tacoma
DRS Renton	701 SW 34th Street, Renton
DRS Woodinville	5906 238th St SE, Woodinville
DTG Enterprises	22014 W Bostian Road, Woodinville
Maltby Container and Recycling	20225 Broadway Avenue, Snohomish
Recovery 1	1805 Stewart Street, Tacoma
United Recycling - Seattle	74 S Hudson Street, Seattle
United Recycling - Snohomish	18827 Yew Way, Snohomish


Metal
Metal
Blue Bin
Contenedor Azul De Basura
Cardboard
Cartón
Green Bin
Contenedor Verde De Basura
WARNING
ADVERTENCIA
AVERTISSEMENT
DO NOT wrap release cable around hand
NO se envuelva el cable en la mano
NE PAS rouler câble de dégagement autour de la main
STAY CLEAR of hopper when dumping
MANTENGASE ALJEADÓ del carrito cuando se este volcando
RESTER À L'ÉCART de la trémie pendant benneg
CARDBOARD
ONLY

5 Solid Waste Transfer and Processing System



Policies

T-1 Provide solid waste services to commercial collection companies and self-haul customers at transfer stations, and to self-haul customers at drop boxes.

T-2 Provide solid waste transfer services in the urban and rural areas of the county that may be tailored to local and facility conditions and interlocal agreements with King County cities.

T-3 Work with cities and communities to develop mitigation measures for impacts related to the construction, operation, and maintenance of transfer facilities, as allowed by applicable local, state, and federal laws.

T-4 Build, maintain, and operate Solid Waste Division facilities with the highest green building and sustainable development practices.

T-5 Provide for collection of recyclable materials at all transfer facilities – recognizing resource limitations, availability of markets, and service area needs – focusing on maximum diversion of recyclables from the waste stream and on materials that are not easily recycled at the curb or through a readily available producer or retailer-provided program.

Summary of Recommended Actions

The following table includes a menu of recommended actions that the county and the cities should implement. Under the responsibility column, the entity listed first has primary responsibility for the action, bold indicates that the entity has responsibility for the action, and a star (*) indicates that the action is a priority. If the responsibility is not in bold, it indicates that the action is optional for the entity to implement.

Responsibility	Action	Detailed Discussion
1-t County	Continue to implement the transfer system renovation plan set forth in the Solid Waste Transfer and Waste Management Plan and approved by the Metropolitan King County Council in 2007, including planning for providing adequate capacity in the Northeast service area, except as noted in recommendation 2-t.	Page 5-16
2-t County	Although approved for closure under the Solid Waste Transfer and Waste Management Plan, reserve the option to retain the Renton station until the new urban transfer facilities have been sited and the impact of closure has been fully evaluated.	Page 5-16
3-t County	Evaluate adding a second scale and an additional collection container at the Cedar Falls Drop Box to improve capacity.	Page 5-24
4-t County	After the new recycling and transfer stations (including the new South station) are sited, if service level assessments indicate the need for additional capacity in the rural areas, consider siting drop box facilities.	Page 5-24
5-t County, cities	Periodically evaluate the level of service criteria to ensure that the criteria remain relevant.	Page 5-11
6-t County	Explore prospects for the transfer of commercial loads of organics through county transfer stations.	Page 5-30
7-t County	Continue to implement a resource recovery program at new recycling and transfer facilities to remove targeted materials from the waste stream.	Page 5-5
8-t Material recovery facilities	Encourage recycling processors to continue to improve facility sorting and processing equipment and practices to remove contaminants and separate recyclables into marketable commodity grades.	Page 5-29

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
9-t **County, cities, Public Health, haulers, processors***	Work collaboratively with stakeholders to increase capacity for organics processing.	Page 5-30
10-t **County**	Continue to evaluate and assess the feasibility of advanced materials recovery and anaerobic digestion at division facilities.	Page 5-31
11-t **Cities, county**	In the event of an emergency, reserve the transfer system for municipal solid waste and make the recycling of related debris a priority.	Page 5-28
12-t **Cities, county**	Identify potential temporary debris management sites where emergency debris can be stored until it is sorted for recycling or proper disposal.	Page 5-28
13-t **Cities, county**	Provide education and outreach on the proper management of home-generated sharps.	Page 5-6

Solid Waste Transfer and Processing

The increased focus on environmental stewardship has reshaped the role of transfer stations in managing solid waste, creating the need for more robust and modern facilities that will facilitate a sustainable system in the future.

This chapter outlines a transfer system plan that will improve current levels of service, with the flexibility to adapt to changing needs and emerging technologies. The chapter also discusses plans for effectively managing local and regional emergencies.

The Transfer System and Services

The concept of a regional transfer and disposal network in King County grew out of a nationwide movement in the 1960s to impose stricter standards for protection of public health and the environment. The original purpose of the transfer network was to replace the open, unlined community dump sites in use at the time with environmentally safe transfer facilities where garbage could be delivered by curbside collection trucks and self-haulers. From these transfer sites garbage could then be consolidated into larger loads for transport to the Cedar Hills Regional Landfill (Cedar Hills) (see Figure 5-1).

Table 5-1 lists the locations of current transfer facilities, along with the tons of garbage, yard and wood waste received, numbers of customers served, and recycling services provided for at each facility.

Bow Lake Recycling and Transfer Station

Figure 5-1. Locations of solid waste facilities

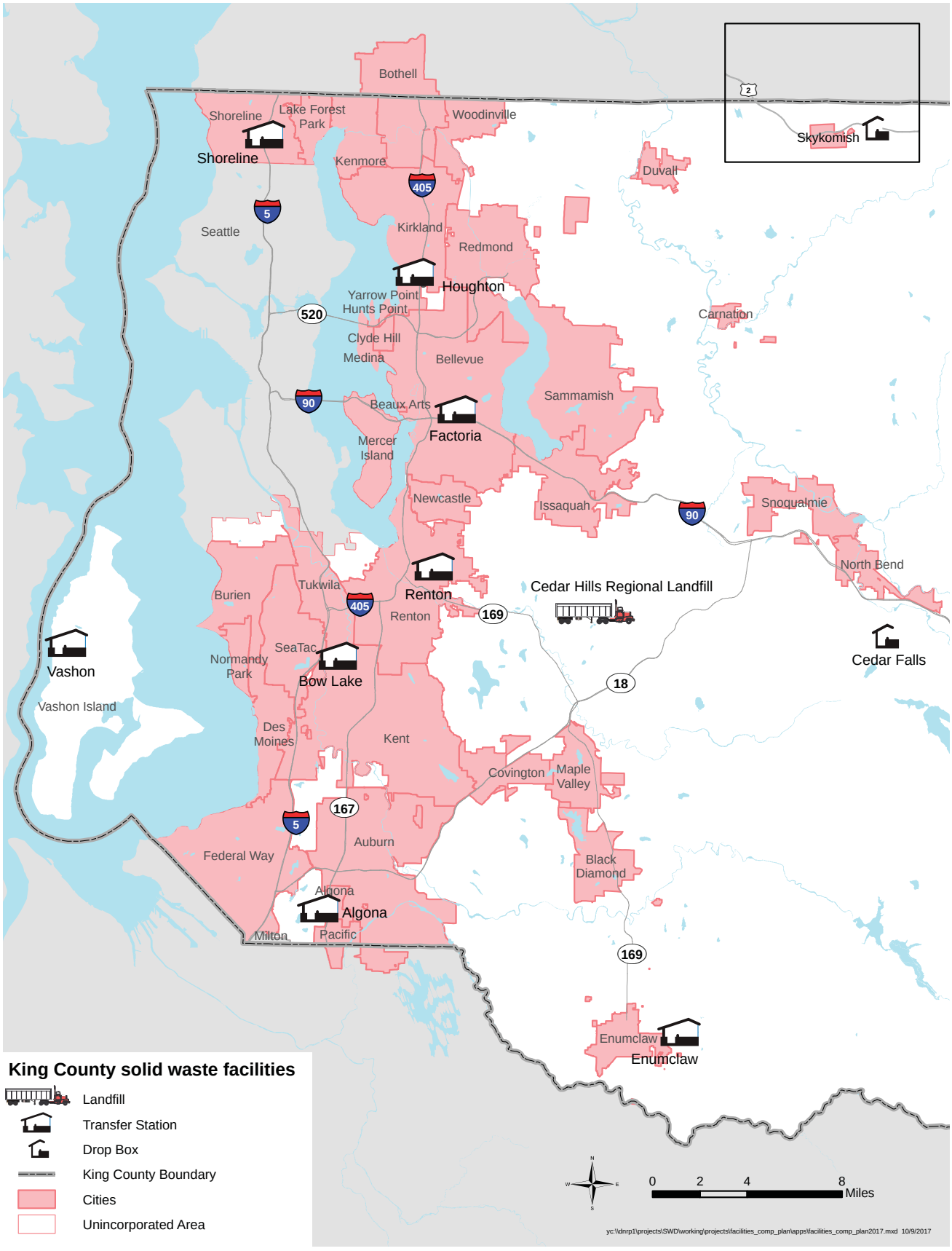


Table 5-1. Current facilities and services

Facility and Address by Area Served	Year Opened	Garbage Tons Received 2016	Recycling Tons Received 2016	Customer Transactions 2016[i]	Recycling and Other Services Provided	Transfer Plan Recommendation and Status
North County						
Shoreline Recycling & Transfer Station[ii] 2300 North 165th St Seattle 98133	2008	70,983	12,644	153,520	Standard curbside recyclables[iii], appliances, bicycles and bicycle parts, clean wood, fluorescent bulbs and tubes, scrap metal, textiles, yard waste, flags, plastic film and plastic grocery bags, expanded polystyrene foam blocks and coolers, household sharps	Replace First Northeast Transfer Station Complete 2008
Northeast County						
Factoria Recycling & Transfer Station 13800 SE 32nd St Bellevue 98005	2017	131,976	N/A	105,464	Standard curbside recyclables, scrap metal, textiles, appliances, clean wood, yard waste, household sharps, and moderate risk waste including recycling of batteries (household, vehicle or marine), fluorescent bulbs and tubes, thermometers and thermostats, propane tanks	Replace Factoria Transfer Station Complete 2017
Houghton Transfer Station 11724 NE 60th St Kirkland 98033	mid-1960s	157,743	585	128,876	Standard curbside recyclables, textiles	Close Houghton Transfer Station when replacement capacity is available. Process to review capacity needs starting in 2018.
Central County						
Bow Lake Recycling & Transfer Station 18800 Orillia Rd South Tukwila 98188	2013	271,202	7,000	215,052	Standard curbside recyclables, appliances, bicycles and bicycle parts, clean wood, scrap metal, yard waste, fluorescent bulbs and tubes, plastic film and plastic grocery bags,expanded polystyrene foam blocks and coolers, household sharps	Replace Bow Lake Transfer Station Complete 2013
Renton Transfer Station 3021 NE 4th St Renton 98056	mid-1960s	68,654	726	86,905	Standard curbside recyclables, textiles	Close Renton Transfer Station when replacement capacity is available No decisions have been made regarding closure pending completion of the new South Recycling and Transfer Station and decisions for a potential Northeast Station

Facility and Address by Area Served	Year Opened	Garbage Tons Received 2016	Recycling Tons Received 2016	Customer Transactions 2016[i]	Recycling and Other Services Provided	Transfer Plan Recommendation and Status
South County						
Algona Transfer Station 35315 West Valley Hwy Algona 98001	mid-1960s	155,722	N/A	146,075	None	Close Algona Transfer Station and replace it with a new South Recycling and Transfer Station Site selected, anticipated opening date in 2022
Rural County						
Cedar Falls Drop Box 16925 Cedar Falls Rd SE North Bend 98045	1990	3,880	683	23,104	Standard curbside recyclables, textiles, yard waste	
Enumclaw Recycling & Transfer Station 1650 Battersby Ave East Enumclaw 98022	1993	21,434	1,715	50,648	Standard curbside recyclables, appliances, clean wood, scrap metal, textiles, yard waste, fluorescent tubes and bulbs	
Skykomish Drop Box 74324 NE Old Cascade Hwy Skykomish 98288	1980	1,484	51	3,493	Standard curbside recyclables	
Vashon Recycling & Transfer Station 18900 Westside Hwy SW Vashon 98070	1999	7,413	2,060	22,296	Standard curbside recyclables, appliances, scrap metal, textiles, yard waste, fluorescent tubes and bulbs, household and business generated sharps, construction and demolition debris[iv]	

[i] Only paid transactions are recorded.

[ii] Replaced the First NE Transfer Station.

[iii] Standard curbside recyclables are glass and plastic containers, tin and aluminum cans, mixed paper, newspaper, and cardboard.

[iv] Construction and demolition debris is accepted for disposal.

Resource Recovery at Transfer Stations

Resource recovery is separation of recyclables that happens after disposed materials are received by the county. It is a growing aspect of division business. Historically, the division's recycling programs have been limited to source separation by curbside customers. However, since 70 percent of the materials brought to the transfer stations could be recycled, sorting out target materials can help reach recycling goals. The division is increasing its resource recovery efforts. Based on a successful pilot project that separated tons of recyclables at the Shoreline Recycling and Transfer Station, new staff were approved for expanded sorting of recyclables from mixed waste at the Shoreline, Bow Lake, and Enumclaw stations. Recycling bins are also provided near where self-haul customers unload their cars at those stations.

In addition to providing the standard recycling services, Bow Lake, Enumclaw, and Shoreline Recycling and Transfer Stations have increased the amounts of cardboard, scrap metal, and clean wood recycled by actively removing these materials from mixed waste with use of an excavator and by providing additional staff to engage customers in the separation of recyclables from mixed waste loads at the point of disposal.

A Transfer Station Operator recovers cardboard from a mixed load of solid waste

Materials Recovery by the Numbers

In 2016, additional staffing, recycling bins, and signage in the self-haul areas resulted in the recovery of 5,861 tons of cardboard, metal, and wood, an increase of 2,400 tons over last year.

Material Recovery (Additional Tons) April 1, 2014 - Dec 31, 2016				
	2014	2015	2016	Total
Bow Lake	0	1,160	2,814	3,975
Enumclaw	6	156	286	448
Shoreline	1,184	2,114	2,761	6,059
	1,190	3,431	5,861	10,482

Services for Moderate Risk Wastes

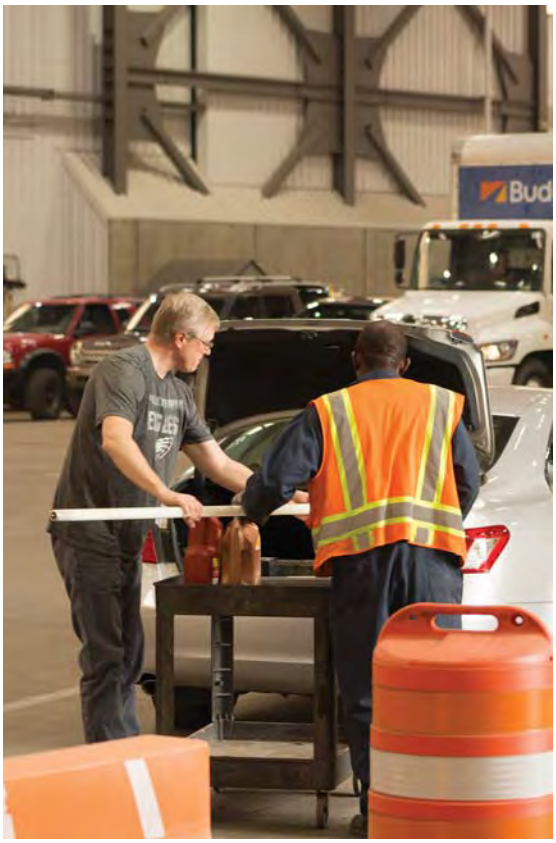
Many common household products, such as pesticides and certain cleaning products, contain ingredients that are toxic, flammable, reactive, or corrosive. Disposed improperly, these products, referred to collectively as moderate risk waste, can pose a threat to human health and the environment. Moderate risk waste generated in King County is managed through the Local Hazardous Waste Management Program (LHWMP). This program is jointly managed by

King County, the City of Seattle, the 37 cities within our service area, and Public Health. The guiding policies and plans are contained in the joint *Local Hazardous Waste Management Plan* (Watson 2010), mandated under RCW 70.105.

The county accepts moderate risk waste from residents through two avenues: the traveling Wastemobile and the stationary drop-off site at the Factoria Recycling and Transfer Station. In addition, the City of Seattle operates two moderate risk waste collection sites within its borders, which are open to all King County residents. Wastes collected through these services are recycled, reused, or incinerated when necessary. None is disposed at Cedar Hills. Moderate risk waste collection for residents is funded through a surcharge on garbage disposal, residential and business garbage collection, and wastewater discharge fees. Residents and businesses using the services are not charged at the drop-off locations. Jurisdictions receive funds from the LHWMP to provide the service.

Created in 1989, the county's Wastemobile was the first program of its kind in the nation. It is a mobile service that travels to communities within King County, staging collection of moderate risk waste at each site for two or three days at a time. The traveling Wastemobile had 21 events in 2016 that served 11,209 King County residents, collecting 254 tons of moderate risk waste. This represents a customer increase of 25% from 2015. The Wastemobile also provides moderate risk waste collection at The Outlet Collection Seattle (formerly the Supermall) in Auburn each Saturday and Sunday. In 2016, 226 tons of moderate risk waste were collected at this location from 8,921 customers, 33 percent more customers than used the service in 2015.. The county's Factoria Recycling and Transfer Station offers moderate risk waste drop-off service six days a week. In 2016, a little over 12,000 customers brought about 214 tons of moderate risk waste to Factoria.

Since 2008, Factoria and the Wastemobile have also accepted moderate risk waste from small businesses. In 2016, this program served 274 small quantity generator business customers and collected 18 tons of moderate risk waste.



The moderate risk waste collection facility at the new Factoria Recycling and Transfer Station collects moderate risk waste from households and small businesses

Collection of Sharps

Sharps are medical products, such as hypodermic needles, scalpel blades, and lancets, which require special handling to ensure their safe collection, transfer, and disposal. Without proper containment, sharps can pose a safety hazard to workers through potential exposure to blood-borne pathogens or other disease-causing agents. Within King County, the disposal of sharps is regulated by Title 10 of the Code of the King County Board of Health and by King County's Waste Acceptance Rule PUT 7-1-6(PR), 9/17.

Disposal of sharps in the general waste stream is prohibited. Separate, secure receptacles for sharps collection are provided for residents and small businesses at the Vashon Recycling and Transfer Station with prior authorization from the division's Special Waste Unit. Residents may also deposit home-generated sharps in separate, secure receptacles at the Factoria, Shoreline and Bow Lake Recycling and Transfer Stations. Business-generated sharps are not accepted

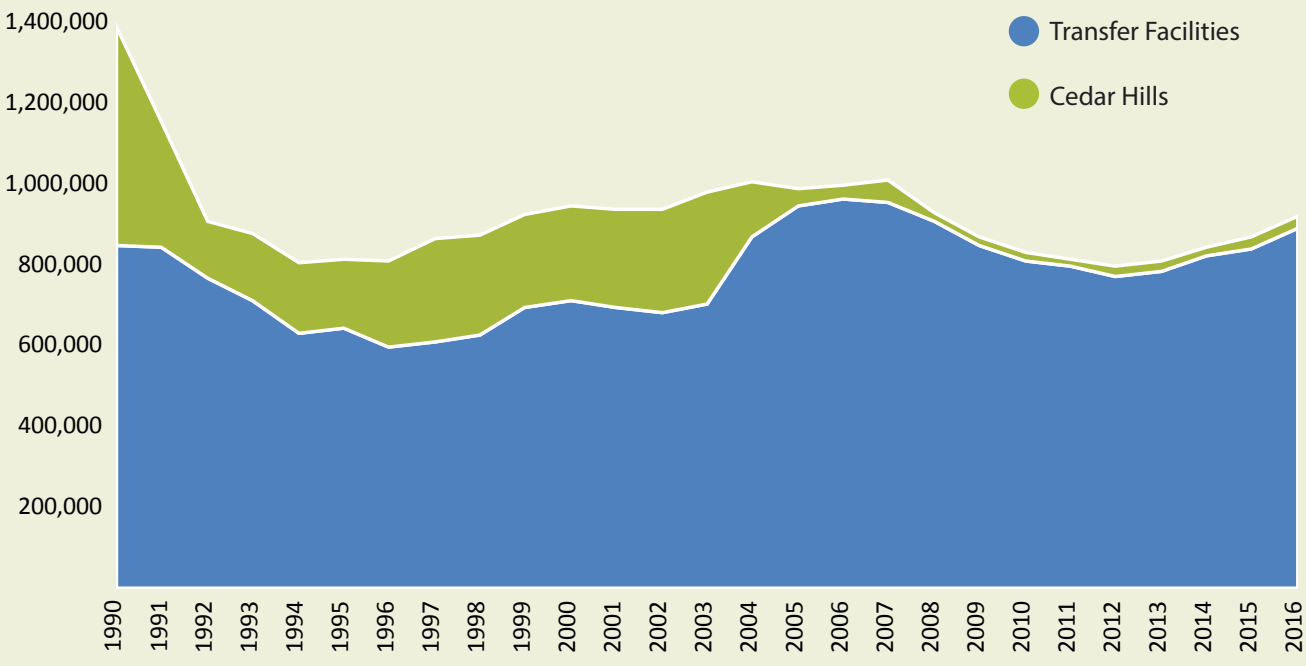
at the transfer facilities, except at Vashon with prior authorization from the Special Waste Unit. Sharps generated by medical facilities or businesses are accepted for disposal at Cedar Hills with prior authorization from the Special Waste Unit.

There are alternative methods for the proper management of sharps. For example, some health care providers and pharmacies will take back used sharps in pre-approved containers. There are also mail-in programs available.

Trends in Transfer Station Usage

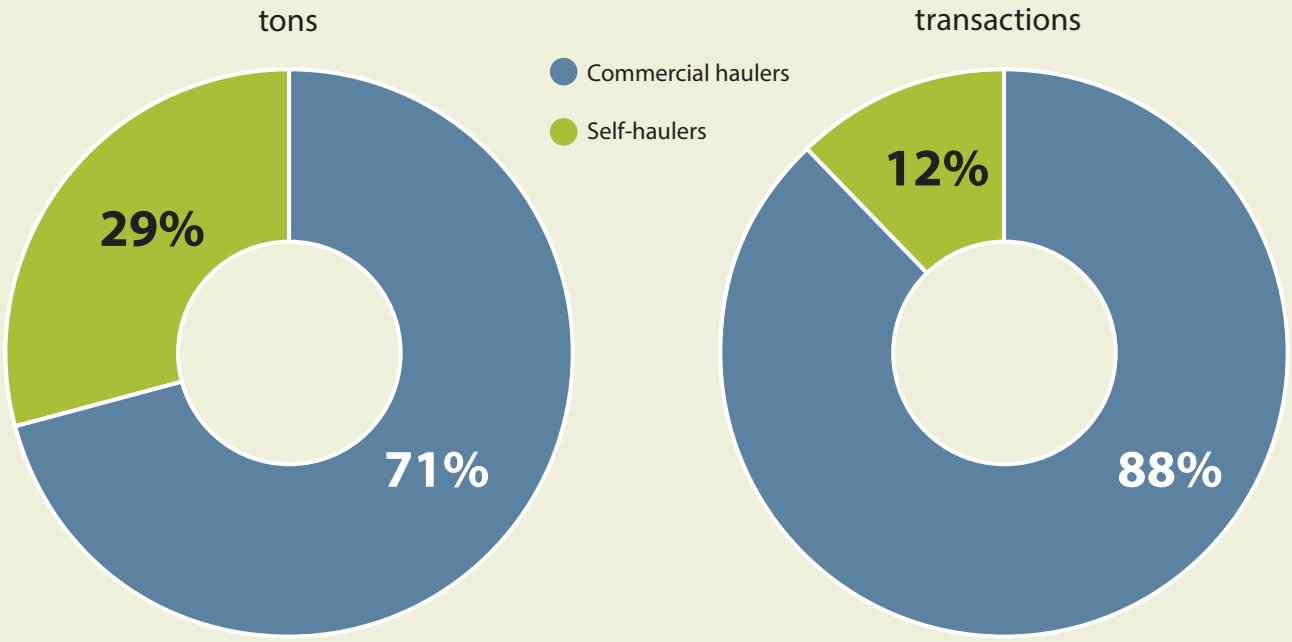
Figure 5-2 shows the tons of garbage received at the transfer stations and the landfill over the last 27 years. The drop in total tons disposed in the early to mid-1990s is attributable to the success of waste prevention and recycling programs that began in the late 1980s, the withdrawal of the City of Seattle from the county's system in 1991, and the ban on most construction and demolition debris from the division's solid waste system in 1993. In 2004, the amount of garbage taken directly to Cedar Hills decreased significantly due to an increase in the fee charged to commercial collection companies that were hauling wastes directly to the landfill. The economic downturn is primarily responsible for the tonnage reduction since 2007. The division does not expect a rapid return to earlier tonnage levels.

Figure 5-2. Total tons processed at transfer facilities and disposed at Cedar Hills (1990 - 2016)



Seventy-one percent of the garbage received at the transfer facilities in 2016 was brought by the larger, commercial collection trucks, with the remaining 29 percent delivered by business and residential self-haulers (shown in Figure 5-3). While the larger garbage loads come from the commercial haulers, self-haulers account for 88 percent of the customer transactions (Figure 5-3). At some of the urban stations that are operating at or near maximum capacity, the mix of self-haul and commercial customers can cause long traffic queues and crowded conditions on the tipping floor. Transfer station capacity depends on a number of variables such as the mix of collection trucks versus self-haulers, available tipping stalls for each, on-site queue capacity for each, and trailer loading ability (in the case of the

Figure 5-3. Percent of tons and transacations at transfer facilities by hauler type (2016)



older stations with no preload compactors). The division has managed these problems, to the extent possible at each station, by providing separate queuing lanes for the two customer types and allowing maximum separation on the tipping floor, for safety as well as efficiency. Crowding is somewhat eased by the fact that self-haulers typically use the stations more on weekends, while commercial transactions occur primarily on week days.

To understand who self-hauls to the transfer facilities and why, the division conducts periodic surveys of customers through on-site questionnaires at each facility. Self-haulers consist of single- and multi-family residents and non-residential customers, such as landscapers, small contractors, industries, offices, stores, schools, government agencies, and increasingly, independent haulers for hire. The most common type of self-hauler is the single-family resident.

Of the self-haul trips, about 88 percent are made by residential customers, who bring in about 75 percent of the self-haul tons. About 12 percent of the trips are made by non-residential self-haulers, bringing about 25 percent of the self-haul tons.

The number one material disposed by self-haulers is dimensional lumber (a subset of construction and demolition debris), followed by yard waste, other construction and demolition wastes, furniture, and scrap metal. The division's waste characterization studies indicate that approximately 70 percent of the materials disposed by self-haulers are recyclable.

Planning Capacity at New Recycling and Transfer Stations

New recycling and transfer facilities are being designed to safely and efficiently serve both commercial and self-haul customers. When a new station is designed, maximum capacity is not targeted to occur when the station opens, but is dependent upon vehicular projections into the future, usually 20 - 30 years. The mix of traffic and tonnage on weekends and weekdays varies significantly, so it is usually vehicular capacity on weekends that drive queue length, number of tip stalls, and therefore overall size of the facility. On weekdays, tonnage drives the throughput of a station.

Waste characterization studies conducted at transfer stations also survey self-haulers on-site at the transfer facilities (Cascadia 2016). The most common reason for transfer station visits reported by residential customers was that self-hauling was "large amount of garbage"(18 percent). Other primary reasons for self-hauling included, "items too big to fit in garbage can," (16 percent) "cheaper or saves money"(14 percent), "other"(10 percent), and "cleaning home or workplace"(nine percent). The most frequent response from nonresidential customers was "large amount of garbage" (26 percent).

Evaluation and Planning for the Urban Transfer Stations

The county's implementation of the *Solid Waste Transfer and Waste Management Plan* (Transfer Plan) to renovate the aging transfer system to better serve its customers is underway. This investment in the transfer system will help the division meet demands created by the growth in population since Cedar Hills began accepting waste in the mid-1960's, technological changes in the industry, and ongoing advances in the recycling and salvage of materials from the waste stream.

The Algona Transfer Station was built in the mid-1960's

The Planning Process

Since 1992, continuing growth in the county and technological changes in the industry have intensified the need for significant improvements and updates to the division's infrastructure. The 2001 *Comprehensive Solid Waste Management Plan* (2001 Plan) reasserted the need for an updated transfer system (KCSWD 2002). Given the scope of changes anticipated, both the cities and the county recognized the need for a more coordinated approach to the planning and decision-making process. In 2004, the County Council adopted Ordinance 14971, which prioritized evaluation of the urban transfer station network as an integral part of the waste management plan and established a process for collaborative participation by the cities in solid waste planning.

Codified in KCC 10.25.110, Ordinance 14971 outlined an iterative process of analysis and reporting that would culminate in a plan containing recommendations for upgrading the solid waste system. The ordinance also established a forum for cities, division, and County Council staff to collaborate on solid waste planning through the advisory committees – the Solid Waste Advisory Committee (SWAC) and the Metropolitan Solid Waste Management Advisory Committee (MSWMAC). The legislation also created the Interjurisdictional Technical Staff Group (ITSG) to assist MSWMAC with its work. ITSG included staff representatives from the cities, County Council staff, and the division. The group was very active during the initial stages of data gathering and analysis for the planning process, but is no longer meeting. Much of the initial work was to evaluate the whole system and develop recommendations that would help inform and guide the direction of this Plan.

Along with division staff, the committees first analyzed various aspects of the solid waste system through four iterative milestone reports. These reports identified the need to renovate the county's urban transfer facilities by evaluating the

current conditions of each facility, discussed options for public and private ownership and operation of solid waste and recycling facilities, and identified packaged alternatives for the future configuration of the transfer station network.

These four milestone reports culminated in the Transfer Plan (KCSWD 2006b), which provides recommendations for upgrading the transfer station system and services; methods for extending the lifespan of Cedar Hills; and options for preparing the landfill for eventual closure. Through the process of analysis and reporting, the division's stakeholders had a significant role in shaping the recommendations in the Transfer Plan. At the conclusion of the process, they communicated their support of the plan to the King County Executive and the County Council.

Before final approval of the Transfer Plan, the County Council requested an independent third-party review of the Transfer Plan, which was conducted by the firm Gershman, Brickner & Bratton, Inc. (GBB). GBB fully supported the primary objectives of the plan to modernize the transfer station system and maximize the lifespan of the Cedar Hills landfill. Based on GBB's review and the support of both SWAC and MSWMAC, the County Council unanimously approved the Transfer Plan in December 2007.

In 2012, as the division moved to implement the Transfer Plan, several cities raised questions about how changes in core planning assumptions may call for a change in if/how to proceed with the replacement of the Algona, Factoria, and Houghton transfer stations. With a lower tonnage forecast than was predicted in 2006 when the Transfer Plan was agreed to, and the indication that five cities were going to exit the system in 2028 resulting in an additional drop of system tonnage, it was decided to conduct a Transfer Plan Review, starting in 2013. At the end of that process, it was confirmed that a new Factoria Recycling and Transfer Station should be built and siting for a new South County Recycling and Transfer Station should continue. However, siting for a new Northeast Recycling and Transfer Station was postponed while alternative options were explored.

In 2014, Council Motion 14145 directed the division, in collaboration with stakeholders, to continue to evaluate a mix of capital facilities and operational approaches to address system needs over time, including implementing operational approaches such as transaction demand management strategies that would provide service for the northeast county without building an additional transfer station; and to compare trade-offs and benefits with the Transfer Plan.

The division transmitted a final report to the County Council on June 30, 2015 as directed by Motion 14145. The report reaffirmed that the siting process for the South County Recycling and Transfer Station should continue, but that the siting process for the Northeast Recycling and Transfer Station should be postponed. Instead, the report recommended that the division conduct a demand management pilot to test whether instituting longer

The new Factoria Recycling and Transfer Station opened in the fall of 2017

hours and peak pricing at the Factoria Transfer Station would influence customers to either use the station at different hours or to use another station. During lengthy discussions with the division, advisory committees raised numerous concerns about the demand management pilot, including its impact on service levels, traffic, and regional equity.

In 2017, with the city of Bellevue signing the *Amended and Restated Solid Waste Interlocal Agreement* (Amended and Restated ILA), the cities of Clyde Hill, Hunts Point, Medina and Yarrow Point also expressing interest in signing it, and higher tonnage than was forecast in 2014 coming into the system, the county concluded that the demand management pilot as planned would likely not be effective. County Council Ordinance 18577 and accompanying Motion 14968 canceled the demand management pilot and initiated a further planning effort for transfer capacity in the Northeast service area. The legislation allocated one million dollars to planning work to assess waste transfer capacity needs in the Northeast area of King County and options to meet these needs. It also directs the division to plan for needed transfer station capacity in the Northeast area that would be in addition to the existing Factoria Recycling and Transfer Station. Evaluation of options is presented in this chapter.

Service Level Evaluation Criteria

In the first milestone report (KCSWD and ITSG 2004), the division and advisory committees developed 17 criteria to evaluate the urban transfer facilities. To determine the appropriate standards of performance, the division consulted the local commercial collection companies and other experts, and applied national environmental and transportation standards. Details on the application of these evaluation criteria to individual facilities are contained in the second milestone report prepared by the division and advisory committees and approved by the County Council (KCSWD 2005a). Criteria to address costs and rate-setting considerations were applied during the development of system alternatives in the final milestone report (KCSWD 2006a).

The evaluation criteria were applied to five of the six urban stations – Algona, Bow Lake, Factoria, Houghton, and Renton. The former First Northeast station was not evaluated because it was in the process of being rebuilt. The rebuilt station opened in 2008 as the Shoreline Recycling and Transfer Station. These criteria were again evaluated and confirmed as appropriate during the 2013/14 Transfer Plan Review process.

For the urban station evaluations, the 17 criteria were grouped into three broad categories – level of service to customers, station capacity and structural integrity, and effects on surrounding communities. As expected for these five aging facilities, the majority of the criteria were not met, resulting in decisions to reconstruct or close the stations when sufficient replacement capacity was available.

The three categories of evaluation criteria are described below:

Level of Service

- *Estimated travel time to a facility* – This criterion measures how conveniently located the facilities are for customers, measured by the maximum travel time to the closest facility in their service area. The standard was established as 30 minutes for at least 90 percent of the customers. It provides an indication of whether the transfer stations are well dispersed throughout the county.
- *Time on site* – Time on site measures the time to get in and out of the station, including unloading time. It was evaluated separately for commercial haulers (with a standard of 16 minutes) and business and residential self-haulers (each with a standard of 30 minutes). It provides an indicator of whether a transfer station can efficiently handle customers in a timely manner.

- *Facility hours* – Individual days and hours of operation for each station are based on the division's usage data and customer trends. Some of the urban stations are open in the early morning or late evening hours to serve the commercial haulers. Currently, the only days that the entire system is closed are Thanksgiving, Christmas, and New Year's Day.

- *Level of Recycling Services* – The final criterion in this category was whether recycling services provided at the stations met the waste prevention and recycling policies established in the *2001 Comprehensive Solid Waste Management Plan*. In general, the policies directed that all stations should 1) provide for collection of the curbside recyclables, including glass and plastic containers, tin and aluminum cans, mixed waste paper, newspaper, and cardboard, 2) where feasible, provide areas for source-separated yard waste collection, and 3) maintain the capacity to add collection of new materials based on market opportunities and community needs.

Station Capacity

Station capacity is likely the single greatest limitation of the five urban transfer stations, both now and in the future. It was measured using a number of criteria that affect daily operations, future expansion, and emergency capacity.

- *Vehicle and tonnage capacity* – Two major operational considerations measured were station capacity for vehicle traffic and solid waste tonnage, both at the time of the study and over the 20-year planning horizon. Optimal operating capacity is the maximum number of vehicles and tonnage that can be efficiently processed through the station each hour based on the station design and customer mix. To derive criteria that would indicate how well a station could be expected to perform, the division modeled its criteria after the transportation standards used to measure roadway capacity. The transportation standards were modified to assign measures of capacity to transfer facilities. The optimal level of service was defined as "able to accommodate vehicle and tonnage throughput at all times of the day, except for occasional peak hour times. Based on the criteria, a station that provides the optimal level of service more than 95 percent of the time is considered underutilized, meaning it offers more capacity than required for the area it serves. A level of service in which capacity is exceeded during only 5 to 10 percent of operating hours is considered optimal.

Recycling at the Enumclaw Recycling and Transfer Station

- *Space for three days' storage* – Available storage capacity establishes whether a transfer station can continue to operate, or accept garbage, for at least three days in the event of a major regional disaster.

- *Space for station expansion* – Stations were evaluated to determine 1) whether there is space for expansion on the existing property or 2) whether there is adjacent land available on which to expand operations. These two standards were used primarily to determine if the station could be expanded in its current location or if a new location would be needed to efficiently manage current and future needs.

- *Meets facility safety goals* – While all stations hold current permits from Public Health and meet health and safety standards, overall safety is a concern as stations become more congested and operations more constricted. The presence of these physical challenges at the stations does not mean they operate in an unsafe manner; it does mean that it takes extra effort by staff and management at the stations to ensure the facilities are operating safely.

- *Roof clearance* – This criterion measures a station's capacity to handle the larger commercial collection trucks. Through discussions with the commercial collection companies, it was determined that a minimum clearance of 25 feet was needed to allow the new, larger trucks to unload efficiently. The longer truck/trailers with automated lifts, which allow the garbage to slide out the back of the trailers, require higher vertical clearance than trucks did in the past. At some of the older stations, the collection trucks can hit and potentially damage station roofs, supporting structures, or hanging lights as they unload.

The roof at the Houghton Transfer Station was raised in 2012 to accommodate larger trucks.

- *Ability to compact waste* – This criterion examines whether the station is equipped with, or has the space to install, a waste compactor. Waste compactors increase efficiency and reduce costs by compressing more garbage into fewer loads for transport to the landfill or other disposal option. When garbage has been compacted, transfer trailers can carry about one-third more tons per trip, resulting in less traffic, less wear on local roads, less fuel use, and a reduction in greenhouse gases.

- *Structural integrity* – The purpose of this criterion is to ensure the facility meets code requirements for seismic, wind, and snow events. All facilities were constructed in compliance with the applicable standards of the time and were grandfathered in their current condition and presently meet the "life safety" standard, meaning the station would not endanger occupants in the event of an emergency. The current standard for assessing new transfer buildings for seismic performance is the Immediate Occupancy standard, developed by the Federal Emergency Management Agency (FEMA). This standard means that the facility could be occupied immediately following a seismic event. Because the *King County Emergency Management Plan* identifies transfer stations as critical facilities in the event of an emergency, this FEMA standard applies to all new stations.

Effects on Surrounding Communities

One of the division's highest priorities is to minimize the effects of its facilities on host cities and surrounding communities. Through its advisory committees and meetings with cities, the division works to understand city and community issues and concerns and bring their perspectives to system planning. Working together, five criteria were developed to evaluate effects on communities.

- *Meets applicable local noise ordinance levels* – This criterion is to ensure that a facility does not violate state or local (city) standards for acceptable noise levels. State and city standards are based on maximum decibel (dBA) levels that consider zoning, land use, time of day, and other factors. Evaluations were based on the existence of any reports of noise violations to the cities and additional noise level measurements performed at each station by a consultant.
- *Meets Puget Sound Clean Air Agency standards for odors* – The primary measure of odor issues is complaints by the public or employees. Complaints are typically reported to the Puget Sound Clean Air Agency (PSCAA) or directly to the division. Complaints to PSCAA are verified by an inspector. If an odor is verified and considered to be detrimental, PSCAA issues a citation to the generator of the odor. The division also tracks and investigates odor complaints.
- *Meets goals for traffic on local streets* – This criterion measures the impacts on local streets and neighborhoods from vehicle traffic and queuing near the transfer stations. The area that could be affected by traffic from self-haulers and commercial collection trucks extends from the station entrance to the surrounding streets. The division hired a consultant to evaluate this criterion based on two standards: 1) that additional traffic meets the local traffic level of service standard as defined in the *American Association of State Transportation Officials Manual* and 2) that traffic does not extend onto local streets during more than 5 percent of the station's operating hours.
- *Existence of a 100-foot buffer between the active area and nearest residence* – This criterion calls for a 100-foot buffer between the active area of the station and the nearest residence.
- *Compatibility with surrounding land uses* – The final criterion used to evaluate the stations was the most subjective and difficult to apply. It looks at consistency with land use plans and zoning regulations, aesthetics, and compliance with state and local regulations. This criterion was evaluated for each station during lengthy discussions between the division and its advisory committees.

Since the level of service criteria were first applied to the transfer stations in 2005, the division has made changes and upgrades to the system. New recycling and transfer stations have been completed at Bow Lake and Factoria, and the roofs at Houghton, Algona and Renton were raised to meet the roof clearance standard. In 2017, the division applied selected criteria to the transfer stations again, using the current system conditions and an updated tonnage forecast. Table 5-2 presents the updated results for criteria that could be affected by these changes. Although the Shoreline station was not part of the original analysis, it is included in the update for reference.

Table 5-2. Key service level criteria applied to urban transfer stations

		Algona	Bow Lake	Factoria	Houghton	Renton	Shoreline
2. Time on site meets standard for 90% of trips							
a. commercial vehicles	< 16 min = yes	NO*	YES	YES	NO*	NO*	YES
b. business self-haulers	< 30 min = yes	YES	YES	YES	YES	YES	YES
c. residential self-haulers	< 30 min = yes	YES	YES	YES	YES	YES	YES
*Average time on site is within the **16 minute** standard, but these stations are not able to accommodate peaks.							
3. Recycling services . . . meet policies in 2001 Solid Waste Plan							
a. business self-haulers	YES/NO	NO	YES	YES	NO	NO	YES
b. residential self-haulers	YES/NO	NO	YES	YES	NO	NO	YES
4. Vehicle capacity							
a. meets current needs	YES/NO	NO	YES	YES	YES	YES	YES
b. meets 20-year forecast needs	YES/NO	NO	YES*	YES	NO	YES	YES
*Will meet criterion on weekdays, but may not on weekends depending on level of recycling service available.							
5. Average daily handling capacity (tons)							
a. meets current needs	YES/NO	NO*	YES	YES	NO	YES	YES
b. meets 20-year forecast needs	YES/NO	NO	YES	YES	NO	YES	YES
*This is a very close; the result is within .5 percent of meeting the criteria.							
6. Space for 3 days storage							
a. meets current needs	YES/NO	NO	YES	YES	NO	NO	YES
b. meets 20-year forecast needs	YES/NO	NO	YES	YES	NO	NO	YES
11. Ability to compact waste	YES/NO	NO	YES	YES	NO	NO	YES

Remaining criteria not listed above includes:

1. Maximum Time to a Transfer Facility
- a. meets current needs
- b. meets 20 year forecast needs

7. Space for 3 days' storage
- a. meets current needs
- b. meets 20 year forecast needs

8. Space exists for station expansion
- a. inside the property line
- b. on available adjacent lands through expansion

9. Minimum roof clearance of 25 feet

10. Meets facility safety goals

12. Structural integrity
- a. Meets goals for structural integrity
- b. Meets FEMA immediate occupancy standards

13. Meets applicable local noise ordinance levels

14. Meets PSCAA standards for odors

15. Meets goals for traffic on local streets
- a. Meets LOS standard
- b. Traffic does not extend onto local streets 95% of time

16. 100 foot buffer between active area & nearest residence

17. Transfer station is compatible with surrounding land use

Plans for the Urban Transfer Stations

Based on the application of evaluation criteria, the division and its advisory committees developed a plan to modernize the transfer system, including the addition of waste compactors and other changes needed to provide efficient and cost-effective services to the region's customers.

Activities approved by the County Council in the Transfer Plan include the following:

Bow Lake – deconstruct the existing transfer station and construct a new recycling and transfer station on the existing site and adjacent property - complete

Factoria – deconstruct the existing transfer station and construct a new recycling and transfer station on the existing site and adjacent property - complete

Algona – close the station and replace it with a new recycling and transfer station in the South County area – site selected

Houghton – close the station when replacement capacity is available

Renton – close the station when replacement capacity is available

Although approved for closure, the division recommends reserving the option to retain the Renton station in some capacity, should its closure leave Renton and surrounding rural areas underserved. After the new transfer stations have been sited, the impact of closure can be fully evaluated. Table 5-3 shows the planned changes for the urban transfer stations and the two areas identified for construction of new stations.

The new Bow Lake Recycling and Transfer Station is located on the site of the old Bow Lake Transfer Station and on adjacent property purchased from the Washington State Department of Transportation. During construction, the facility remained open to commercial haulers and self-haulers. The new transfer building opened in July 2012, immediately followed by deconstruction of the old transfer building to make way for an expanded recyclables collection area and new scale house. The station was completed in 2013.

The new Factoria Recycling and Transfer Station was built on the existing site and adjacent property purchased by the division for construction of the new facility. The old station remained open as the new transfer building was constructed. Once the new building was complete, the old building was deconstructed to make room for the stationary moderate risk waste facility and recyclables collection area. The new facility was completed in late 2017, cost approximately 90 million dollars, and will not be expanded per Ordinance 18577 and accompanying Motion 14968.

A new South County station, estimated to cost about 113 million dollars, will replace the current facility in Algona on a site just north of the existing station. Investigation of how to provide long-term transfer capacity in the Northeast service area will resume when a project manager is hired and will include initiating the planning process. If a new Northeast Recycling and Transfer Station is pursued, it is estimated to cost approximately 133 million in 2017 dollars.

All new stations will be built to similar standards of service and sustainability as the Bow Lake, Factoria, and Shoreline Recycling and Transfer Stations. There will be differences to accommodate community needs (e.g., Factoria retained a stationary moderate risk waste facility), and each station will be appropriately sized and designed to meet tonnage and customer requirements. All stations will have improved capacity, waste compactors, and additional space for collection of recyclable materials. The capacity to accept yard waste and other recyclables from commercial collection companies and to sort and remove recyclables from mixed loads will also be considered for new transfer facilities. For each new station, the division will seek the highest appropriate environmental certification as mandated by the County Green Building Ordinance.

Figure 5-4. Locations of existing and planned solid waste facilities

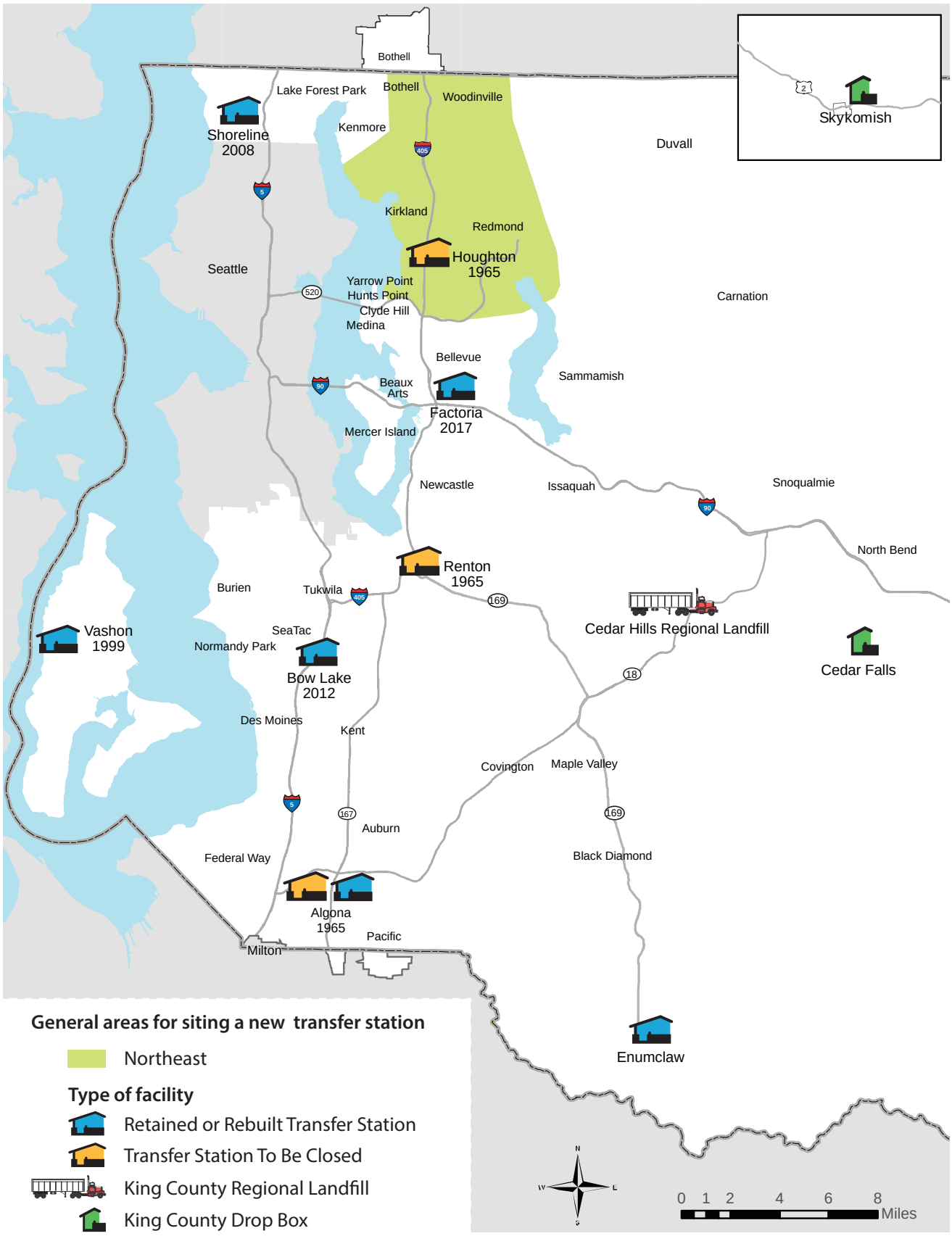


Table 5-3. Timeline for the facility renovation plan

	2017	2018	2019	2020	2021	2022	2023	2024	2025
Factoria	open								
South	siting	design and permit			construction		open		
Algona						close			
Northeast	planning								
Houghton[1]									Close when replacement capacity available
Renton[2]									Close or modify operations[1]

1 There is no timeline for facility renovation in the Northeast service area. A study of how to provide long-term transfer capacity in that area will begin in 2018.

2 Division recommends reserving the option to retain the Renton Transfer Station in some capacity.

The timeline for completing the siting, design, construction, and closure of the urban transfer stations is shown in Table 5-3.

Selecting the Approach to Provide Long-Term Transfer Capacity in the Northeast Service Area

In October 2017, the King County Council passed an ordinance that states "The Plan must also address current waste transfer capacity needs in the Northeast area of King County and how those needs are proposed to be met." The following discussion includes information and data from past studies, and evaluates options to provide transfer capacity for the Northeast service area. A preferred option to provide transfer capacity for the Northeast service area will be selected following public review of the Plan.

In addition, the division will begin a process in 2018 to assess the transfer capacity needs in the Northeast service area. The division will use experience gained in siting the South County Recycling and Transfer Station to refine its approach to understanding capacity needs, evaluating potential sites, and involving the community. Criteria for any facility that might ultimately be built in the Northeast service area would be developed with members of that community. A first step in this process will be a dialogue to understand the needs and concerns of all of the stakeholders in the northeast service area.

Consistent with King Count y Ordinance 18577 and Motion 14968, transfer capacity in the northeast area of King County will be in addition to the existing Factoria Recycling and Transfer Station and allocated equitably among jurisdictions. Additionally, transfer capacity in the northeast area of King County will not be developed on the upper Eastgate Way property near the Factoria Recycling and Transfer Station and will not be accomplished using methods from the demand management pilot project.

The Existing Houghton Transfer Station and the Northeast Service Area

As early as the 1992 Comprehensive Solid Waste Management Plan, the Houghton Transfer Station was identified as being in need of replacement. Throughout the years, subsequent evaluations and studies, including the 2006

Transfer Plan, confirmed the need for a new station and the closure of the old one. The existing Houghton station was constructed in the mid-1960s on 8.4 acres of land. The station is bordered by the closed Houghton landfill on the north side, Bridle Trails State Park on the south side, and private homes on the east and west sides. The station has an open-sided, direct-dump style transfer building, a scalehouse, a modestly-sized no-fee recyclables collection area for a limited range of materials, and trailer parking areas.

The Houghton station does not have a compactor to compact waste, which would reduce outbound transfer loads by one-third. In addition, this older station does not include the more advanced environmental controls that are featured in newer stations such as rain water collection, dust control systems, and an enclosed facility that mitigates operational impacts to the surrounding area.

In 2011, a number of improvements were completed – including increasing the height of the roof and adding a wall to screen operations. The purpose of these improvements was to enable the station to continue to operate safely but more efficiently and with less impact on neighbors and the surrounding community.

The Houghton Transfer Station

The Houghton Transfer Station is one of the division's busiest stations. In 2016, the station handled 157,743 tons of solid waste, constituting 18 percent of the solid waste at all King County transfer stations (number three in the system). The waste was brought to the station through 128,876 customer visits (number two in the system). Eighty-two percent of the visits were made by self-haul customers, who contributed 22 percent of the total solid waste received at the station. Commercial customers contributed 78 percent of the total solid waste with 18 percent of the visits.

The Northeast service area – currently served by the Houghton Transfer Station - includes the cities of Kenmore, Kirkland, Redmond, and Woodinville and parts of Bellevue, Bothell, and unincorporated King County. Table 5-4 shows the percent of the city transactions that go to the Houghton station. The 2015 Customer Service Survey indicated that this station provides service to jurisdictions with minimum service overlap from other transfer stations. For example, commercial and self-haul solid waste traffic from Kirkland, Redmond, and Woodinville almost exclusively goes to the Houghton station.

As shown in Table 5-5, population in the Northeast and Factoria service areas combined is expected to grow from about 509,000 people in 2010 to 657,000 people in 2040 (a 29 percent increase); or from about 38 percent of the total population in the division's service area to 39 percent. Employment in the Northeast and Factoria service areas combined is anticipated to grow from about 298,300 in 2010 to about 498,500 in 2040 (a 67 percent increase); or from about 41 percent of the total employment in the division's service area to 43 percent. Figure 5-5 shows the estimated tons disposed at the transfer stations in 2040.

Table 5-4: Percent of Jurisdiction's Solid Waste Traffic that Uses the Houghton Transfer Station

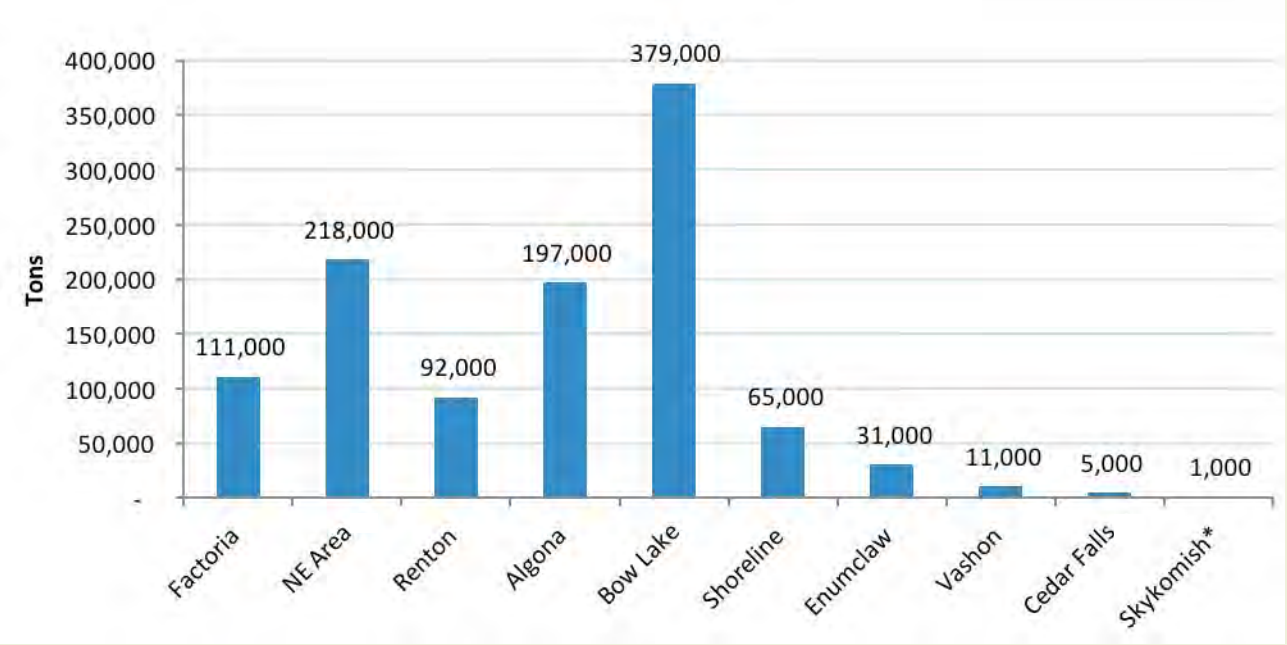
Jurisdiction	Percent Commercial Transactions	Percent Self-Haul Transactions
Woodinville	100	86
Kirkland	96	97
Redmond	94	89
Bothell	22	91

(Source: Cascadia 2015b)

Table 5-5. Population and Employment Growth in Northeast and Factoria service areas

	2010		2040	
Service Area	**Population**	**Employment**	**Population**	**Employment**
Solid Waste Division Service Area	1,345,587	702,782	1,678,447	1,159,122
Eastside (Factoria & Northeast)	508,804	298,337	656,693	498,470
Percent of Solid Waste Division Service Area	38	42	39	43

Figure 5-5. Annual Tons Disposed Estimate in 2040 by Transfer Station*



*assumes 57 percent recycling. Source: King County Solid Waste Division

Factors to Consider in Selecting Transfer Capacity for the Northeast Service Area

These factors were used to assess alternatives in the Transfer Plan Review (KCSWD 2013) and are among the factors to consider in determining how to provide transfer capacity in the northeast service area:

- Cost – County capital and operating costs, and costs to curbside customers
- Service and Capacity – includes level of service criteria
- Environment – greenhouse gas emissions, recycling opportunities, and community impacts

Additional factors to consider include:

- Equity in geographic distribution, service levels, rates, and transportation impacts
- Efficiency in use of the entire system

Demand Management is No Longer an Option

The Transfer Plan Review Parts 1 and 2 (KCSWD 2013a and KCSWD 2015) evaluated several different alternatives for providing transfer capacity for the whole solid waste system. The conclusion of these reviews was that capital and operating options (demand management strategies) could be tested to determine if there were viable ways to offset the need for building a new Northeast Recycling and Transfer Station. Because circumstances have changed since the two reviews took place in 2013/2014 and 2014/2015, some of the conclusions from the reports are no longer accurate. In particular, the conclusion that demand management strategies (peak pricing and extended hours) could substitute for a transfer facility in the Northeast service area is no longer valid. Changed circumstances include:

- System tons were eight percent higher in 2016 than the tonnage forecast assumed in the Transfer Plan Review Part I because of regional economic growth.
- The Transfer Plan Review Parts I and 2 assumed an annual 1% increase in the recycling rate up to 70 percent recycling. Actual progress towards this goal has stalled, creating increased future demand for solid waste transfer services.
- Bellevue signed the Amended and Restated ILA in late 2017 and Clyde Hill, Hunts Point, Medina, and Yarrow Point have indicated that they will also sign it. Therefore, overall tonnage and transactions would be higher beyond 2028 than was forecast in the Transfer Plan Review Part 2.

Three Options to Provide Transfer Capacity in the Northeast Service Area

Consistent with King Count y Ordinance 18577 and Motion 14968, transfer capacity in the northeast area of King County will be in addition to the existing Factoria Transfer Station and allocated equitably among jurisdictions. Additionally, transfer capacity in the northeast area of King County will not be developed on the upper Eastgate Way property near the Factoria Transfer Station and will not be accomplished using methods from the demand management pilot project.

Keep the Existing Houghton Transfer Station Open – This option would keep the existing station open indefinitely and largely in its current condition. This option would be the "no action" or status quo alternative to addressing transfer capacity in the Northeast service area.

Site and Build a New Northeast Recycling and Transfer Station – This option would assess the Northeast service area based on expected population and employment growth, transportation corridors, and other criteria to determine the type and size of a transfer station needed to serve the area. The division would conduct a site selection process similar to the one conducted to locate a suitable site for the South County Recycling and Transfer Station.

Consistent with King County's Solid Waste Facility Siting Plan (KCSWD 2006b, Appendix C) an advisory committee composed of Northeast service area residents, city, and business representatives would be formed to develop siting criteria that would guide the site selection process.

Use a Combination of Facilities to Meet Transfer Capacity Needs –This option would assess the Northeast service area based on expected population and employment growth, transportation corridors and other criteria to determine the types and sizes of transfer stations needed to serve the area. It would consider various combinations of facilities to meet transfer capacity needs. For example, it could include leaving the existing Houghton Transfer Station open to serve only self-haulers and siting and building a separate facility elsewhere in the service area to serve commercial haulers. The division would conduct a site selection process for one or more sites similar to the one conducted to locate a suitable site for the South County Recycling and Transfer Station. Consistent with King County's Solid Waste Facility Siting Plan (KCSWD 2006b, Appendix C) an advisory committee composed of Northeast service area residents and city and business representatives would be formed to develop siting criteria that would guide the site selection process.

Comparison of Options

Table 5-6 below shows a comparison of the following discussion of the criteria as they apply to the options.

Cost

Capital Cost – Keeping the existing Houghton Transfer Station "as is" would save on capital costs. A new Northeast Recycling and Transfer Station is estimated to cost up to $133 million in 2017 dollars (assuming a Factoria-type station). This capital cost translates to about $.50 per month per single-family household in the division's service area. The option to use a combination of facilities would likely have costs somewhere between the other two options, assuming that the existing Houghton station is used to provide capacity for self-haulers.

Operating Cost – Operating costs for the existing Houghton Transfer Station would be slightly lower than operating costs of a new Northeast Recycling and Transfer Station. A new station would have more services, such as more recycling and resource recovery opportunities, which would require more staff than at the existing station. The option using separate facilities for commercial and self-haulers would be the most expensive, since the division would be operating two facilities instead of one.

The new Factoria Recycling and Transfer Station has two compactors and room for an recyclables collection

Service and Capacity

Level of Service Criteria - The 2001 Plan identified the Houghton Transfer Station as being a constrained station, meaning that it is located on a small site and has limited ability to enlarge the transfer building or to expand services. As discussed in the *Service Level Evaluation Criteria* section, the Houghton station does not meet several of the level-of-service criteria, in part due to the nature of the site. The site has limited space for recyclables collection and does not have a compactor.

Building a new Northeast Recycling and Transfer Station would enable the division to build a facility that meets all of the level-of-service criteria. The station would be built on a site that would allow the station to function optimally and to provide recycling and resource recovery services that are not currently available at the existing station.

Using a combination of stations could also meet more of the service level criteria than the existing Houghton Transfer Station. Although the existing station would still be used, the commercial traffic would no longer be present, so it is possible that the site could be reconfigured to offer more recycling opportunities. A new commercial facility built on a different site would be designed to meet the level-of-service criteria.

Environment

Greenhouse Gas Emissions - As a general rule, traffic impacts and resulting greenhouse gas (GHG) emissions are minimized by distributing facilities equitably throughout the service area and by compacting waste before hauling it to the Cedar Hills landfill (compactors reduce transfer trailer trips by about one-third). The existing Houghton Transfer Station does not have stationary compactors and does not have available space to install one. A new station would have space for a compactor and therefore have reduce transfer trailer traffic.

Where a new facility is sited could also impact greenhouse gas emissions. Ideally, a new facility would be centrally located in the service area. Because the major transportation corridors - I-405, I-90, and SR 520 - are often congested, the location of a new facility could either limit or increase greenhouse gas emissions as a result of customers spending increased time in traffic

Recycling – The existing Houghton Transfer Station accepts the standard recyclables (glass, metal, paper, plastic, and textiles). Because of its limited space, it does not accept yard waste. A new Northeast Recycling and Transfer Station would be designed to have the space for the standard recyclables as well as the materials collected at the newer recycling and transfer stations (Shoreline, Bow Lake, Enumclaw, and Factoria), including yard waste. In addition, a new facility would be designed to allow for resource recovery and have the flexibility to add recyclables as markets develop. The option to use two facilities to meet customer needs may not be able to provide the same range of recyclables. If the existing Houghton Transfer Station is re-purposed to be a self-haul only station, more recycling opportunities could likely be added, but not the full range of opportunities available at the newer stations. Space and design constraints would limit those opportunities. For instance, because self-haul customers dump their solid wastes directly into trailers, there is no opportunity for resource recovery at the existing Houghton Station.

Community Impacts - Potential impacts from transfer stations may include noise, odor, and traffic on neighboring streets and the regional transportation system. All of the options would result in some impacts to the surrounding areas, including impacts to neighborhoods that connect to transfer stations. The division would work with the host community to minimize those impacts. The existing Houghton Transfer Station has a sound wall and a wall to screen the transfer station, but it is an older station with open sides. New recycling and transfer facilities are fully enclosed to minimize potential odor, noise, and litter impacts. Therefore, new facilities are much more compatible with a variety of surrounding land uses.

Equity

Geographic distribution, service levels, and financial and transportation impacts – The location, services offered, and financial and transportation impacts to the community are components of providing regional equity in transfer services in the northeast service area. Since the location and transportation impacts of a new northeast station or of a new station under the hybrid option are not known at this time, it is difficult to determine how equitable each of those options are. The existing Houghton station does not provide the range of recycling opportunities as other stations do, and so does not provide equity in recycling services available to all the region's customers. Financial

equity considerations range from the impacts to curbside customers' bills if collection trucks in the one service area (such as the northeast) need to travel farther, to increases in the county's per ton fees that would pay for station construction and be shared by all system users. Northeast service area customers currently are paying for new stations in other parts of the county without seeing the benefits of the services provided at a new station in the northeast service area.

Efficiency in use of the entire system

The three different options provide different levels of efficiency for the system. Since the existing Houghton Transfer Station does not provide the level of services that a new station would, it is not as efficient for the system. A new northeast station or a hybrid system could provide the services, location and space that help the system to work more efficiently.

Table 5 -6 provides a visual comparison of the criteria discussed above as applied to the three options. In the table, green is the more favorable, yellow is in the middle, and red is less favorable. Since many details of the options are unknown at this point, the colors represent how the options compare relative to one another.

Table 5-6. Comparison of Options for Providing Capacity for the Northeast Service Area

	Capital Cost	Operating Cost	LOS Criteria	GHG	Recycling	Community	Equity	Efficiency
Keep Houghton Transfer Station								
Northeast Recycling and Transfer Station								
Combo								

Evaluation and Planning for the Rural Transfer Facilities

Historically, the rural areas were served by small community landfills. As those landfills closed, most were replaced by either a transfer station or a drop box. The Duvall and Hobart (near Maple Valley) landfills were closed without replacement. Currently, rural King County is served by two recycling and transfer stations, in Enumclaw and on Vashon Island; and two drop boxes, in North Bend (Cedar Falls) and Skykomish.

In 2007, the division applied the same 17 criteria used for the urban stations to the rural facilities. Because the drop boxes are essentially collection containers covered by roof structures, there is no building per se to evaluate, so many of the criteria did not apply. Criteria specific to the rural system were not developed because a preliminary look indicated that the rural facilities, for the most part, met the standards set for the urban system, although they may be open for fewer hours and days. To provide an appropriate level of service to area

The Vashon Recycling and Transfer Station

residents and the commercial collectors, the division periodically reviews the operating hours of rural facilities and makes adjustments as needed.

The Enumclaw Recycling and Transfer Station, which opened in 1993, serves the City of Enumclaw and southeastern King County. The City of Enumclaw provides its own garbage collection service and takes the wastes to the transfer station. The station offers a wide variety of recycling opportunities and is equipped with a waste compactor. This station met all of the evaluation criteria, with the capacity to provide a wide range of services and the flexibility to respond to future needs.

The Vashon Recycling and Transfer Station opened in 1999 to serve residents and businesses on Vashon Island. This station also met all of the evaluation criteria. It accepts a wide range of recyclables and is also equipped with a waste compactor. Because of its remote island location, the facility accepts some construction and demolition materials and special wastes for disposal that the other stations do not. The division partnered with Zero Waste Vashon, a community group focused on finding practical ways to recycle waste, to conduct a pilot program to collect yard waste mixed with food waste. The program started in October 2015 and was made permanent in 2016. The division will continue to partner with Zero Waste Vashon to find solutions to managing Island waste in a cost effective and environmentally appropriate fashion.

The drop boxes are scaled-down facilities, designed to provide cost-effective, convenient drop-off services in the more remote areas of the county. The Cedar Falls Drop Box, which opened in 1990, serves self-haulers in the North Bend area. It has three containers – two for garbage and one for yard waste – and provides a collection area for some recyclables. This facility met all applicable evaluation criteria except for vehicle capacity, which is primarily due to heavy weekend use. Currently, the same scale is used by both inbound and outbound traffic, which can lead to backups on weekends when the station is most busy. The division is considering a number of improvements to this facility, including a second scale to address heavy weekend use, another container for garbage or yard waste collection, and expanded recycling opportunities.

The most remote facility operated by the division is a drop box in the Town of Skykomish. Built in 1980, the drop box serves Skykomish and the communities of Grotto and Baring. Skykomish provides its own garbage collection service and takes the wastes to the Skykomish Drop Box. The drop box is also used by self-haulers, who can bring garbage and recyclables to the facility. The Skykomish facility is unstaffed; payment is made at an automated gate using a credit or debit card or pre-paid solid waste disposal card. There are cameras at the site to monitor activities, and division staff makes regular visits to the site to perform maintenance. In addition, the King County Road Services Division has a facility next door, from which Road's staff help monitor the site. The drop box met all the applicable evaluation criteria and appears to provide an appropriate level of service for the area. The facility received a new roof in 2008, after the old roof collapsed under record snowfall in January of that year.

The Skykomish Drop Box

Some rural area customers may be affected by changes to the urban transfer system, primarily self-haulers who currently use the Houghton or Renton transfer stations. If a new urban facility is ultimately sited in the Northeast service area, the facility location may or may not adequately meet the service needs of rural areas. Should it be necessary, the division may consider siting drop box facilities to serve residents. Construction of regional transfer stations in these areas is not being considered. The division recommends deferring decisions about whether to site drop boxes in these potentially underserved areas and whether to close the Renton transfer station until after the new urban transfer stations have been sited and the impact on service capacity has been fully evaluated.

City Mitigation

Transfer stations provide an essential and beneficial public service. However, the stations have the potential to cause undesirable impacts on host cities and neighboring communities, such as increased litter, odor, noise, road/curb damage, and traffic, as well as aesthetic impacts. The division works to mitigate these impacts in a number of ways, such as collecting litter, landscaping on and around the site, limiting waste kept on-site overnight to reduce the potential for odor, making road modifications, and siting facilities on or near major roadways to keep traffic off local streets.

Seven cities in the division's service area currently have county-owned transfer facilities within their boundaries:

- **Algona** – the Algona Transfer Station
- **Bellevue** – the Factoria Recycling and Transfer Station
- **Enumclaw** – the Enumclaw Recycling and Transfer Station
- **Kirkland** – the Houghton Transfer Station
- **Renton** – the Renton Transfer Station
- **Shoreline** – the Shoreline Recycling and Transfer Station
- **Tukwila** – the Bow Lake Recycling and Transfer Station

As new transfer stations are constructed in the near future, the division will work with host and neighboring cities to build stations that are compatible with the surrounding community. For example, during the design of the Shoreline Recycling and Transfer Station, the division worked closely with the community to identify impacts and mitigation measures. One result is that transfer trailers drive directly from the station onto Interstate 5 using King County Metro Transit's dedicated freeway ramps rather than city streets for access. In addition, sidewalks on nearby streets were improved; a new walking path was constructed at nearby Ronald Bog Park; trees were planted; and the portion of Thornton Creek that flows through the site underwent significant restoration. The transfer building was also moved farther from residences and is fully enclosed to mitigate impacts from noise, odor, and dust.

The division has also worked closely with the City of Bellevue on the replacement of the Factoria Transfer Station. The initial plan was for a new facility to be constructed on property that fronts Interstate 90 adjacent to the south side of the old station. However, as a result of discussions with Bellevue, the division purchased adjacent property to the northwest of the old station to complete the new facility.

In the Amended and Restated ILA (included in its entirety in Appendix C), which identifies the roles and responsibilities of the county and the cities in the regional solid waste system, the county agrees to collaborate with host and neighboring cities on both environmental review and project permitting. Additionally, the Amended and Restated ILA recognizes that in accordance with RCW 36.58.080 a city is authorized to charge counties to mitigate impacts directly attributable to a county-owned solid waste facility. It must be established that such charges are

reasonably necessary to mitigate impacts and the revenue generated may only be expended to mitigate the impacts. Direct impacts may include wear and tear on infrastructure, including roads. The city and county will work cooperatively to determine impacts and appropriate mitigation payments and will document any agreement. Mitigation, including any necessary analysis, is a cost of the solid waste system and as such would need to be included in the solid waste rate.

Transfer Facility Siting

As described earlier in this chapter, the need for new transfer facilities was identified through a comprehensive analysis of the transfer system network, with extensive involvement from the division's advisory committees. While general areas for site locations were identified (Figure 5-4), specific sites or specific site selection criteria were not.

The siting of a transfer facility is based on the technical requirements of operations and site constraints, such as site size and shape; however, a successful siting effort must also be tailored to address the needs and concerns of the service area communities. The siting process involves a number of steps – from development of site selection criteria to final selection of a site – and public involvement plays an important role each step of the way. The following section describes how the division has begun to implement the standards and practices developed for transfer station siting during the planning process in its search for a new south county facility site.

Siting a New South County Recycling and Transfer Station

The search for a site to replace the Algona Transfer Station with a new South County Recycling and Transfer Station began in 2012. The new station will serve the same communities that are served by the current Algona station – Algona, Auburn, Federal Way, and Pacific.

A Siting Advisory Committee (SAC) was formed to advise the division from a community - and system-user perspective by identifying community concerns and impacts, developing criteria used to evaluate potential sites, and expressing opinions and preferences. SAC members included representatives from cities, local agencies and businesses, chambers of commerce, school districts, commercial garbage and recycling collection companies, transfer station users, environmental and neighborhood groups, tribes, and interested citizens.

In addition to forming a SAC, the division worked to ensure that members of the communities to be served by the new station were aware of the project, were able to receive information about the project, and had opportunities to give input on the project. Public information efforts to non-English speaking communities included translating public information materials into Spanish, Russian, and Korean and providing translators at public meetings.

After an extensive site selection process and the completion of an Environmental Impact Statement (EIS), the County selected a site at 35101 West Valley Highway South, Algona, WA which is just north of the existing station. As indicated in Table 5-3, the next phase of this project, design and permitting, will be undertaken in the next two years, followed by another two years of construction. It is anticipated that the existing Algona Transfer Station will continue to operate until the new station is complete. At that point, the old station will close. Up-to-date information about the South County Recycling and Transfer Station project can be found on the division's website: www.kingcounty.gov/depts/dnrp/solid-waste/facilities/algona.aspx.

Transfer Services after an Emergency

Relatively common emergencies, such as seasonal flooding and winter storms, as well as major events, such as earthquakes, can create a significant amount of debris. Debris generated during these types of events can obstruct roadways, cause power outages, and interrupt essential services. A coordinated and effective plan ensures that debris is properly managed to lessen the impacts on communities, the economy, and the environment in the immediate aftermath of an emergency without causing additional problems later in recovery.

To minimize disruptions and provide for efficient management of disaster debris, the division prepared the *King County Operational Disaster Debris Management Plan* (Debris Management Plan)(KCSWD 2009) for unincorporated King County. The Debris Management Plan is intended to facilitate rapid response and recovery efforts during a disaster. The plan will be reviewed periodically, prior to the storm season, and updated as needed.

The Debris Management Plan supports the 37 incorporated cities that are part of the King County solid waste system by providing a framework and making recommendations that can be used by the cities to develop their own operational disaster debris management plans. The cities have the flexibility to develop a debris management plan that best addresses their individual needs without compromising continuity within the county. Several cities have now adopted individual plans. The City of Seattle has its own debris management plan and the City of Milton is participating in Pierce County's debris management program.

The county's Debris Management Plan stipulates that during emergency response and recovery, the roles within the King County solid waste system do not change. This means that the division will continue to accept municipal solid waste at the transfer stations to the extent possible and will maximize recycling in accordance with RCW 70.95.010 (8) and KCC Title 10. The transfer facilities will not be used for disposal of disaster debris that could be recycled.

The debris created by a larger event, such as an earthquake, would likely consist primarily of recyclable materials, such as concrete, metal, and wood. The division's Debris Management Plan is coordinated with emergency plans prepared by other jurisdictions to maximize the recycling of these materials. The division works with the King County Regional Communications and Emergency Coordination Center (RCECC) and the Local Hazardous Waste Management Program to coordinate public information and help cities and residents identify recycling options in the event of a debris-causing emergency. Recycling the majority of emergency debris will maximize the division's capacity to continue to handle municipal solid waste over the short- and long-term.

In the event of an emergency, transfer services may be suspended in the short-term. The division's priorities are to:

1. Ensure the safety of staff and customers.
2. Confirm the structural integrity of facilities and environmental control systems.
3. Coordinate with the RCECC to determine any immediate needs for division staff or equipment.
4. Resume service.

The division will attempt to maximize the use of existing transfer facilities after an emergency through operational measures such as increased staffing or hours. If some transfer facilities are closed or damaged as a result of the event, customers will be rerouted to remaining stations, and commercial haulers may be routed directly to Cedar Hills. Additionally, the division and the cities may establish temporary debris management sites where debris can be stored until it can be sorted for recycling or proper disposal. It is recommended that potential sites in unincorporated King County and in cities be identified by each jurisdiction in advance of an emergency. The acceptance policies at these sites would be determined in response to the nature of the event and the debris that is generated.

Processing Collected Materials

Processing Commingled Recyclables

The division expects that the private sector will continue to expand processing capacity for commingled recyclables as the need arises. In addition, numerous other private-sector facilities have emerged across the county where individual residents and businesses can bring source-separated recyclables, from paper, cans, and bottles to printer cartridges and cellular telephones, for processing.

While the conversion to commingled collection makes recycling easier for consumers and has resulted in increased recycling, it presents some challenges for the recovery and processing facilities. One of the challenges is cross-contamination of materials as they are sorted and separated. This is a problem particularly for the paper stream, where materials such as plastic milk jugs end up in the baled paper. Plastic bags sometimes catch in and jam the sorting machinery at material recovery facilities, and they can blow around and cause litter problems. Paper mills overseas typically perform additional sorting of the materials to recover misplaced recyclables; however, most domestic paper mills dispose of these materials. In the case of glass, even small amounts of contamination in the sorted material can reduce the quality and affect the potential end use of the recycled glass. These problems illustrate a fundamental conflict between the benefits of commingled recycling (it makes collection easier and leads to increased recycling) and the need for the material recovery facilities and end users to minimize the costs of handling these materials.

Sorting line at the Cascade Recycling Center (Photo courtesy of Waste Management)

For the processing of commingled recyclables to be most efficient, it is important that consumers are careful about preventing contamination in the recycled loads by: 1) preparing recyclables for the collection cart (i.e., rinsing out bottles and jars, breaking down cardboard boxes) and 2) placing materials in the proper collection container. Contamination in the recyclables can cause a wide array of problems during processing, which can lead to a reduction in the value of the materials processed for market or, in extreme cases, the disposal of entire mixed loads. This issue can best be remedied through education programs on proper recycling techniques offered through local governments and the collection companies.

As the region moves forward, the recommended role of the county and cities is to focus on increasing the supply and improving the quality of recyclable materials delivered to processors. The value of materials for recycling can be maximized through public education – to decrease contamination in the recycling stream and ensure that materials are properly prepared before being placed in the recycling container – and through market development – by encouraging businesses to invest in technologies used to sort and process recyclables.

There are materials that present unique challenges or require more definitive decisions about the optimal way to process them, such as container glass, food-contaminated paper, compostable and degradable plastic, plastic bag and film, plastic caps, poly-coated paper, and shredded paper. The division, along with several cities, has participated in the Northwest Region Commingled Workgroup to identify key issues with commingled collection and processing and to develop recommendations for addressing them. The division will be working with the cities, the collection companies, and processors to determine which of these recommendations should be implemented in King County.

Processing Organics

Composting is the primary processing option for food scraps, compostable paper, and yard waste in the region. Composting capacity appears adequate for the quantity of yard waste and food scraps currently being collected from King County residents. However, only a few private sector processors are operating in the region and they may be near their maximum permitted capacities. One reason that capacity is constrained in the region is because organics cannot be transported to Central/Eastern Washington for new processing capacity because of the Washington State Apple Maggot Quarantine regulations (RCW 17.24).

If organics diversion significantly increases in King County and the surrounding region, more processing capacity is needed. In order to significantly increase diversion of organic materials that are disposed from single and multi-family homes and businesses, a regional dialogue with exploration of alternatives and solutions for expanding capacity is necessary. This will help minimize environmental and community impacts related to regional organics processing and ensure an adequate capacity and infrastructure is in place for regional organics processing, including contingency plans in the event regional capacity is constrained.

Maintaining the quality of finished product is critical to compost markets, and processing challenges include:

- Contamination of composting feedstocks, particularly from glass and plastic film
- Composting feedstocks are in transition. Regional commercial facilities were largely designed for yard waste, not the mix of food, yard, and compostable packaging that is collected and processed today. There exists a need for upgraded technology to manage the new material mix
- Processors have expressed a desire to better anticipate the future feedstock mix, noting a need for better information on volumes and incoming materials to inform investments in capacity, equipment, and labor
- Financing for technology upgrades at existing facilities

Composters report that market prices and sales for compost products have been stable. However, maintaining the quality of finished product is key to maintaining adequate market demand for compost; processors must balance the costs of adding processing steps (such as for additional contaminant removal) with maintaining competitive market prices for finished product.

Cedar Grove Composting Facility (Photo courtesy of Cedar Grove)

Emerging Processing Technologies

Resource recovery goes beyond sorting to include technologies such as anaerobic digestion, advanced materials recycling, pyrolysis, and gasification. Most of these technologies hold promise for the future but do not yet have extensive track records in reliably handling the amount of waste in King County's system. A brief discussion of anaerobic digestion and advanced materials recovery follows. For a discussion on pyrolysis and gasification, see Chapter 6, *Landfill Management and Solid Waste Disposal*.

Anaerobic Digestion

In 2016, the division hired HDR Engineering to evaluate options for adding anaerobic digestion to regional organics processing (KCSWD 2017b). Anaerobic digestion is a biological process that transforms organic waste into renewable energy, and in some situations, a useable residual by-product. HDR evaluated anaerobic digestion technologies using both source-separated organics with minimal contamination, and municipal solid waste containing approximately one third organic waste. The division required HDR to focus on local conditions, feedstocks, and markets.

Example of a small anaerobic digester located at the Fremont Brewery in Seattle

While the study does not identify a clear role for anaerobic digestion in the county's solid waste system, it does recommend further research into several small-scale anaerobic digestion options for source - separated organics, with varying levels of public and private sector collaboration. Source-separated organics-based anaerobic digestion solutions are currently more affordable and more reliable than municipal solid waste-based systems. Municipal solid waste as a feedstock typically benefits greatly from advanced pre-processing, which is costly and currently has mixed success rates.

Currently, source-separated organics in King County are managed by private-sector companies, and do not even come to the county's transfer stations. However, source-separated organics are likely the best feedstock for successful anaerobic digestion based on minimal contamination which lowers pre-processing costs, eases the anaerobic digestion process, and results in a marketable organic by-product.

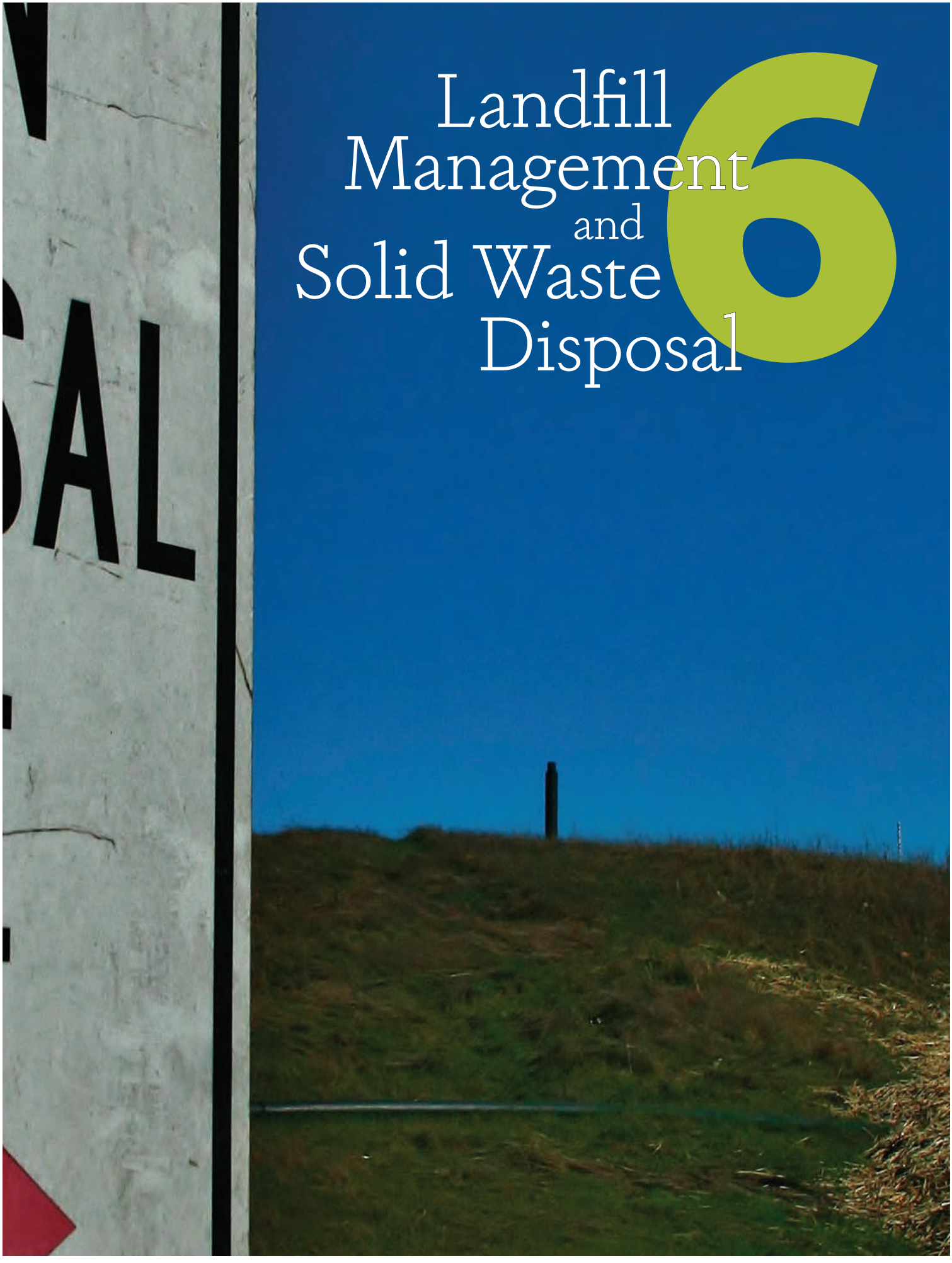
Advanced Material Recovery

Advanced material recovery as it is envisioned at the county recycling and transfer stations would involve both floor sorting of recyclables by division staff and installing some mechanical sorting systems at select facilities (most likely Bow Lake, the new south station, and any other new stations). An additional consideration might be a separate advanced material recovery facility (public, private, or a partnership) capable of processing sufficient mixed waste to reach a 70 percent recycling rate for the county. This alternative would reach recycling goals more quickly than waste prevention would, as it relies less on changes in customer behavior. However, feasible system configurations and cost effectiveness are not yet known and would require more study, including a cost benefit analysis.


328

6

Landfill Management and Solid Waste Disposal



Policies[1]

D-1 Operate and maintain the Cedar Hills Regional Landfill to meet or exceed the highest federal, state, and local standards for protection of public health and the environment.

D-2 Maximize the capacity and lifespan of the Cedar Hills Regional Landfill, subject to engineering and environmental constraints, relative costs to operate, changes in technology, and stakeholder interests.

D-3 Monitor and maintain closed landfills to meet or exceed the highest federal, state, and local standards for protection of public health and the environment.

D-4 Plan for future disposal when Cedar Hills Regional Landfill closes to ensure no gap in service.

[1] These policies may be revised depending on the long-term disposal option selected.

Summary of Recommended Actions

The following table includes a menu of recommended actions that the county and the cities should implement. Under the responsibility column, the entity listed first has primary responsibility for the action, bold indicates that the entity has responsibility for the action, and a star (*) indicates that the action is a priority. If the responsibility is not in bold, it indicates that the action is optional for the entity to implement.

Responsibility	Action	Detailed Discussion
1-d County, cities, advisory committees	Evaluate long-term disposal options using the screening criteria developed by the County and advisory committees, including: environmental, social, economic, land availability, operating history, and contract/operational requirements	Page 6-5
2-d County, cities, advisory committees	Select and implement a long-term disposal method from the following options: • Develop new cells at Cedar Hills landfill • Waste export to an out-of-county landfill • Site, build, and operate a waste-to-energy facility	Page 6-6
3-d County	Continue to track and evaluate other disposal and conversion technologies for their potential to handle all or a portion of the county's future waste	Page 6-19
4-d County, cities, tribal governments, advisory committees	To prepare for potential emergencies, work with state and regional authorities to coordinate an updated Debris Management Plan for King County.	Page 6-23
5-d County	Investigate beneficial reuse options for closed landfills, designing monitoring and environmental systems that will facilitate reuse of the properties, provide potential revenue, and provide continued benefit to the surrounding communities.	Page 6-26

Landfill Management and Solid Waste Disposal

This chapter discusses the County's current disposal practices at the Cedar Hills landfill, as well as presenting important long-term disposal choices that must be decided as part of the approval of this Plan. It also provides information on how special wastes are disposed, disposal of waste after an emergency is handled, and programs to address disposal of illegally dumped waste are operated. Finally, it addresses how past disposal sites – closed landfills – are managed.

Current Disposal at the Cedar Hills Landfill

For more than 50 years, King County has relied on the Cedar Hills landfill as a local means of cost-effective solid waste disposal. Although another disposal method will ultimately be needed, the county has used several approaches to maximize value for ratepayers and extend the landfill's life beyond the 2012 closure date predicted in the 2001 *Comprehensive Solid Waste Management Plan*. Since 2001, new practices have made better use of landfill space, new capacity has been built, the amount of tons going to the landfill have been reduced, and studies have identified opportunities for further development to extend the landfill to 2040 or beyond. Policy also was established to maximize the use of Cedar Hills. The *Solid Waste Transfer and Waste Management Plan* (Transfer Plan), approved by the County Council in December 2007, included the following recommendation:

> "Explore opportunities for taking advantage of available landfill capacity to extend the life of this cost-effective disposal option; revise the Cedar Hills Site Development Plan and seek to maximize the capacity (lifespan) of the landfill, subject to environmental constraints, relative costs to operate, and stakeholder interests."

To implement the Transfer Plan recommendation, the division is pursuing three primary strategies to extend landfill life:

- Operational efficiencies
- New area development
- Diversion of waste

These three strategies seek to extend the life of the landfill by increasing landfill capacity and density, which are defined as follows:

- **Landfill capacity** –the amount of space, often referred to as airspace, which is permitted and available for disposal of waste. Landfill capacity is calculated based on the height, footprint, and slopes of the landfill.
- **Density –** how tightly materials are packed together, in this case solid waste in the landfill. A higher density means more waste packed into a given amount of space. The density of solid waste within the landfill is a function of both operational practices and natural processes. Density is increased as waste is compacted by heavy machinery on the face of the landfill and by the natural settling that occurs over time as solid waste decomposes.

Operational Efficiencies

The division has made a series of operational changes to increase landfill capacity and density. These changes include reducing the amount of soil and rock buried in the landfill, using more efficient unloading and compaction equipment, and taking advantage of natural settlement. Some of the key changes and efficiencies achieved are described below:

- The division has implemented strategies to minimize the placement of soil in the landfill. For example, in the past, six inches of compacted soil was used to cover the entire surface of the active solid waste disposal area at the end of each working day. Daily cover serves to control litter and discourage foraging by animals, such as rodents and birds. However, the use of soil consumes valuable landfill space. The division now uses retractable tarps to cover most of the waste at the end of each day to reduce the amount of soil buried in the landfill. The tarps serve the same function as daily soil cover. At the start of each day's operations, the tarps are rolled up, and more solid waste is placed directly on top of the previous day's waste. Soil is still used to cover side slope areas. However, as much of this soil as possible is removed before more waste is placed, and the soil is then reused. Together, these practices have resulted in a reduction of the volume of soil buried in the landfill.

Tippers empty trailers more efficiently

- Tippers now empty trailers and containers rather than the walking floor trailers previously used. Walking floor trailers require a large, rock covered surface for the trucks to drive on as the walking floor rolls the garbage out the back of the trailer. These large rock surfaces are not required with the tippers. Instead, the garbage trailers are backed onto the tipper, which tilts the trailer, allowing the garbage to slide out of the back and into the refuse area. The use of tippers not only reduces the use of rock, it also decreases unloading time for each trailer by at least half, and reduces damage to equipment and tires.

- Heavier equipment and improved methods have increased waste compaction. Packing the waste to a greater density allows more airspace for additional solid waste in each landfill area.

- Another strategy for increasing landfill capacity is taking advantage of the natural settlement that occurs as waste placed in each area decomposes. As this natural settling occurs, the level of the landfill drops below the permitted height, allowing more waste to be added to bring the height of a previously filled area back up to its planned level. To take advantage of this natural settlement, the division has delayed final closure of Areas 5 and 6, and will delay final closure of Area 7, to allow settling to occur so that additional waste can be added before final cover is applied.

With these operational changes, more solid waste can be placed within the already designed and permitted refuse areas. The division will continue to pursue these and other best management practices that preserve airspace and make more efficient use of landfill capacity.

Diversion of Waste

Reducing the amount of waste delivered to the landfill (waste diversion) is the most effective strategy for extending landfill life. The division will continue to practice current methods of waste diversion and may implement further strategies, as discussed below.

Current Strategies for Waste Diversion

Waste is currently diverted from Cedar Hills through two primary methods – waste prevention and recycling and a ban on the acceptance of most construction and demolition debris.

Waste prevention and recycling efforts have proven a successful strategy for extending the life of the landfill. During a 20-year period, an estimated 10 million tons of materials that would otherwise have been disposed in the landfill were recycled, extending the landfill's life by approximately 10 years.

Banning most construction and demolition debris from Cedar Hills has also contributed to extending landfill life. Since the disposal ban went into effect in 1994, an estimated 4 million tons of construction and demolition debris has been diverted from the landfill (see Chapter 4, *Sustainable Materials Management* for more information about construction and demolition debris recycling and disposal).

Potential Strategies for Waste Diversion

The division will continue to consider diverting a portion of the solid waste stream to another disposal option(s) while the landfill is still in operation. However, a cost-benefit analysis, including a comparative analysis of greenhouse gas emissions, would precede any decision to pursue early diversion because the cost of adding a new disposal method to the cost of operating Cedar Hills may outweigh the benefits of extending landfill life. Possible diversion options include waste conversion technologies such as anaerobic digestion or exporting some waste to an out-of-county landfill. Environmental, social, economic, and other criteria also would play into any waste diversion decision.

New Area Development

During 2009 and 2010, the division explored alternatives for developing new refuse areas to extend the landfill life. A wide range of alternatives was originally identified. Based on a preliminary assessment of operational and engineering feasibility, as well as likely environmental impacts, five action alternatives were developed that would extend landfill life for an additional three to 13 years beyond the then projected closure date. The environmental impacts of these alternatives were evaluated in an environmental impact statement (EIS), with the Final EIS issued in July 2010. The EIS determined that none of the five action alternatives would result in any significant unavoidable adverse environmental impacts compared with the no action alternative (KCSWD 2010a).

The preferred alternative from the Final EIS develops 56.5 acres for a new Area 8 in the southwestern portion of the landfill and extends landfill life for eight to nine years. It maximizes the use of readily available space at the landfill, with the least amount of disruption to existing landfill structures and the buffer. At the same time, this alternative preserves the flexibility to implement further development should it be necessary in the future and balances the cost of future development and operations with savings to the ratepayer.

Developing a new area requires extensive excavation and preparation

Following publication of the Final EIS, the division submitted a Project Program Plan for implementing the preferred alternative to the County Council for approval (KCSWD 2010b). The County Council approved the Project Program Plan in December 2010.

Permitted Capacity Planned for Cedar Hills through 2028

Cedar Hills has built capacity remaining in four areas (Areas 5, 6, 7, and 8). The estimated capacities are based on the difference between existing landfill contours (September 14, 2016 aerial survey) and the approved design contours at completion.

As the landfill ages, it settles. Airspace from settlement can be recovered for disposal. Settlement occurs due to consolidation and to loss of mass from leachate and more importantly gas production. As gas is collected, it is removed from the landfill. The airspace gas once occupied consolidates and the landfill settles. Soil surcharge can be used to accelerate settlement. Areas 5 and 6 both have areas of soil stockpiled over them to accelerate settlement. This soil will be recovered later for other uses. Cedar Hills landfill has additional planned capacity in Area 8. Area 8 is currently under construction, which began in 2017 and will continue into 2018. In addition to Area 8, a topping lift over Areas 7 and 8 is planned to bring those areas to a permitted maximum design elevation of 800 feet.

The table below presents current and planned capacity in cubic yards and tons by area, as of September 14, 2016. It is based on an airspace utilization of 1,600 pounds of refuse disposed per cubic yard of air space consumed, and an average yearly tonnage of 1,025,000 tons (forecasted between 2017 and 2028). 1,600 pounds per cubic yard is the airspace utilization achieved in Area 7 using current operational practices (compaction, daily cover usage, and rock recovery).

Area Capacity	Estimated Cubic Yards	Estimated Tons	Estimated Number of Years
5 Top Lift	1,923,000	1,538,400	1.5
6 Top Lift	1,367,000	1,093,600	1.1
7	3,244,000	2,595,200	2.5
8	7,842,000	6,273,600	6.1
7 & 8 Top Lift	1,061,000	848,800	0.8
Total	15,437,000	12,349,600	12

Selecting the Next Disposal Method

A Disposal Method Must Be Selected as Part of This Plan's Approval

With permitted capacity at the landfill predicted to be used by 2028, a fresh look at long-term disposal options is warranted. When Cedar Hills reaches capacity and closes, the county will no longer own or operate a disposal facility. This plan does not consider the development of a replacement landfill either in King County or in another county unless the policy set in Ordinance 14236 is changed. Conditions in King County such as land availability, environmental considerations, public acceptance, cost, and other issues would impede any effort to site a replacement landfill in the county. In addition, there are existing landfills outside of King County with significant capacity available.

Given that a new landfill in King County is not anticipated, another disposal method must be selected. The selection must provide substantial lead time to complete financial, operational, and infrastructure preparations. Time must be allocated for environmental review under the State Environmental Policy Act (SEPA) process. Interlocal agreements also require the county to consult with partner cities at least seven years before Cedar Hills closes, triggering a consultation in 2021 if no new Cedar Hills capacity is built. For these reasons, selecting a disposal method as part of approval of this plan is essential to provide a sufficient planning window for a successful transition to the region's next disposal solution.

Factors in Selecting a Long-Term Disposal Method

In cooperation with advisory committees, the division identified several criteria be used in selecting a long-term disposal method (see below). It is particularly important that disposal methods are consistent with the commitment of the County and its partner cities to Zero Waste of Resources by 2030. Any long-term disposal method also must be responsive to increases in population, housing, and solid waste tonnage, as well as the specific composition of King County's waste. The 2016 tonnage forecast projects solid waste tons increasing to 1.1 million tons by 2028 and continuing to grow, reaching 1.3 million tons in 2040. This forecast assumes that the region's recycling rate increases to 57% by 2018.

Screening and Evaluation Criteria for Disposal Options

The division, in collaboration with its advisory committees, has developed criteria by which disposal options may be screened and evaluated when making future decisions. The screening and evaluation criteria fall into six categories, each with a number of sub-categories:

- **Environmental**
  - Human health
  - Climate change
    - Air quality
    - Water quality
    - Energy production
    - Resource conservation
    - Compatibility with waste prevention and recycling
- **Availability**
  - Capacity
  - Start date
  - Operating life of facility
  - Siting, design, permitting, and construction requirements
  - Operating and maintenance personnel
  - Financial assurance and insurability

- **Economic**
  - Capital cost
  - Financing
  - Operating cost
  - Revenue generated
  - Risk
- **Operating history**
  - Proven performance
  - Ability to handle amount of waste
  - Operator record
  - Safety record
  - Environmental compliance
  - Compliance with regulatory requirements
  - Ability to respond after an emergency
  - Ability to provide performance guarantees
- **Social**
  - Environmental justice
  - Social justice/equity
  - Effects on livability and character of communities
- **Contract and operational requirements**
  - Minimum level of waste required
  - Composition of waste required
  - Contract flexibility
  - Length of commitment required
  - Opportunity for contract reopeners
  - Waste not accepted/ability to handle special waste
  - Residue disposal requirements
  - Compatibility with waste prevention and recycling
  - Compatibility with current collection and transfer systems

King County's Long-Term Disposal Method Will Be One of Three Options

The division used information on waste disposal options from the *Conversion Technology Report* (R.W. Beck 2007), the *Waste-to-Energy Study (Normandeau 2017)*, and an updated *Cedar Hills Site Development Alternatives Final Report* (KCSWD 2017a) to identify three options to meet the county's disposal needs after currently permitted capacity at Cedar Hills is used. Action 2-d states that a long-term disposal method will be selected from the following three options:

- Further develop Cedar Hills
- Waste Export
- Waste to Energy (Mass Burn) Facility

Further Develop Cedar Hills

This option would further develop Cedar Hills with a goal of providing disposal to at least 2040, extending the county's 50-year practice of managing its waste locally. To account for emerging technologies, the disposal method beyond 2040 would not be specified, but criteria would be established for selecting the next disposal method. This option is consistent with county policy to maximize the life of the Cedar Hills landfill. The Conversion Technology Report (R.W. Beck 2007) and more recent division analysis concluded that Cedar Hills disposal is the most economical way to handle King County's waste. Other advantages include the division's experience in landfill operation, availability of space in a county-owned landfill with state of the art environmental controls, and collection of landfill gas to produce renewable energy. Challenges with this option include obtaining new or modified permits to authorize further development, relocating buildings to make room for refuse, and continuing to be good neighbors for the surrounding community.

Features used in the re-evaluation of this option include:

- New landfill cells would be developed at the Cedar Hills landfill
- The permit and the landfill would be modified to increase the height of the landfill from approximately 800 feet to 830 feet
- Division facilities currently located in areas permitted for refuse disposal would be moved
- High-efficiency collection systems would continue to deliver landfill gas to the Bio-Energy Washington facility, resulting in pipeline-quality natural gas, revenue for the division, and reduced greenhouse gas emissions
- The added capacity would be sufficient to handle the forecast tonnage, with a goal of operating the landfill at least through 2040
- Consistent with long-standing practice, new development would be financed through rate revenues managed in the landfill reserve fund
- As Cedar Hills reaches capacity, previously described evaluation criteria would be used to select the next disposal method
- A new disposal method would need to be ready for service when the new capacity at Cedar Hills is exhausted, estimated at 2040

Heavy equipment compacts garbage in place at Cedar Hills.

Waste Export

This option would export waste to an out-of-county landfill after currently permitted capacity at Cedar Hills is used in 2028. Current county policy establishes export to an out-of-county landfill as the choice for disposal after closure of the Cedar Hills landfill. Waste export by rail is a proven disposal option used by neighboring jurisdictions, including the City of Seattle and Snohomish County. There are several regional landfills available by rail with combined capacity sufficient to handle the county's waste in the long term. (Table 6-1)(KCSWD 2017c). This option would transfer a significant portion of the County's waste management activities into the private sector for long haul and landfilling. Challenges include modifying transfer stations for rail-ready transport, cost, lead time needed for contracting and division operational changes, and potential rail service disruptions that might arise from rail capacity constraints and weather events.

Features of this option include:

- The county would enter into a contract to export waste after current permitted capacity at Cedar Hills is used in 2028
- Waste would be exported to a yet-to-be determined out-of-county landfill
- The out-of-county landfill would produce energy from landfill gas using an efficient collection system
- The county would negotiate revenue sharing or energy credits for the energy harvested from its landfill gas
- Waste would be transported to the out-of-county landfill by rail, the preferred transport mode based on travel time, equipment requirements, payload, and capital costs (KCSWD 2017c)

- The division would buy container-ready trailers to transport rented rail-ready containers from transfer stations to a rail intermodal facility
- The division would modify its transfer stations so that municipal solid waste can be loaded into railroad shipping containers
- The division would contract for an intermodal facility to transfer containers from trucks to rail

Table 6-1. Potential locations for out-of-county landfill disposal

Landfill Name	Location	Owner	Miles from Seattle	Waste-to-Energy	Total Permitted Capacity (tons)	Remaining Capacity (2013, *2016)	Opening Year	Estimated Closure
1. Columbia Ridge Landfill and Recycling Center	Gilliam County, OR	Waste Management	325	12.8 MW gas-to-electricity; plasma gasification demonstration plant.	354,275,000	329,000,000*	1990	2150+
2. Roosevelt Regional Landfill	Klickitat County, WA	Allied Waste Industries dba Regional Disposal Co.	330	20 MW gas-to-electricity co-generation facility.	244,600,000	120,000,000*	1990	2110+
3. Finley Buttes Regional Landfill	Morrow County, OR	Waste Connections	352	4.6 MW gas-to-electricity; co-generation facility.	158,900,000b	131,000,000*	1990	2250+
4. Simco Road	Elmore County, ID	Idaho Waste Systems	628		210,000,000c	200,000,000	2000	2100+

a Co-generation facility captures waste heat from burning landfill gas in gas turbines, and uses it to make steam to generate more power in a steam turbine. The water used to produce steam is continually cooled, condensed and reused. Co-generation facility captures waste heat from gas-to-electricity plant for use by adjacent property owner.

b Finley Buttes has the potential to expand to a permitted capacity of 400 million tons.

c Simco Road Regional Landfill is currently expanding to a permitted capacity of 420 million tons.

Waste to Energy Facility

Under this option, current permitted capacity at Cedar Hills would be exhausted in 2028 and then all of the region's municipal solid waste would be directed to a waste to energy facility built in King County. As discussed previously, a recent study identified a mass burn facility as the best waste to energy technology for consideration by King County (Normandeau 2017).

This option would reduce waste 90 percent by volume and 75 percent by weight, while offsetting some costs through sale of electricity and increasing recycling by as much as two percent. Challenges include facility siting, cost, providing guaranteed amounts of feedstock, having unused capacity at the beginning of the operating period with potential inefficient operation during periods when less capacity is used, possible shutdowns due to waste deliveries below the system's requirements, rail capacity constraints for ash and bypass waste export, and other factors.

Features of this option include:

- For the first 20 years of operation (2028-2048), the facility would be designed to minimize waste that bypasses the facility because it is too bulky or exceeds facility capacity, resulting in a 4,000 tons-per-day plant built on a 40-acre site with four lines that could handle 1,000 tons per day each
- To handle forecast tons, additional capacity would be required beyond 2048, or sooner if the actual tonnage increases faster than forecast
- The mass burn facility would include a tipping floor, pre-incineration screening of non-processable materials at transfer stations, an infeed hopper, combustion chamber, ash collection, metals recovery, and emissions scrubbing systems that use activated carbon and selective catalytic reduction technologies to keep dioxin and other potential emissions below permit limits
- The facility would burn municipal solid waste to produce steam, which turns an electrical turbine to create electricity. Washington State does not currently consider electricity from a mass burn facility as renewable
- The ash produced as a by-product of the process would be screened to recover all remaining metal for recycling
- After screening, ash would be transported to an out-of-county landfill where it would be buried separate from the municipal solid waste in an ash monofill. Various groups are researching beneficial use of incinerator ash; however, in Washington State the ash must be disposed in an ash monofill
- Non-processable and bypass waste would be transported to an out-of-county landfill

Waste-to-Energy in King County and the United States

In the late 1980s, both King County and the City of Seattle planned to convert from burying municipal solid waste in a landfill to sending waste to a mass burn facility. Protests by the public and environmental groups led both jurisdictions to abandon plans to build mass burn facilities and instead shift emphasis to recycling and waste reduction, along with exploring waste export to out-of-county landfills. However, during the past decade, technological advances in mass burn facilities and the emergence of other potentially viable waste conversion technologies have resulted in renewed interest in these options for long-term disposal once Cedar Hills has reached its permitted capacity.

The *King County Waste-to-Energy Study* (Normandeau 2017) identified a mass burn facility as the best waste-to-energy technology to consider for the county's solid waste system. Mass burn is a type of waste-to-energy technology. There are 77 individual waste-to-energy facilities in 22 states listed in the *Energy Recovery Council 2016 Directory of Waste to Energy Facilities* (ERC 2016). Sixty of the facilities are mass burn, 13 are refuse-derived fuel, and 4 are modular. Mass burn is the most common waste-to-energy technology, representing 78 percent of the industry technology in the United States. The most recent plant was built in Florida in 2011 (operational in 2015) and is a 3,000 tons per day facility. Most facilities were built before 1996. In the United States, 3,000 tons per day is the upper capacity limit on the aging facilities from the 1990s. Small units with capacity of 1,000 tons per day or less have been built and some have been redesigned to expand capacity. A 4,000 ton per day facility, as proposed for King County, would be the largest mass burn facility in the United States.

Rail Capacity

The Waste Export and Waste to Energy options rely on rail transport of waste to an out-of-county landfill. Adequate rail capacity is needed for either option. According to the Washington State Freight Rail Plan, it is unclear if the freight rail system will have adequate rail capacity for King County's waste by 2028 (Normandeau 2017). In addition, according to the Washington State Department of Transportation 2014 "Landslide Mitigation Action Plan," rail service can be disrupted by landslides and flooding. If service interruptions stretch from days to weeks, unsanitary conditions could occur at transfer stations and eventually in the neighborhoods where collection services must be stopped. Scarce rail capacity and service disruptions could increase costs and require robust contingency planning.

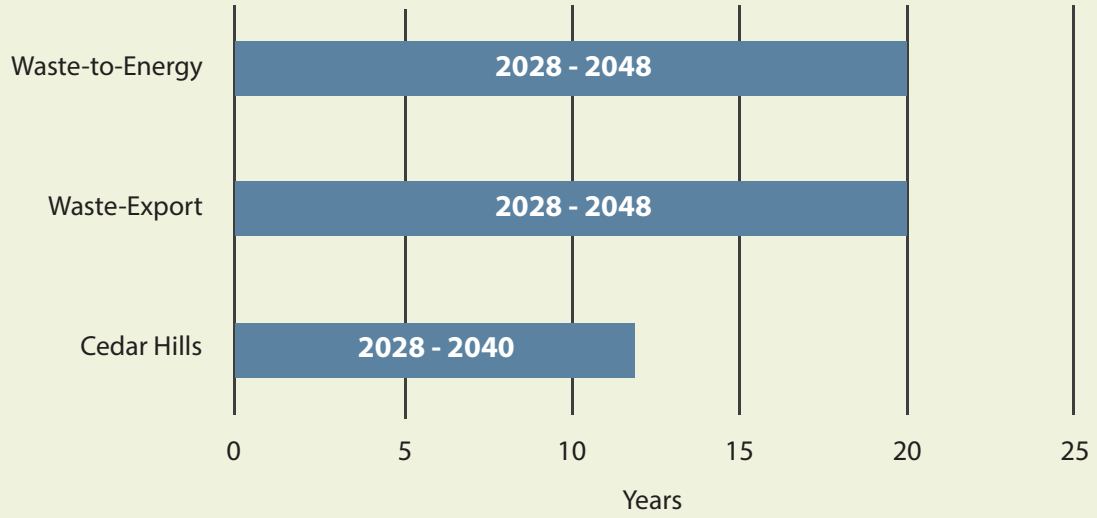
Comparison of Options

Although many criteria were identified to select a long-term disposal option, this analysis focuses on several key factors that are summarized in Table 6-2:

Service Period

King County has interlocal agreements with partner cities to provide disposal services through 2040 and likely will continue to provide regional disposal services beyond that date. Although it may be possible to extend the life of Cedar Hills beyond 2040 and other out-of-county landfills may also have capacity into the next century, the following service periods have been established to assess the options for decision makers. The Further Develop Cedar Hills option would provide disposal at least through 2040 after which another disposal method would be needed. The Waste Export and Waste to Energy Facility options could meet disposal needs at least through 2048.

Figure 6-1. Disposal Option Service Period



Annual Revenue (in 2017 dollars)

Some costs can be offset by revenue from the sale of Cedar Hills landfill gas-derived natural gas or electric power from the waste to energy facility. Under the Further Develop Cedar Hills option the division is expected to receive $1 million to $3 million from Puget Sound Energy each year from the sale of pipeline-quality natural gas, for a total of $12 million to $36 million over the expected 12-year life of new landfill development. Operators of out-of-county landfills under the Waste Export option may obtain revenue from sale of landfill gas that is incorporated into contract prices, but the county would not receive direct revenue unless negotiated in a contract. The Waste to Energy Facility option in 2028 would be expected to generate $27 million to $41 million of revenue from sale of electricity and recovered metals each year.

Figure 6-2. Disposal Option Annual Revenue

Initial Capital Cost (in 2017 dollars)

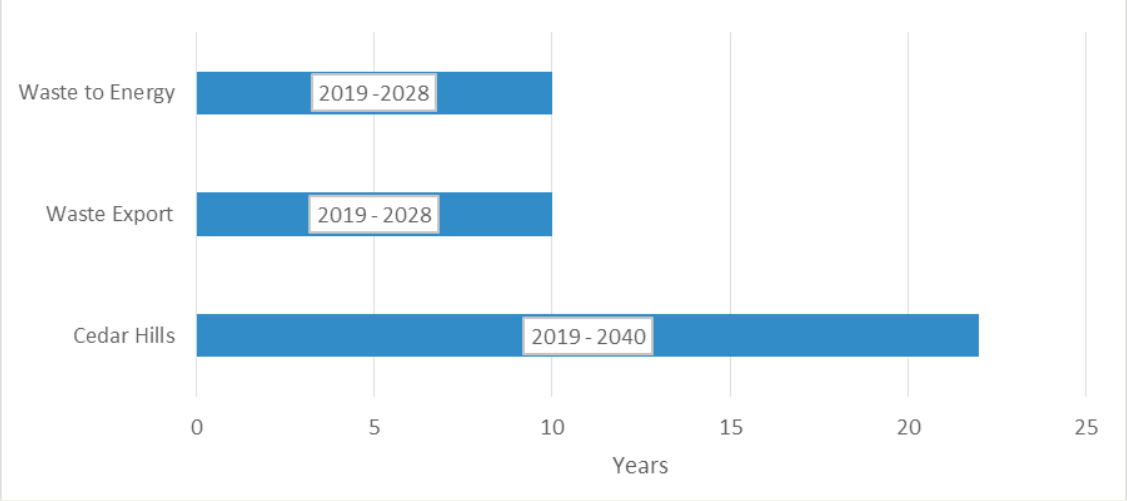
All options require capital spending. The Further Develop Cedar Hills option would cost about $241 million to develop new refuse areas and move facilities currently located in areas permitted for landfilling. The Waste Export option would require $4.6 million to purchase 55 truck trailers capable of carrying rail-ready containers. The Waste to Energy Facility option would cost $1.1 billion to build the initial 4,000 tons-per-day plant to provide capacity through the first 20 years.

Figure 6-3. Disposal Option Initial Capital Cost

Time to Accrue Landfill Reserve Post-Closure Balances

All options rely on Cedar Hills operating through 2028. Cedar Hills costs from 2019 through 2028 for the Develop Cedar Hills option are lower than costs under the other options. Federal law requires that dollars sufficient for 30 years of post-closure monitoring and maintenance be available when Cedar Hills closes. The division budgets those post-closure costs as well as refuse area development costs in the Landfill Reserve Fund. Upon closure of the landfill, balances in the Landfill Reserve Fund need to be about $90 million to cover estimated ongoing post-closure costs. Balances currently are $25 million, leaving $65 million to be collected before closure. Closure in 2040 allows more years (22 instead of 10) to build the needed balance. More years result in a 2019-2028 Cedar Hills disposal cost shown in Figure 6-5 that is lower for the Develop Cedar Hills option despite significant spending to develop new capacity

Figure 6-4. Disposal Option Time to Save for Post Closure Costs



Capital Cost Funding Source (in 2017 dollars)

Different financing approaches are used for the options. The Further Develop Cedar Hills option follows the long-standing county practice of financing refuse area development with rate dollars managed in the Landfill Reserve Fund valued at $9 million per year. For the Waste Export option, purchase of rail container-ready truck trailers would be financed with 12-year bonds, with debt payments of $0.6 million per year (2028 to 2048) with an annual capital expense over the life of the asset of $0.2 million (in 2017 dollars). The Waste to Energy Facility option assumes the facility would be financed with one 20-year bond, with initial debt payments of $116 million per year (2028 to 2048) and an annual capital expense over the life of the asset of $78 million in 2017 dollars.

Figure 6-5. Disposal Option Annual Capital Expense Over Asset Life

Annual Operating Cost (in 2017 dollars)

Operating costs in 2028 for the options do not differ as much as capital costs. These costs only include operations and maintenance. Operating costs in 2028 would be $20 million for the Further Develop Cedar Hills option, $43 million for the Waste Export option, and $41 million for the Waste to Energy Facility option.

Figure 6-6. Disposal Option Annual Operating Costs in 2028

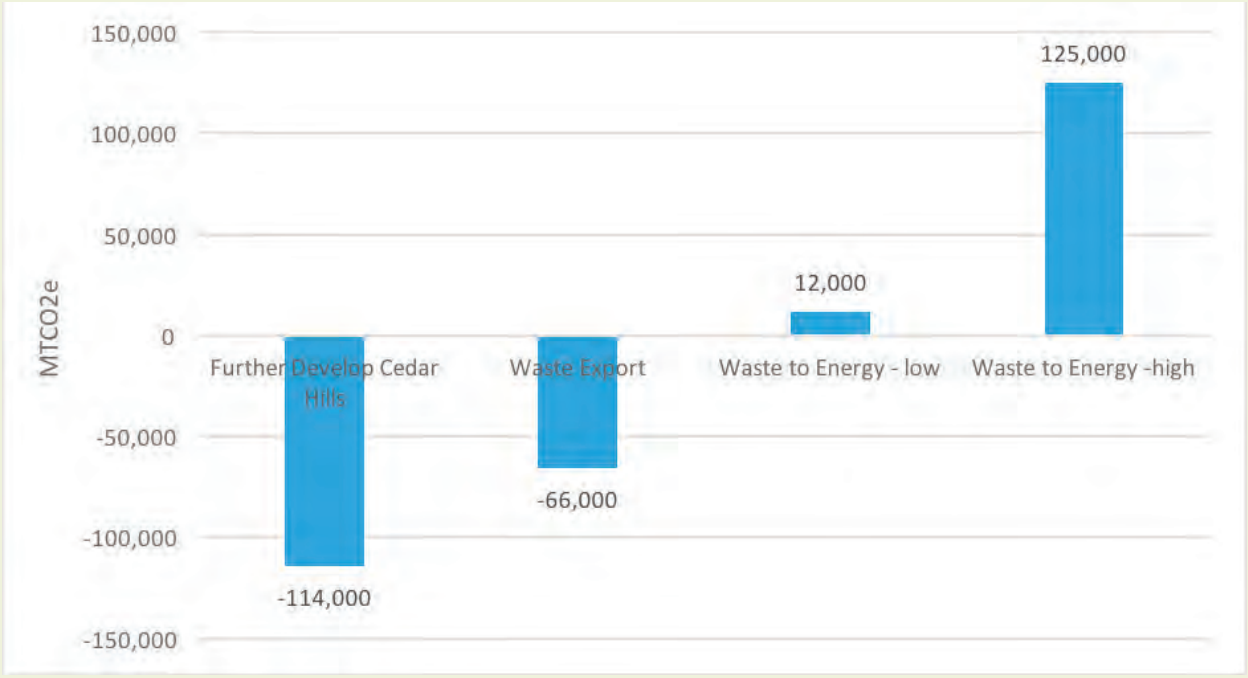
Additional Capacity Cost

The Further Develop Cedar Hills option does not assume the development of additional land beyond 2040. If that assumption were to change, additional costs would be required for that capacity development. The Waste Export option may require investment by railroads in additional rail capacity to meet increasing rail transport demand. These costs are anticipated to be passed onto users of the rail system but there is no estimate of these costs in our assumptions. The Waste to Energy Facility option would require additional capacity development after 2048 at additional cost.

Greenhouse Gas Emissions (EPA's Waste Reduction Model [WARM])

WARM is the U.S. Environmental Protection Agency (EPA)-recommended model for holistically comparing climate effects of different courses of action such as landfilling, combustion, anaerobic digestion and composting. The WARM model was used to compare greenhouse gas emissions for each option in the base year, 2028. The model was configured to match King County's existing solid waste management practices, including Cedar Hill's higher-than-national average (98 percent versus 75 percent) efficiency in landfill gas collection (EPA and KC 2011). The model also includes an energy mix specific to Washington State where hydropower dominates the electric energy market instead of the coal and natural gas common in other parts of the U.S. The model takes a life cycle view and incorporates emission factors for each material from raw materials acquisition, processing, manufacturing, transportation, and end-of-life management. It includes both emissions and offsets from landfill-derived gas and other sources.

Figure 6-7. Disposal Options Greenhouse Gas Emissions (WARM)



Greenhouse Gas Emissions (EPA's Mandatory Reporting Requirements (MRR) Model)
EPA's MRR creates an inventory of greenhouse gas emissions from a specific facility (such as a landfill or mass burn facility) in a given year. MRR default values can over-ride site-specific data, so model results and facility monitoring data may not entirely agree. The division reports MRR-estimated emissions from the Cedar Hills landfill each year for the Washington Department of Ecology and EPA. By consulting Ecology's website, year-to year emission changes from the Cedar Hills landfill can be tracked and compared with emissions from other facilities. Agencies also use the results to better understand emission sources and focus emission-reduction efforts. Because it estimates current-year, site-specific emissions, emission values are higher under MRR than under WARM, which incorporates offsets that occur elsewhere in the lifecycle of disposed materials.

Models used by Regulatory Agencies to Calculate Greenhouse Gas Emissions

- The WARM model is U.S. Environmental Protection Agency (EPA)-approved decision tool for estimating relative lifecycle greenhouse gas emissions associated with disposal options such as landfilling, composting, mass burn, or anaerobic digestion. WARM answers the question: Which of my next disposal options result in the lowest lifecycle greenhouse gas emissions, accounting for both emissions and offsets?

  WARM requires a profile of disposed materials, which was drawn from the division's 2015 Waste Characterization. WARM then assigns emissions to the materials and converts the emissions into metric tons of carbon dioxide equivalents (MTCO2e). Each material's emissions represent lifecycle emissions from mining to manufacturing to disposal. Because those emissions did not happen in a single year or place, WARM results cannot be directly ascribed to a particular year or facility site. WARM emissions are not precise – they represent the relative emissions of different choices (i.e. Option A has lower emissions than Option B). WARM results from this plan's landfill options show negative values largely due to offsets created by displacing fossil fuels with landfill-derived gas and sequestration of carbon due to burial of organics.

- The MRR model creates a greenhouse gas (GHG) inventory of emissions from a specific facility (such as a landfill or mass burn facility) in a given year. MRR answers the question: What are the emissions from historically disposed materials at my landfill this year?

  MRR default values can over-ride site-specific data so that model results and facility monitoring data may not entirely agree. The division reports MRR-estimated Cedar Hills landfill emissions each year for the Washington Department of Ecology and EPA. Year-to year MRR emission changes from that specific facility can be tracked and compared with emissions from other facilities. The agencies also use the results to set priorities for developing facility emission-reduction programs.

Recycling Rate

Compatibility of the options with County waste reduction and recycling goals is an important factor in comparing the options. The County's most recently documented recycling rate is 52 percent (in 2014) with a goal of Zero Waste of Resources by 2030. The Further Develop Cedar Hills and Waste Export options assume continued reliance on programs already underway, with no additional recycling accomplished due to the disposal method. Based on the most recent King County waste characterization study, division staff estimate that up to 50,000 tons of ferrous and non-ferrous metals have the potential to be recovered from the ash residue of a mass burn operation. Recovering most of the metal would increase the County's waste diversion rate by about two percent.

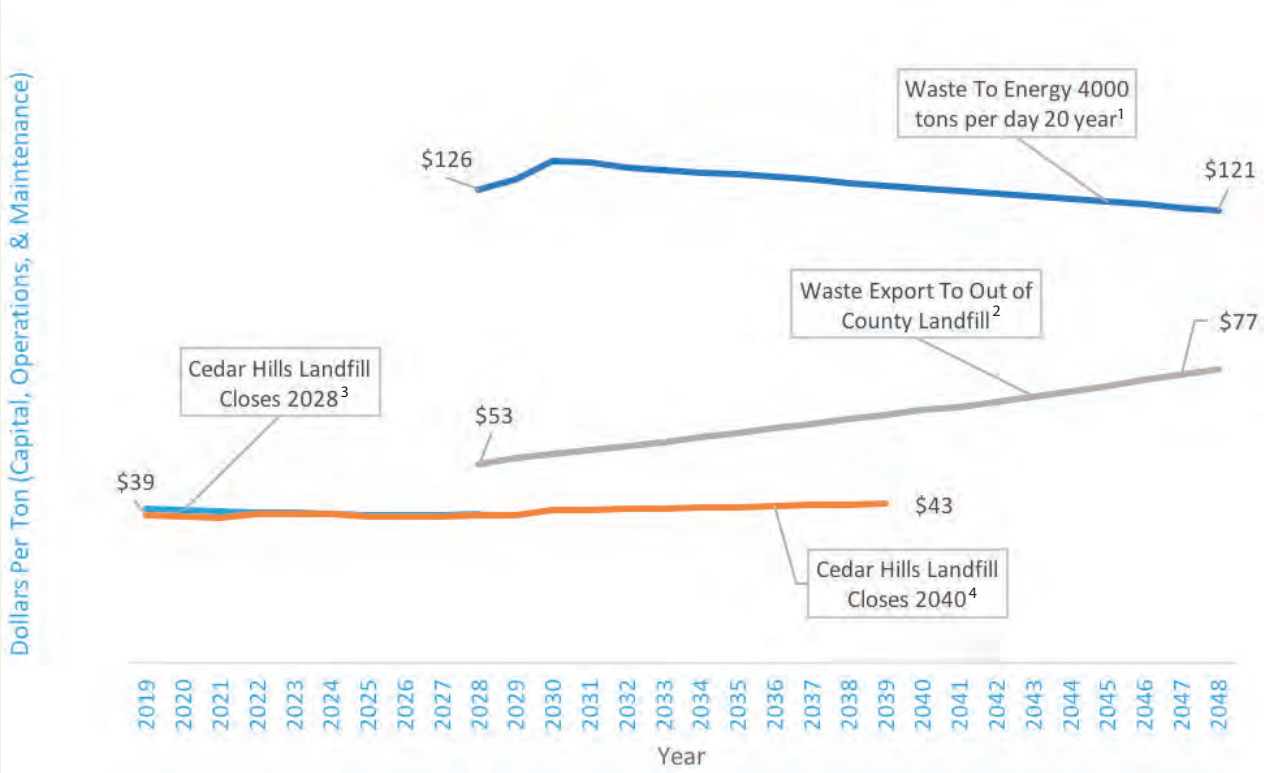
Figure 6-8. Disposal Option Recycling Improvement

Table 6-2. Comparison of Key Disposal Option Characteristics (Planning Level Estimates)

Comparative Attribute	Further Develop Cedar Hills	Waste Export To An Out-of-County Landfill	Waste To Energy Facility[1]
Service Period	12 Years 2028-2040 (Cedar Hills Closes and transition to another disposal method)	20 Years 2028-2048	20 Years 2028-2048
Annual Revenue (2017 Dollars)	Annual: $1 to $3 million[2] Service Period: $12-36 million	Revenue sharing could be negotiated for the energy harvested from landfill gas.	Annual: $27 to $41 million[3] Service Period: $700 million
Initial Capital Cost (2017 Dollars)	$241 million[4]	$4.6 million[5]	$1.1 billion[6]
Time to Accrue Landfill Reserve Post Closure Balances	22 years	10 years	10 years
Capital Cost Funding Source	Landfill Reserve Fund	Bond Sales	Bond Sales
2028 Annual Operating Cost In (2017 Dollars)	$20 million[7]	$43 million[8]	$41 million
Additional Capacity Cost	Assumes no additional capacity available after 2040.	See Additional Capacity section above regarding rail capacity risks.	Additional costs will be required after 2048
Greenhouse Gas Emissions (EPA's WARM Model)	-114,000 MTCO2e/year[9]	-66,000 MTCO2e/year[10]	12,000 to 125,000 MTCO2e/year[11]
Greenhouse Gas Emissions (EPA's MRR Model)	99,000 MTCO2e/ year [12]	99,000 MTCO2e/year	1.2 million MTCO2e/year
Recycling Rate (see Chapter 4 for actions to increase recycling)	No change	No change	2% increase

1 *Assumes 20 year debt service. (Scenario 1 in the 2017 Normandeau report)*
2 *This represents revenue from the sale of gas to Puget Sound Energy.*
3 *This represents revenue from the sale of electricity and recovered ferrous & non-ferrous metals (CDM Smith Task 2 Report: Table 6-1)*
4 *$229 million in capital costs will be paid out of the landfill reserve fund starting as soon as Area 9 is approved. $241 million is the estimated capital costs in year 2017 dollars.*
5 *This assumes the division purchases 55 trailers for rail containers in 2028. Rail containers are included in the operating costs. Replacement trailers will be purchased through operational costs (see footnote #7)*
6 *Cost to establish initial capacity of 4 x 1,000 tons per day lines. In 2028 three thousand tons per day is required and would cost less, but capacity would be exceeded in 4 years.*
7 *Includes post closure maintenance.*
8 *Export cost plus annual maintenance for years 2029 through 2048 including replacing 5 trailers every year.*
9 *WARM model calculation. (King County SWD) . For more information, see Appendix D.*
10 *WARM model calculation. (King County SWD). For more information, see Appendix D.*
11 *WARM model calculation.(Normandeau 2017)*
12 *Landfill options show Cedar Hills emissions in 2028.*

Figure 6-9. Disposal Option Preliminary Cost Per Ton



1 *The Waste To Energy cost per ton is based on the Normandeau Task 2 Report, 8/18/2017 WTE - 20 Year Plan financial data found on pages 52-57. It includes all capital costs, operating and maintenance costs, and revenue.*

2 *The Waste Export To Out of County Landfill disposal cost per ton is based on the amended City of Seattle waste export contract. The 2017 price of $41 was inflated using King County Office of Economic and Financial Analysis March 2016 Seattle CPI-U for years 2017 through 2025 and then 2.5% for years 2026 through 2048. It includes all costs for intermodal transfer of waste, rental of containers, truck haul from remote intermodal to the landfill, and landfill disposal.*

3 *The Cedar Hills Closes 2028 cost per ton is the status quo disposal option that includes the currently approved expansion of Cedar Hills through 2028 with the development of a new refuse area (Area 8). It includes all capital costs for new area development, future final cover, facility construction, post-closure maintenance, capital equipment recovery, operation and maintenance of the landfill, rent for Cedar Hills, and revenue from the sale of landfill gas.*

4 *The Cedar Hills Closes 2040 cost per ton is a disposal option that includes the currently approved expansion of Cedar Hills through 2028 with the development of a new refuse area (Area 8) and an additional potential expansion through 2040. It includes all capital costs for new area development, future final cover, facility construction, post-closure maintenance, capital equipment recovery, operation and maintenance of the landfill, rent for Cedar Hills, and revenue from the sale of landfill gas.*

Other Key Factors for Comparison

In addition to considering the characteristics in Table 6-2 and the preliminary cost per ton shown in Figure 6-9, other considerations will be important for fostering public support for a long-term disposal method:

- Equity and Social Justice considerations
- Neighborhood support for essential public facilities
- Industry support for facilities and operations
- Permitting and other siting regulations
- Potential of changing state solid waste and renewable energy laws
- Job loss, creation, or transfer between private and public sectors

Beyond the Three Disposal Options: Technologies for Future

A number of other thermal, biological, and chemical technologies, some established and some emerging, could handle all or specific components of the county's waste stream in the future (RW Beck 2007, KCSWD 2014a, and Normandeau 2017).

Hundreds of companies are forming, developing new methods, obtaining patents, and improving waste conversion technology systems. Many universities, consultants, and organizations are conducting studies and producing reports, and partnerships are forming to fund, build, and operate facilities. Meanwhile, jurisdictions are undertaking rule-making efforts to define terms and establish regulations that both facilitate the development of sustainable technologies and protect the environment and the public. Waste conversion technologies are also now being defined separately from incineration, e.g., "Waste conversion technologies are non-incineration technologies that are used to convert the non-recyclable portion of the municipal solid waste stream to electricity, fuels, and/or industrial chemical feedstocks" (SWANA 2011).

Waste conversion technologies use thermal, biological, or chemical processes that are sometimes combined with mechanical processes. Technologies using a thermal process include pyrolysis, gasification, and plasma arc gasification. Hydrolysis/fermentation, anaerobic digestion, and aerobic composting use biological processes. Depolymerization uses a chemical process.

The feedstock used by waste conversion technology systems can be municipal solid waste; selected materials removed from municipal solid waste, such as organics; or municipal solid waste combined with sewage sludge. Each system has unique requirements regarding the types, size, and amount of feedstock processed per day.

Below is a sampling of conversion technologies, as described by Jeremy K. O'Brien of the Solid Waste Association of North America (SWANA 2011). These technologies are not currently considered to have the capability to reliably and cost-effectively handle all the materials in the regional system.

> **Gasification** is a commercially proven manufacturing process that converts such hydrocarbons as coal, petroleum coke, biomass (such as wood and agricultural crops or wastes) and other organics to a synthesis gas (syngas), which can be further processed to produce chemicals, fertilizers, liquid fuels, hydrogen, and electricity. In a gasification facility, hydrocarbon feedstock is injected with air or oxygen and steam into a high-temperature, pressurized reactor until the chemical bonds of the feedstock are broken. The resulting reaction produces the syngas. The syngas is then cleansed to remove such impurities as sulfur, mercury, particulates, and trace minerals.

Pyrolysis is a process that involves the thermal decomposition of feedstock at high temperatures (750°F–1,500°F) in the absence of air. The resulting end product is a mixture of solids (char), liquids (oxygenated oils), and gases (methane, carbon monoxide, and carbon dioxide). The oils and fuel gases can be used directly as boiler fuel or refined for higher-quality uses such as engine fuels, chemicals, adhesives, and other products. The solid residue contains most of the inorganic portion of the feedstock as well as large amounts of solid carbon or char.

Plasma arc gasification technology is a heating method that can be used in both pyrolysis and gasification systems. This technology was developed for the metals industry in the late nineteenth century. Plasma arc technology uses very high temperatures (7,000°F) to break down the feedstock into elemental by-products. When municipal solid waste is processed, the intense heat actually breaks up the molecular structure of the organic material to produce such simpler gaseous molecules as carbon monoxide, hydrogen, and carbon dioxide. The inorganic material is vitrified to form a glassy residue.

Anaerobic digestion is the bacterial breakdown of organics in the absence of oxygen. It can occur over a wide temperature range from 50°F to 160°F. Anaerobic digestion of municipal solid waste can occur naturally, as in a landfill, or in a controlled environment, such as a municipal solid waste anaerobic digestion facility. In the latter, municipal solid waste is first processed for removal of inorganic and recyclable components, reduced in size, and then placed in an airtight vessel called a digester, where the process occurs. Biogas is one of the by-products of anaerobic digestion facility and it can be used as fuel for engines, gas turbines, fuel cells, boilers, and industrial heaters. It can also be used in other processes and in the manufacture of chemicals. Anaerobic digestion would be a good option when the food waste is separated at its source from other wastes.

The division is committed to the continued exploration of these and other emerging technologies. In addition, the division is monitoring changing definitions, legislation and regulations, companies, and partnerships.

Terms

Waste conversion technologies are non-incineration technologies that use thermal, chemical, or biological processes, sometimes combined with mechanical processes, to convert the unrecycled portion of the municipal solid waste stream to electricity, fuels, and/or chemicals that can be used by industry.

Incineration is a disposal method that converts waste materials into ash, flue gas, and heat using controlled flame combustion.

Waste-to-energy technologies recover energy from municipal solid waste and include both waste conversion technologies and incineration with energy recovery, such as mass burn waste-to-energy, refuse-derived fuel, and advanced thermal recycling.

Systems are unique technological methods for processing specified feedstock that are developed and patented by companies.

Feedstock is the input material used by waste conversion and waste-to-energy technologies.

Disposal of Special Wastes

Most of the waste delivered to the division's facilities is municipal solid waste (garbage) from residential and non-residential sources. A portion of the waste stream, however, requires special handling and waste clearance before disposal because of legal, environmental, public health, or operational concerns. Of the approximately 800,000 to 1 million tons of solid waste disposed each year, between 6,000 and 9,000 tons is designated as special waste. These special items include industrial wastes; asbestos-containing materials; off-specification, recalled, or expired consumer products; over-sized materials; treatment plant grit and vactor wastes; and other miscellaneous materials. It does not include moderate risk wastes.

The division continues to educate customers on the county's waste acceptance policies through public outreach materials and hands-on customer service. Since 1993, the division has conducted a waste screening program to ensure that materials in the waste stream are handled in accordance with federal and state regulations (Resource Conservation and Recovery Act, Title 40, Subtitle D and WAC 173-351). Under this program, waste screening technicians, in cooperation with other staff, perform random manual and visual screening of incoming loads of waste at each transfer facility and at Cedar Hills to identify and properly manage any potentially unacceptable wastes. About 11,000 loads of waste are screened at division facilities each year. Waste screening, combined with ongoing surveillance and control of incoming solid waste by transfer station and landfill operations staff, is a significant step in the county's solid waste enforcement program. In cases where special waste policies are repeatedly disregarded, division staff enforces compliance through a progressive process of warnings, citations, and eventually fines for improper disposal of special wastes.

Under the county's Waste Clearance Policy PUT 7-2-1(PR) and Waste Acceptance Rule PUT 7-1-6(PR), the Special Waste Unit provides a free service to customers to evaluate wastes and determine if they can be accepted for disposal and under what conditions. Special waste staff process and provide more than 400 waste clearances for disposal each year. Conditions for disposal could include wetting to control dust, bagging, hauling directly to the Cedar Hills landfill, specific packaging and labeling requirements, separation from other waste in a special waste disposal area, or certification of disposal by authorized landfill staff. Procedures for disposal of special waste are often defined by local, state, or federal regulation.

The method for handling special wastes once the Cedar Hills landfill closes will be considered during the evaluation of alternative disposal options.

Managing Illegal Dumping and Litter

Managing municipal solid waste that is dumped on open ground is one of the division's responsibilities. Illegal dumping and litter can cause environmental contamination and pose both safety hazards and risks to public health. Addressing the issue of illegal dumping requires several coordinated programs and the participation of many county departments, the cities, and other agencies. The division manages or participates in programs that strive not only to reduce littering and illegal dumping on public and private property, but also to assist its victims.

Illegal dumping

Illegal dumping is a continuing problem for agencies, businesses, and the general public who find yard waste, appliances, car bodies, and other wastes dumped on their personal property, on public property, and on road rights of way. The division continues to lead the implementation of recommendations made in 2004 by a county task force

charged with strengthening and coordinating the county's response to illegal dumping complaints. In 2008, the County Council adopted an ordinance to refine the county's role in enforcing laws that prohibit illegal dumping on public and private lands.

The ordinance enhances the county's authority to cite and prosecute illegal dumpers. For example, it allows the county to charge a restitution fee to illegal dumpers and, in turn, provide monetary relief to victims of the illegal dumping. The fee can be waived if the illegal dumper cleans up and properly disposes of the waste.

Coordinating illegal dumping reporting and response through the Illegal Dumping Hotline (206-296-SITE) is a major element in the county's surveillance and control system for illegal dumping.

Regional responsibilities for illegal dumping enforcement, clean up, and prevention are identified in the following chart.

Clean-up of an illegal dumpsite

Table 6-3. Illegal Dumping Clean-Up Responsibilities

Entity	Responsibility
Washington State Department of Ecology	Provides coordinated prevention grants Community Litter Cleanup Program funding for cleanup to local agencies. Sets statewide policy.
Puget Sound Clean Air Agency	Responds to illegal dumping of materials where asbestos is suspected, such as some demolition materials, and addresses illegal dumping where incineration occurs.
Public Health - Seattle & King County	Primary enforcement agent for illegal dumping complaints on private property.
Department of Planning and Environmental Review	Provides code enforcement. Addresses junk and debris on private property.
Road Services Division	Responds to complaints and removes illegally dumped materials from public roads and rights of way in unincorporated King County.
Local Hazardous Waste Management Program	Addresses illegal dumping and mishandling of potentially hazardous waste materials.
Solid Waste Division	Responds to complaints about illegal dumping and litter near county solid waste facilities and manages: programs for illegal dumping cleanup, the Illegal Dumping Hotline, county-wide illegal dumping prevention programs, and the junk vehicle program.
Water and Lands Resources Division	Investigates illegal dumping and litter complaints involving surface water.
Cities	Enforce municipal littering and illegal dumping ordinances and provide cleanup of litter and illegally dumped material from city streets and properties.

The division also developed a program called the Community Cleanup Assistance Program, which enables environmental site inspectors from the county, cities, and other agencies to issue free disposal vouchers to property owners who are victims of illegal dumping.

Community Litter Cleanup

The division's Community Litter Cleanup Program, funded in part by a grant from Ecology, supports the cleanup of litter and illegal dumpsites on public lands and waterways in King County. The program also supports prevention and education, through advertising, signage, and other measures.

In 2016, litter crews cleaned up over 176 tons of debris from 151 sites. About 17 percent of the debris – including items such as tires, appliances, and junk vehicles – was recycled.

Secure Your Load

In accordance with state law, since 1994 the division has assessed a fee to the drivers of vehicles with unsecured loads arriving at its staffed transfer facilities and landfill. An unsecured load has not been fastened in or attached to the vehicle with tarps, rope, straps, netting, or chains, so as to prevent any part of the load or the covering from becoming loose, detached, or leaving the vehicle while it is moving.

According to the Washington State Department of Ecology's *Focus on Secured Loads* (Ecology 2009a), road debris causes about 400 accidents every year on Washington State highways and roughly 40 percent of litter on highways comes from unsecured loads.

The requirement to secure loads is in the *"Rules of the Road"* (RCW 46.61.655), which is enforced by the Washington State Patrol. State law (RCW 70.93.097) and King County Code (Title 10.12.040) require the division to charge an unsecured-load fee, which is assessed by scale operators.

In 2006, the division launched the Secure Your Load outreach program to raise public awareness of the importance of securing loads. The division has worked closely with the King County Sheriff's Office and the Washington State Patrol to enforce the law, and with Ecology and the Maria Federici Foundation to raise public awareness. In 2013, to strengthen its deterrent effect, the fee for an unsecured load arriving at a division facility was raised to $25. Division staff have received training from the Washington State Patrol to help them accurately identify unsecured loads and uniformly assess the fee. The increased fee for unsecured loads supports safe, clean communities.

Disposal Services after an Emergency

The *King County Operational Disaster Debris Management Plan* (Debris Management Plan)(KCSWD 2009) outlines the process for managing disaster debris within the boundaries of unincorporated King County and for coordinating with the 37 cities with which King County has interlocal agreements. The Debris Management Plan is aligned with other national, state, and county plans, including the 2014 *King County Comprehensive Emergency Management Plan*, as well as regulations and policies that will affect how King County manages disaster debris.

Debris management operations are grouped into three response levels – routine, medium, and high. The response level is determined by the division based on the geographic scope and impact of an actual or anticipated incident. Routine incidents are relatively common emergencies such as small landslides or minor flooding, which can be supported with existing resources and require minimal coordination. Medium impact incidents require more than routine coordination, and generally involve multiple jurisdictions. These include incidents such as moderate earthquakes, minor or moderate flooding in multiple locations, and storms with snow, ice, and/or high winds. The situation may require mutual aid or contract resources, and it may be necessary for the King County Executive to proclaim an emergency. High impact incidents require a high degree of coordination and generally involve requests for state and federal assistance. These include incidents such as large earthquakes, severe flooding, or severe storms. In most cases, an emergency will have already been proclaimed by the King County Executive.

A regional approach to planning is essential for managing the multi-jurisdictional impacts of emergencies in the Puget Sound area and for coordinating the limited disposal capacity in western Washington. This disposal capacity is subject to two major constraints. First, most jurisdictions in the region export their solid waste to landfills east of the Cascade Mountains. Without local landfill space, disposal capacity relies on the region's transportation network, which could be compromised in a major emergency. Second, the only operational landfill in King County – Cedar Hills – does not accept materials other than municipal solid waste for disposal.

The coordinated regional Debris Management Plan emphasizes recycling to the extent possible. The plan calls for the use of temporary debris management sites for storage of debris until it can be sorted for recycling or proper disposal. The division has worked with the King County Regional Communications and Emergency Coordination Center to coordinate public information and help cities and residents identify recycling options in preparation for and in response to emergency events of all types.

The ability to respond after a major regional emergency is one criterion that will be used to select a disposal option to be used once the Cedar Hills landfill closes.

Restoration of Closed Landfills

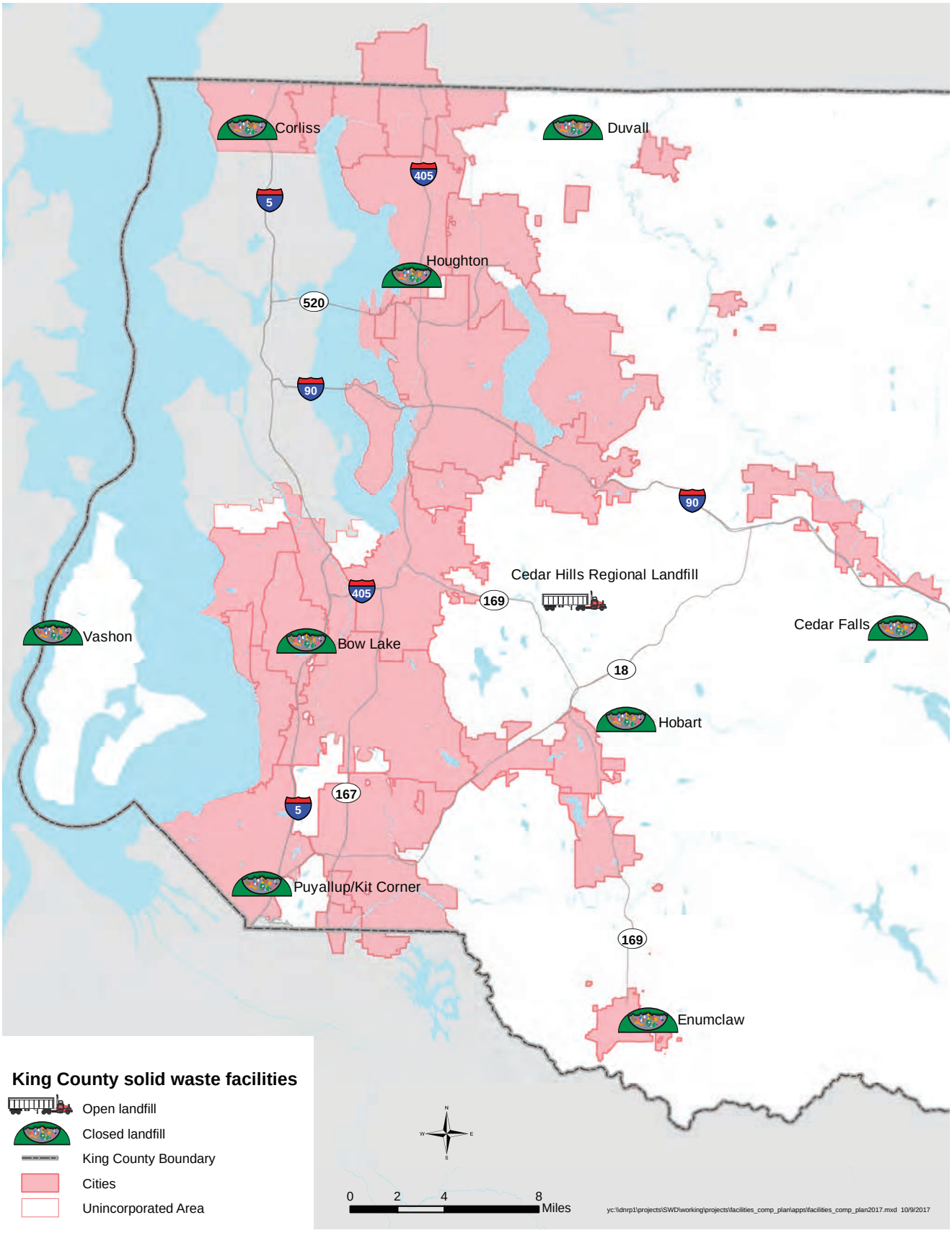
The division is responsible for maintaining and monitoring closed landfills that were constructed under different standards than those that guide landfill development today. Depending on the year the landfill closed, a minimum maintenance and monitoring post-closure period of five to 30 years is specified in the Washington Administrative Code, but the timeline is not definite in state law. Although most of the closed landfills have reached the end of the required minimum post-closure period, regulations and the understanding of closure requirements have changed, requiring ongoing maintenance and monitoring. See Figure 6-10 for the location of the closed landfills.

Post-Closure Monitoring and Maintenance

At seven of the nine closed landfills, the division routinely monitors groundwater, surface water, wastewater, and landfill gas. The Bow Lake and Corliss landfills were excavated to build new transfer stations on site, so very little, if any, waste is left and monitoring is no longer necessary. Studies are underway at the Vashon, Cedar Falls, Hobart, and Enumclaw landfills to determine what additional actions are needed for these landfills to reach a stable state. When a stable state has been reached, post-closure activities at these landfills may be reduced or terminated.

Under the current monitoring program, sampling data are collected from more than 180 groundwater, surface water, and wastewater monitoring stations, and approximately 100 landfill gas monitoring stations. These data are

Figure 6-10. Map of closed landfills



summarized in quarterly and annual reports submitted to the Washington State Department of Ecology and Public Health. Public Health also routinely inspects all of the closed landfills.

The closed landfills were constructed under different standards than those that guide landfill development today. With the exception of portions of the Vashon landfill constructed after 1989, they are unlined and do not, in some cases, incorporate all of the environmental control systems present in a modern landfill. Thus, the unique characteristics of each site – in particular the underlying geology, what lies downstream, and the waste that was originally placed in the landfill – play an important role in the post-closure needs of the site. These factors also influence the need for ongoing monitoring and maintenance of the existing landfill control systems. Since all but the Vashon closed landfill have reached the end of their required post-closure periods, each is being evaluated to determine what actions are required to bring the landfill to a stable state. In some cases, there may be no need to continue monitoring; at other sites, monitoring may continue at a reduced frequency and for a reduced range of constituents found in the medium being tested.

A bioberm at the Cedar Falls closed landfill filters landfill gas.

When the Cedar Hills landfill reaches capacity and closes, the bottom liner, capped top, and extensive gas and water control systems will inhibit releases to the environment for many years. Applicable regulations will define the minimum post-closure period (currently 30 years). Landfill closure is guided by the Resource Conservation and Recovery Act Title 40, Subtitle D, Part 258, Subpart F – Closure and Post-Closure Care, as well as Washington Administrative Code 173-351. The post-closure period may be shortened or lengthened based on the perceived risk to human health and the environment. After the post-closure period, there is expected to be some reduced level of monitoring and care to ensure the integrity of the cap and other environmental controls.

Beneficial Reuse of Landfill Properties

The county continues to examine possibilities for the beneficial reuse of closed landfill properties. While the presence of landfill control systems at these landfills can limit the types of beneficial reuse projects that can be implemented, the county has been successful in converting several properties wholly or in part to new purposes. Future beneficial uses also could create revenue opportunities.

Houghton landfill – Athletic fields were developed on the former Houghton landfill area.

Hobart landfill – Model airplane enthusiasts and an astronomy club use the open spaces of the Hobart landfill.

Duvall landfill – The county installed an 800-MHz radio tower outside of the refuse boundary of the Duvall landfill as part of its Emergency Communications Project.

Cedar Falls, Duvall, and Puyallup/Kit Corner landfills – Walking and cycling trails in the property buffers are used by area communities.

Other beneficial uses

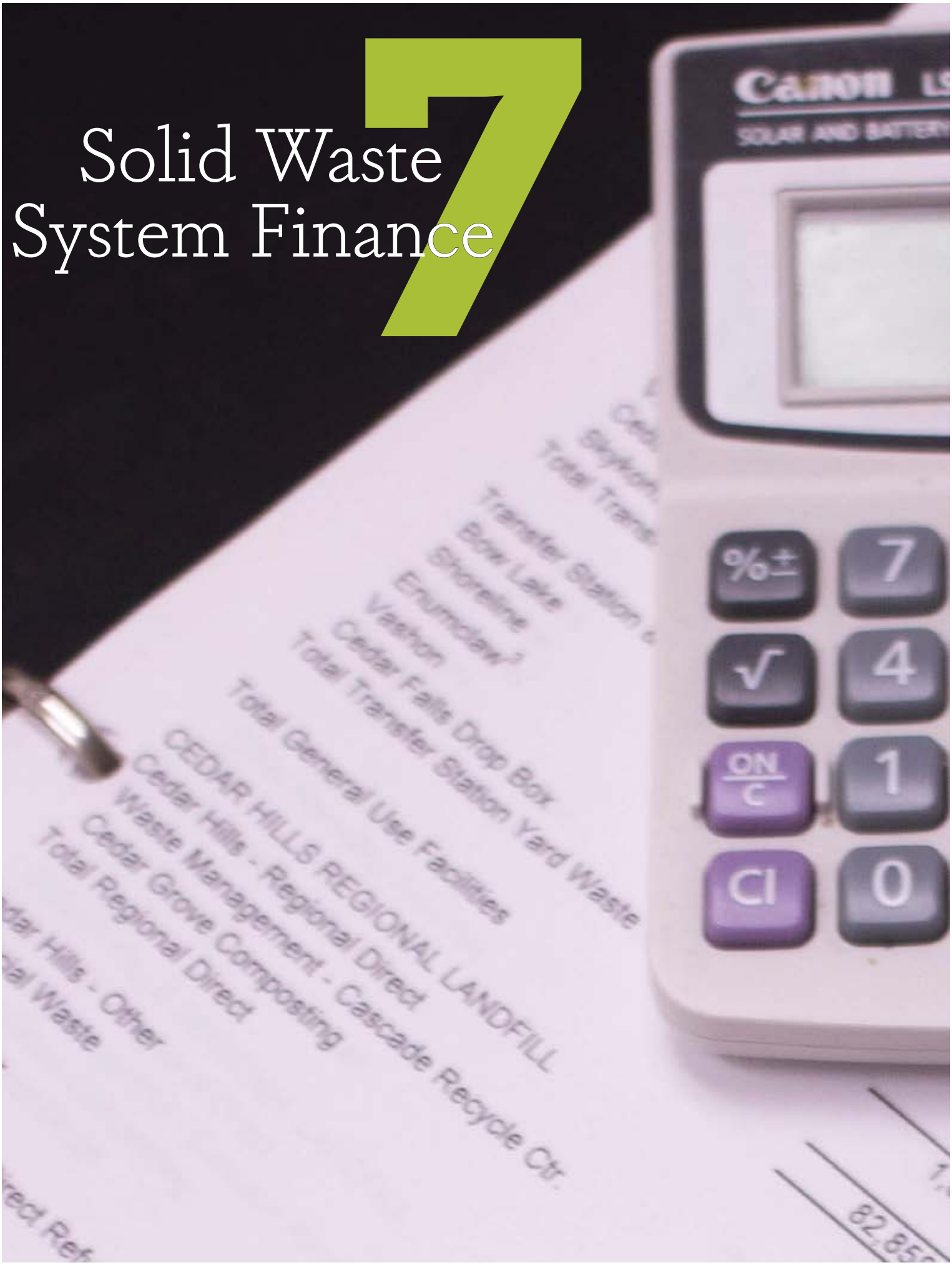
The open spaces at closed landfills, often grassy areas surrounded by woods, provide habitat for diverse species of plants and animals. Closed landfills that currently provide homes to healthy populations of wildlife are Cedar Falls, Duvall, Hobart, Houghton, Puyallup/Kit Corner, and Vashon. Grass covers have been placed over all the landfills, engineered to suit the naturally occurring features and areas of potential enhancement at the properties. Vegetative covers at the Duvall and Puyallup/Kit Corner properties include planted trees and other vegetation to improve ground cover and water quality, as well as perches and nesting boxes for hawks and owls. The Cedar Falls and Duvall landfills are near the headwaters of large streams and provide cover and a source of food for birds, deer, coyote, and other woodland animals. Managing these properties as green space helps support the county's goals and policies for habitat preservation and increases carbon sequestration (i.e., reduces the total carbon emissions) at the properties.

Vegetative cover at the Duvall landfill

Finding reuse opportunities for the closed landfill properties provides continued benefit to the surrounding communities, but the uses need to be compatible with the ongoing environmental monitoring at the sites. The division continues to explore beneficial reuse options for closed landfills, such as alternative energy farms (solar and wind) and sustainable forestry.


MAIN
DISPOSAL
SITE

7 Solid Waste System Finance



Policies

Goal: Keep tipping fees as low as reasonable, while covering the costs of effectively managing the system, protecting the environment, encouraging recycling and providing service to customers.

F-1 Assess fees for use of the solid waste transfer and disposal system at the point of service.

F-2 The fee charged to customer classes will be the same at all facilities, unless the Metropolitan King County Council determines a change in the rate structure is necessary.

F-3 Utilize the assets of the King County Solid Waste Division exclusively for the benefit of the solid waste system, and fully reimburse the solid waste system for the value associated with the use or transfer of its assets.

F-4 The County General Fund will not charge use fees or receive other consideration from the Solid Waste Division for use of any transfer facility property in use as of November 6, 2013. The division's use of assets acquired by other separate County funds is subject to use fees. If the division ceases to use a property, all proceeds from the sale or other use of such property are due to the owner of record.

F-5 Maintain a Solid Waste Division financial forecast and cash-flow projection of four years or more.

F-6 Maintain reserve funds and routinely evaluate the funds for long-term adequacy and set contributions to maintain reasonable rate stability.

F-7 Finance capital projects using an appropriate combination of cash and debt depending upon the life of the asset, financial benefits such as rate stability, and interest rates.

Summary of Recommended Actions

The following table includes a menu of recommended actions that the county and the cities should implement. Under the responsibility column, the entity listed first has primary responsibility for the action, bold indicates that the entity has responsibility for the action, and a star (*) indicates that the action is a priority. If the responsibility is not in bold, it indicates that the action is optional for the entity to implement.

Responsibility	Action	Detailed Discussion
1-f County	Subject to approval from the Metropolitan King County Council, define customer classes and establish equitable fees for each customer class based on services provided, benefits received, use of the system, and the costs, incurred or avoided, of providing those services.	Page 7-9
2-f County	Study the advantages and disadvantages of alternatives to the current rate methodology, such as incorporating a transaction fee into the rate structure.	Page 7-9
3-f County	Study the cost of providing services to self-haul customers, and to other customer classes if needed.	Page 7-9
4-f County	Consider discounts for low-income customers consistent with RCW 81.77.195.	Page 7-9
5-f County, cities	Continue to explore new revenue sources to help finance the solid waste system.	Page 7-10
6-f County, cities	Use solid waste fees to fund mitigation payments to cities for impacts directly attributable to solid waste facilities per RCW 36.58.080 and the Amended and Restated Solid Waste Interlocal Agreement.	Page 7-5
7-f County	Use solid waste fees to fund required mitigation for solid waste facilities, including mitigation mandated by federal, state, and local regulations and permits.	Page 7-5
8-f County, cities	The Executive may establish an Environmental Reserve Fund with revenue from solid waste fees for the benefit of the signatories to the Amended and Restated Interlocal Agreement.	Page 7-7

Summary of Recommended Actions

Responsibility	Action	Detailed Discussion
9-f County	Continue to evaluate and implement fiscally responsible operational changes to support a sustainable business model.	Page 7-8
10-f County	Include a target fund balance in the Solid Waste Division financial plan equal to at least thirty days of operating expenses.	Page 7-5
11-f County	Incorporate a rate stabilization reserve into multi-year rates.	Page 7-5
12-f County	Maintain the following solid waste funds: a. Landfill Reserve b. Landfill Post-Closure Maintenance c. Capital Equipment Recovery Program d. Construction Fund	Page 7-5
13-f County	Maintain the Landfill Post-Closure Maintenance Fund at a level to ensure that environmental monitoring and maintenance of the closed landfills will be fully funded through the end of their regulated post-closure maintenance periods, as defined by applicable law.	Page 7-6
14-f County	Fund transfer facility capital projects with a combination of contributions to the Construction Fund and debt financing. The term for repayment of debt will not extend beyond, and may be less than, the useful life of the capital asset.	Page 7-6
15-f County	Consider various financing options for capital projects and in consultation with stakeholders evaluate projected costs, benefits, schedules, project features, and overall rate payer value for the design and construction of the project.	Page 7-5
16-f County	When possible, manage solid waste rates through smaller, more frequent increases, which in combination with the rate stabilization reserve, smooths rate increases over time.	Page 7-3

Solid Waste System Finance

Financial policies help guide the solid waste system's operations and investments; policies should be considered as a whole rather than individually. The policies will be set at the same time as comprehensive solid waste management plan updates, but may be amended from time to time outside of the plan update process.

This chapter first provides a brief summary of the division's financial structure, including descriptions of funding sources, revenues, and expenditures. The remainder of the chapter describes a range of influences expected to have a financial impact on the division in the future.

Funding of Solid Waste Services and Programs

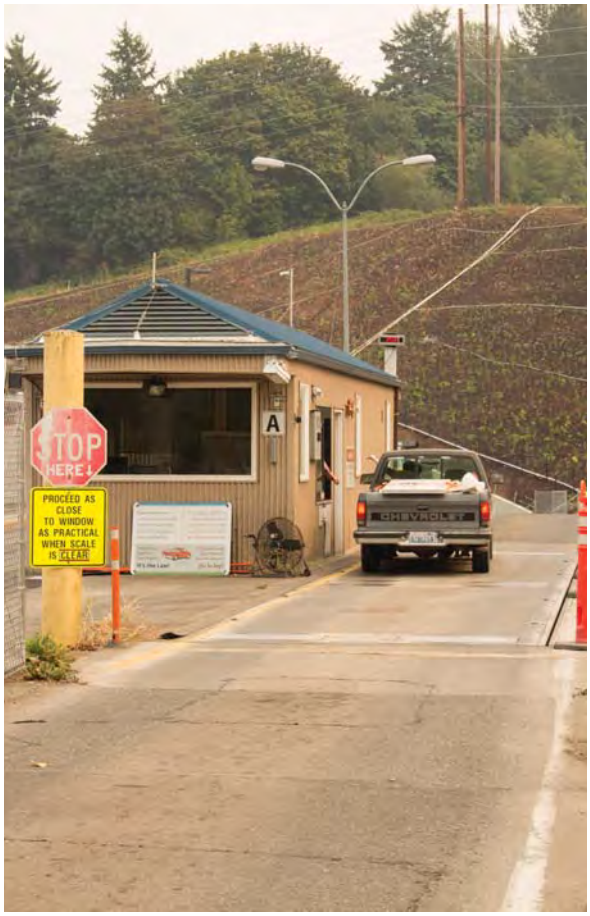
King County's solid waste transfer and disposal system is a public-sector operation that is funded almost entirely by fees collected from its customers. The division is an enterprise fund, managing nearly all of its expenses with revenues earned through these fees.

The fees charged at county facilities, called tipping fees, pay for the operation and maintenance of transfer and disposal facilities and equipment, education and promotion related to waste prevention and recycling, grants to cities to support waste prevention and recycling efforts, and administrative operating expenses and overhead.

Tipping fees also pay for the construction of transfer facilities. Bonds or loans may be used for large projects, but repayment of this debt is funded by tipping fees.

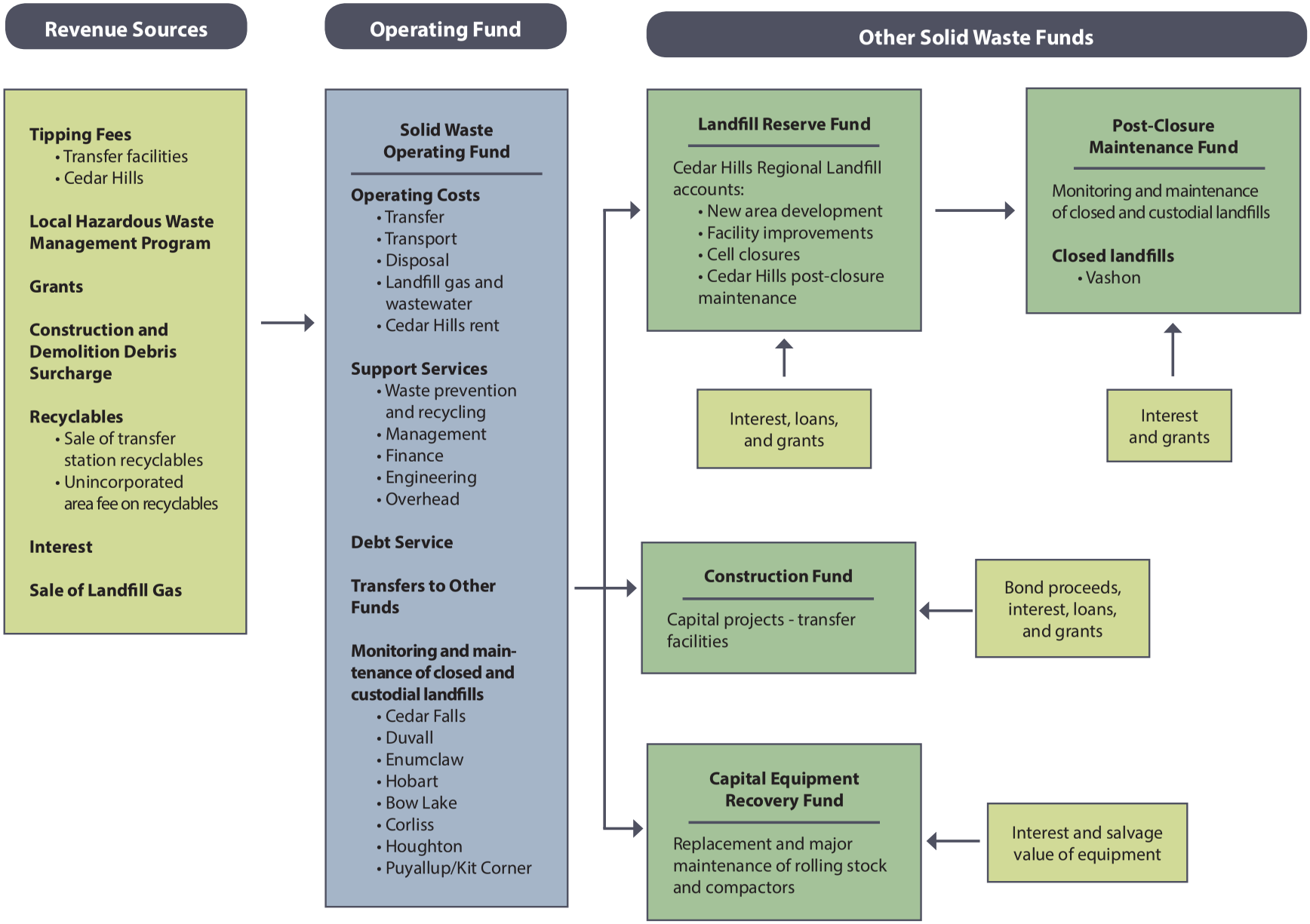
As discussed later in this chapter, through transfers into reserve funds, the fee paid for each ton of waste entering the system today covers the expenses involved in disposal of that waste, even if some costs are incurred decades in the future. Using this financial structure ensures that the full cost of solid waste handling is paid by the users of the system.

A summary of the fund structure is illustrated in Figure 7-1 and discussed in the following sections.



Customers pay a tipping fee at the scalehouse

Figure 7-1. Solid Waste Division fund structure



How Cities Fund Solid Waste Programs

Cities fund their solid waste and waste prevention and recycling programs in a variety of ways, and the resources available to the 37 cities in the King County system vary widely. Some cities receive revenue from fees paid for solid waste collection services. These fees may be paid directly to the city or to the collection company depending on who provides the collection service – the city itself or a commercial collection company – and what contractual arrangements have been made. In some cases, the collection companies charge a fee that is passed on to the city to fund their programs. Some cities also charge a utility tax. Another funding source for cities is state and county grants (see Chapter 4, *Sustainable Materials Management* for more information about grants). For cities that do not receive any revenue from collection, the only revenue sources for funding waste prevention and recycling programs may be grants and the city's general fund.

Solid Waste Division Revenues

As mentioned earlier, the solid waste system is funded primarily by the tipping fees charged at division facilities. The tipping fee is charged to the commercial collection companies that collect materials curbside and to residential and business self-haulers who bring wastes to the transfer facilities themselves. In accordance with KCC 10.08.040, the County Council establishes the fees charged at county solid waste facilities.

There are four main types of tipping fees:

Basic Fee – The per-ton fee charged to customers disposing of municipal solid waste at transfer facilities and to curbside collection vehicles at the Cedar Hills landfill. The basic fee accounts for about 85 percent of tipping fee revenues.

Regional Direct Fee – A discounted fee charged to commercial collection companies that haul solid waste to Cedar Hills in transfer trailers from their own transfer stations and processing facilities, thus bypassing county transfer stations.

Yard Waste and Clean Wood Fee – A fee for separated yard waste and clean wood delivered to facilities that have separate collection areas for these materials.

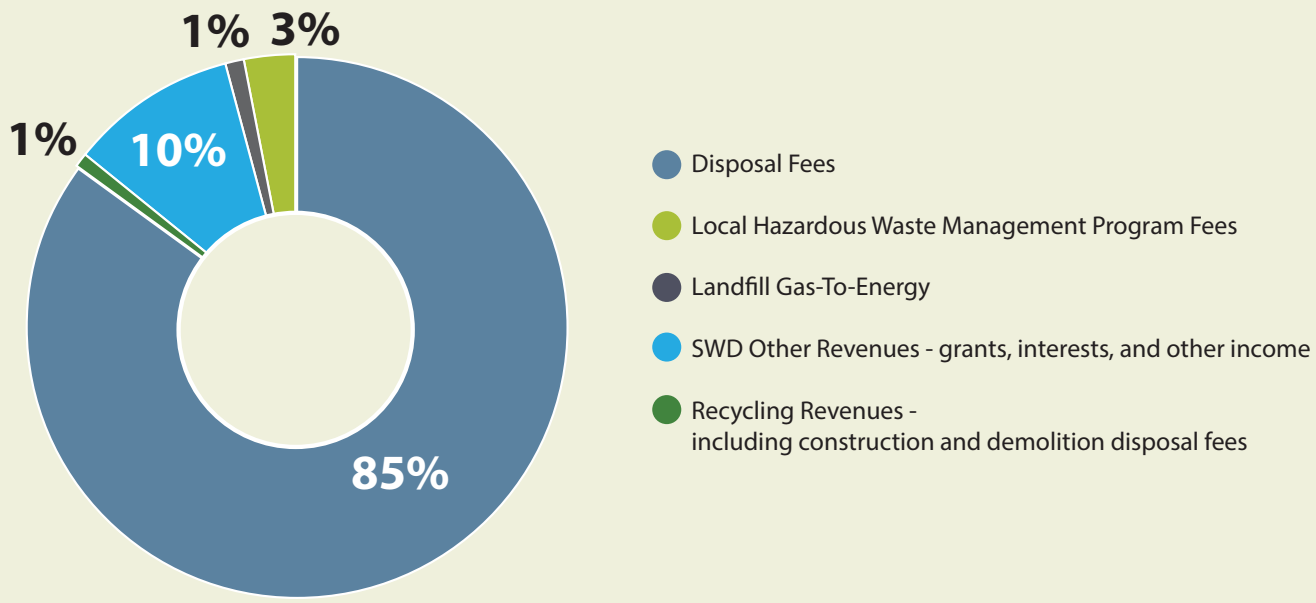
Special Waste Fee – The fee charged for certain materials that require special handling, record keeping, or both, such as asbestos-containing materials and contaminated soil. There are two different special waste fees that reflect the greater or lesser expense involved in handling and tracking different materials.

Other fees are charged for recyclables, such as appliances. KCC 10.12.021.G authorizes the division director to set fees for recyclable materials for which no fee has yet been established by ordinance. These fees may be set to encourage recycling and need not recover the full cost of handling and processing. In accordance with state law (RCW 70.93.097), the division also charges a fee to vehicles with unsecured loads arriving at any staffed King County transfer facility or the Cedar Hills landfill.

Figure 7-2 shows the breakdown of revenues as projected for 2017 and 2018 in the 2016 Rate Study. As shown, about 85 percent of the division's revenue comes from tipping fees. The remainder of the division's revenue comes from a

few additional sources. The most significant of those is the Local Hazardous Waste Management Program (LHWMP). Other sources of revenue include revenue from the sale of landfill gas from the Cedar Hills landfill; interest earned on fund balances; recyclables revenue, including revenue from both the sale of scrap metals received at division transfer facilities and from a fee on recyclables collected in unincorporated areas; fees collected from construction and demolition disposal; income from rental properties; fees collected on unincorporated area curbside accounts to support waste prevention and recycling education; and Washington State Department of Ecology grants to help clean up litter and illegal dumping throughout the county, as well as to support waste prevention and recycling. Based on economic and market conditions, revenues from these sources and interest earned can vary considerably.

Figure 7-2. Projected Sources of Revenue 2017 and 2018



Construction and Demolition Debris Surcharge

Starting in September 2015, management of the county's construction and demolition waste changed. In the past, the division had contracts with two private companies – Republic Services and Waste Management – to manage the majority of the county's construction and demolition debris. Under the new system, the division designates qualified facilities to accept and process construction and demolition debris.

In 2016, the division banned disposal of construction and demolition materials that have stable recycling markets. As future markets develop, more materials may also be banned. Materials that are brought to a designated facility for processing, but cannot be recycled, will incur a $4.25 per ton disposal surcharge that will be payable to the division. This system is designed to encourage recycling of construction and demolition materials. For more information, see Chapter 4, *Sustainable Materials Management*.

Solid Waste Division Expenditures

Division expenditures, can be divided into four broad categories: operating costs, support service costs, debt service, and transfers to other solid waste funds. The division maintains a target fund balance – an average balance in the Operating Fund sufficient to cover 30 days of direct operating expenses. Operating expenses are defined to exclude reserve funds. A rate stabilization reserve allows the accrual of funds to smooth out rate increases over time.

Figure 7-3 uses 2017-2018 projections to illustrate the various division expenditures, which are described in the following sections:

Operating Costs
Operating costs, which constitute the majority of all division spending, include the day-to-day expenses for transfer, transport, and landfill operations, maintenance of equipment and facilities, and management of landfill gas and wastewater. Operating costs also include business and occupation tax, and an emergency contingency to cover some costs related to weather-related events or other small emergencies. In addition, all but one of the closed landfills have met the obligatory number of years of post-closure care, but have on-going needs for monitoring and maintenance. Since the post-closure period has expired and maintenance and monitoring is still required, those projects are now funded by the Operating Fund.

Also included in the operating costs category is the rent that the division pays to the county's General Fund for use of the landfill property. Rent is based on a fair market property appraisal. An appraisal by Murray & Associates in 2012 determined a rent payment schedule for 2015 through 2025. Also included in operation costs are mitigation paid to cities for impacts directly attributable to solid waste facilities (RCW 36.58.080) as well as other mitigation related to construction or other activities as required by federal, state, and local regulations and permits.

Another expense in this category is recycling costs. This includes grants to the cities and other waste prevention and recycling programs and services provided by the division.

Support Service Costs
This cost category includes functions that support operations, such as engineering, overhead, finance, administration, and planning.

Debt Service
Debt service is the payment of interest and principal on bonds and loans. Major transfer facility capital projects are generally financed by a combination of general obligation (GO) bonds backed by the full faith and credit of the county's General Fund and rate dollars in the Construction Fund. It is anticipated that with approval of the County Council, GO bonds will be issued for future transfer facility capital projects. Repayment of the debt will not extend beyond, and may be less than, the useful life of the facility. Additional factors that may be considered include but are not limited to: changes in disposal method, length of the ILA, bond market/bond rates, and waste generation.

To date, Cedar Hills landfill capital projects are not funded through debt financing, but through the Landfill Reserve Fund discussed later in this section.

Transfers to Other Solid Waste Funds
Transfers from the Operating Fund to reserve funds make up a portion of the division's costs. These reserve funds were established to ensure that the division can meet future obligations, or expenses, some of which are mandated by law. Contributions to reserve funds are routinely evaluated to ensure they are adequate to meet short- and long-term needs. Paying into reserve funds stabilizes the impact on rates for certain expenses by spreading the costs over a longer time period, and ensures that customers who use the system pay the entire cost of disposal. The three reserve

funds – the Capital Equipment Recovery Program Fund, the Landfill Reserve Fund, and the Post-Closure Maintenance Fund – are discussed below.

Bond proceeds and contributions from the Operating Fund to the **Construction Fund** are used to finance new construction and major maintenance of division transfer facilities and some closed landfill mitigation projects. Contributions from the Operating Fund to the Construction Fund result in less borrowing, and consequently, a lower level of debt service.

The **Capital Equipment Recovery Program Fund** (CERP) is codified in KCC 4A.200.680. The purpose of the CERP is to provide adequate resources for replacement and major maintenance of solid waste rolling stock (primarily long-haul trucks and trailers) and stationary compactors. New equipment is purchased from the Operating Fund, but after the initial purchase, replacements are funded from the CERP.

By accumulating funds in the CERP, the division is able to cover the expense of replacing needed equipment without impacting rates, even while revenue fluctuates. Annual contributions to the CERP are calculated by projecting future replacement costs, salvage values, and equipment life. Contributions are adjusted to reflect changes in facilities and operations that affect equipment needs. The contributions are held in an account, earning interest, until needed.

The CERP Fund provides resources for replacement and major maintenance of equipment.

The **Landfill Reserve Fund** (LRF), codified in KCC 4A.200.390, covers the costs of four major accounts maintained for the Cedar Hills landfill, which are described below.

- **New area development account** – Covers the costs for planning, designing, permitting, and building new disposal areas.
- **Facility improvements account** – Covers a wide range of capital investments required to sustain the infrastructure and operations at the landfill, such as enhancements to the landfill gas and wastewater systems.
- **Closure account** – Covers the cost of closing operating areas within the landfill that have reached capacity. Mandated by federal and state law, these contributions help the division prepare incrementally for the cost of final closure of the entire landfill.
- **Post-closure maintenance account** – Accumulates funds to pay for post-closure maintenance of the Cedar Hills landfill for 30 years. This account is also mandated by federal and state law.

The sum of all four accounts, based on projected cost obligations, makes up the LRF contribution from the Operating Fund. Projected cost obligations are based on the current plan for the landfill. When Cedar Hills closes, the division will discontinue its contributions to the LRF. After final closure, the balance of the LRF will be transferred to the Post-Closure Maintenance Fund to pay for Cedar Hills' post-closure maintenance and monitoring.

The **Post-Closure Maintenance Fund**, codified in KCC 4A.200.710, is a separate fund that pays for the maintenance and environmental monitoring of the Vashon landfill – the only closed landfill that is still within the regulatory period set in 40 CFR 258.61 and Washington Administrative Code 173-351-600 (see Chapter 6, Landfill Management and Solid Waste Disposal).

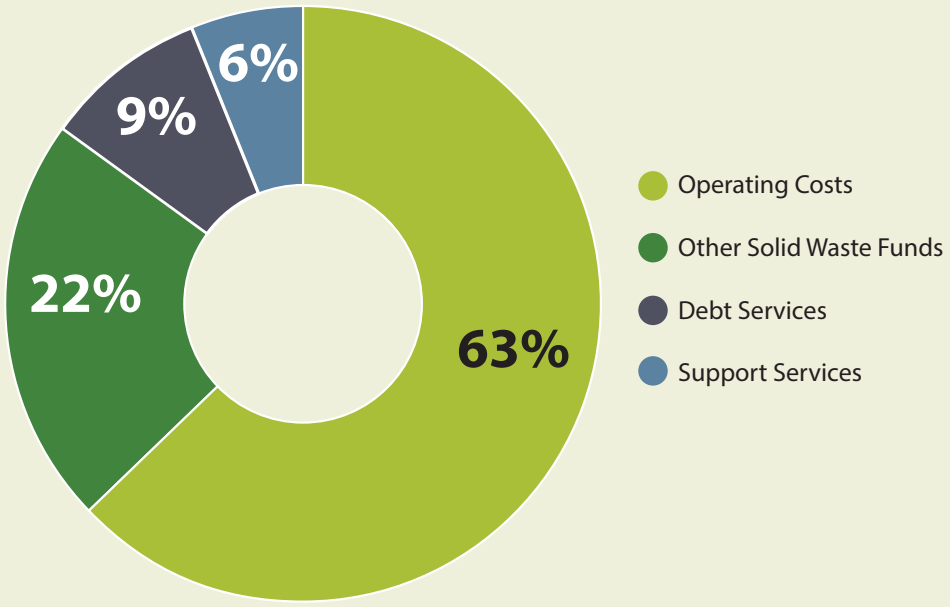
In addition to the funds mentioned above, the division is investigating the establishment of an Environmental Reserve, as discussed in the Amended and Restated ILA. The purpose of such a fund would be to help to pay for any environmental liabilities not already covered by system rates or insurance. The fund would be retained for a minimum of thirty years following the closure of the Cedar Hills Landfill.

Target Fund Balance

The current policy is to retain an average balance in the operating fund sufficient to cover at least 30 days of direct operating costs.

A stormwater pond at the Cedar Hills Landfi ll is part of the infrastructure paid for by the Facility Improvements Account

Figure 7-3. Projected 2017 Expenditures



Influences on Future Costs and Revenue

In addition to the unanticipated increases or reductions in tonnage due to the economy, there are other factors that can be expected to influence costs and revenues. These factors, which can be projected and budgeted for with varying degrees of certainty are summarized below.

Interest Earnings

The division's reserve funds are invested to earn interest during the years, or even decades, before the funds are needed. This is particularly significant for the long-term Landfill Reserve Fund, which will finance landfill closure and 30 years of post-closure care, a period expected to run from about 2028 (the currently approved capacity) through 2058, or if expanded capacity is approved, from about 2040 through 2070; making interest earnings a considerable factor in the amount that needs to be put aside. In 2013, the value of interest earned was less than inflation. Starting in 2018, a small increase in interest above inflation is expected through 2026. The county is looking at how the funds might be invested differently consistent with County guidelines to earn a higher rate of return.

Waste Prevention and Recycling

As discussed earlier, revenues from garbage tipping fees cover the costs of waste prevention and recycling services and programs. This financing structure requires the division to estimate the effects of waste prevention and recycling on garbage disposal to reasonably project future revenues.

While the revenue stream relies primarily on garbage tipping fees, the current priorities in solid waste management are waste prevention and recycling, which lead to reductions in the amount of solid waste disposed and therefore in revenues received. The reduction in the amount of waste received due to waste prevention, recycling and product stewardship has been gradual, and the system has adjusted to lower revenues. Further reductions through increasingly rigorous waste prevention and recycling efforts will continue to affect the revenues of King County and other jurisdictions across the state. The state's Moving Washington Beyond Waste and Toxics 2015 Update recognizes that, " Local governments in particular are concerned about how to sustain funding for programs when the goal is to reduce waste disposal, the source of most funding." (Ecology 2015). The county completed a Sustainable Solid Waste Management Study (KCSWD 2014a) that looked at multiple strategies, technologies and services that the division could employ to increase recycling and manage solid waste. One of the strategies suggested by the study is to develop a sustainable financing model that is aligned with waste prevention and recycling (KCSWD 2014a).

Increased waste prevention and recycling efforts have had positive influences on the financial aspects of the system as well. As discussed in Chapters 4 and 6, waste prevention and recycling have contributed to extending the life of the Cedar Hills landfill, which will save money for ratepayers. Another aspect of waste prevention and recycling that has had a positive financial effect is product stewardship. Product stewardship shifts the management of materials at the end of their life to the product manufacturer. This shift reduces the costs to cities and counties of managing products such as televisions, computers, and fluorescent bulbs and tubes, to name a few. The savings are most substantial for products that contain hazardous materials and are more difficult and expensive to manage within the public collection, transfer, and disposal system.

Operational Efficiencies

The division continually seeks to eliminate waste and variability in its operations. This commitment ensures the division's ability to provide value to its customers, while improving the quality of service, controlling costs, and upholding the county's environmental goals. Examples of operational efficiencies that are producing significant and long-term results are discussed briefly below.

Landfill Tippers

The division uses tippers to empty garbage from transfer trailers at the landfill. The tippers replaced the use of older walking floor trailers (see Chapter 5, *Landfill Management and Solid Waste Disposal*, for more details). Tippers save staff time and other resources, as well as reduce equipment and tire damage.

Landfill tippers are an efficient way to empty transfer trailers.

Solid Waste and Cardboard Compactors

As discussed in Chapter 4, the transfer system in King County is undergoing major renovations to update station technology, improve efficiencies, and enhance environmental sustainability. The installation of solid waste compactors is one important component of that plan. The Bow Lake, Enumclaw, Shoreline, Factoria, and Vashon stations currently have waste compactors. All newly constructed recycling and transfer stations will incorporate compactors as well.

Compacting solid waste at the stations reduces the number of trips necessary to transport the waste by up to 30 percent. Fewer trips translate directly into lower costs for fuel, equipment, and staff. In July 2012, the Bow Lake Recycling and Transfer Station began operating with a compactor, saving almost 900 trips and over 8,400 gallons of diesel during the last six months of that year.

In addition to solid waste compactors, the division is installing cardboard compactors at many of the stations. These compactors will allow the division to reduce the number of trips needed to pick up the bales.

Potential Changes in the Fee Structure

The division may propose changes to the current fee structure in future rate studies. Possible changes include establishing different customer classes, discounts for low income customers, and moving some costs from the fee charged at transfer facilities and the landfill to a fee on the curbside collection bill. In the 2014 *Sustainable Solid Waste Management Study* (KCSWD 2014), one of the recommendations was to look at revising the fee structure. The division completed a rate restructure study in 2017 and will be discussing with stakeholders what a rate restructure might entail (KCSWD 2017d).

To equitably allocate the benefits and costs of transfer system improvements, the division may consider different customer classes. The customer classes would take into consideration the services provided, benefits received, use of the system, and the costs (incurred or avoided), of providing those services. An example of a customer class would be self-haul customers or commercial customers at the transfer stations.

In 2010, legislation was passed authorizing the Washington Utilities and Transportation Commission to approve discounts for low-income customers under certain circumstances. The division will consider what would be involved in establishing such a policy, and whether it should be implemented in King County.

Before changes to the fee structure are proposed, the division is studying a number of factors, including the impact on revenue and cost, equity issues, and system-wide financing implications. These factors will be considered in future rate studies.

Closure of the Cedar Hills Regional Landfill

When Cedar Hills reaches capacity and closes, the division's solid waste tipping fee is expected to increase to cover the cost of using an alternate means of disposal. Whether it is export to an out-of-county landfill, disposal at a waste-to-energy facility, or other conversion technology, a preliminary recent study indicates that the cost for disposal after Cedar Hills closes will be higher (KCSWD 2017c) (see Chapter 6, *Landfill Management and Solid Waste Disposal* for further discussion).

New Revenue Sources

The division is continually exploring new sources of revenue to help offset reductions in tonnage. Cities may also want to consider additional funding sources to support their solid waste and WPR programs.

Sales from the Landfill Gas-to-Energy Facility

An example of the successful development of a revenue source is the sale of landfill gas. In 2009, a landfill gas-to-energy facility began operations at Cedar Hills, and the division began to receive revenues from the sale of landfill gas. The facility, which is privately owned and operated by Bio Energy Washington LLC, converts methane collected from the landfill into pipeline quality natural gas, which it sells to Puget Sound Energy. The division receives revenue in the range of $1 to $1.4 million depending on production rates and the market price.

The Bio Energy Washington plant at Cedar Hills landfill converts landfill gas to pipeline quality gas.

Carbon Emissions Credits

Carbon emissions credits, also called greenhouse gas offsets, from the landfill gas-to-energy facility at Cedar Hills offer another ongoing source of revenue. The conversion of landfill gas to a renewable source of green energy generates greenhouse gas offsets, which have value in the market. The division, rather than the owner of the landfill gas facility, Bio Energy Washington LLC, has contractually retained the offset rights associated with the project. In January of 2011, the County Council unanimously approved an ordinance authorizing the division to enter into a contract to sell carbon emissions credits associated with the landfill gas-to-energy project to Puget Sound Energy. This contract is structured so that the county shares in profits that Puget Sound Energy gets when selling the emissions credits associated with the gas. Because of the nature of the sale of carbon emissions credits, the amount received may vary year to year. The division will also be investigating the possibility of attaining greenhouse gas offsets from other sources related to solid waste operations or programs.

Resource Recovery at Transfer Stations

Significant amounts of recyclable materials – notably wood, metal and cardboard - are disposed at the transfer stations. The division is implementing new approaches, such as sorting the recyclable materials on the tipping floor and banning certain materials from disposal, to recover more of these materials at the transfer stations. Revenues from the sale of these materials help offset the costs of sorting and equipment. (see Chapter 5, *Solid Waste Transfer and Processing System* for further discussion).

Fees from Materials Collected at the Transfer Stations

King County Code (KCC 1 0.12.021.G) does not require that fees for recyclables recover the full costs of handling and processing recyclable materials. Therefore the fees can be set lower to encourage recycling over disposal. In fact, for materials such as the standard curbside recyclables collected at the transfer stations, there is currently no fee at all, even though the division pays the cost of transport and processing. As collection services for more recyclable materials are added at transfer facilities and more tons of materials are recycled, fees will be evaluated on a regular basis and adjusted as necessary to optimize the financial and environmental benefits.

The division will continue to explore innovative opportunities, such as partnering with the private sector or other public agencies, to earn additional revenues and achieve savings through operational efficiencies. Although, these efforts may involve relatively small amounts of money, cumulatively they contribute to stabilizing rates for solid waste customers.


CANON LS-82Z
SOLAR AND BATTERY
Total Transfer Station Yard Waste
Total General Use Facilities
CEDAR HILLS REGIONAL LANDFILL
Cedar Hills - Regional Direct
Waste Management - Cascade Recycle Ctr
Cedar Grove Composting
Total Regional Direct
Cedar Hills - Other
Special Waste
Other
Total - Other
Cedar Hills Direct Refuse
not added to totals.
n 7 days a week starting May 1, 2017.

8 References

References

Cascadia. 2009a. 2007/2008 Construction and Demolition Materials Characterization Study. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://www.kingcounty.gov/depts/dnrp/solid-waste/about/waste-monitoring/waste-documents.aspx

Cascadia. 2012a. King County Waste Monitoring Program: 2011 Waste Characterization Study. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/documents/waste-characterization-study-2011.ashx?la=en

Cascadia. 2012b. Organics Characterization Report. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. (http://your.kingcounty.gov/solidwaste/garbage-recycling/documents/Organics-Characterization-report-2012.pdf)

Cascadia. 2015a. Waste Monitoring Program: Market Assessment for Recyclable Materials in King County. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Inc., Seattle, WA. http://your.kingcounty.gov/solidwaste/about/documents/waste-monitoring-market-assessment-2015.pdf

Cascadia. 2015b. King County Waste Monitoring Program: 2015 Waste Characterization and Customer Survey Report. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://kingcounty.gov/~/media/depts/dnrp/solid-waste/about/documents/waste-characterization-study-2015.ashx?la=en

Cascadia. 2016. Transfer Station Customer Survey. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://your.kingcounty.gov/solidwaste/about/documents/customer-survey-2016.pdf

Cascadia. 2017a. King County LinkUp Program 2017 Market Assessment. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://kingcounty.gov/depts/dnrp/solid-waste/programs/linkup/documents.aspx

Cascadia. 2017b. King County 2017 Targeted Business Characterization Report. Prepared for the King County Solid Waste Division by Cascadia Consulting Group, Seattle, WA. http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/documents/business-characterization-2017.ashx?la=en

City of Seattle. 1998/2004. On the Path to Sustainability and 2004 Plan Amendment. City of Seattle, Seattle Public Utilities, WA. (A draft update to this plan is posted here:
http://www.seattle.gov/util/MyServices/Garbage/AboutGarbage/SolidWastePlans/SolidWasteManagementPlan/index.htm)

Ecology. 2004. Background Paper for Beyond Waste Summary Document Financing Solid Waste for the Future.
http://www.ecy.wa.gov/pubs/0407032.pdf

Ecology. 2015. The State Solid and Hazardous Waste Plan. Moving Beyond Waste and Toxics, 2015 Update. Washington State Department of Ecology, Olympia, WA.
http://www.ecy.wa.gov/wasteplan/

Ecology. 2009b. Focus on Secured Loads. Washington State Department of Ecology. Olympia, WA.
https://fortress.wa.gov/ecy/publications/publications/0907020.pdf

GBB. 2007. Independent, Third Party Review of the Solid Waste Transfer and Waste Export System Plan. Prepared for the King County Council by Gershman, Brickner & Bratton, Inc., Fairfax, VA.
http://your.kingcounty.gov/solidwaste/about/planning/documents/solid-waste-transfer-export-review.pdf

KCSWD. Updated monthly. Solid Waste Advisory Committee Web Page. King County Solid Waste Division, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/swac.asp

KCSWD. Updated monthly. Metropolitan Solid Waste Management Advisory Committee Web Page. King County Solid Waste Division, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/mswmac.asp

KCSWD. 2002. 2001 Comprehensive Solid Waste Management Plan. King County Solid Waste Division, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/planning/comp-plan.asp

KCSWD and ITSG. 2004. Transfer System Level of Service Evaluation Criteria and Standards. Prepared by the King County Solid Waste Division and Interjurisdictional Technical Staff Group, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD. 2005a. Analysis of System Needs and Capacity: Using the Transfer System Level of Service Evaluation Criteria and Standards. King County Solid Waste Division, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD. 2005b. Options for Public and Private Ownership of Transfer and Intermodal Facilities: Using the Transfer System Level of Service Evaluation Criteria and Standards. King County Solid Waste Division, Seattle, WA.
http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD. 2006a. Preliminary Transfer & Waste Export Facility Recommendations and Estimated System Costs, Rate Impacts & Financial Policy Assumptions. King County Solid Waste Division, Seattle, WA. http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD. 2006b. Solid Waste Transfer and Waste Management Plan and associated Environmental Impact Statement. King County Solid Waste Division, Seattle, WA. http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD et al. 2008a. Commercial Customer Evaluation of Waste Densities & Food Waste Recycling Impacts. King County Solid Waste Division, City of Kirkland, Waste Management, Inc., and Sound Resources Management Group, Inc., WA.

KCSWD et al. 2008b. Sustainable Curbside Collection Pilot. Prepared by the King County Solid Waste Division, City of Renton, Public Health - Seattle & King County, and Waste Management, Inc. http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp

KCSWD. 2009. King County Operational Disaster Debris Management Plan. King County Solid Waste Division, Seattle, WA.

KCSWD. 2010a. Final Environmental Impact Statement: Cedar Hills Regional Landfill, 2010 Site Development Plan. Prepared for the King County Solid Waste Division by HDR Engineering, Inc., Bellevue, WA. http://your.kingcounty.gov/solidwaste/facilities/cedar-hills-development.asp

KCSWD. 2010b. Project Program Plan: Cedar Hills Regional Landfill 2010 Site Development Plan. King County Solid Waste Division, Seattle, WA. http://your.kingcounty.gov/solidwaste/facilities/cedar-hills-development.asp

KCSWD. 2010c. Vashon Recycling Survey. King County Solid Waste Division, Seattle, WA. http://your.kingcounty.gov/solidwaste/about/documents/2010-Vashon-recycling-survey.pdf

KCSWD. 2012. Executive Proposed Solid Waste Disposal Fees 2017-2018.

KCSWD. 2013a. Solid Waste Transfer and Waste Management Plan Review. http://your.kingcounty.gov/solidwaste/about/plan-review.asp

KCSWD. 2013b. Optimized Transfer Station Recycling Feasibility Study. Prepared for the King County Solid Waste Division by Herrerra, O'Brien and Company, and HDR Engineering, Inc. http://kingcounty.gov/~/media/depts/dnrp/solid-waste/about/Planning/documents/optimized-TS-feasibility-study.ashx?la=en

KCSWD. 2013c. DRAFT Comprehensive Solid Waste Management Plan.
http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/planning/documents/2013-swd-comp-plan.ashx?la=en

KCSWD. 2014a. Sustainable Solid Waste Management Plan. Prepared for the King County Solid Waste Division.
http://your.kingcounty.gov/solidwaste/about/planning/documents-planning.asp#sustain-study

KCSWD. 2014b. King County UTC Area Multifamily Pilots. Prepared for King County Solid Waste Division by Cascadia Consulting Group.
http://kingcounty.gov/~/media/depts/dnrp/solid-waste/about/Planning/documents/KC-UTC-multifamily-recycling-project-2013-final-report.ashx?la=en

KCSWD 2015. Solid Waste Transfer and Waste Management Plan Review Part 2.
http://your.kingcounty.gov/solidwaste/about/plan-review.asp

KCSWD. 2016a. Waste Export Evaluation, October 2016. Moorehead, Hobson, et al., page 27.

KCSWD. 2016b. Multi-Family Recycling Best Practices Report.

KCSWD. 2017a. Cedar Hills Site Development Alternatives Final Report, Volumes 1 and 2. Prepared for the King County Solid Waste Division by Herrera Environmental Consultants.

KCSWD. 2017b. Anaerobic Digestion Feasibility Study. Prepared for the King County Solid Waste Division by HDR Engineering, Inc.
http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/planning/documents/anaerobic-digestion-feasibility-study.ashx?la=en

KCSWD. 2017c. Working Draft Copy of Evaluation of Disposal Technologies. March 28, 2017.

KCSWD. 2017d. Alternative Solid Waste Revenue Structure. Prepared for the King County Solid Waste Division by FCS Group. November 2017.

King County. 2011. Annual Report of King County's Climate Change, Energy, Green Building, and Environmental Purchasing Programs. King County, Seattle, WA.
http://your.kingcounty.gov/dnrp/climate/documents/2011-King-County-Sustainability-Report.pdf

King County. 2012. Greenhouse Gas Emissions in King County: An Updated Geographic-Plus Inventory, a Consumption-based Inventory, and an Ongoing Tracking Framework. Prepared for King County by the Stockholm Institute.
http://your.kingcounty.gov/dnrp/library/dnrp-directors-office/climate/2008-emissions-inventory/ghg-inventory-summary.pdf

King County. 2015a. King County Strategic Plan, 2015 Update: Working Together for One King County. King County, Seattle, WA.
http://www.kingcounty.gov/depts/executive/performance-strategy-budget/performance-strategy/Strategic-Planning/2015%20Strategic%20Plan%20Update.aspx

King County. 2015b. Strategic Climate Action Plan. King County, Seattle, WA.
http://www.kingcounty.gov/services/environment/climate/strategies/strategic-climate-action-plan.aspx

King County. 2016a. King County Comprehensive Plan with 2016 Update. King County, Seattle, WA.
http://www.kingcounty.gov/depts/executive/performance-strategy-budget/regional-planning/king-county-comprehensive-plan.aspx

King County. 2016b. King County Equity and Social Justice Strategic Plan 2016-2022. King County, Seattle, WA.
http://www.kingcounty.gov/elected/executive/equity-social-justice/strategic-plan.aspx

Michaels, T., Shiang, I., 2016 Directory of Waste to Energy Facilities, ERC, page 5.

Morris, J. 2008. Curbside Recycling in King County: Valuation of Environmental Benefits-Revised Draft. Dr. Jeffrey Morris, Sound Resource Management Group, Olympia, WA.

Normandeau. 2017. King County Waste-to-Energy Study. Prepared for the King County Department of Resources and Parks, Solid Waste Division by Normandeau Associates Inc, CDM Smith, and Neomer.
http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/planning/documents/waste-to-energy-options-considerations.ashx?la=en

R.W. Beck. 2007. Comparative Evaluation of Waste Export and Conversion Technologies Disposal Options. Prepared for the King County Department of Natural Resources and Parks, Solid Waste Division by R.W. Beck, Inc., Seattle, WA.
http://www.kingcounty.gov/~/media/depts/dnrp/solid-waste/about/planning/documents/Conversion_Technologies_Report.ashx?la=en

Sound Resource Management 2006. Estimated Market Value for Recyclables Remaining in King County's Disposal Stream. Memorandum from Sound Resource Management Group to the King County Solid Waste Division, January 2006 (values updated by Sound Resource Management August 2008).

SWANA. 2008. The Long-Term Environmental Risks of Subtitle D Landfills. Solid Waste Association of North America Applied Research Foundation, Dallas, TX.

SWANA. 2011. Waste Conversion Technologies, Jeremy K. O'Brien, P.E., Solid Waste Association of North America MSW Management Magazine.

Watson, Jay L., Liz Tennant, and Dave Galvin. 2010. 2010 Local Hazardous Waste Management Plan Update. Local Hazardous Waste Management Program in King County, Seattle, WA.
http://www.hazwastehelp.org/AboutUs/pdf/Chapter4_LegalAuthority_Cover.pdf


VARIOUS MARKED UP PRINTS CH
FENCE PLAN 1981 CH
CH TOPOGRAPHIC 11/14/85
CH TOPOGRAPHIC 3/20/86
CH TOPOGRAPHIC 3/20/86
TOPOGRAPHIC 3/21/83
CH TOPOGRAPHIC 3/21/83
CH TOPOGRAPHIC 4/13/84
TOPOGRAPHIC 4/4/60

Appendix A

Washington Utilities and Transportation Commission
Cost Assessment

This plan is prepared for King County and its incorporated cities, excluding Seattle and Milton.

Prepared by: King County Solid Waste Division

Contact: Meg Morehead, Planning & Communications Manager

Date: September 27, 2017

DEFINITIONS

Throughout this document:

Year 1 refers to 2017
Year 3 refers to 2019
Year 6 refers to 2022

Year refers to calendar year January 1 – December 31

1. DEMOGRAPHICS

The King County solid waste system comprises 37 of the 39 cities in the county (including all but the cities of Seattle and Milton) and the unincorporated areas of King County. In all, the county's service area covers approximately 2,050 square miles. There are about 1.3 million residents and 690,000 people employed in the service area.

1.1. Population

1.1.1. Population for the entire King County

Year 1: 2,153,700
Year 3: 2,194,800
Year 6: 2,257,900

1.1.2. Population for the King County solid waste system

Year 1: 1,439,099
Year 3: 1,465,817
Year 6: 1,505,893

1.2. References and Assumptions

Projections for population are based on data developed by the Puget Sound Regional Council (PSRC; 2015). Data provided by PSRC are based on U.S. Census and other data sources and developed in close cooperation with the county and the cities.

2. WASTE STREAM GENERATION

2.1. Tonnage Recycled

Year 1: 1,126,900 (55% recycling)
Year 3: 1,115,700 (57% recycling)
Year 6: 1,159,300 (57% recycling)

2.2. Tonnage Disposed

Year 1: 837,500
Year 3: 841,700
Year 6: 874,600

2.3. References and Assumptions

The division uses a planning forecast model to predict future waste generation, which is defined as *waste disposed + materials recycled*. The forecast is used to guide system planning, budgeting, rate setting, and operations. The primary objectives of the model are to: 1) estimate future waste disposal and 2) provide estimates of the amount of materials expected to be diverted from the waste stream through division and city waste prevention and recycling programs. The tonnage forecast is described in more detail in Chapter 3 of the Plan.

3. SYSTEM COMPONENT COSTS

This section addresses costs associated with current programs and those recommended in the draft plan.

3.1. Waste Reduction and Recycling Programs

Many programs address waste reduction and prevention as well as recycling; therefore, they are presented here together.

3.1.1.Programs

- Education and promotion campaigns
- EcoConsumer program
- Grants to cities to support waste prevention and recycling
- Product stewardship support and promotion – “Take it Back Network”
- Construction and demolition debris waste prevention and recycling education and promotion
- Sustainable building education and promotion
- LinkUp program
- Organics management program
- Master Recycler composter program
- School programs
- Special recycling collection events
- Green Holidays program
- Transfer facility recycling

Detail on current programs and proposed waste prevention and recycling programs, primarily building on current efforts, are presented in the recommendations in Chapter 4 of the Plan.

3.1.2. The costs of waste reduction and recycling programs (including transfer station recycling) implemented and proposed are estimated to be:

Year 1: $8,082,818
Year 3: $8,450,633
Year 6: $9,244,099

3.1.3. Funding mechanisms:

Year 1:	
Disposal fees	$7,709,818
Coordinated Prevention Grant	213,000
Unincorporated area recycling fee	160,000
Year 3:	
Disposal fees	$8,074,736
Coordinated Prevention Grant	215,897
Unincorporated area recycling fee	160,000
Year 6:	
Disposal fees	$8,858,218
Coordinated Prevention Grant	225,881
Unincorporated area recycling fee	160,000

3.2. Recycling Programs – see 3.1, combined with Waste Reduction Programs

3.3 Solid Waste Collection Programs

3.3.1 WUTC Regulated Solid Waste Collection Programs

Data for 2016 and estimates for 2017, 2019 and 2022 are shown below[1]:

WUTC Regulated Hauler Name:	**Waste Management of Washington, Inc.**			
G-permit #: G-327	**720 4th Ave, Ste 400 Kirkland WA 98033**			
		Yr 1	Yr 3	Yr 6
	2016	2017	2019	2022
Residential				
# of Customers	23,563	23,784	24,225	24,888
Tonnage (garbage, YW & recycling)	63,260	57,460	57,748	60,006
Commercial				
# of Customers	654	660	672	691
Tonnage Collected (garbage only)	18,960	17,222	17,308	17,985

WUTC Regulated Hauler Name:	**American Disposal Company, Inc.**			
G-permit #: G-87	**4662 70th Ave E, Puyallup WA 98371**			
		Yr 1	Yr 3	Yr 6
	2016	2017	2019	2022
Residential				
# of Customers	2,032	2,051	2,089	2,146
Tonnage (garbage, YW & recycling)	1,719	1,561	1,569	1,630
Commercial				
# of Customers	215	217	221	227
Tonnage Collected (garbage only)	891	809	813	845

[1] The 2016 tons disposed were higher than the forecast for 2016 suggested.

WUTC Regulated Hauler Name:	**Fiorito Enterprises, Inc. & Rabanco Companies**			
G-permit #: G-60	**22010 76th Ave S, Kent WA 98032**			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	25,055	25,290	25,759	26,464
Tonnage (garbage, YW & recycling)	16,567	15,048	15,123	15,715
Commercial				
# of Customers	521	526	536	550
Tonnage Collected (garbage only)	7,785	7,071	7,106	7,384

WUTC Regulated Hauler Name:	**Rabanco LTD, 1600 127th Ave NE Bellevue WA 98005**			
G-permit #: G12	**1600 127th Ave NE, Bellevue WA 98005**			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	7,692	7,764	7,908	8,124
Tonnage (garbage, YW & recycling)	15,811	14,361	14,433	14,997
# of Customers	195	197	200	206
Tonnage Collected (garbage only)	5,620	5,105	5,131	5,331

3.3.2 Other (non-regulated) Solid Waste Collection Programs

Data for 2016 and estimates for 2017, 2019, and 2022 are shown below.

Hauler Name:	**Republic Services**			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	7,911	7,985	8,133	8,356
Tonnage (garbage, YW & recycling)	189,703	172,310	173,173	179,945
Commercial				
# of Customers	4,160	4,199	4,277	4,394
Tonnage Collected (garbage only)	92,891	84,374	84,796	88,112

Hauler Name:	**Recology**			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	62,739	63,327	64,503	66,266
Tonnage (garbage, YW & recycling)	115,486	104,897	105,422	109,545
Commercial				
# of Customers	2,266	2,287	2,330	2,393
Tonnage Collected (garbage only)	61,744	56,083	56,364	58,568

Hauler Name:	Waste Management of Washington, Inc.			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	23,047	23,263	23,695	24,343
Tonnage (garbage, YW & recycling)	212,286	192,822	193,788	201,366
Commercial				
# of Customers	6,663	6,052	6,082	6,320
Tonnage Collected (garbage only)	127,427	115,743	116,323	120,872

Hauler Name:	City of Enumclaw			
	2016	Yr 1 2017	Yr 3 2019	Yr 6 2022
Residential				
# of Customers	3,050	3,079	3,136	3,221
Tonnage (garbage, YW & recycling)	4,703	4,272	4,293	4,461
Commercial				
# of Customers	3,594	3,628	3,695	3,796
Tonnage Collected (garbage only)	2,452	2,227	2,238	2,326

3.4 Energy Recovery & Incineration (ER&I) Programs

Not applicable – the Solid Waste Division has no such program.

3.5 Land Disposal Program

3.5.1 Landfill Name: Cedar Hills Regional Landfill
Owner: King County
Operator: King County Solid Waste Division

3.5.2 The approximate tonnage disposed at the landfill by WUTC regulated haulers is expected to be[2]:

Year 1: 130,600
Year 3: 118,600
Year 6: 119,200

3.5.3 The approximate tonnage disposed at the landfill by other contributors is expected to be:

Year 1: 806,700
Year 3: 732,700
Year 6: 736,400

3.5.4 Landfill operating and capital costs are estimated to be:

Year 1: $48,501,139

Year 3: $39,721,525

Year 6: $44,839,041

3.5.5 Landfill funding:

Tipping fees

3.6 Administration Program

3.6.1 Budgeted cost and funding sources:

Budgeted Cost	Funding Source
Year 1: $33,681,726	Tipping fees
Year 3: $35,255,729	Tipping Fees
Year 6: $38,562,851	Tipping fees

3.6.2 Cost components included in these estimates are:

All Operating Expenditures except for direct cost components of Transfer Operations, Disposal Operations, and ancillary operating units.

3.6.3 Funding mechanisms

More than 90 percent of the division's revenue comes from tipping fees charged at transfer facilities and the Cedar Hills landfill. The remainder comes from a few additional sources,

[2] The tons disposed in 2016 were higher than the current forecast estimated

including interest earned on fund balances, a surcharge on construction and demolition (C&D), revenue from the sale of recyclable materials received at division transfer facilities, a fee on recyclables collected in unincorporated areas, and grants to help clean up litter and illegal dumping throughout the county and to support WPR. Other than grant funds, all revenue sources support all programs.

3.7 Other Programs

3.7.1 The Transfer Services System Program is described in Chapter 5 of the Plan. It includes the division's recycling and transfer stations, private facilities that handle construction and demolition debris (C&D), and household hazardous waste (HHW) service, which is covered in detail by the Local Hazardous Waste Management Plan.

3.7.2 The division owns and operates eight transfer stations and two drop boxes. Allied Waste and Waste Management own and operate facilities that handle C&D. The division operates HHW service at its Factoria transfer station and provides Wastemobile service via a contractor.

3.7.3 The WUTC regulates the C&D facilities.

3.7.4 Solid Waste Division Costs

3.7.4.1 Transfer facility operating and capital costs are estimated to be:

Year 1: $52,944,701,

Year2: $54,009,812,

Year 3: $64,286,388

3.7.4.2 HHW service costs are estimated to be: NA

3.7.5 The major funding source for division transfer operations is tipping fees. Capital costs are paid from the construction fund; bond proceeds and contributions from the operating fund (tipping fees) are deposited into the construction fund. The cost of providing HHW service is funded by the LWHMP.

3.8 References and Assumptions

The estimate for year 1 costs is from the updated 2016 budget request; years 3 and 6 were increased to account for inflation, tonnage projections, and expected program additions. The collection program estimates were derived using hauler reports and a projected rate of population increase in King County. Numbers have been rounded in most instances.

4 FUNDING MECHANISMS

Table 4.1.1 Facility Inventory

Facility Name	Type of Facility	Tip Fee per Ton	Estimated Transfer and Transportation Cost**	Transfer Station Location	Final Disposal Location	Total Tons Disposed	Total Revenue Generated (Tip Fee x Tons)
King County Transfer Stations	Transfer Station	$ 134.59	$ 52,944,701	King County	Cedar Hills Landfill	810,467	$109,080,709
Regional Direct Cedar Hills	Landfill	$ 114.00			Cedar Hills Landfill	6,500	$741,000
Special Waste Cedar Hills	Landfill	$ 162.00			Cedar Hills Landfill	1,500	$243,000
Commercial Haul Cedar Hills	Landfill	$ 134.59			Cedar Hills Landfill	19,000	$2,557,210
Recycling	Transfer Stations King County	$ 75.00			Cedar Grove Composting	13,000	$975,000
Total						**850,467**	**$113,596,919**

Table 4.1.2 Disposal (Tip) Fee Components

	Fee per ton	Moderate risk waste surcharge	State tax	Other
Basic Fee	**134.59**	4.73	5.02	
Regional Direct	**114.00**			40.24
Special Waste	**162.00**		5.22	
Yard Waste	**75.00**			

Table 4.1.3 Funding Mechanism (see next tables)

Table 4.1.4 Tip Fee Forecast

Tip fee per ton by facility [1]	Year One (2017	Year Three (2019)	Year Six (2022)
All Facilities	$134.59	$141.66	$147.33

[1] Basic fee

4.2 Funding Mechanisms

4.2.1 Funding Mechanism By Percentage – Year 1

Component	Tip Fee %	Grant %	Bond %	Collection Tax Rates %	Other %	Total
Waste Reduction & Recycling	97%	3%				100%
Transfer	100%					100%
Capital Projects			100%			100%
Land Disposal	100%					100%
Administration	100%					100%
Capital Debt Service	100%					100%
Other	100%					100%

4.2.2 Funding Mechanism By Percentage – Year 3

Component	Tip Fee %	Grant %	Bond %	Collection Tax Rates %	Other %	Total
Waste Reduction & Recycling	97%	3%				100%
Transfer	100%					100%
Capital Projects			100%			100%
Land Disposal	100%					100%
Administration	100%					100%
Capital Debt Service	100%					100%
Other	100%					100%

4.2.3 Funding Mechanism By Percentage – Year 6

Component	Tip Fee %	Grant %	Bond %	Collection Tax Rates %	Other %	Total
Waste Reduction & Recycling	98%	2%				100%
Transfer	100%					100%
Capital Projects			100%			100%
Land Disposal	100%					100%
Administration	100%					100%
Capital Debts Service	100%					100%
Other	100%					100%

4.3 References and Assumptions

Revenue and operating cost projections for years 1, 3, and 6 are shown in Attachment 1.

4.4 Surplus Funds

The division develops its solid waste rate to maintain a 30-day emergency reserve in the operating fund.

Attachment 1

	2017	2019	2022
Basic Fee	135	142	147
Revenues			
Disposal Fees	113,816,117	123,657,075	143,747,449
Interest Earnings	252,293	205,494	282,712
Grants	213,000	215,897	225,881
Landfill Gas	1,000,000	1,000,000	1,000,000
Recycling	-	-	-
Rental Incomes	620,873	625,783	664,538
C&D	677,195	696,157	739,270
Other Revenue	385,000	395,472	432,605
Total Revenue	116,964,479	126,795,878	147,092,455
Operating Expenditures			
Public Health Transfer	912,839	964,801	1,112,686
Capital program debt service	13,732,413	13,602,163	19,491,156
Landfill Reserve Fund	25,073,066	16,362,804	20,029,860
Capital Equipment Recovery Program	6,900,000	6,900,000	6,300,000
Construction Fund	3,000,000	-	1,000,000
Cedar Hills Rent	2,972,000	3,062,000	3,202,000
Post-closure Reserve Fund	1,225,000	1,258,320	1,376,469
City mitigation	22,080	460,680	565,562
CHRLF Environmental Liability Policy	405,000	427,290	467,410
Fund Management	10,460,983	10,985,366	12,016,829
SW Directors Office	981,631	1,041,412	1,137,979
Human Resources	1,079,872	1,139,306	1,246,280
Legal Support	565,318	596,431	652,432
Strategy, Communications & Performance	3,356,678	3,395,721	3,714,560
Enterprise Services	4,121,544	4,348,382	4,756,671
Contract Management	446,491	471,065	515,295
Project Management	1,538,070	1,622,721	1,775,085
Recycling & Environmental Services	8,082,818	8,450,633	9,244,099
WPR City Grants (54150)	1,165,659	1,229,814	1,345,286
Facility Engineering & Science	3,474,749	3,665,989	4,010,205
Transfer & Transport Operations	30,576,547	34,159,712	37,367,115
Disposal Operations	14,919,654	14,678,711	16,056,959
B & O Tax	1,707,242	1,854,856	2,156,212
Total SWD Costs	136,719,653	130,678,176	149,540,151
under expenditure of 2% in low orgs	***1,592,087***	***1,691,109***	***1,849,870***
SWD cost minus under expenditure	135,127,566	128,987,067	147,690,281

Appendix B

APPENDIX B
6 YEAR CAPITAL IMPROVEMENT PROJECT

Proj. No.	Project Title	Escalated	Actuals Thru Dec 2016	2017	2018	2019	2020	2021	2022	2023	2024 Beyond
1033504	SOLID WASTE FUND 3901 CONTRACT AUDIT	Current Forecast	54,213	51,500	53,045						
1033504	SOLID WASTE FUND 3901 CONTRACT AUDIT	2017 Adopted/2016 Cashflow Solid Waste Division	1,711	51,500	53,045						
1033505	SOLID WASTE FACILITIES CAPITAL PROJECT CONTROL SUPPORT	Current Forecast	819,401	257,500	265,225	218,545	225,102	231,855	238,810		
1033505	SOLID WASTE FACILITIES CAPITAL PROJECT CONTROL SUPPORT	2017 Adopted/2016 Cashflow Solid Waste Division	783,436	257,500	265,225	218,545	225,102	231,855	238,810		
1033510	SOLID WASTE LAND FILL RESERVE CONTRACT AUDIT SERVICES	Current Forecast	216,385	51,500	53,045						
1033510	SOLID WASTE LAND FILL RESERVE CONTRACT AUDIT SERVICES	2017 Adopted/2016 Cashflow Solid Waste Division	170,556	51,500	53,045						
1033547	SOLID WASTE LAND FILL RESERVE CAPITAL PROJECT CONTROL SUPPORT	Current Forecast	767,792	257,500	265,225	273,182	281,377	289,818	238,810		
1033547	SOLID WASTE LAND FILL RESERVE CAPITAL PROJECT CONTROL SUPPORT	2017 Adopted/2016 Cashflow Solid Waste Division	650,125	257,500	265,225	273,182	281,377	289,818	238,810		
1116833	SOLID WASTE CEDAR FALLS ENVIRONMENTAL CONTROL SYSTEM MODEL	Current Forecast	1,745,590	360,500	412,024						
1116833	SOLID WASTE CEDAR FALLS ENVIRONMENTAL CONTROL SYSTEM MODEL	2017 Adopted/2016 Cashflow Solid Waste Division	1,331,281	360,500	412,024						
1124106	SOLID WASTE CEDAR HILLS SUPPORT FACILITIES EVALUATION	Current Forecast	44,474	1,395,640	525,941						
1124106	SOLID WASTE CEDAR HILLS SUPPORT FACILITIES EVALUATION	2017 Adopted/2016 Cashflow Solid Waste Division	13,219	648,393							
1033516	SOLID WASTE CEDAR HILLS REVISED SITE DEVELOPMENT PLAN	Current Forecast	1,712,336	549,132	188,535	61,002	62,668				
1033516	SOLID WASTE CEDAR HILLS REVISED SITE DEVELOPMENT PLAN	2017 Adopted/2016 Cashflow Solid Waste Division	1,511,679	461,311	123,021						
1033540	SOLID WASTE CEDAR HILLS LEACHATE FORCEMAIN UPGRADE	Current Forecast	470,835								
1033540	SOLID WASTE CEDAR HILLS LEACHATE FORCEMAIN UPGRADE	2017 Adopted/2016 Cashflow Solid Waste Division	469,156								
1033542	SOLID WASTE CEDAR HILLS AREA 7 CLOSURE	Current Forecast	9,086,938	5,297,626	6,826,428	1,789,325	17,387,247	528,428			
1033542	SOLID WASTE CEDAR HILLS AREA 7 CLOSURE	2017 Adopted/2016 Cashflow Solid Waste Division	8,468,415	5,297,626	6,826,428	1,789,325	17,387,247	482,147			
1033545	SOLID WASTE CEDAR HILS ENVIRONMENTAL SYSTEM MODIFICATIONS	Current Forecast	5,071,906	663,971							
1033545	SOLID WASTE CEDAR HILS ENVIRONMENTAL SYSTEM MODIFICATIONS	2017 Adopted/2016 Cashflow Solid Waste Division	4,339,578	118,450							

APPENDIX B
6 YEAR CAPITAL IMPROVEMENT PROJECT

Proj. No.	Project Title	Escalated	Actuals Thru Dec 2016	2017	2018	2019	2020	2021	2022	2023	2024 Beyond
1112415	CEDAR HILLS AREA 8 CIOSURE	Current Forecast					1,071,233	8,113,510	7,249,217	7,466,693	14,221,679
1112415	CEDAR HILLS AREA 8 CIOSURE	2017 Adopted/2016 Cashflow Solid Waste Division	5,435				1,071,233	8,113,510	7,249,217		21,688,372
1115992	SOLID WASTE AREA 8 DEVELOPMENT/FACILITY RELOCATION	Current Forecast	27,280,800	22,085,125	20,670,556	3,269,865					
1115992	SOLID WASTE AREA 8 DEVELOPMENT/FACILITY RELOCATION	2017 Adopted/2016 Cashflow Solid Waste Division	14,560,916	24,662,644	16,077,448	2,002,968					
1124105	SOLID WASTE CEDAR HILLS LAND FILL GAS PIPELINE UPGRADE	Current Forecast	4,585,486	3,149,463							
1124105	SOLID WASTE CEDAR HILLS LAND FILL GAS PIPELINE UPGRADE	2017 Adopted/2016 Cashflow Solid Waste Division	492,359	1,079,853							
1129844	SOLID WASTE CEDAR HILLS LAND FILL PUMP STATION REPAIR	Current Forecast		1,740,879	1,389,595						
1129844	SOLID WASTE CEDAR HILLS LAND FILL PUMP STATION REPAIR	2017 Adopted/2016 Cashflow Solid Waste Division		1,740,879	1,389,595						
1129847	SOLID WASTE CEDAR HILLS LAND FILL NORTH FLARE STATION REPAIR	Current Forecast		214,369	1,453,353	5,464					
1129847	SOLID WASTE CEDAR HILLS LAND FILL NORTH FLARE STATION REPAIR	2017 Adopted/2016 Cashflow Solid Waste Division		214,369	1,453,353	5,464					
1129848	SOLID WASTE CEDAR HILLS AREA 5 TOP DECK	Current Forecast			151,608	240,819	992,173	1,279,618	5,424,583	7,597,389	9,441,864
1129848	SOLID WASTE CEDAR HILLS AREA 5 TOP DECK	2017 Adopted/2016 Cashflow Solid Waste Division			482,223	1,415,562	9,846,176	10,141,561	1,523,756		
1116838	SOLID WASTE ENUMCLAW ENVIRONMENTAL CONTROL SYSTEM MODEL	Current Forecast	937,760	284,280	291,747						
1116838	SOLID WASTE ENUMCLAW ENVIRONMENTAL CONTROL SYSTEM MODEL	2017 Adopted/2016 Cashflow Solid Waste Division	456,537	98,880	180,353						
1116840	SOLID WASTE VASHON ENVIRONMENTAL CONTROL SYSTEM MODEL	Current Forecast	1,679,613	1,287,500	742,630						
1116840	SOLID WASTE VASHON ENVIRONMENTAL CONTROL SYSTEM MODEL	2017 Adopted/2016 Cashflow Solid Waste Division	1,196,115	515,000	424,360						
1124104	SOLID WASTE HOBART LAND FILL COVER & GAS CONTROL	Current Forecast	666,343	902,280	795,675						
1124104	SOLID WASTE HOBART LAND FILL COVER & GAS CONTROL	2017 Adopted/2016 Cashflow Solid Waste Division	247,060	902,280	795,675						
1129849	SOLID WASTE DUVALL ENVIRONMENTAL CONTROLS	Current Forecast		257,500	291,747	300,500	619,030	637,601			
1129849	SOLID WASTE DUVALL ENVIRONMENTAL CONTROLS	2017 Adopted/2016 Cashflow Solid Waste Division		257,500	291,747	300,500	619,030	637,601			
1129851	SOLID WASTE POST CLOSURE PUYALLUP/KIT CORNER ENVIRONMENTAL CONTROL SYSTEM	Current Forecast		257,500	291,747	300,500	619,030	637,601			

APPENDIX B
6 YEAR CAPITAL IMPROVEMENT PROJECT

Proj. No.	Project Title	Escalated	Actuals Thru Dec 2016	2017	2018	2019	2020	2021	2022	2023	2024 Beyond
1129851	SOLID WASTE POST CLOSURE PUYALLUP/KIT CORNER ENVIRONMENTAL CONTROL SYSTEM	2017 Adopted/2016 Cashflow Solid Waste Division		257,500	291,747	300,500	619,030	637,601			
1129852	SOLID WASTE POST CLOSURE HOUGHTON ENVIRONMENTAL CONTROL SYSTEM	Current Forecast		257,500	291,747	300,500	619,030	637,601			
1129852	SOLID WASTE POST CLOSURE HOUGHTON ENVIRONMENTAL CONTROL SYSTEM	2017 Adopted/2016 Cashflow Solid Waste Division		257,500	291,747	300,500	619,030	637,601			
1033497	SOLID WASTE SOUTH COUNTY RECYCLING & TRANSFER STATION	Current Forecast	6,666,042	2,509,510	6,275,223	6,441,625	34,153,562	36,260,929	19,583,649	821,556	
1033497	SOLID WASTE SOUTH COUNTY RECYCLING & TRANSFER STATION	2017 Adopted/2016 Cashflow Solid Waste Division	6,143,955	2,509,510	6,275,223	6,441,625	34,153,561	36,260,929	19,583,648		821,556
1033503	SOLID WASTE HARBOR ISLAND SAFETY IMPROVEMENTS	Current Forecast	2,503,495								
1033503	SOLID WASTE HARBOR ISLAND SAFETY IMPROVEMENTS	2017 Adopted/2016 Cashflow Solid Waste Division	2,300,343								
1033506	SOLID WASTE BOW LAKE RECYCLING & TRANSFER STATION	Current Forecast	88,253,335								
1033506	SOLID WASTE BOW LAKE RECYCLING & TRANSFER STATION	2017 Adopted/2016 Cashflow Solid Waste Division	88,033,130								
1048385	SOLID WASTE FACTORIA RECYCLING & TRANSFER STATION	Current Forecast	82,208,424	12,447,478	833,591	188,657					
1048385	SOLID WASTE FACTORIA RECYCLING & TRANSFER STATION	2017 Adopted/2016 Cashflow Solid Waste Division	63,663,745	11,903,635	838,274	191,185					
1115975	SOLID WASTE CEDAR FALLS DROP BOX IMPROVEMENT	Current Forecast	9,363	267,405	588,686						
1115975	SOLID WASTE CEDAR FALLS DROP BOX IMPROVEMENT	2017 Adopted/2016 Cashflow Solid Waste Division	9,363	602,205							
1124107	SOLID WASTE ALGONA TRANSFER STATION DECONSTRUCTION	Current Forecast					22,620	297,064	1,818,127	34,436	
1124107	SOLID WASTE ALGONA TRANSFER STATION DECONSTRUCTION	2017 Adopted/2016 Cashflow Solid Waste Division					22,620	297,064	1,818,126		34,436
1129850	SOLID WASTE HARBOR ISLAND DOCK DEMO	Current Forecast		187,877	1,831,154	1,381,494					
1129850	SOLID WASTE HARBOR ISLAND DOCK DEMO	2017 Adopted/2016 Cashflow Solid Waste Division		142,014	1,727,194	1,422,938					
1033507	SOLID WASTE CONSTRUCTION CIP OVERSIGHT	Current Forecast	104,245	3,060	3,153						
1033507	SOLID WASTE CONSTRUCTION CIP OVERSIGHT	2017 Adopted/2016 Cashflow Solid Waste Division	101,959	3,152	3,247						
1033548	SOLID WASTE LAND FILL RESERVE CIP OVERSIGHT	Current Forecast	45,846	22,738	23,421						

APPENDIX B
6 YEAR CAPITAL IMPROVEMENT PROJECT

Proj. No.	Project Title	Escalated	Actuals Thru Dec 2016	2017	2018	2019	2020	2021	2022	2023	2024 Beyond
1033548	SOLID WASTE LAND FILL RESERVE CIP OVERSIGHT	2017 Adopted/2016 Cashflow Solid Waste Division	27,987	23,420	24,124						
1124571	SOLID WASTE PARADIGM UPGRADE -FUND 3901	Current Forecast	288,970	169,410							
1124571	SOLID WASTE PARADIGM UPGRADE -FUND 3901	2017 Adopted/2016 Cashflow Solid Waste Division	126,604								
1033485	SOLID WASTE CERP CAPITAL REPAIRS	Current Forecast	12,263,886	1,700,001	1,699,999	1,699,999	1,700,001	1,699,999	1,700,001		
1033485	SOLID WASTE CERP CAPITAL REPAIRS	2017 Adopted/2016 Cashflow Solid Waste Division	11,527,454	1,700,001	1,699,999	1,699,999	1,700,001	1,699,999	1,700,001		
1033487	SOLID WASTE CERP EQUIPMENT REPLACEMENT PURCHASE	Current Forecast	86,223,926	8,692,499	8,692,500	7,644,500	7,644,500	4,751,424	4,751,426		
1033487	SOLID WASTE CERP EQUIPMENT REPLACEMENT PURCHASE	2017 Adopted/2016 Cashflow Solid Waste Division	82,312,676	8,692,500	8,692,500	7,644,500	7,644,500	4,751,424	4,751,426		
		Current Forecast	333,707,406	65,321,242	54,907,601	24,115,976	65,397,572	55,365,447	41,004,622	15,920,074	23,663,543
		2017 Adopted/2016 Cashflow Solid Waste Division	324,243,551	63,479,119	49,322,459	24,006,794	74,188,906	64,181,109	37,103,795	0	22,544,364

Appendix C

AMENDED AND RESTATED SOLID WASTE INTERLOCAL AGREEMENT

This Amended and Restated Solid Waste Interlocal Agreement ("Agreement") is entered into between King County, a political subdivision of the State of Washington and the City of ___ _____, a municipal corporation of the State of Washington, hereinafter referred to as "County" and "City" respectively. Collectively, the County and the City are referred to as the "Parties." This Agreement has been authorized by the legislative body of each jurisdiction pursuant to formal action as designated below:

King County: Ordinance No._____

City: _____

PREAMBLE

A. This Agreement is entered into pursuant to chapter 39.34 RCW for the purpose of extending, restating and amending the Solid Waste Interlocal Agreement between the Parties originally entered into in ____ (the "Original Agreement"). The Original Agreement provided for the cooperative management of Solid Waste in King County for a term of forty (40) years, through June 30, 2028. The Original Agreement is superseded by this Amended and Restated Agreement, as of the effective date of this Agreement. This Amended and Restated Agreement is effective for an additional twelve (12) years through December 31, 2040.

B. The Parties intend to continue to cooperatively manage Solid Waste and to work collaboratively to maintain and periodically update the existing King County Comprehensive Solid Waste Management Plan (Comprehensive Plan) adopted pursuant to chapter 70.95 RCW.

C. The Parties continue to support the established goals of Waste Prevention and Recycling as incorporated in the Comprehensive Solid Waste Management Plan, and to meet or surpass applicable environmental standards with regard to the Solid Waste System.

D. The County and the Cities agree that System-related costs, including environmental liabilities, should be funded by System revenues which include but are not limited to insurance proceeds, grants and rates;

E. The County, as the service provider, is in the best position to steward funds System revenues that the County and the Cities intend to be available to pay for environmental liabilities; and

F. The County and the Cities recognize that at the time this Agreement goes into effect, it is impossible to know what the ultimate environmental liabilities could be; nevertheless, the County and the Cities wish to designate in this Agreement a protocol for the designation and distribution of funding for potential future environmental liabilities in order to protect the general funds of the County and the Cities.

G. The County began renting the Cedar Hills Landfill from the State of Washington in 1960 and began using it for Disposal of Solid Waste in 1964. The County acquired ownership of the Cedar Hills Landfill from the State in 1992. The Cedar Hills Landfill remains an asset owned by the County.

H. The Parties expect that the Cedar Hills Landfill will be at capacity and closed at some date during the term of this Agreement, after which time all Solid Waste under this Agreement will need to be disposed of through alternate means, as determined by the Cities and the County through amendments to the Comprehensive Solid Waste Management Plan. The County currently estimates the useful life of the Cedar Hills Landfill will extend through 2025. It is possible that this useful life could be extended, or shortened, by System management decisions or factors beyond the control of the Parties.

I. The County intends to charge rent for the use of the Cedar Hills Landfill for so long as the System uses this general fund asset and the Parties seek to clarify terms relative to the calculation of the associated rent.

J. The County and Cities participating in the System have worked collaboratively for several years to develop a plan for the replacement or upgrading of a series of transfer stations. The Parties acknowledge that these transfer station improvements, as they may be modified from time-to-time, will benefit Cities that are part of the System and the County. The Parties have determined that the extension of the term of the Original Agreement by twelve (12) years as accomplished by this Agreement is appropriate in order to facilitate the long-term financing of transfer station improvements and to mitigate rate impacts of such financing.

K. The Parties have further determined that in order to equitably allocate the benefit to all System Users from the transfer station improvements, different customer classes may be established by the County to ensure System Users do not pay a disproportionate share of the cost of these improvements as a result of a decision by a city not to extend the term of the Original Agreement.

L. The Parties have further determined it is appropriate to strengthen and formalize the advisory role of the Cities regarding System operations.

The Parties agree as follows:

I. DEFINITIONS

For purposes of this Agreement the following definitions shall apply:

"Cedar Hills Landfill" means the landfill owned and operated by the County located in southeast King County.

"Cities" refers to all Cities that have signed an Amended and Restated Solid Waste Interlocal Agreement in substantially identical form to this Agreement.

"Comprehensive Solid Waste Management Plan" or "Comprehensive Plan" means the Comprehensive Solid Waste Management Plan, as approved and amended from time to time, for the System, as required by chapter 70.95.080 RCW.

"County" means King County, a Charter County and political subdivision of the State of Washington.

"Disposal" means the final treatment, utilization, processing, deposition, or incineration of Solid Waste but shall not include Waste Prevention or Recycling as defined herein.

“Disposal Rates” means the fee charged by the County to System Users to cover all costs of the System consistent with this Agreement, all state, federal and local laws governing solid waste and the Solid Waste Comprehensive Plan.

"Divert" means to direct or permit the directing of Solid Waste to Disposal sites other than the Disposal site(s) designated by King County.

"Energy/Resource Recovery" means the recovery of energy in a usable form from mass burning or refuse-derived fuel incineration, pyrolysis or any other means of using the heat of combustion of Solid Waste that involves high temperature (above 1,200 degrees F) processing. (chapter 173.350.100 WAC).

"Landfill" means a Disposal facility or part of a facility at which Solid Waste is placed in or on land and which is not a land treatment facility.

“Metropolitan Solid Waste Advisory Committee” or “MSWAC” means the advisory committee composed of city representatives, established pursuant to Section IX of this Agreement.

"Moderate Risk Waste" means waste that is limited to conditionally exempt small quantity generator waste and household hazardous waste as those terms are defined in chapter 173-350 WAC, as amended.

"Original Agreement" means the Solid Waste Interlocal Agreement first entered into by and between the Parties, which is amended and restated by this Agreement. "Original Agreements" means collectively all such agreements between Cities and the County in substantially the same form as the Original Agreement.

"Parties" means collectively the County and the City or Cities.

"Recycling" as defined in chapter 70.95.030 RCW, as amended, means transforming or remanufacturing waste materials into usable or marketable materials for use other than landfill Disposal or incineration.

"Regional Policy Committee" means the Regional Policy Committee created pursuant to approval of the County voters in 1993, the composition and responsibilities of which are prescribed in King County Charter Section 270 and chapter 1.24 King County Code, as they now exist or hereafter may be amended.

"Solid Waste" means all putrescible and nonputrescible solid and semisolid wastes including but not limited to garbage, rubbish, ashes, industrial wastes, swill, commercial waste, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged materials, discarded commodities and recyclable materials, but shall not include dangerous, hazardous, or extremely hazardous waste as those terms are defined in chapter 173-303 WAC, as amended; and shall further not include those

wastes excluded from the regulations established in chapter 173-350 WAC, more specifically identified in Section 173-350-020 WAC.

"Solid Waste Advisory Committee" or "SWAC" means the inter-disciplinary advisory forum or its successor created by the King County Code pursuant to chapter 70.95.165 RCW.

“System” includes King County’s Solid Waste facilities used to manage Solid Wastes which includes but is not limited to transfer stations, drop boxes, landfills, recycling systems and facilities, energy and resource recovery facilities and processing facilities as authorized by chapter 36.58.040 RCW and as established pursuant to the approved King County Comprehensive Solid Waste Management Plan.

“System User” or “System Users” means Cities and any person utilizing the County’s System for Solid Waste handling, Recycling or Disposal.

"Waste Prevention" means reducing the amount or type of waste generated. Waste Prevention shall not include reduction of already-generated waste through energy recovery, incineration, or otherwise.

II. PURPOSE

The purpose of this Agreement is to foster transparency and cooperation between the Parties and to establish the respective responsibilities of the Parties in a Solid Waste management System, including but not limited to, planning, Waste Prevention, Recycling, and Disposal. .

III. DURATION

This Agreement shall become effective as of _____, and shall remain in effect through December 31, 2040.

IV. APPROVAL

This Agreement will be approved and filed in accordance with chapter 39.34 RCW.

V. RENEGOTIATION TO FURTHER EXTEND TERM OF AGREEMENT

5.1 The Parties recognize that System Users benefit from long-term Disposal arrangements, both in terms of predictability of System costs and operations, and the likelihood that more cost competitive rates can be achieved with longer-term Disposal contracts as compared to shorter-term contracts. To that end, at least seven (7) years before the date that the County projects that the Cedar Hills Landfill will close, or prior to the end of this Agreement, whichever is sooner, the County will engage with MSWAC and the Solid Waste Advisory Committee, among others, to seek their advice and input on the Disposal alternatives to be used after closure of the Cedar Hills Landfill, associated changes to the System, estimated costs associated with the recommended Disposal alternatives, and amendments to the Comprehensive Solid Waste Management Plan necessary to support these changes. Concurrently, the Parties will meet to negotiate an extension of the term of the Agreement for the purpose of facilitating the long-term Disposal of Solid Waste after closure of the Cedar Hills Landfill. Nothing in this Agreement shall require the Parties to reach agreement on an extension of the term of this Agreement. If the Parties fail to reach agreement on an extension, the Dispute Resolution provisions of Section XIII do not apply, and this Agreement shall remain unchanged.

5.2 Notwithstanding any other provision in this Agreement to the contrary, the Parties may, pursuant to mutual written agreement, modify or amend any provision of this Agreement at any time during the term of said Agreement.

VI. GENERAL OBLIGATIONS OF PARTIES

6.1 King County

6.1.a Management. The County agrees to provide Solid Waste management services, as specified in this Section, for Solid Waste generated and collected within the City, except waste eliminated through Waste Prevention or waste recycling activities. The County agrees to dispose of or designate Disposal sites for all Solid Waste and Moderate Risk Waste generated and/or collected within the corporate limits of the City which is delivered to the System in accordance with all applicable Federal, State and local environmental health laws, rules, or regulations, as those laws are described in Subsection 8.5.a. The County shall maintain records as necessary to fulfill obligations under this Agreement.

6.1.b Planning. The County shall serve as the planning authority for Solid Waste and Moderate Risk Waste under this Agreement but shall not be responsible for planning for any other waste or have any other planning responsibility under this Agreement**.**

6.1.c Operation. King County shall be or shall designate or authorize the operating authority for transfer, processing and Disposal facilities, including public landfills and other facilities, consistent with the adopted Comprehensive Plan as well as closure and post-closure responsibilities for landfills which are or were operated by the County.

6.1.d Collection Service. The County shall not provide Solid Waste collection services within the corporate limits of the City, unless permitted by law and agreed to by both Parties.

6.1.e Support and Assistance. The County shall provide support and technical assistance to the City consistent with the Comprehensive Solid Waste Management Plan for a Waste Prevention and Recycling program. Such support may include the award of grants to support programs with System benefits. The County shall develop educational materials related to Waste Prevention and Recycling and strategies for maximizing the usefulness of the educational materials and will make these available to the City for its use. Although the County will not be required to provide a particular level of support or fund any City activities related to Waste Prevention and Recycling, the County intends to move forward aggressively to promote Waste Prevention and Recycling.

6.1.f Forecast. The County shall develop Solid Waste stream forecasts in connection with System operations as part of the comprehensive planning process in accordance with Article XI.

6.1.g Facilities and Services. The County shall provide facilities and services pursuant to the Comprehensive Solid Waste Management Plan and the Solid Waste Transfer and Waste Management plan as adopted and County Solid Waste stream forecasts.

6.1.h Financial Policies. The County will maintain financial policies to guide the System's operations and investments. The policies shall be consistent with this Agreement and shall address debt issuance, rate stabilization, cost containment, reserves, asset ownership and use, and other financial issues. The County shall primarily use long term bonds to finance transfer System improvements. The policies shall be developed and/or revised through

discussion with MSWAC, the Regional Policy Committee, the County Executive and the County Council. Such policies shall be codified at the same time as the Comprehensive Plan updates, but may be adopted from time to time as appropriate outside the Comprehensive Plan process.

6.2 City

6.2.a Collection. The City, an entity designated by the City or such other entity as is authorized by state law shall serve as operating authority for Solid Waste collection services provided within the City's corporate limits.

6.2.b Disposal. The City shall cause to be delivered to the County's System for Disposal all such Solid Waste and Moderate Risk Waste which is authorized to be delivered to the System in accordance with all applicable Federal, State and local environmental health laws, rules or regulations and is generated and/or collected within the corporate limits of the City and shall authorize the County to designate Disposal sites for the Disposal of all such Solid Waste and Moderate Risk Waste generated or collected within the corporate limits of the City, except for Solid Waste which is eliminated through Waste Prevention or waste Recycling activities consistent with the Comprehensive Solid Waste Management Plan. No Solid Waste generated or collected within the City may be Diverted from the designated Disposal sites without County approval.

6.3 JOINT RESPONSIBILITIES.

6.3.a Consistent with the Parties' overall commitment to ongoing communication and coordination, the Parties will endeavor to notify and coordinate with each other on the development of any City or County plan, facility, contract, dispute, or other Solid Waste issue that could have potential significant impacts on the County, the System, or the City or Cities.

6.3.b The Parties, together with other Cities, will coordinate on the development of emergency plans related to Solid Waste, including but not limited to debris management.

VII. COUNTY SHALL SET DISPOSAL RATES AND OPERATING RULES FOR DISPOSAL; USE OF SYSTEM REVENUES

7.1 In establishing Disposal Rates for System Users, the County shall consult with MSWAC consistent with Section IX. The County may adopt and amend by ordinance rates necessary to recover all costs of the System including but not limited to operations and maintenance, costs for handling, processing and Disposal of Solid Waste, siting, design and construction of facility upgrades or new facilities, Recycling, education and mitigation, planning, Waste Prevention, reserve funds, financing, defense and payment of claims, insurance, System liabilities including environmental releases, monitoring and closure of landfills which are or were operated by the County, property acquisition, grants to cities, and administrative functions necessary to support the System and Solid Waste handling services during emergencies as established by local, state and federal agencies or for any other lawful solid waste purpose, and in accordance with chapter 43.09.210 RCW. Revenues from Disposal rates shall be used only for such purposes. The County shall establish classes of customers for Solid Waste management services and by ordinance shall establish rates for classes of customers.

7.2. It is understood and agreed that System costs include payments to the County general fund for Disposal of Solid Waste at the Cedar Hills Landfill calculated in accordance with this Section 7.2, and that such rental payments shall be established based on use valuations provided to the County by an independent-third party Member, Appraisal Institute (MAI) certified appraiser selected by the County in consultation with MSWAC.

7.2.a A use valuation shall be prepared consistent with MAI accepted principles for the purpose of quantifying the value to the System of the use of Cedar Hills Landfill for Disposal of Solid Waste over a specified period of time (the valuation period). The County shall establish a schedule of annual use charges for the System's use of the Cedar Hills Landfill which shall not exceed the most recent use valuation. Prior to establishing the schedule of annual use charges, the County shall seek review and comment as to both the use valuation and the proposed payment schedule from MSWAC. Upon request, the County will share with and explain to MSWAC the information the appraiser requests for purposes of developing the appraiser's recommendation.

7.2.b Use valuations and the underlying schedule of use charges shall be updated if there are significant changes in Cedar Hills Landfill capacity as a result of opening new Disposal areas and as determined by revisions to the existing Cedar Hills Regional Landfill Site Development Plan; in that event, an updated appraisal will be performed in compliance with MAI accepted principles. Otherwise, a reappraisal will not occur. Assuming a revision in the schedule of use charges occurs based on a revised appraisal, the resulting use charges shall be applied beginning in the subsequent rate period.

7.2.c The County general fund shall not charge use fees or receive other consideration from the System for the System's use of any transfer station property in use as of the effective date of this Agreement. The County further agrees that the County general fund may not receive payments from the System for use of assets to the extent those assets are acquired with System revenues. As required by chapter 43.09.210 RCW, the System's use of assets acquired with the use of other separate County funds (e.g., the Roads Fund, or other funds)

will be subject to use charges; similarly, the System will charge other County funds for use of System property.

VIII. LIABILITY

8.1 Non-Environmental Liability Arising Out-of-County Operations. Except as provided in this Section, Sections 8.5 and 8.6, the County shall indemnify and hold harmless the City and shall have the right and duty to defend the City through the County's attorneys against any and all claims arising out of the County's operations during the term of this Agreement and settle such claims, provided that all fees, costs, and expenses incurred by the County thereby are System costs which may be satisfied from Disposal Rates as provided in Section VII herein. In providing such defense of the City, the County shall exercise good faith in such defense or settlement so as to protect the City's interest. For purposes of this Section "claims arising out of the County's operations" shall mean claims arising out of the ownership, control, or maintenance of the System, but shall not include claims arising out of the City's operation of motor vehicles in connection with the System or other activities under the control of the City which may be incidental to the County's operation. The provisions of this Section shall not apply to claims arising out of the sole negligence or intentional acts of the City. The provisions of this Section shall survive for claims brought within three (3) years past the term of this Agreement established under Section III.

8.2 Cooperation. In the event the County acts to defend the City against a claim under Section 8.1, the City shall cooperate with the County.

8.3 Officers, Agents, and Employees. For purposes of this Section VIII, references to City or County shall be deemed to include the officers, employees and agents of either Party,

acting within the scope of their authority. Transporters or generators of waste who are not officers or employees of the City or County are not included as agents of the City or County for purposes of this Section.

8.4 Each Party by mutual negotiation hereby waives, with respect to the other Party only, any immunity that would otherwise be available against such claims under the Industrial Insurance provisions of Title 51 RCW.

8.5 Unacceptable Waste

8.5.a All waste generated or collected from within the corporate limits of the City which is delivered to the System for Disposal shall be in compliance with the Resource Conservation and Recovery Act (42 U.S.C. § 6901 et seq.) (RCRA), chapters 70.95 and 70.105 RCW, King County Code Title 10, King County Board of Health Rules and Regulations, the Solid Waste Division operating rules, and all other Federal, State and local environmental health laws, rules or regulations that impose restrictions or requirements on the type of waste that may be delivered to the System, as they now exist or are hereafter adopted or amended.

8.5.b For purposes of this Agreement, the City shall be deemed to have complied with the requirements of Subsection 8.5.a if it has adopted an ordinance requiring waste delivered to the System for Disposal to meet the laws, rules, or regulations specified in Subsection 8.5.a. However, nothing in this Agreement is intended to relieve the City from any obligation or liability it may have under the laws mentioned in Subsection 8.5.a arising out of the City's actions other than adopting, enforcing, or requiring compliance with said ordinance, such as liability, if any exists, of the City as a transporter or generator for improper transport or Disposal of regulated dangerous waste. Any environmental liability the City may have for

releases of pollutants or hazardous or dangerous substances or wastes to the environment is dealt with under Sections 8.6 and 8.7.

8.5.c The City shall hold harmless, indemnify and defend the County for any property damages or personal injury caused solely by the City's failure to adopt an ordinance under Subsection 8.5.b. In the event the City acts to defend the County under this Subsection, the County shall cooperate with the City.

8.5.d The City shall make best efforts to include language in its contracts, franchise agreements, or licenses for the collection of Solid Waste within the City that allow for enforcement by the City against the collection contractor, franchisee or licensee for violations of the laws, rules, or regulations in Subsection 8.5.a. The requirements of this Subsection 8.5.d shall apply to the City's first collection contract, franchise, or license that becomes effective or is amended after the effective date of this Agreement.

8.5.d.i If waste is delivered to the System in violation of the laws, rules, or regulations in Subsection 8.5.a, before requiring the City to take any action under Subsection 8.5.d.ii, the County will make reasonable efforts to determine the parties' responsible for the violation and will work with those parties to correct the violation, consistent with applicable waste clearance and acceptance rules, permit obligations, and any other legal requirements.

8.5.d.ii If the violation is not corrected under Subsection 8.5.d.i and waste is determined by the County to have been generated or collected from within the corporate limits of the City, the County shall provide the City with written notice of the violation. Upon such notice, the City shall take immediate steps to remedy the violation and prevent similar future violations to the reasonable satisfaction of the County which may include but not be

limited to removing the waste and disposing of it in an approved facility; provided that nothing in this Subsection 8.5.d.ii shall obligate the City to handle regulated dangerous waste, as defined in WAC 173-351-200(1)(b)(i), and nothing in this Subsection shall relieve the City of any obligation it may have apart from this Agreement to handle regulated dangerous waste. If, in good faith, the City disagrees with the County regarding the violation, such dispute shall be resolved between the Parties using the Dispute Resolution process in Section XII or, if immediate action is required to avoid an imminent threat to public health, safety or the environment, in King County Superior Court. Each Party shall be responsible for its own attorneys' fees and costs. Failure of the City to take the steps requested by the County pending Superior Court resolution shall not be deemed a violation of this Agreement; provided, however, that this shall not release the City for damages or loss to the County arising out of the failure to take such steps if the Court finds a City violation of the requirements to comply with applicable laws set forth in Subsection 8.5.a.

8.6 Environmental Liability.

8.6.a Neither the County nor the City holds harmless or indemnifies the other with regard to any liability arising under 42 U.S.C. § 9601-9675 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) or as hereafter amended or pursuant to chapter 70.105D RCW (MTCA) or as hereafter amended and any state legislation imposing liability for System-related cleanup of contaminated property from the release of pollutants or hazardous or dangerous substances and/or damages resulting from property contaminated from the release of pollutants or hazardous or dangerous substances ("Environmental Liabilities").

8.6.b Nothing in this Agreement is intended to create new Environmental Liability nor release any third-party from Environmental Liability. Rather, the intent is to protect the general funds of the Parties to this Agreement by ensuring that, consistent with best business practices, an adequate portion of Disposal Rates being collected from the System Users are set aside and accessible in a fair and equitable manner to pay the respective County and City's Environmental Liabilities.

8.6.c The purpose of this Subsection is to establish a protocol for the setting aside, and subsequent distribution of, Disposal Rates intended to pay for Environmental Liabilities of the Parties, if and when such liabilities should arise, in order to safeguard the Parties' general funds. To do so, the County shall:

8.6.c.i Use Disposal Rates to obtain and maintain, to the extent commercially available under reasonable terms, insurance coverage for System-related Environmental Liability that names the City as an Additional Insured. The County shall establish the adequacy, amount and availability of such insurance in consultation with MSWAC. Any insurance policy in effect on the termination date of this Agreement with a term that extends past the termination date shall be maintained until the end of the policy term.

8.6.c.ii Use Disposal Rates to establish and maintain a reserve fund to help pay the Parties' Environmental Liabilities not already covered by System rates or insurance maintained under Subsection 8.6.c.i above ("Environmental Reserve Fund"). The County shall establish the adequacy of the Environmental Reserve Fund in consultation with MSWAC and consistent with the financial policies described in Article VI. The County shall retain the Environmental Reserve Fund for a minimum of 30 years following the closure of the Cedar Hills Landfill (the "Retention Period"). During the Retention Period, the Environmental Reserve Fund

shall be used solely for the purposes for which it was established under this Agreement. Unless otherwise required by law, at the end of the Retention Period, the County and Cities shall agree as to the disbursement of any amounts remaining in the Environmental Reserve Fund. If unable to agree, the County and City agree to submit disbursement to mediation and if unsuccessful to binding arbitration in a manner similar to Section 39.34.180 RCW to the extent permitted by law.

8.6.c.iii Pursue state or federal grant funds, such as grants from the Local Model Toxics Control Account under chapter 70.105D.070(3) RCW and chapter 173-322 WAC, or other state or federal funds as may be available and appropriate to pay for or remediate such Environmental Liabilities.

8.6.d If the funds available under Subsections 8.6.c.i-iii are not adequate to completely satisfy the Environmental Liabilities of the Parties to this Agreement then to the extent feasible and permitted by law, the County will establish a financial plan including a rate schedule to help pay for the County and City's remaining Environmental Liabilities in consultation with MSWAC.

8.6.e The County and the City shall act reasonably and quickly to utilize funds collected or set aside through the means specified in Subsections 8.6.c.i-iii and 8.6.d to conduct or finance response or clean-up activities in order to limit the County and City's exposure, or in order to comply with a consent decree, administrative or other legal order. The County shall notify the City within 30 days of any use of the reserve fund established in 8.6.c.iii.

8.6.f In any federal or state regulatory proceeding, and in any action for contribution, money expended by the County from the funds established in Subsections 8.6.c.i-iii and 8.6.d. to pay the costs of remedial investigation, cleanup, response or other action required

pursuant to a state or federal laws or regulations shall be considered by the Parties to have been expended on behalf and for the benefit of the County and the Cities.

8.6.g In the event that the funds established as specified in Subsections 8.6.c.i-iii and 8.6.d are insufficient to cover the entirety of the County and Cities' collective Environmental Liabilities, the funds described therein shall be equitably allocated between the County and Cities to satisfy their Environmental Liabilities. Factors to be considered in determining "equitably allocated" may include the size of each Party's System User base and the amount of rates paid by that System User base into the funds, and the amount of the Solid Waste generated by the Parties' respective System Users. Neither the County nor the Cities shall receive a benefit exceeding their Environmental Liabilities.

8.7 The County shall not charge or seek to recover from the City any costs or expenses for which the County indemnified the State of Washington in Exhibit A to the Quitclaim Deed from the State to the County for the Cedar Hills Landfill, dated February 24, 1993, to the extent such costs are not included in System costs.

IX. CITY ADVISORY COMMITTEE

9.1 There is hereby created an advisory committee comprised of representatives from cities, which shall be known as the Metropolitan Solid Waste Advisory Committee ("MSWAC"). The City may designate a representative and alternate(s) to serve on MSWAC. MSWAC shall elect a chair and vice-chair and shall adopt bylaws to guide its deliberations. The members of MSWAC shall serve at the pleasure of their appointing bodies and shall receive no compensation from the County.

9.2 MSWAC is the forum through which the Parties together with other cities participating in the System intend to discuss and seek to resolve System issues and concerns. MSWAC shall assume the following advisory responsibilities:

9.2.a Advise the King County Council, the King County Executive, Solid Waste Advisory Committee, and other jurisdictions as appropriate, on all policy aspects of Solid Waste management and planning;

9.2.b Consult with and advise the County on technical issues related to Solid Waste management and planning;

9.2.c Assist in the development of alternatives and recommendations for the Comprehensive Solid Waste Management Plan and other plans governing the future of the System, and facilitate a review and/or approval of the Comprehensive Solid Waste Management Plan by each jurisdiction;

9.2.d Assist in the development of proposed interlocal Agreements between King County and cities for planning, Waste Prevention and Recycling, and waste stream control;

9.2.e Review and comment on Disposal Rate proposals and County financial policies;

9.2.f Review and comment on status reports on Waste Prevention, Recycling, energy/resources recovery, and System operations with inter-jurisdictional impact;

9.2.g Promote information exchange and interaction between waste generators, cities, recyclers, and the County with respect to its planned and operated Disposal Systems;

9.2.h Provide coordination opportunities among the Solid Waste Advisory Committee, the Regional Policy Committee, the County, cities, private waste haulers, and recyclers;

9.2.i Assist cities in recognizing municipal Solid Waste responsibilities, including collection and Recycling, and effectively carrying out those responsibilities; and

9.2.j Provide input on such disputes as MSWAC deems appropriate.

9.3 The County shall assume the following responsibilities with respect to MSWAC;

9.3.a The County shall provide staff support to MSWAC;

9.3.b In consultation with the chair of MSWAC, the County shall notify all cities and their designated MSWAC representatives and alternates of the MSWAC meeting times, locations and meeting agendas. Notification by electronic mail or regular mail shall meet the requirements of this Subsection;

9.3.c The County will consider and respond on a timely basis to questions and issues posed by MSWAC regarding the System, and will seek to resolve those issues in collaboration with the Cities. Such issues shall include but are not limited to development of efficient and accountable billing practices; and

9.3.d. The County shall provide all information and supporting documentation and analyses as reasonably requested by MSWAC for MSWAC to perform the duties and functions described in Section 9.2.

X. FORUM INTERLOCAL AGREEMENT

10.1 As of the effective date of this Agreement, the *Forum Interlocal Agreement* and *Addendum to* Solid Waste Interlocal Agreement *and Forum Interlocal Agreement* by and between the City and County continue through June 30, 2028. After 2028 responsibilities assigned to the Forum shall be assigned to the Regional Policy Committee. The Parties agree that Solid Waste System policies and plans shall continue to be deemed regional countywide policies

and plans that shall be referred to the Regional Policy Committee for review consistent with King County Charter Section 270.30 and chapter 1.24 King County Code.

XI. COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN

11.1 King County is designated to prepare the Comprehensive Solid Waste Management Plan (Comprehensive Plan) and this plan shall include the City's Solid Waste Management Comprehensive Plan pursuant to chapter 70.95.080(3) RCW.

11.2 The Comprehensive Plan shall be reviewed and any necessary revisions proposed. The County shall consult with MSWAC to determine when revisions are necessary. King County shall provide services and build facilities in accordance with the adopted Comprehensive Plan.

11.3 The Comprehensive Plans will promote Waste Prevention and Recycling in accordance with Washington State Solid Waste management priorities pursuant to chapter 70.95 RCW, at a minimum.

11.4 The Comprehensive Plans will be prepared in accordance with chapter 70.95 RCW and Solid Waste planning guidelines developed by the Department of Ecology. The plan shall include, but not be limited to:

11.4.a Descriptions of and policies regarding management practices and facilities required for handling all waste types;

11.4.b Schedules and responsibilities for implementing policies;

11.4.c Policies concerning waste reduction, Recycling, Energy and Resource Recovery, collection, transfer, long-haul transport, Disposal, enforcement and administration; and

11.4.d Operational plan for the elements discussed in Item c above.

11.5 The cost of preparation by King County of the Comprehensive Plan will be considered a cost of the System and financed out of the rate base.

11.6 The Comprehensive Plans will be "adopted" within the meaning of this Agreement when the following has occurred:

11.6.a The Comprehensive Plan is approved by the King County Council; and

11.6.b The Comprehensive Plan is approved by cities representing three-quarters of the population of the incorporated population of jurisdictions that are parties to the Forum Interlocal Agreement. In calculating the three-quarters, the calculations shall consider only those incorporated jurisdictions taking formal action to approve or disapprove the Comprehensive Plan within 120 days of receipt of the Plan. The 120-day time period shall begin to run from receipt by an incorporated jurisdiction of the Forum's recommendation on the Comprehensive Plan, or, if the Forum is unable to make a recommendation, upon receipt of the Comprehensive Plan from the Forum without recommendation.

11.7 Should the Comprehensive Plan be approved by the King County Council, but not receive approval of three-quarters of the cities acting on the Comprehensive Plan, and should King County and the cities be unable to resolve their disagreement, then the Comprehensive Plan shall be referred to the State Department of Ecology and the State Department of Ecology will resolve any disputes regarding Comprehensive Plan adoption and adequacy by approving or disapproving the Comprehensive Plan or any part thereof.

11.8 King County shall determine which cities are affected by any proposed amendment to the Comprehensive Plan. If any City disagrees with such determination, then the City can request that the Forum determine whether or not the City is affected. Such

determination shall be made by a two-thirds majority vote of all representative members of the Forum.

11.9 Should King County and the affected jurisdictions be unable to agree on amendments to the Comprehensive Plan, then the proposed amendments shall be referred to the Department of Ecology to resolve any disputes regarding such amendments.

11.10 Should there be any impasse between the Parties regarding Comprehensive Plan adoption, adequacy, or consistency or inconsistency or whether any permits or programs adopted or proposed are consistent with the Comprehensive Plan, then the Department of Ecology shall resolve said disputes.

XII. MITIGATION

12.1 The County will design, construct and operate Solid Waste facilities in a manner to mitigate their impact on host Cities and neighboring communities pursuant to applicable law and regulations.

12.2 The Parties recognize that Solid Waste facilities are regional facilities. The County further recognizes that host Cities and neighboring communities may sustain impacts which can include but are not limited to local infrastructure, odor, traffic into and out of Solid Waste facilities, noise and litter.

12.3 Collaboration in Environmental Review. In the event the County is the sole or co-Lead Agency, then prior to making a threshold determination under the State Environmental Policy Act (SEPA), the County will provide a copy of the SEPA environmental checklist, if any, and proposed SEPA threshold determination to any identifiable Host City (as defined below) and adjacent or neighboring city that is signatory to the Agreement and that may be affected by the

project ("Neighboring City") and seek their input. For any facility for which the County prepares an Environmental Impact Statement (EIS), the County will meet with any identified potential Host City (as defined below) and any Neighboring City to seek input on the scope of the EIS and appropriate methodologies and assumptions in preparing the analyses supporting the EIS. However, nothing in this Section shall limit or impair the County's ability to timely complete the environmental review process.

12.4 Collaboration in Project Permitting. If a new or reconstructed Solid Waste facility is proposed to be built within the boundaries of the City ("Host City") and the project requires one or more "project permits" as defined in chapter 36.70B.020(4) RCW from the Host City, before submitting its first application for any of the project permits, the County will meet with the Host City and any Neighboring City, to seek input. However, nothing in this Section shall limit or impair the County's ability to timely submit applications for or receive permits, nor waive any permit processing or appeal timelines.

12.5 Separately, the County and the City recognize that in accordance with 36.58.080 RCW, a city is authorized to charge the County to mitigate impacts directly attributable to a County-owned Solid Waste facility. The County acknowledges that such direct costs include wear and tear on infrastructure including roads. To the extent that the City establishes that such charges are reasonably necessary to mitigate such impacts, payments to cover such impacts may only be expended only to mitigate such impacts and are System costs. If the City believes that it is entitled to mitigation under this Agreement, the City may request that the County undertake a technical analysis regarding the extent of impacts authorized for mitigation. Upon receiving such a request, the County, in coordination with the City and any necessary technical consultants, will develop any analysis that is reasonable and appropriate to identify impacts. The cost for such

analysis is a System cost. The City and County will work cooperatively to determine the appropriate mitigation payments and will document any agreement in a Memorandum of Agreement. If the City and the County cannot agree on mitigation payments, the dispute resolution process under chapter 36.58.080 RCW will apply rather than the dispute resolution process under Section XII of the Agreement.

XIII. DISPUTE RESOLUTION

13.1 Unless otherwise expressly stated, the terms of this Section XIII shall apply to disputes arising under this Agreement.

13.2 Initial Meeting.

13.2.a Either Party shall give notice to the other in writing of a dispute involving this Agreement.

13.2.b Within ten (10) business days of receiving or issuing such notice, the County shall send an email notice to all Cities.

13.2.c Within ten (10) business days of receiving the County's notice under Subsection 13.2.b, a City shall notify the County in writing or email if it wishes to participate in the Dispute Resolution process.

13.2.d Within not less than twenty-one (21) days nor more than thirty (30) days of the date of the initial notice of dispute issued under Subsection 13.2.a, the County shall schedule a time for staff from the County and any City requesting to participate in the dispute resolution process ("Participating City") to meet (the "initial meeting"). The County shall endeavor to set such initial meeting a time and place convenient to all Participating Cities and to the County.

13.3 Executives' Meeting.

13.3.a If the dispute is not resolved within sixty (60) days of the initial meeting, then within seven (7) days of expiration of the sixty (60)-day period, the County shall send an email notice to all Participating Cities that the dispute was not resolved and that a meeting of the County Executive, or his/her designee and the chief executive officer(s) of each Participating City, or the designees of each Participating City (an "executives' meeting") shall be scheduled to attempt to resolve the dispute. It is provided, however, that the County and the Participating Cities may mutually agree to extend the sixty (60)-day period for an additional fifteen (15) days if they believe further progress may be made in resolving the dispute, in which case, the County's obligation to send its email notice to the Participating Cities under this Subsection that the dispute was not resolved shall be within seven (7) days of the end of the extension. Likewise, the County and the Participating Cities may mutually conclude prior to the expiration of the sixty (60)-day period that further progress is not likely in resolving the dispute at this level, in which case, the County shall send its email notice that the dispute was not resolved within seven (7) days of the date that the County and the Participating Cities mutually concluded that further progress is not likely in resolving the dispute.

13.3.b Within seven (7) days of receiving the County's notice under Subsection 13.3.a each Participating City shall notify the County in writing or email if it wishes to participate in the executives' meeting.

13.3.c Within not less than twenty-one (21) days nor more than thirty (30) days of the date of the notice of the executives' meeting issued under Subsection 13.3.a, the County shall schedule a time for the executives' meeting. The County shall endeavor to set such

executives' meeting a time and place convenient to all Participating Cities that provided notice under Subsection 13.3.b and to the County.

13.4. Non-Binding Mediation.

13.4.a If the dispute is not resolved within thirty (30) days of the executives' meeting, then any Participating City that was Party to the executives' meeting or the County may refer the matter to non-binding meditation by sending written notice within thirty-five (35) days of the initial executives' meeting to all Parties to such meeting.

13.4.b Within seven (7) days of receiving or issuing notice that a matter will be referred to non-binding mediation, the County shall send an email notice to all Participating Cities that provided notice under Subsection 13.3.b informing them of the referral.

13.4.c Within seven (7) days of receiving the County's notice under Subsection 13.4.b, each Participating City shall notify the County in writing if it wishes to participate in the non-binding mediation.

13.4.d The mediator will be selected in the following manner: The City(ies) electing to participate in the mediation shall propose a mediator and the County shall propose a mediator; in the event the mediators are not the same person, the two mediators shall select a third mediator who shall mediate the dispute. Alternately, the City(ies) participating in the mediation and the County may agree to select a mediator through a mediation service mutually acceptable to the Parties. The Parties to the mediation shall share equally in the costs charged by the mediator or mediation service. For purposes of allocating costs of the mediator or mediation service, all Cities participating in the mediation will be considered one Party.

13.5 Superior Court. Any Party, after participating in the non-binding mediation, may commence an action in King County Superior Court after one hundred eighty (180) days from

the commencement of the mediation, in order to resolve an issue that has not by then been resolved through non-binding mediation, unless all Parties to the mediation agree to an earlier date for ending the mediation.

13.6 Unless this Section XIII does not apply to a dispute, then the Parties agree that they may not seek relief under this Agreement in a court of law or equity unless and until each of the procedural steps set forth in this Section XIII have been exhausted, provided, that if any applicable statute of limitations will or may run during the time that may be required to exhaust the procedural steps in this Section XIII, a Party may file suit to preserve a cause of action while the Dispute Resolution process continues. The Parties agree that, if necessary and if allowed by the court, they will seek a stay of any such suit while the Dispute Resolution process is completed. If the dispute is resolved through the Dispute Resolution process, the Parties agree to dismiss the lawsuit, including all claims, counterclaims, and cross-claims, with prejudice and without costs to any Party.

XIV. FORCE MAJEURE

The Parties are not liable for failure to perform pursuant to the terms of this Agreement when failure to perform was due to an unforeseeable event beyond the control of either Party ("force majeure"). The term "force majeure" shall include, without limitation by the following enumeration: acts of nature, acts of civil or military authorities, terrorism, fire, accidents, shutdowns for purpose of emergency repairs, industrial, civil or public disturbances, or labor disputes, causing the inability to perform the requirements of this Agreement, if either Party is rendered unable, wholly or in part, by a force majeure event to perform or comply with any obligation or condition of this Agreement, upon giving notice and reasonably full particulars to

the other Party, such obligation or condition shall be suspended only for the time and to the extent practicable to restore normal operations.

XV. MERGER

This Agreement merges and supersedes all prior negotiations, representation and/or agreements between the Parties relating to the subject matter of this Agreement and constitutes the entire contract between the Parties [except with regard to the provisions of the Forum Interlocal Agreement]; provided that nothing in Section XV supersedes or amends any indemnification obligation that may be in effect pursuant to a contract between the Parties other than the Original Agreement; and further provided that nothing in this Agreement supersedes, amends or modifies in any way any permit or approval applicable to the System or the County's operation of the System within the jurisdiction of the City.

XVI. WAIVER

No waiver by either Party of any term or condition of this Agreement shall be deemed or construed to constitute a waiver of any other term or condition or of any subsequent breach whether of the same or a different provision of this Agreement.

XVII. THIRD PARTY BENEFICIARY

This Agreement is not entered into with the intent that it shall benefit any other entity or person except those expressly described herein, and no other such person or entity shall be entitled to be treated as a third-party beneficiary of this Agreement.

XVIII. SURVIVABILITY

Except as provided in Section 8.1, 8.2, 8.3, Section 8.6.c, except 8.6.ciii and Section 8.6d, no obligations in this Agreement survive past the expiration date as established in Section III.

XIX. NOTICE

Except as otherwise provided in this Agreement, a notice required to be provided under the terms of this Agreement shall be delivered by certified mail, return receipt requested or by personal service to the following person:

For the City:

For the County:

Director
King County Solid Waste Division
201 South Jackson Street, Suite 701
Seattle, Washington 98104

IN WITNESS WHEREOF, this Agreement has been executed by each Party on the date set forth below:

CITY of	KING COUNTY
(Mayor/City Manager)	King County Executive
Date	Date
Clerk-Attest Approved as to form and legality	Clerk-Attest Approved as to form and legality
City Attorney	King County Deputy Prosecuting Attorney
Date	Date

Appendix D

Table 1: WARM model inputs used in the Solid Waste Division's April 2017 Long Term Disposal Paper, revised Nov 2017

WARM Model Input	**Cedar Hills** - 114,000 MTCO2e	**Waste Export** - 66,000 MTCO2e	**Mass Burn**[1] + 49,000 MTCO2e	**Notes**
Materials (2015 Waste Characterization [2015 WC])	2015 WC	2015 WC	2015 WC	2015 Waste Characterization was adjusted to match the 57% rate[2] before waste was assigned to WARM categories. The WARM model assumes negative emissions (an offset) due to sequestration of organic materials. About 29%[3] of landfilled materials are organics with negative emissions.
Region (regional/state or national average)	Pacific (WA)	Pacific (WA)	Pacific (WA)	Compared to elsewhere in the U.S., the energy displaced in the Pacific NW is largely hydropower instead of fossil fuels
Source Reduction/ Recycling (displace current mix or 100% virgin)	None (current mix)	None (current mix)	Metals (current mix)	This field calculates offsets from recycling. No added recycling was assumed from landfill options. Added metal recycling (equal to 2% on regional recycling rate) was assumed for Mass Burn.
Landfill gas recovery (no, recovery, national average)	Recovery	Recovery	Recovery	For mass burn, gas recovery was assumed for landfilled bypass waste.
Gas Recovery (flare, recover for energy)	Recover for energy	Recover for energy	Recover for energy	For mass burn, gas recovery for energy was assumed for the bypass waste that is landfilled.
Collection efficiency (typical, worst, aggressive, CA)	CA	aggressive	typical	Cedar Hills most closely matches the efficiency assumptions in the California regulatory collection scenario.
Moisture (nat. average, dry, moderate, wet)	wet	arid	National average	Decay rates and fugitive emissions are higher in wet climates than in other categories.
Anaerobic digestion (AD) (wet or dry)	wet	wet	wet	A choice must be made in the model, but because AD is not part of the proposal, it doesn't affect outcome
AD digestate (cured, not cured)	cured	cured	cured	See above. Cured is the default.
Transport emissions (default <20 mi, actual >20 mi)	default	320 mi	default	A landfill choice has not been made but waste export shows the closest out of county landfill.

[1]A 2017 Normandeau Waste to Energy study also made WARM estimates. Their WARM inputs are not available but results ranged from 12,000 to 125,000 MTCO2e per year. Their range is likely explained by a different waste composition assumption, exclusion of bypass waste disposal, and much longer time periods (and thus larger plants burning more materials) than in this SWD comparison, which used 2028 as the base year.

[2] Paper 16.7%, Plastic 12.2%, Food 20.5%, Wood 16.8%, Other Organics 15.3%, Metal 4.7%, Glass 2.6%, Electronics 0.4%, Household Hazardous Waste 0.9%

[3] 2015 Waste Categorization material categories that create WARM offsets when landfilled include corrugated containers 3%, Dimensional Lumber 11%, Yard Trimmings 6%, Mixed paper 7%, and Drywall 2%.

King County
Department of
Natural Resources and Parks
Solid Waste Division