2019 Integrated Solid Waste Management Plan Update

County of Hawai'i

County of Hawai'i
Department of Environmental Management
Solid Waste Division
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2019 Integrated Solid Waste Management Plan Update

Prepared for

County of Hawai'i

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ACRONYMS AND ABBREVIATIONS

ACM	asbestos-containing materials
ADF	advance disposal fee
AES	AES Hawaii, Inc.
BPI	Biodegradable Products Institute
BYOB	Bring-Your-Own-Bag
CATI	computer-assisted telephone interviewing
CBOs	community-based organizations
C&D	construction and demolition
CEDs	covered electronic devices
CESQGs	conditionally exempt small quantity generators
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CRCs	Certified Redemption Centers
CRTs	cathode ray tubes
CTVs	covered televisions
DEA	U.S. Drug Enforcement Administration
DEM	Department of Environmental Management
DIY	Do-It-Yourself
DOTA	Department of Transportation, Airports
EA	Environmental Assessment
EHOF	East Hawai'i Organics Facility
EHRSS	East Hawai'i Regional Sort Station
EPA	U.S. Environmental Protection Agency
EPR	extended producer responsibility
FAA	Federal Aviation Administration
FOG	Fat, Oil, and Grease
FONSI	Finding of No Significant Impact
FTE	full-time equivalent
FY	fiscal year
GO	general obligation
GPS	global positioning system
GVW	gross vehicle weight

ACRONYMS AND ABBREVIATIONS (CONTINUED)

HAR	Hawai'i Administrative Rule
HCC	Hawai'i County Code
HCPD	Hawai'i County Police Department
HDOH	Hawaii State Department of Health
HEDRP	Hawai'i Electronic Device Recycling Program
HHW	household hazardous waste
H-POWER	Honolulu Program of Waste to Energy Recovery
HRS	Hawaii Revised Statutes
IRSWMP	Integrated Resources and Solid Waste Management Plan
LED	light emitting diode
LEED	Leadership in Energy and Environmental Design
LFAs	little fire ants
MBT	mechanical-biological treatment
MMSW	mixed municipal solid waste
MRF	material recovery facility
MSW	municipal solid waste
OTC	Over-the-Counter
PAD	predictive auto dialer
PAYT	pay-as-you-throw
Plan	County of Hawai'i Integrated Solid Waste Management Plan
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RDF	refuse-derived fuel
REI	Recycling Economic Information
RFP	Request for Proposal
RRCs	recycling and reuse centers
SHSL	South Hilo Sanitary Landfill
SQGs	small quantity generators
SRF	State Revolving Fund
SWAC	Solid Waste Advisory Committee
SWANA	Solid Waste Association of North America
SWD	Solid Waste Division

ACRONYMS AND ABBREVIATIONS (CONTINUED)

UH	University of Hawai‘i
UPW	United Public Workers
USC	United States Code
WHOF	West Hawai‘i Organics Facility
WHSL	West Hawai‘i Sanitary Landfill
WRT	waste reduction technology
WTE	waste to energy
WUTC	Washington Utilities and Transportation Commission

EXECUTIVE SUMMARY

ES.1 Introduction

The County of Hawai'i, in accordance with the Hawai'i Revised Statutes Chapter 342G (HRS 342G), has completed its review, revisions, and updates for the 2019 Integrated Solid Waste Management Plan (Plan). Work on this update began in the spring of 2018. The Plan development process involved monthly meetings that engaged both the Solid Waste Advisory Committee (SWAC) and the County of Hawai'i (County) Solid Waste Division (SWD) of the Department of Environmental Management (DEM). The last update of the Plan was produced in 2009.

The Plan update evaluates waste management in the County, including waste reduction practices and programs, opportunities for recycling, implementation of zero waste policies and practices, the status of active and closed landfills, and options for increasing landfill diversion. The results are organized by chapter in accordance with HRS 342G. Each chapter contains a summary of the 2009 Integrated Solid Waste Management Plan (ISWMP) recommendations and status of implementation of those recommendations, a description of the existing conditions, a description of options available to the County for improvement of the solid waste management program, and recommendations for implementation of selected options.

ES.2 The Path to Zero Waste

In December 2007, the County Council adopted Resolution 356-07 to "embrace and adopt the principles of zero waste as a long-term goal for Hawai'i County" and the County subsequently developed a Zero Waste Implementation Plan in 2008 that outlines suggested changes to solid waste management (County of Hawai'i 2009a). The zero waste philosophy promotes the efficient use of materials to eliminate waste and pollution by emphasizing a closed-loop system of production and consumption, and moving in logical increments toward the goal of zero waste.

As stated in Resolution 356-07, the County of Hawai'i recognizes "that zero waste is a long-term goal and that in the interim, programs may need to be implemented that may be counter to the zero waste philosophy and are necessary to reach the long-term goal of zero waste and that such programs should not be prohibited by the embracing and adoption of the long-term goal of zero waste." To this end, the components of the Zero Waste Implementation Plan, which can be realistically achieved during the life span of this Plan, have been incorporated into the Plan.

The County will continue to take incremental steps toward achieving zero waste in the long term with the understanding that the ability to truly achieve zero waste is realistically challenging for an island.

ES.3 Plan Update Process

Development of this Plan update was guided by an eight-member SWAC, appointed by the Mayor. SWAC members participated in 13 meetings at which they toured solid waste facilities on both sides of the island, reviewed draft Plan chapters, debated key issues, developed plan goals (provided in Section 1), and shaped recommendations. In addition, input was requested from the public in a variety of forums including monthly SWAC meetings; routine posting of all draft documents, agendas, and

meeting minutes to the County's online records archive; and two public hearings and the public comment period to the draft Plan. Appendix A includes the meeting minutes from the monthly SWAC meetings held during the Plan update process.

The key recommendations included in this Plan update have consensus support from the SWAC and are intended to balance the many interests of the various stakeholders within the County. The County has taken the top recommendations developed during this process, and will keep the stakeholders in mind as the recommendations are implemented. This Plan update includes individual chapters that cover various waste management topics as stipulated in HRS 342G. It includes responses to comments received from the State of Hawai'i Department of Health (HDOH) and the public and was submitted by the Mayor to the County Council for adoption. Final approval by HDOH is anticipated by the first quarter of 2020.

A summary of the Plan recommendations are presented below.

ES.4 Chronology of Plan Updates

The County's initial Plan, as required by state law (HRS 342G) was adopted on October 5, 1994. Updates to the original plan were completed by the County and approved by the State of Hawai'i in 2002 and 2009.

2002 Plan

A key issue addressed in the 2002 plan update was the pending closure of the South Hilo Sanitary Landfill (SHSL), which was expected to reach capacity in the summer of 2004. The 2002 update included the following key recommendations:

- Construct no new landfills in East Hawai`i.
- Emphasize the recovery of recyclable materials at the planned East Hawai'i Regional Sort Station (EHRSS), possibly by incorporating features of a material recovery facility (MRF).
- Procure a waste reduction facility for the East Hawai'i waste stream using either waste- to-energy, thermal gasification, or anaerobic digestion technology. (See Appendix E for a chronology of waste reduction study and procurement activities in Hawai'i County.)
- Establish a County recycling program with a long list of elements that have the potential to increase waste diversion significantly.

After adopting the 2002 ISWMP update, the County took steps toward implementing these recommendations, as follows:

- Expanded the number and scope of its recycling programs, which increased its recycling rate from 15 percent in FY 01-02 to 29 percent in FY 07-08.
- Initiated development of elements of the EHRSS that could potentially serve a number of strategic waste management functions.
- Issued two requests for proposals (RFPs) for construction of a waste reduction facility. The first RFP was cancelled by the County. The second procurement process resulted in a proposal for a 230-ton-per-day mass-burn waste-to-energy facility to be located at the SHSL. In 2008, the County Council rejected the recommended proposal, in part because the construction and operation costs were higher than anticipated.

Since 2006, the County has taken three other important actions related to its solid waste management system:

1. Completed a comprehensive engineering evaluation of its 21 recycling and transfer stations. This evaluation concluded that 13 have serious failures requiring reconstruction to correct and another six have serious problems that could be corrected without complete reconstruction.
2. Extended the capacity of the SHSL through sliver fill—an innovative engineering solution to gaining and utilizing additional airspace. The County also implemented a comprehensive compaction program.
3. Prepared an expansion feasibility study and capital cost estimate to assess whether undertaking a 7-acre landfill expansion immediately adjacent to the SHSL would be less expensive than long-hauling waste to the County's West Hawai'i Sanitary Landfill (WHSL) in Pu`uanahulu. The feasibility study did not support the 7-acre expansion and this option was removed from further consideration.

2009 Plan

In 2009, the key focus of the Plan update was evaluating a series of potential options for managing residuals that remain after source reduction, reuse, and recycling. After SWAC and stakeholder consideration of potential options, the 2009 Plan recommended the following residuals management strategy:

- Conduct a series of activities necessary to confirm the feasibility and cost-effectiveness of undertaking development of a new landfill within the quarry adjacent to the SHSL site.
- Reassess trucking waste to the WHSL site including further analysis of consolidating waste at the ERHSS and associated hauling operations, haul routes, traffic issues, and equipment acquisition plans.
- Avoid issuance of RFPs for waste reduction technology during the Plan's 5-year life cycle. During each subsequent solid waste management plan review period, evaluate whether new technology advances or other circumstances have occurred to warrant issuing an RFP for a conversion technology for part, or all, of the County residuals management stream.

In addition to activities associated with handling residual wastes, the 2009 Plan presented a series of recommendations regarding next steps on the path to zero waste, including expanded programs targeted toward reducing the volume of landfill-bound waste and improving existing infrastructure. The Plan also recommended reconstructing and upgrading one or more County recycling and transfer stations each year.

2019 Plan

Subsequent to the 2009 Plan, the County has made many key decisions that will drive the functioning of waste management on the island for years to come, notably the decision to truck waste (residuals) to WHSL through the EHRSS (implementation 2019). Other decisions and actions that will have a lasting impact on waste management and diversion include:

- Constructed two green waste facilities—one in Hilo on the east side of the island, and one adjacent to the WHSL on the west side of the island.
- Constructed seven new reuse centers located at the County recycling and transfer stations.
- Planned a compost facility to process more than green waste (and wood pallets). The new facility will process food waste, paper, and compostable plastics (planned operation 2020).

Since 2009, the County performed major upgrades to seven recycling and transfer stations—the upgraded facilities are expected to operate sufficiently through 2029. The County is also in the process of constructing a permanent recycling and transfer station in Ocean View. Although great progress has been made, the need to improve facilities with major engineering deficiencies still remains.

With the planned shipment of residuals to WHSL, the current deteriorating global recycling market, new facilities (reuse and compost facilities), and fiscal concerns, the County, in this Plan update, focuses on waste diversion, with an emphasis on education, outreach, and public awareness. Outside of maintaining or improving existing facilities, this Plan does not generally recommend the construction of costly new facilities or operations. Instead, the County will assess how the existing facilities and programs are functioning followed by a study to identify a solution that best suits the current and projected future conditions. This includes seeking joint solutions with state and other Hawaiian jurisdictions. For example, with the current market for plastics, the County has eliminated #5 plastics (e.g., yogurt containers, margarine tubs), plastic grocery bags, and clam-shell-type plastic (e.g., salad, bento boxes) in the mixed recyclable bins at the recycling and transfer stations. If the County were to coordinate and negotiate with the City and County of Honolulu, there may be a temporary solution that keeps these formerly recyclable materials out of the landfill until market conditions change.

ES.5 Consequences of Inaction

This Plan update outlines a series of options for the County during the next 10-year implementation period. Some of these programs may be challenging and perhaps even controversial because they require changes to ingrained behaviors and increased costs. The status quo is not sustainable for a variety of reasons—notably market conditions, aging infrastructure, fiscal responsibilities, and environmental impacts. Some consequences of inaction would include the following:

- The County's recycling and transfer stations would continue to deteriorate resulting in reduced service and potential public safety concerns.
- No further progress would be made in providing additional waste reduction, recycling, or reuse services that are desired by many County residents.
- No significant progress would be made in further reducing waste sent to the WHSL, thus resulting in a missed opportunity to reduce greenhouse gas emissions and reduce the toxicity of waste materials sent to the County's sole landfill.
- The WHSL would fill up faster.

The County's proposed strategy of incrementally pursuing waste reduction and diversion with continued local landfilling of residuals will result in decisions that best serve the needs for generations to come.

ES.6 Summary of Recommendations

The primary purpose of the Plan is to develop waste management strategies through the period of 2019 to 2029. The County developed these through careful consideration by the County's SWAC, which comprises representatives from various stakeholders. In total, 82 recommendations covering nine solid waste management programs were identified.

The SWAC categorized the 82 recommendations (and supporting implementation strategies) as high, moderate, or low to provide the County DEM feedback on the solid waste planning initiatives that are important to them as representatives of the community.

Table ES-1 summarizes the recommended strategies and ranking of importance for managing solid waste in Hawai'i County. Considerations for ranking included:

Diversion Potential—What is the measure's tonnage diversion potential from landfill?

Local Authority—How much control must the local government exert over the disposal management system (e.g., service providers, infrastructure collection/transfer/disposal, and/or waste generators) to accomplish the measure?

- Implied—indirectly through culture or practice: less likely to accomplish measure.
- Influenced—by policy, permit, license or ordinance: moderately likely to accomplish measure.
- Explicit—directly through contracts or operations: highly likely to accomplish measure.

Receptivity—What is the relative ease and level of effort to initiate and obtain local buy-in for the measure? For example, does it involve promotional activities, recognition, no requirements on waste generators, minor costs (generally easier), or does it involve setting mandatory requirements, restrictions, or higher costs (generally more difficult)?

Environmental Outcome—What is the environmental effect, for example, in consideration of the following: ecological toxicity, human heath, greenhouse gas emissions generated by raw materials extraction and product manufacturing?

Staff Knowledge—How much staff knowledge or specific expertise is needed to implement the measure? Can it be implemented by mid-level local agency staff without outside legal or contractor assistance?

Community-Led Initiatives—How easy or hard is it for individuals or groups to initiate adoption or implementation of the measure without actions required by the jurisdiction? Can a local non-profit or group of interested residents carry out the activity (e.g., develop a "how-to guide") or will it require initiation by local jurisdiction staff or elected bodies (e.g., adopt a local ordinance)?

Outcome of Recommendation Prioritization

Ultimately, the majority of the recommendations and supporting implementation strategies were ranked as moderate (45), followed by high (37), with only one recommendation identified as low. This demonstrates that representative SWAC members agree that most of these actions are attainable with the propensity to improve the County's existing solid waste management program.

To further prioritize, each SWAC member was tasked to identify their top five recommendations or themes. Recommendations that received a number one ranking were weighted (scored) higher than those that received a number five ranking. Additionally, because some of the recommendations are thematically similar, they were combined. Of the 82 recommendations, six recommendations or themes were identified by more than one SWAC member as priorities. The top six recommendations identified by the SWAC are:

- Conduct education, outreach, and public awareness (multiple recommendations).
- Regularly review and, when appropriate, renegotiate WHSL contract (Chapter 10, Recommendation 2).
- Conduct additional household hazardous waste (HHW) collection events (Chapter 6, Recommendation 5).
- Change County code to allow small businesses to drop off recyclables at recycling and transfer stations (Chapter 8, Recommendation 5).

- Establish goals that are expressed and measured in terms of environmental impacts (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, in addition to tonnage-based landfill diversion or waste recovery goals (Chapter 4, Recommendation 5).
- Develop County policy and ordinances related to source reduction and recycling (Chapter 3, Recommendation 1; Chapter 4, Recommendation 1).

Appendix B provides the average numerical scores for the low, moderate, and high rankings as shown in Exhibit ES-1. It also provides all the outcomes from the top five prioritization exercise.

Exhibit ES-1. Prioritization of Plan Recommendations

Chapter	Program	Low	Moderate	High
Ch 3	**Source Reduction**			
1.	Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills, including:	–	X	–
	• Develop a County ordinance that requires a waste reduction plan be submitted to obtain a commercial or residential building permit.	–	X	–
	• Work with other counties to develop Extended Producer Responsibility (EPR) policy statements or resolutions. As a component of EPR policy, implement a campaign to develop EPR for difficult-to-recycle products, and lobby state and federal lawmakers to advance EPR initiatives.	–	X	–
	• Implement a County government source reduction program policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies.	–	X	–
2.	Investigate a pay-as-you-throw (PAYT) program or other funding method.	–	X	–
3.	Improve the current reuse facility program.	–	X	–
	• Work with contractor to create a list for public distribution, which describes what items are preferable donations.	–	X	–
	• Work with the contractor managing the reuse centers to be more selective about merchandise, emphasizing items that are lightly used, clean, and in good condition. Improve signage, organization, and display of merchandise.	–	X	–
	• Provide more covered space at reuse centers.	–	–	X
	• Collaborate with the volunteer-based Laupāhoehoe Reuse Center to increase participation of volunteers.	–	X	–
	• Continue public-private partnerships with organizations such as Goodwill Industries to develop reuse centers at existing outlets within the County.	–	X	–
	• Consider expanding the program to other recycling and transfer stations and/or upgrade the Laupāhoehoe Reuse Center	–	X	–
4.	Expand and improve public education and awareness programs.	–	–	X
	• Develop a business waste audit and education program to foster source reduction within the local business community.	–	X	–
	• Develop a visitor industry waste reduction education program.	–	–	X
	• Continue reuse education, outreach, and public awareness campaign to encourage public participation and use of the reuse centers.	–	–	X

Exhibit ES-1. Prioritization of Plan Recommendations (continued)

Chapter	Program	Low	Moderate	High
Ch 4	**Recycling, Bioconversion, and Markets**			
	Recycling			
1.	Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates.	–	–	X
	• Thoroughly investigate mandates prior to implementation including assessment of markets (should be well-established), operational viability (solicit input from recycling and transfer station attendants, haulers, landfill operators), and implementation in other jurisdictions with an emphasis on other Hawai'i counties.	–	–	X
	• Establish a differential tip fee ordinance	–	X	–
	• Investigate the feasibility of establishing a mandatory curbside collection program for some single-family residences.	–	X	–
	• Establish mandatory source separation and recycling ordinance, which would require all businesses and institutions to recycle selected types of materials. This could include implementing landfill bans for select recyclables.	–	X	–
	• Develop legislation that requires owners and managers of multi-family dwellings and multi-tenant commercial buildings to provide recycling	–	X	–
	• Conduct research and coordinate with legislators and waste managers within Maui, Kauai, and Honolulu counties, to evaluate the potential for combining efforts to develop a statewide landfill diversion strategy.	–	X	–
	• Lobby the State to change school waste collection contracts to mandate that recycling services are included.	–	–	X
2.	Complete capital projects to facilitate implementation of expanded recycling programs. A common theme expressed during discussions with the SWAC is that the County needs improved facilities to manage recyclables.	–	–	X
	• Modify infrastructure at recycling and transfer stations to accommodate recycling processes.	–	–	X
	• Improve signage at recycling and transfer stations to provide the public with comprehensive information about recycling opportunities and procedures.	–	–	X
3.	Expand the opportunities for commercial recycling.	–	–	X
	• Allow small businesses to use the recycling and transfer stations to recycle selected materials.	–	–	X
	• Work with the HDOH Solid and Hazardous Waste Branch to modify recycling and transfer station operating permits to accommodate expanded recycling services.	–	–	X
	• Expand education and outreach programs for both large and small businesses to foster participation in commercial recycling programs.	–	–	X
4.	Expand opportunities to recycle in public areas and during public events.	–	–	X
	• Install additional recycling bins in parks and other public areas.	–	–	X
	• Conduct additional recycling events within the community each year.	–	–	X
5.	Establish goals that are expressed and measured in terms of environmental impacts (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, in addition to tonnage-based landfill diversion or waste recovery goals.	–	–	X
6.	Annually or bi-annually assess existing local and regional markets for materials across the waste stream; study service voids for missed opportunities to recover commodities.	–	X	–

Exhibit ES-1. Prioritization of Plan Recommendations (continued)

Chapter	Program	Low	Moderate	High
	Organics			
1.	Improve education and outreach programs that promote improved management of organics.	–	X	–
	• Ensure that the contractor responsible for administering the organics program is meeting contractual requirements.	–	–	X
	• Expand and further develop a master composter program (low priority).	X	–	–
	• Develop a training program and guidance materials for farmers and gardeners.	–	X	–
	• Implement a 'Stop Wasting Food' program that would benefit programs such as local food banks.	–	X	–
	• Partner to establish compost demonstration gardens at recycling and transfer stations or other visible locations in the community	–	X	–
2.	Onsite composting program (subsidized bins and distribution to residents and businesses)	–	X	–
3.	Landfill organics ban implementation study	–	X	–
4.	Organics management facilities and equipment	–	–	X
	• Add food waste drop-off bins at recycling and transfer stations that already collect green waste	–	X	–
	• Formulate compostable bag ASTM D6400-compliance legislation	–	X	–
	• Add organics/yard waste disposal to existing brochures/signage	–		X
	• Expand the number of drop-off locations for green waste and/or food waste at recycling and transfer stations	–	X	–
	• Continue operation of mulch facilities at WHSL and SHSL	–	–	X
	• Investigate organics collection programs, including a residential curbside collection program and recycling and transfer station drop-off facilities. As part of this investigation, perform pilot food waste demonstration projects with the potential for eventual expansion into full-scale food waste management programs.	–	–	X
Ch 5	**Education, Outreach, and Public Awareness**			
1.	Implement a 3-year education and social marketing program to educate the public and business community about landfill diversion initiatives and opportunities.	–	–	X
2.	Conduct a waste management attitude residential survey.	–	X	–
3.	Ensure County has staffing levels commensurate with the needs of the public outreach program.	–	–	X
Ch 6	**Household Hazardous Waste (HHW) / Electronic Waste (E-Waste)**			
1.	Ensure enough staffing to operate HHW/ e-waste programs successfully.	–	–	X
2.	Implement HHW/ e-waste education, outreach, and public awareness program.	–	–	X
3.	Research and evaluate elements of successful e-waste/ HHW programs implemented in other jurisdictions and integrate those successes into the County's program	–	X	–
4.	Explore e-waste take-back programs with State and manufacturers/sellers	–	X	–
	• Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of e-waste.	–	X	–
	• Coordinate with other counties and the State to develop and implement e-waste EPR take-back programs.	–	X	–
	• Coordinate with local retailers to facilitate implementation of take-back programs for e-waste.	–	X	–
	• Assess legislative actions that may be necessary to improve e-waste programs including demanufacturing, storage and handling, and funding equity.	–	X	–

Exhibit ES-1. Prioritization of Plan Recommendations (continued)

Chapter	Program	Low	Moderate	High
5.	Conduct additional HHW collection events (10 to 12 additional per year)	–	–	X
6.	Explore legislative actions for hazardous products and packaging take-back programs.	–	X	–
	• Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of hazardous waste or packaging.	–	X	–
	• Assess what legislative actions may be necessary to facilitate storage and handling of hazardous products and packaging at various types of collection locations, and funding equity.	–	X	–
7.	Explore a public-private partnership for a local e-waste campaign (on-island demanufacturing).	–	X	–
Ch 7	**Special Waste**			
1.	Continue to integrate a Do-It-Yourself Used Motor Oil program within the County's public education and information program.	–	–	X
2.	Increase the number of Recycling and Transfer Stations that accept white goods. Continue to explore the feasibility of removing the freon at the site to simplify the handling, loading, and transport of white goods.	–	X	–
4.	Continue to ensure that recycling facilities responsible for dismantling of white goods are trained properly for the recovery and recycling of Freon-containing appliances.	–	X	–
3.	Continue to promote tire recycling best management practices within the County's public education and information program.	–	–	X
Ch 8	**Collection and Transfer**			
1.	Retain the County's system of recycling and transfer stations; however, also explore alternative funding methods via a feasibility study as discussed in Chapter 3 recommendations (Recommendation 2).	–	–	X
2.	Reconstruct one or more recycling and transfer stations annually.	–	X	–
3.	Consider 'Satellite' compaction units for recyclables at select stations	–	–	X
4.	Reduce operating hours at recycling and transfer stations and consider closing one or more stations.	–	X	–
5.	Change County code to allow small businesses to drop off recyclables at recycling and transfer stations.	–	–	X
6.	Conduct an operational efficiency analysis to lower costs.	–	–	X
Ch 9	**Residuals Management**			
1.	Consider recovery and treatment technology (e.g., waste to energy (WTE), pyrolysis) if: (1) other waste diversion approaches (e.g., proposed compost facility in Hilo, shipping of market-driven unrecyclable materials to the City and County of Honolulu) are cost prohibitive, (2) it can be demonstrated that it is environmentally and economically feasible, and (3) the technology has a verifiable and viable commercial track record (a minimum of 5 years) for handling municipal solid waste.	–	X	–
2.	Investigate the feasibility of a landfill with a sorting and reuse area for construction and demolition materials.	–	–	X
3.	Update infrastructure at the WHSL and EHRS.	–	X	–
4.	Engage in dialog with the State/Counties about joint solutions (e.g., Discuss with City and County of Honolulu, the shipping of market-driven unrecyclable materials to their H-Power WTE plant).	–	–	X
Ch 10	**Administration and Funding**			
1.	Prepare a Solid Waste System Financial Analysis.	–	X	–
2.	Regularly review, and when appropriate, renegotiate WHSL contract.	–	–	X

1. INTRODUCTION

This update to the County of Hawai'i Integrated Solid Waste Management Plan (the Plan) presents the County's existing waste management practices and programs, explores opportunities for implementation of waste diversion policies and practices, and outlines potential options and recommendations for improving the waste management program. In addition, the Plan presents information on the status of active and closed landfills, historical information regarding the County's evaluation of waste reduction technology alternatives during the past decade, and closure of South Hilo Sanitary Landfill (SHSL) and transitioning to solid waste disposal wholly at the West Hawai'i Sanitary Landfill (WHSL). The County of Hawai'i (the County) produced this Plan in accordance with the requirements of Hawai'i Revised Statutes Chapter 342G (HRS 342G).

The information in the Plan is organized by chapter according to HRS 342G. Each chapter contains a brief summary of the previous plan's recommendations and a summary of their implementation status, a description of the County's existing waste management practices and conditions, a description of options available to the County for improvement of the waste management program, and recommendations for implementation for the next 10-years.

Development of this Plan update was guided by an 8-member Solid Waste Advisory Committee (SWAC), appointed by the Mayor. SWAC members participated in 13 meetings at which they reviewed the draft Plan chapters, debated key issues, developed plan goals (see Section 1.1 below), and shaped recommendations. In addition, input was requested from the public in a variety of forums including monthly SWAC meetings; routine posting of all draft documents, agendas, and meeting minutes to the County's online records archive; and two public hearings and the public comment period to the draft Plan. Appendix A includes the meeting minutes from the monthly SWAC meetings held during the Plan update process.

The key recommendations included in this Plan update have consensus support from the SWAC and are intended to balance the many interests of the various stakeholders within the County. The County has taken the top recommendations developed during this process and will keep the stakeholders in mind as these recommendations are implemented. This Plan update includes individual chapters that cover various waste management topics as stipulated in HRS 342G. It also includes responses to comments received from the State of Hawai'i Department of Health (HDOH) and the public (Appendix G) through the draft review process. It was adopted by the County Council on X, X, XXX and received final approval by HDOH on X, X, XXXX.

1.1 Goals of the Solid Waste Management Plan Update

This Plan presents not only recommendations, it also presents a vision for solid waste management within the County for the next few decades. Consideration was given to the current state of waste management technology in the United States and internationally, the history of waste management practices in the County, and an assessment of successful waste management practices in other jurisdictions. The objective was to develop County-wide solutions that consider the desires of the many stakeholders, while balancing the fiscal realities of implementing the selected programs. It was recognized that selected programs must be both implementable and sustainable to be successful.

The following goal statement and the goals that follow were developed during a series of meetings and adopted unanimously by members of the County's SWAC.

> ***"The people of the County of Hawai'i understand they are a part of the global community and can create a model for others. They value the environment, healthy social relationships, fiscal prudence, and long-term goals coupled with specific, local accomplishments. The following long-term goals will guide us as we develop an implementable Plan."***

The goals presented below were used to guide the development of waste management options and the resulting recommendations of this Plan update.

- **Sustainability.** To ensure that programs and actions meet the environmental, economic, and social equity needs of the present without compromising the ability of future generations to meet their own needs.
- **Increase Landfill Diversion.** The County views waste as an inefficient use of resources, and seeks to lessen discards to landfills by reducing waste, reusing (and repairing) still good stuff, and recycling/composting by all County residents, visitors, businesses, and institutions.
- **Efficient and Affordable.** To balance funds available for managing solid waste with other County priorities, the Plan identifies programs that get the best value ('bang for the buck') for County ratepayers and taxpayers.
- **Minimize Environmental Impacts.** To improve the environment and reduce greenhouse gas emissions, the Plan emphasizes transportation efficiencies, supports material reuse and recycling, and minimizes organic materials sent to the landfill.
- **Litter-free.** To eliminate illegal dumping on public and private lands, the Plan includes legislation, education, and outreach programs.
- **Sound Finances with Appropriate Incentives.** To include financial incentives that will increase landfill diversion, such as pay-as-you-throw (PAYT), while ensuring that the Solid Waste Division (SWD) has enough funds to pay for the services it provides.
- **Customer Service**. To share aloha as well as information.

The goals listed above are intended to support all aspects of Plan implementation, including the following:

- **Policy.** In County legislation and support for state legislation.
- **Funding.** Move towards diversifying funding sources.
- **Operations.** Reuse and recycling, household hazardous waste collection, residuals management, recycling and transfer stations, and special events.
- **Regulatory/Legal.** Consistency and compliance with all federal, state, and County requirements.
- **Education and Outreach.** For County employees, residents, visitors, businesses, and institutions.
- **Management and Employee Safety.** Working in partnership with the United Public Workers Union and the Hawai'i Government Employees Association.

The County acknowledges that the updates to this Plan could be challenging and will require a significant amount of public education and stakeholder participation to be successful. The integrated approach to solid waste management utilized by the County, the SWAC, and all contributors address the

overarching waste management goals of the community. The County will continue to foster collaboration among the stakeholders for the implementation and ultimate success of the Plan.

1.2 Plan Implementation

With uncertainties regarding the recycling market, and the outcome of programs planned for operation early in the planning period (e.g., shipping residual waste exclusively to the WHSL, opening of a new organic composting facility in Kea'au), this Plan does not outline funding projections for the 10-year planning timeframe. Instead, as described in Chapter 10 (Administration, Funding, and Implementation), the County would:

1. Continue the current system of funding most operating expenditures using property taxes and tip fees in the near term.
2. Study new funding strategies (e.g., PAYT, Enterprise Fund) to assess market fluctuations and uncertainties, and to achieve less reliance on the general fund as aligned with Plan recommendations.
3. Continue to fund major capital expenditures through general obligation bonds.

An initial draft Plan was distributed to stakeholders in December 2018 for comment, and a final draft was made available to the public for a 60-day public comment period during X 2019. The draft plan was then modified based on subsequent meetings with the SWAC and key staff with the County Department of Environmental Management, SWD; comments received at public hearings during X 2019; and written comments received during the 2-month public comment period. Comments and responses are included in Appendix G.

1.3 Organization of this Plan

This Plan is organized into the chapters listed below. Each chapter contains a summary of the existing conditions and waste management practices related to the specific topic covered, potential issues or concerns, and options that the County may consider to improve the program. Each chapter concludes with recommendations for implementation during the next 10 years.

- **Chapter 2: Waste Stream Assessment.** Provides an assessment of the County waste stream including background information about population and employment, historical and forecast waste generation, recycling, and disposal, as well as information about waste composition.
- **Chapter 3: Source Reduction.** Discusses existing source reduction activities within the County, identifies current issues and concerns with respect to current source reduction practices, and presents options and recommendations for achieving further source reduction.
- **Chapter 4: Recycling, Bioconversion, and Markets.** Describes existing recycling and bioconversion activities within the County; identifies current issues and concerns with respect to current recycling, bioconversion, and marketing practices; and presents options and recommendations for achieving the County's recycling and bioconversion goals.
- **Chapter 5: Public Education and Information.** Discusses existing public education activities within the County, identifies current issues and concerns with respect to public education, and presents options and recommendations that will help enhance educational opportunities.

- **Chapter 6: Household Hazardous Waste and Electronic Waste.** Describes the current status of the household hazardous waste (HHW) and electronic waste (e-waste) collection and disposal system within the County, identifies current issues and concerns, and presents options and recommendations for achieving the County's HHW and e-waste goals.
- **Chapter 7: Special Waste.** Defines special wastes and describes existing conditions, potential improvements, and recommendations for special wastes including asbestos, used oil, petroleum-contaminated soil, used batteries, sewage sludge, agricultural and farm-generated waste, medical waste, used tires, white goods, and derelict vehicles.
- **Chapter 8: Collection and Transfer.** Describes current conditions of the existing solid waste collection and transfer system within the County, identifies current issues and concerns, and presents options and recommendations for achieving the County's solid waste collection and transfer goals.
- **Chapter 9: Residuals Management.** Provides current conditions of the existing residuals management system within the County, identifies current issues and concerns, and presents options and recommendations for managing the residuals remaining after source reduction, reuse, and recycling.
- **Chapter 10: Administration, Funding, and Implementation.** Discusses current conditions of the existing administration and funding within the County, identifies current issues and concerns, presents options currently under consideration by the County, and provides recommendations for implementation.

2. WASTE STREAM ASSESSMENT

2.1 Introduction

This chapter assesses the County waste stream, including background information about population and employment, historical and forecast waste generation, recycling, disposal, waste stream projections, as well as information about waste composition.

2.2 Population and Employment

This section provides historical and forecast information about population and employment in the County. These variables, along with other factors such as increases in tourism and construction activity, are elements that contribute to increases in waste generation within the County.

Historical resident and de facto population for the County is shown in Exhibit 2-1. The de facto population is a measure used by the State of Hawai'i to account for the effects of tourism[1]. As shown, the resident population of Hawai'i was 198,449 in 2016. The average annual resident growth has decreased since 2000, with a peak average annual growth of 2.8 percent between 2000 and 2005 to a more modest growth between 2010 and 2015 (1.2 percent). The ratio of de facto versus resident population has remained consistent through the years.

Exhibit 2-1. Estimated Historical Population, Hawai'i County

	Persons		Average Annual Growth		Ratio De Facto/ Resident
Year[a]	Resident	De Facto	Resident	De Facto	
2000	148,677	167,063	–	–	–
2005	168,237	188,612	2.8%	2.0%	1.12
2010	185,079	202,682	1.9%	2.0%	1.09
2015	196,156	220,070	1.2%	1.7%	1.12
2016	198,449	222,485	0.6%	0.5%	1.12

[a] Source: State of Hawai'i Department of Business, Economic Development, and Tourism (2016). Table 01.06 Resident Population, by County: 2000-2016 and Table 1.09 De Facto Population, by County: 2000 to 2016.

Exhibit 2-2 provides a forecast of Hawai'i resident population growth through the year 2040 in each of the County's nine council districts, and summaries for West Hawai'i and East Hawai'i. As shown, future population growth is projected to be slow. This is also the same for the de facto population estimates, which are projected to exceed resident population growth at a rate of 1.6 percent compared to 1.3 percent annual growth through 2020, and then is expected to follow the same growth rate thereafter (through 2040).

[1] De facto population is defined as the number of persons physically present in an area, regardless of military status or usual place of residence. It includes visitors present but excludes residents temporarily absent.

Exhibit 2-2. Resident Population Forecast by District, Hawai'i County

District	2010 Census (base year)[1]	2010-2016	2016-2020	2020-2025	2025-2030	2030-2035	2035-2040
East Hawai'i							
Hāmākua	6,513	6,871	7,421	8,091	8,576	9,048	9,500
Puna	42,326	44,654	47,556	52,578	55,733	58,798	61,738
North Hilo	2,041	2,153	2,326	2,535	2,687	2,835	2,977
South Hilo	50,927	53,728	58,026	63,262	67,058	70,746	74,284
South Kona	9,997	10,547	11,391	12,418	13,164	13,888	14,582
West Hawai'i							
Ka'u	8,451	8,916	9,629	10,498	11,128	11,740	12,327
North Kohala	6,322	6,670	7,203	7,853	8,324	8,782	9,221
North Kona	37,875	39,958	43,155	47,049	49,872	52,615	55,246
South Kohala	17,627	18,596	20,084	21,897	23,210	24,487	25,711
Total	**176,750**	**186,471**	**201,389**	**219,562**	**232,735**	**245,536**	**257,813**
East Hawai'i	105,287	111,078	119,964	130,789	138,637	146,262	153,575
West Hawai'i	71,463	75,393	81,425	88,772	94,099	99,274	104,238
Forecasted Average Annual Growth Rate	–	1.1%	1.3%	1.3%	1.2%	1.1%	1.0%

[1] Baseline 2010 population by district, obtained from the Hawai'i Statewide GIS program (metadata source: US Census Bureau [2010]).

Source: State of Hawai'i Department of Business, Economic Development, and Tourism (2018a). The 2010 population by district were multiplied by the County resident annual growth rate from the Department of Business, Economic Development, and Tourism Table A-3. Hawaii County Population Projection, Selected Components, 2010-2045.

Historical employment in the County is shown in Exhibit 2-3. Employment has grown in recent years, from 79,100 in 2010 to 88,150 in 2016. The average annual 1.8 percent growth (2010 to 2016) in employment exceeds the County's average resident average annual population growth (1.2 percent) during that same time frame.

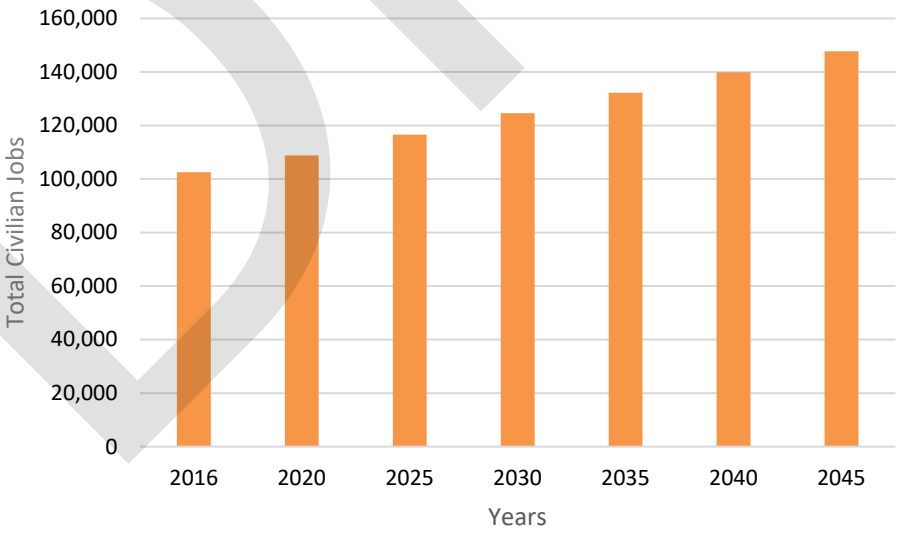
Forecasted employment for the County is shown in Exhibit 2-4. Employment is forecast to increase at an annual rate of 1.4 percent between 2020 and 2025, at an annual rate of 1.3 percent between 2025 and 2030, and dropping to an annual rate of 1.1 percent by 2040.

Exhibit 2-3. Historical Civilian Employment in Hawai'i County

Year	Civilian Employment
1980	40,850
1985	46,150
1990	56,150
1995	58,600
2000	70,150
2005	78,000
2010	79,100
2015	84,800
2016	88,150
	Average Annual Growth
1980-1985	2.5%
1985-1990	4.0%
1990-1995	0.9%
1995-2000	3.7%
2000-2005	2.1%
2005-2010	0.3%
2010-2016	1.8%

Source: Hawai'i Department of Business, Economic Development, and Tourism (2018b). Historical employment data spanning 1980–2016. Table A-30. Total Civilian Jobs, Labor Force, and Employment for Hawai'i County, 1980-2016.

Exhibit 2-4. Forecasted Civilian Employment in Hawai'i County



2.3 Generation, Disposal, and Recycling

2.3.1 Historical

Historical generation, recycling, and disposal for the County, and the resulting diversion rates are shown in Exhibits 2-5 and 2-6. Generation is the sum of recycling and disposal. As shown, since estimated fiscal year (FY)[2] 2009–10, both recycling and disposal in the County have changed substantially. Recycling tonnage reported to the County by local businesses and the amount of recyclables managed by the County decreased from a 36.1 percent diversion rate in FY 2009–10 to 20.8 percent in FY 2017–18, and disposal increased from 155,682 tons to 224,196 tons over the same period. Review of the County's annual solid waste disposal summaries dating back to FY 2009–10 shows a decrease in metal recycling starting in FY 2012–13. The County-contracted scrap metal recycling facilities were required to remove their stockpiles prior to permit expiration. With the facilities no longer in operation, the County limited the scrap metal they would accept and diverted scrap metal to the private sector; thus, there is a marked decrease in subsidized scrap metal recycling following FY 2012–13. For example, in FY 2014–15, County data show 5,757 tons of scrap metal recycled, which is 10.0 percent of the total recycling/diversion tonnage. In comparison, County data show 35,240 tons or 39.0 percent of the total volume diverted or recycled in FY 2011–12. Therefore, although the recycling and diversion rates appear to have decreased, this number is skewed because the County began sending most of the scrap metal recycling to the private sector starting in 2013. Finally, Exhibits 2-5 and 2-6 do not account for non-County-sponsored (private) recycling or diversions. These could include big-box stores (e.g., Costco, Walmart) that ship combined bales of cardboard and plastic to either the West Coast to third-party brokers or to the retailer's distribution center. Contractors or non-profit groups also sell recycled materials directly to brokers on the mainland.

Exhibit 2-5. Historical Generation, Recycling/Diversion, and Disposal and Estimated Diversion Rate, Hawai'i County

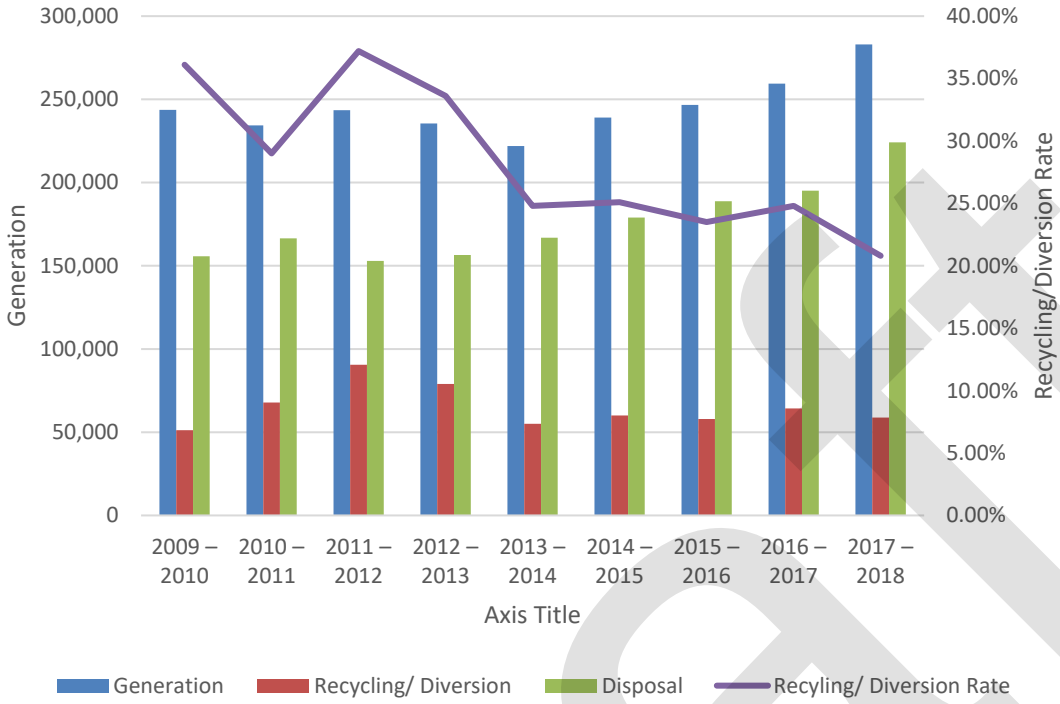
Fiscal Year	Generation	Recycling/Diversion	Disposal	Recycling/Diversion Rate
2009–2010	243,719	88,037	155,682	36.1%
2010–2011	234,308	67,854	166,454	29.0%
2011–2012	243,457	90,508	152,949	37.2%
2012–2013	235,483	79,029	156,455	33.6%
2013–2014	221,915	55,025	166,890	24.8%
2014–2015	239,052	60,028	179,024	25.1%
2015–2016	246,679	57,921	188,758	23.5%
2016–2017	259,472	64,309	195,162	24.8%
2017–2018	283, 021	58,825	224,196	20.8%
Percent Change between FY 2009–10 and FY 2017–18	14.0%	1.6%	44.0%	-48.0%
Average Annual Percent Change	2.0%	2.5%	4.6%	-6.4%

Source: Multi-year data provided by County of Hawai'i DEM, Solid Waste Division.

Note: The table does not account for non-County-sponsored (private) recycling or diversions. These could include big-box stores (e.g., Costco, Walmart) that ship combined bales of cardboard and plastic to either the West Coast to third-party brokers or to the retailer's distribution center. Contractors or nonprofit groups also sell recycled materials directly to brokers on the mainland.

[2] The County fiscal year is from July 1 to June 30.

Exhibit 2-6. Historical Generation, Recycling, and Disposal for Hawai'i County



As reported in the 2009 Plan, the 2008 resident and de facto population of the County generated 9.4 pounds and 8.3 pounds of solid waste per capita per day, respectively. Using the same methodology as the 2009 Plan[3], comparatively, 2016 waste generation dropped to 7.1 pounds and 6.4 pounds per capita per day for respective resident and de facto populations. The reduction in pounds per day could be attributed to the County's adoption of the zero waste philosophy in 2008 aimed at significantly reducing the volume of generated solid waste. For instance, the County has opened eight new reuse locations where residents may donate household items for resale, thus reducing tonnage values for disposal or recycling. The County also added a new convenience center (Ocean View), increased opportunities for scrap metal recycling and yard waste collection at recycling and transfer stations, and added two new facilities for processing green waste on both the east and west sides of the island.

Exhibit 2-7 provides a breakdown of total waste discarded at County recycling and transfer stations and total commercial waste delivered directly to landfills between FY 2009–10 and FY 2017–18 for West and East Hawai'i. As shown, disposal at recycling and transfer stations has grown faster in West Hawai'i (approximately 35 percent) than in East Hawai'i (approximately 12 percent) during this period. Commercial disposal has increased substantially over the past 9 years, experiencing percent change of approximately 83 percent in West Hawai'i and approximately 19 percent in East Hawai'i. Commercial waste comprises approximately 59 percent, while waste from recycling and transfer stations comprise approximately 41 percent of the total disposed waste County-wide. Commercial waste accounts for a much larger share of the total waste sent to landfill in West Hawai'i (approximately 70 percent) than in East Hawai'i (approximately 48 percent).

[3] Estimated 2016 solid waste generation divided by estimated 2016 resident population and estimated 2016 de facto population. Table 2-2 provides a breakdown of the estimated resident and de facto populations from 2000-2016.

Exhibit 2-7. Historical Disposal at Recycling and Transfer Stations and Commercial Customers for West and East Hawai'i (in tons)

	West Hawai'i		East Hawai'i		Total County	
Fiscal Year	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial
2009–2010	34,295	55,961	34,525	30,902	68,820	86,863
2010–2011	35,417	67,592	32,421	31,025	67,838	98,617
2011–2012	39,303	51,880	28,018	33,749	67,321	85,629
2012–2013	35,898	55,628	31,688	33,240	67,586	88,868
2013–2014	38,358	61,955	33,640	32,936	71,998	94,891
2014–2015	42, 162	64,442	35,016	37,404	77,178	101,846
2015–2016	44,000	70,967	36,529	37,262	80,529	108,229
2016–2017	46,022	76,892	35,956	36,291	81,978	113,183
2017–2018	46,442	102,442	38,737	36,606	85,179	139,048
Percent Change between FY 2009–10 and FY 2017–18	35.4 %	83.1%	12.2%	18.5%	23.8%	60.1%
Average Annual Percent Change	4.0%	6.4%	2.5%	2.2%	2.4%	5.8%

Note: Commercial includes waste delivered directly to landfills by commercial haulers, and some businesses, institutions, and residents.
Source: Multi-year data provided by County of Hawai'i DEM, Solid Waste Division.

Historical generation in tons, resident and de facto population, and pounds per capita per day are presented in Exhibit 2-8. As shown, the overall trend over the past 9 years through FY 2017–18 has been minimal in all these variables (average annual change for all variables is equal to or less than 2.0 percent).

Exhibit 2-8. Historical Generation Trends in Hawai'i County

Fiscal Year	Generation (tons) [1]	Resident Population[2,3]	Pounds/Capita/Day[4]	De Facto Population[2]	Pounds/Capita/Day[4]
2009–2010	243,719	183,629	7.3	199,047	6.7
2010–2011	234,308	185,079	7.1	202,682	6.3
2011–2012	243,457	186,933	7.1	205,570	6.5
2012–2013	235,483	188,765	6.6	209,099	6.2
2013–2014	221,915	191,147	6.6	212,373	5.7
2014–2015	239,052	193,885	6.6	216,108	6.1
2015–2016	246,679	196,156	7.1	220,070	6.1
2016–2017	259,472	198,449	7.1	222,485	6.4
2017–2018	283,021	200,381	7.7	–[5]	–[5]
Percent Change between FY 2009–10 and FY 2017–18	14.0%	9.1%	5.5%	11.7%	-4.5%
Average Annual Percent Change	2.0%	1.1%	-0.4	1.6%	-0.5

[1] Generation data for fiscal years 2009 through 2018 were derived from Annual Reports for Recycling and Diversion from all Transfer Stations and Recycling Programs, provided by County of Hawai'i DEM, Solid Waste Division.

[2] [a] Source: State of Hawai'i Department of Business, Economic Development, and Tourism (2016). Table 01.06 Resident Population, by County: 2000-2016 and Table 1.09 De Facto Population, by County: 2000 to 2016.

[3] FY 2017-2018 data estimated from U.S. Census Bureau (2018a).

[4] Pounds per capita is the annual total generation divided by the annual de facto population.

[5] Data available at the time (Department of Business, Economic Development, and Tourism) do not go beyond 2016 for de facto population.

FY 2017–18 disposal totals specific to each of the County's 22 recycling and transfer stations are shown in Exhibit 2-9. Total disposal during 2018 at recycling and transfer stations ranged from a low of 509 tons at the Kalapana station, to a high of 15,592 tons at the Hilo station.

Exhibit 2-9. FY 2017–18 Disposal by Recycling and Transfer Station

Recycling and Transfer Stations	Tons	Percent of Subtotal	Percent of Total
East Hawai'i			
East Hawai'i Regional Sort Station	1,192	2.5	1.4
Glenwood	1,907	4.1	2.2
Hilo	15,592	33.1	18.3
Honoka`a	4,154	8.8	4.9
Honomū	983	2.1	1.2
Kalapana	509	1.1	0.6
Kea`au	9,211	19.6	10.8
Laupāhoehoe	1,045	2.2	1.2
Pa`auilo	771	1.6	1.0
Pāhala	1,087	2.3	1.3
Pāhoa	7,318	15.5	8.6
Pāpa`ikou	1,597	3.4	1.9
Volcano	1,366	2.9	1.6
Other	330	0.7	0.4
Subtotal (East Hawai'i)	47,062	100.0%	55.3%
West Hawai'i			
Ka`auhuhu (Hāwī)	4,247	11.1	5.0
Kealakehe (Kailua-Kona)	12,089	31.7	14.2
Keauhou	5,922	15.5	7.0
Ke`ei/Nāpo`pop`o	1,276	3.3	1.5
Miloli`i	687	1.8	0.8
Puakō	2,011	5.3	2.4
Waiea	1084	2.8	1.3
Waimea	6,586	17.3	7.7
Wai`ōhinu/ Ka`u	3,496	9.2	4.1
Other	713	1.9	0.8
Subtotal (West Hawai'i)	38,111	100.0%	44.7%
Total	**85,173**		**100.0%**

Source: County of Hawai'i County DEM.

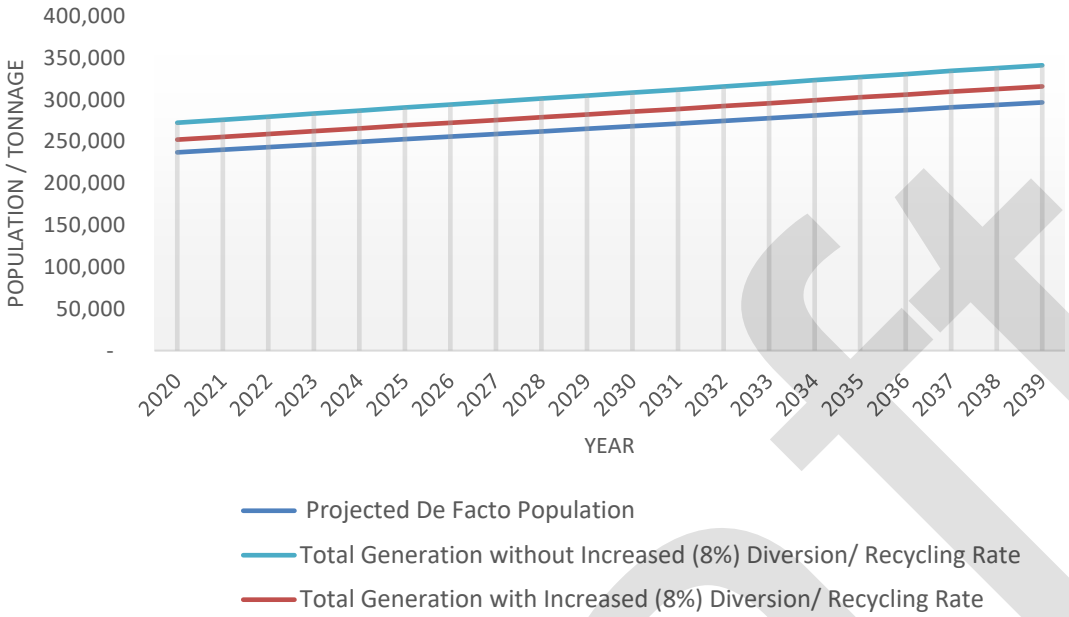
2.3.2 20-Year Projection

To plan for future solid waste management needs, projections are made using a generation forecast model. The County prepared the 20-year projection by examining forecasted de facto population, past generation and diversion trends, and potential changes to those trends (Exhibit 2-10). The de facto generation estimate for 2016 was applied as the baseline for disposal tonnage. The diversion rate estimate (29 percent = average of approximately 5 pounds/day/per person) is based on the median diversion rate from FY 2009 through FY 2017. The implementation of additional diversion programs and other outside factors have the potential to increase or decrease the diversion rate in coming years beyond the average annual diversion rate. These factors could include:

- Market stagnation. For example, China has recently set new limits on imported recycled materials, significantly decreasing the amount of recycling accepted.
- Economic trends. An economic upturn typically results in increased waste generation, as well with a waste generation decrease during an economic downturn. Because Hawai'i is a popular vacation destination, economic trends can be particularly influential.
- County-wide reduction efforts. Ongoing efforts by the County and residents, businesses, and institutions to reduce waste may help moderate waste generation in the future (i.e., yard waste mulching facilities introduced during the last planning period).
- Availability of curbside collection infrastructure.
- Availability of educational program funding.
- Improvements to diversion rate calculations. Non-County program recycling – big box stores, for example.
- Investment in new technology. For example, potential for privately- or publicly-funded recovery and treatment facility (e.g., waste to energy [WTE], pyrolysis).

Because of the unpredictability of market and economic trends, Exhibit 2-10 shows a conservative increased diversion rate of 8 percent through 2039. This is based on the potential for increased diversion when the proposed compost facility is in operation (estimated for operation in 2020, see Chapter 4 for further details). The waste composition study performed in 2008 estimated 16.3 percent of the waste going into the landfill as food waste (see Section 2.4 Waste Composition). Eight percent conservatively represents a diversion of half of this total. This 8.0 percent diversion rate is extended through 2039. Detailed data for Exhibit 2-10 are provided in Appendix C.

Exhibit 2-10. Projected Disposal with 8 Percent Increase in Recycling/Diversion 2020- 2039



2.4 Waste Composition

Hawai'i County conducted a waste composition study in 2008, included as Appendix D (CH2M Hill 2008). That study includes composition estimates for the overall waste stream and results broken down by recycling and transfer station, commercial, and self-haul wastes[4] disposed at the landfill. The results are based on samples taken at the WHSL during May 2008. A similar study was performed at the SHSL in 2001 (Cascadia Consulting Group 2001). Results of the 2008 and 2001 waste composition studies and the 2008 disposal data were combined to estimate the composition of waste that enters both landfills. The results are combined to provide waste composition estimates for the total County disposal.

Exhibits 2-11, 2-12, and 2-13 show disposed composition estimates for nine waste categories for the entire County, for West Hawai'i, and for East Hawai'i, respectively. When combined, organics and paper comprise more than half of the waste stream. The organics category contains such components as food, green waste, and textiles. Construction and demolition waste accounts for another 22.0 percent by weight. The construction and demolition category includes such components as lumber and gypsum scrap.

The composition of waste disposed in West Hawai'i is similar to the composition of disposed waste in East Hawai'i. Two differences that merit mention: 1) there are more organics disposed of in West Hawai'i (35.3 percent) than in East Hawai'i (29.6 percent); and 2) there is more special waste disposed of in East Hawai'i (5.2 percent) than in West Hawai'i (1.9 percent). Most of the special wastes disposed of in East Hawai'i consist of industrial sludge, bulky items, and tires.

The waste stream study includes the amount of waste disposed for 58 different types of waste. County-wide composition estimates for all 58 waste components evaluated during the study are shown in Exhibit 2-14.

[4] Self-haul refers to waste delivered directly to the landfill (as opposed to a recycling and transfer station).

Exhibit 2-11. Disposed Composition Estimates by Waste Category for the Total County

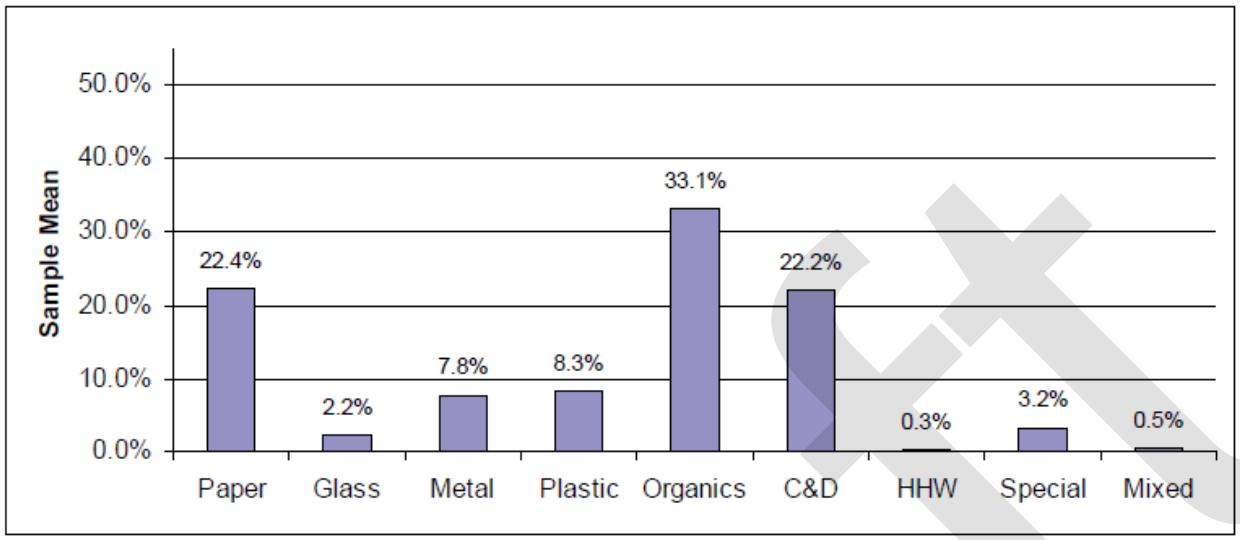


Exhibit 2-12. Disposed Composition Estimates by Waste Category for West Hawai'i

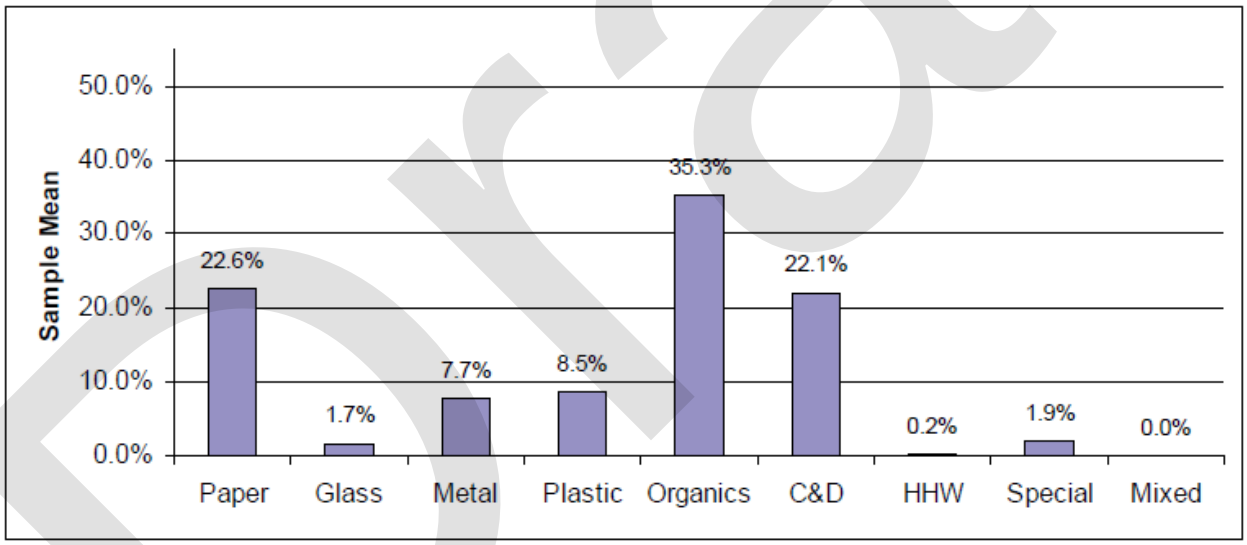


Exhibit 2-13. Disposed Composition Estimates by Waste Category for East Hawai'i

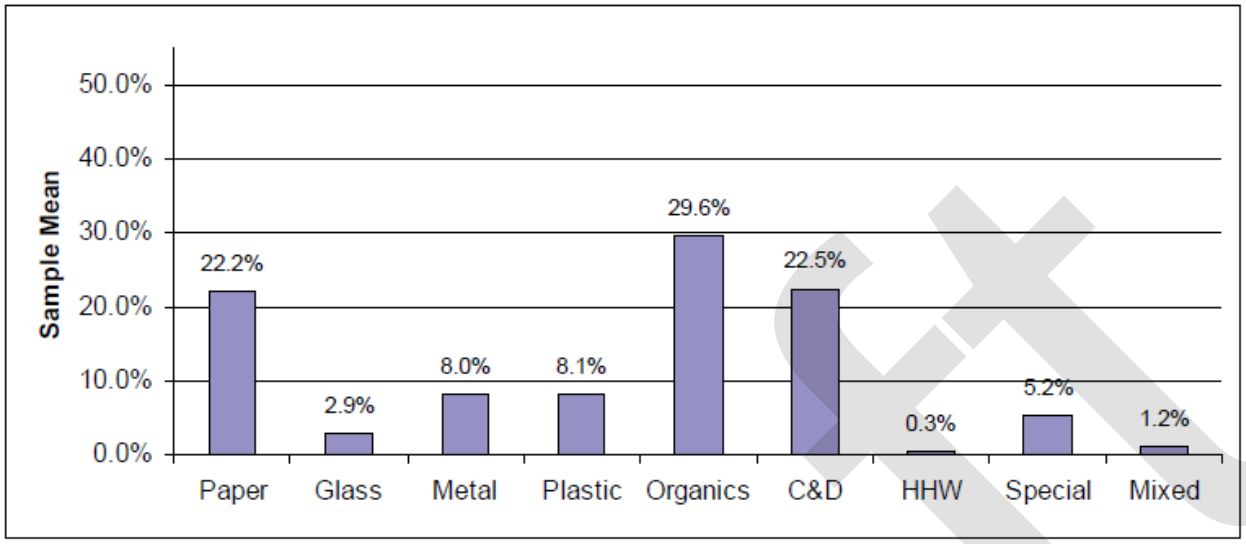


Exhibit 2-14. Disposed Composition Estimates: Total County

Composition	Tons Disposed	Percent of Total	Composition	Tons Disposed	Percent of Total
Paper	**47,130**	**22.4%**	**Construction and Demolition**	**46,702**	**22.2%**
Cardboard	16,182	7.7%	Concrete	5,128	2.4%
Bags	723	0.3%	Asphalt Paving	2,212	1.1%
Newspaper	4,193	2.0%	Asphalt Roofing	381	0.2%
White Ledger	1,540	0.7%	Clean and Treated Lumber	22,984	10.9%
Colored Ledger	280	0.1%	Gypsum Board	1,471	0.7%
Computer	92	0.0%	Rocks and Soil	1,707	0.8%
Office	1,510	0.7%	R/C Demo	12,819	6.1%
Magazines	2,424	1.2%	**Household Hazardous**	**527**	**0.3%**
Directories	109	0.1%	Paint	171	0.1%
Miscellaneous	8,634	4.1%	Vehicle Fluids	20	0.0%
R/C Paper	11,443	5.4%	Oil	54	0.0%
Glass	**4,592**	**2.2%**	Batteries	117	0.1%
Clear Containers	1,476	0.7%	R/C Hazardous	165	0.1%
Green Containers	1,296	0.6%	**Special**	**6,762**	**3.2%**
Brown Containers	1,024	0.5%	Ash	93	0.0%
Other Containers	307	0.1%	Sewage Sludge	0	0.0%
Flat Glass	160	0.1%	Industrial Sludge	2,826	1.3%
R/C Glass	329	0.2%	Treated Medical	139	0.1%
Metal	**16,388**	**7.8%**	Bulky Items	2,177	1.0%
Aluminum Cans	565	0.3%	Tires	1,124	0.5%
Tin Cans	1,525	0.7%	R/C Special	404	0.2%
Ferrous	7,441	3.5%	**Mixed**	**997**	**0.5%**
Nonferrous	504	0.2%	Mixed Residue	997	0.5%
White Goods	742	0.4%			

Exhibit 2-14. Disposed Composition Estimates for the Total County (continued)

Composition	Tons Disposed	Percent of Total	Composition	Tons Disposed	Percent of Total
R/C Metal	5,611	2.7%			
Plastic	**17,482**	**8.3%**			
#1 Containers	1,067	0.5%			
#2 Containers	882	0.4%			
Other Containers	818	0.4%			
Film	6,170	2.9%			
Durable	4,002	1.9%			
R/C Plastic	4,543	2.2%			
Organics	**69,448**	**33.1%**			
Food	34,230	16.3%			
Textiles	5,485	2.6%			
Leaves and Grass	6,160	2.9%			
Prunings	7,057	3.4%			
Stumps	2,637	1.3%			
Crop Residue	3	0.0%			
Manure	0	0.0%			
R/C Organic	13,875	6.6%			
Total Tons	**210,030**				

3. SOURCE REDUCTION

3.1 Introduction

Source reduction adopts practices that generate less waste. Source reduction strategies include changes in product design and packaging, reduction of consumer purchases, and the reuse of materials or goods. By decreasing the amount of waste that must be disposed of, waste reduction programs decrease the environmental issues associated with waste disposal. Reusing a grocery bag, buying materials in bulk, and reselling or donating unwanted and still usable materials or products are typical examples of waste reduction.

This chapter describes the County's source reduction activities, identifies current issues and concerns with respect to current source reduction practices, and presents options for achieving further source reduction.

3.2 Background

3.2.1 Regulatory Context

As described in the Hawai'i Revised Statutes Chapter 342G (HRS 342G), each County is required to consider solid waste management practices and processing methods in the following order of priority:

1. Source reduction.
2. Recycling and bioconversion (including composting).
3. Landfilling and incineration.

HRS 342G-3 established a 25 percent waste reduction goal by 1995, and a 50 percent goal by 2000 through source reduction, recycling, and bioconversion.

Recycling and bioconversion practices were first detailed in the original Integrated Solid Waste Management Plan created in 1993 and in subsequent updated plans. In 2003, the County passed a resolution with a goal to divert 50 percent of the solid waste from landfills by 2008 and 80 percent by 2013.

3.2.2 Resolution 356-07 (Zero Waste)

In 2007, the County adopted Resolution 356-07, "A Resolution to Embrace and Adopt the Principles of Zero Waste as a Long-term Goal for Hawai'i County." The resolution embraces the zero waste philosophy of solid waste management and commits to taking the necessary steps to incorporate the zero waste philosophy into legislation, policies, and actions.

The zero waste philosophy is based on the concept that current standards of waste management are inefficient and unsustainable, and that waste can be virtually eliminated by emulating sustainable natural cycles, where all discarded materials are treated as resources that can effectively be reused. It is a whole-system approach that emphasizes a closed-loop production and consumption system by 1) reducing the volume and toxicity of waste through product and packaging redesign strategies; 2) reusing materials and products for alternative uses, as well as for their original intended use; and 3) recycling and composting all remaining materials for their best use. Within the zero waste framework, materials that cannot be easily and conveniently reduced, reused, recycled, or composted are returned to the manufacturer, who is ultimately responsible for product disposal. The zero waste approach includes aggressive education of public and private entities because consumer choices are considered to be the driving force in changing consumption and disposal patterns.

With a focus on eliminating waste at the source, one of the fundamental principles of zero waste is redesigning products and packaging, by considering the entire life cycle of a product. In contrast to the current emphasis on disposability, products and packaging within the zero waste framework are designed with an emphasis on minimal use of materials, use of recycled and benign resources, longer product lives, and maximum potential for every product to be repaired, reused, or recycled. Critical to this principle is the concept of extended producer responsibility (EPR), a policy tool in which manufacturers are held legally and financially responsible for the waste and environmental impact associated with their product and packaging, rather than passing that responsibility on to the consumer. Under EPR, manufacturers are mandated to 'take back' their end-of-life products and create closed looped systems. As a result, EPR enforces design, production, and packaging strategies that consider the quantity and type of materials required for production, product lifespan, and the ability with which products can be disassembled and recycled.

In addition, zero waste emphasizes an aggressive combination of reuse, recycling, and composting. Within the zero waste framework, all organic materials, including yard trimmings and food scraps, are composted and treated as "biological nutrients" rather than being disposed of in landfills where they can potentially contribute to future environmental liabilities. Instead of using revenues generated through the tax base or other financial resources to build new landfills or incinerators, the zero waste approach advocates for investment in recycling, composting, and reuse facilities, especially those that accommodate the entire spectrum of reuse and recycling activities (for example, resource recovery parks). By supporting the reuse and recycling of discarded products and materials, the zero waste approach creates jobs and stimulates local economies. According to Eco-Cycle Solutions, recycling creates an "average of ten times more jobs than trash [landfilling], composting creates at least twice as many jobs as landfills, and reuse creates as many as 30 times more jobs than landfills" (Eco-Cycle Solutions 2018). According to EPA's 2016 Recycling Economic Information (REI) Report, recycling of construction and demolition waste provides the largest contribution to job, wage, and tax revenue, followed by ferrous and non-ferrous metals (EPA 2016a).

A Zero Waste Implementation Plan developed for the County in 2008 outlines suggested changes to the way that solid waste is handled within the County (Recycle Hawaii 2009). As stated in Resolution 356-07, the County recognizes "that zero waste is a long-term goal and that in the interim, programs may need to be implemented that may be counter to the zero waste philosophy and are necessary to reach the long-term goal of zero waste and that such programs should not be prohibited by the embracing and adoption of the long-term goal of zero waste." To this end, the components of the Zero Waste Implementation Plan, which can be realistically achieved during the life span of this Plan, have been incorporated into the Plan.

In conclusion, the County will continue to take incremental steps toward achieving zero waste in the long term with the understanding that the ability to truly achieve zero waste is realistically challenging for an island.

3.2.3 Review of 2009 Plan

Exhibit 3-1 provides a summary of the recommendations put forth in the 2009 Integrated Resources and Solid Waste Management Plan (2009 Plan) relative to source reduction, and a description of the actions taken to achieve each recommendation.

Exhibit 3-1. Status Update of 2009 Plan Recommendations for Source Reduction

2009 Plan Recommendation	Status
Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills.	2012-01-17 Ordinance 12-1 Plastic Bag Reduction Ordinance adopted; 2013-01-17 implemented. 2017-09-29 Ordinance 17-63 Polystyrene Disposable Food Service Ware Reduction Ordinance adopted, to be implemented 2019-07-01.
Develop ordinances requiring that a waste reduction plan be submitted.	Did not pass an ordinance; however, the County permit process does require commercial, industrial, and multiple structure demolition projects to develop solid waste demolition diversion plans.
Develop EPR policy statements or resolutions.	In 2007 the Solid Waste Division (SWD) drafted a resolution that would mandate recycling at County offices. This has not yet been implemented.
Implement a campaign to develop EPR for difficult-to-recycle products.	Did not implement.
Implement a County government source reduction program.	No staff available for program implementation.
Implement Pay-as-You-Throw program or other funding method.	Difficult to achieve a balanced community-supported outcome in advancing this recommendation.
Expand the current reuse program.	The County has added additional reuse centers.
Expand reuse facilities.	Added Hilo, Kealakehe, Pāhoa, and Wai'ōhinu reuse centers; closed Ka`auhuhu (Hāwī) reuse center.
Develop public-private partnerships.	The County's website, HawaiiZeroWaste.org, provides a listing of private reuse stores. The County contracted Recycle Hawaii to consult with large-scale Leadership in Energy and Environmental Design (LEED) construction sites to recommend how construction and demolition materials could be diverted from the landfill.
Expand and improve public education and awareness programs.	No dedicated public education and awareness program since summer 2014. The County maintains the HawaiiZeroWaste.org website and provides facility tours, press releases, advertisements, and presentations.
Develop a business waste audit and education program.	No staff available for audits. The County provides disposal and recycling information on the HawaiiZeroWaste.org website.
Develop a visitor industry waste reduction education program.	No staff available for developing the visitor industry waste reduction education program. The County provides disposal and recycling information on the HawaiiZeroWaste.org website.
Develop a reuse education, outreach, and public awareness campaign.	Information is available on the HawaiiZeroWaste.org website and Reuse Center vendors can promote program.

3.3 Existing Conditions

The status of source reduction efforts in the County is described below. This discussion includes 1) a description of County-operated or sponsored programs, 2) a description of other programs conducted by private entities, and 3) an overview of County waste reduction staffing levels.

3.3.1 County of Hawai'i Waste Reduction Programs

3.3.1.1 Backyard Composting

The County's Zero Waste website includes links to guidance by the U.S. Environmental Protection Agency (EPA) and other resources on backyard composting, and locations on the island where vermiculture bins, worms, and accessories can be purchased.

3.3.1.2 Reuse Centers

Reuse centers are located at eight of the County's recycling and transfer stations. The County contracts out the management and operation of seven of these facilities, which include Kealakehe, Keauhou, Waimea, Wai'ōhinu, Hilo, Pāhoa, and Kea'au. Laupāhoehoe is a volunteer-based facility. Materials accepted are as follows:

Kea'au Recycling and Transfer Station: Reuse Center

- Furniture and furnishings.
- Working appliances (contingent on space availability).
- Office equipment (non-computer or electronics).
- Toys and baby items.
- Recreational items.
- Small kitchen appliances (e.g., electric coffee makers, toasters).
- Garden/farm items.
- Tools.
- Books, magazines, music and movie media (CDs, DVDs, Blu-rays, etc.).
- Crafts and craft supplies.
- School supplies.
- Clothing and fabric.
- Home construction and demolition materials (except for Kea'au, contingent on space availability).

Items are available for free or sold at a modest price, and the revenue is used to partially fund operations and education outreach programs. Reusable latex paint is collected at Hilo, Kea'au, and Waimea reuse centers. The latex paint collected at the select reuse centers and during designated household waste collection events is sorted and available for purchase at a discount over the retail price of new paint. Upon written approval from the County's Contract Manager, the reuse center contractor may be allowed to collect latex paint at additional reuse centers. No oil-based paint may be collected at any reuse centers because it requires special handling. The reuse center contractor is also required to provide an area at the Kea'au and Hilo reuse centers to collect clean and dry reusable newspaper. The containers are covered to store the newspaper, which is made into high-quality shredded material that is aesthetically pleasing (e.g., flower growers use the clean and dry newspaper as packing material for island-grown flowers shipped off-island). The Contractor must ensure that the newspaper is being reused.

Exhibit 3-2 breaks down the tonnage of material recycled at reuse centers since FY 2009–10. The peak timeframe for participation was FY 2017–18, which is likely due to the increased availability of facilities (increased from one facility to eight facilities since FY 2009–10).

Exhibit 3-2. Tonnage Diverted at Reuse Centers FY 2009–10 to FY 2016–18

Year	East Hawai'i (tons)	West Hawai'i (tons)	Total (tons)
2009–10	172.6	71.5	244.1
2010–11	206.9	148.7	355.6
2011–12	236.3	133.6	369.8
2012–13	241.0	145.3	386.3
2013–14	245.0	120.9	365.8
2014–15	275.2	69.8	345.0
2015–16	185.1	59.8	245.0
2016–17	182.2	58.6	240.8
2017–18	265.0	175.8	440.8

3.3.1.3 Reduction and Reuse Education

The County has an education program targeting waste reduction and reuse. Its main education initiatives include:

- Information and resources provided through the County's HawaiiZeroWaste.org website.
- Newspaper, radio, and television advertising.
- Brochures.
- Community outreach (e.g., promotion of zero waste event planning and reuse centers on County's HawaiiZeroWaste.org website).
- Community events.
- Sporting events.
- School programs (e.g., recycling site tours).
- Business education (e.g., HawaiiZeroWaste.org).

More information about these initiatives is provided in Chapter 5 Public Education and Information.

3.3.1.4 Solid Waste Demolition Diversion Plan

The County Department of Environmental Management (DEM) currently works with the County Department of Public Works (DPW) and County Planning Department to assist developers with large projects in finding alternative ways to dispose of demolition waste other than the landfill. The County DEM also routinely comments on National Environmental Policy Act (NEPA) environmental assessments (EAs) and environmental impact statements (EISs) for development projects, advising the project proponents to consult with the DEM to determine the best way to dispose of demolition waste. The DEM's comments on NEPA environmental documentation often result in projects that are committed to alternative methods of handling demolition waste in lieu of landfilling.

Common materials recycled through this program include roofing, steel posts, and gutters. Concrete rubble from foundations or other structures is usually reused as fill material and road subgrade once the rebar is removed. Asphalt, otherwise called "reclaimed asphalt pavement" is reused in asphalt pavement mixtures, road base course, or utility backfill.

3.3.1.5 Procurement Policies

Public sector procurement can help reduce waste, foster reuse of products, and stimulate markets for recyclable materials and compost. In addition, these procurement policies can serve as a model for other entities, including private sector businesses and institutions.

Pursuant to HRS 342G-41-44, the County has a policy to "give preference to vendors who utilize products with recycled content," when purchasing paper and plastic materials (for example, office paper, printed materials, plastic bags, and so forth), and has a policy to make double-sided copying standard practice at County offices.

3.3.1.6 E-Waste Producer "Take-Back" Program

As of 2010, the state of Hawai'i legislature enacted Act 13 to encourage recycling of electronics, and mandated manufacturers to establish, conduct and manage take-back recycling programs for "covered electronic devices" (CEDs). Act 13 was revised in 2011 to include "covered televisions" (CTVs) [herein referenced as e-waste]. The HDOH is responsible for implementing the program. County public awareness campaigns educate residents on e-waste programs and promote collection events. The County contracts for the collection of e-waste products, which are then shipped off island for proper disposal or treatment. See Chapter 6 Household Hazardous Waste and Electronic Waste for more information related to the e-waste take-back program.

As described in Section 3.3.1.2, seven reuse centers throughout the County allow residents to drop off unwanted and still useful non-e-waste electronics such as small kitchen appliances for purchase at a nominal fee.

3.3.1.7 Product Bans

Since the 2009 Plan, the County regulates the use of plastic bags and polystyrene foam food containers to reduce landfilling of these products and for gaining the overall environmental benefits. Hawai'i Ordinance 121, as codified in Chapter 14 of the County of Hawai'i Code (HCC), bans businesses from providing plastic checkout bags to their customers and encourages use of environmentally preferable alternatives, such as reusable bags. This law went into effect in 2013.

Pursuant to HCC 20-60, the County proposes to reduce the use of polystyrene foam food containers and food service ware by restaurants, supermarkets and other vendors, eliminate the use of polystyrene foam for packaging prepared and unprepared food, and in doing so promote the use of environmentally preferable alternatives. Under this reduction plan, outside purveyors are encouraged, and not required to use alternative packaging to polystyrene foam. On July 1, 2019, all food vendors and County facility users (i.e., concession contracts with the County, renters of County facilities) using disposal food service ware are required to use recyclable or compostable products. If not exempted and found out of compliance, a fine may be imposed by the County; the amount ranges from $10 to $600 depending on the circumstances. In preparation for the ban, the County established an education program for businesses, nonprofits, and the public regarding compostable alternatives to polystyrene foam.

3.3.1.8 Private Reuse Programs

In addition to the County reuse centers, there are several for-profit and nonprofit reuse facilities. For example, Habitat for Humanity Restores are located in Kona and Waimea in West Hawai'i, and Hilo in East Hawai'i; and emphasize reusable building materials, as well as products returned to local 'big box' stores, such as Wal-Mart. Home building items accepted by Habitat for Humanity include lumber (greater than 4 feet long), kitchen and bathroom fixtures, doors, windows, concrete blocks and bricks, latex paint, large appliances, and light and fan fixtures.

Re-use Hawai'i, a local nonprofit deconstruction company, salvages building materials for reuse on other construction projects. Re-use Hawai'i opened their West Hawai'i location in 2018 in Kona. Their first job involved dismantling the Kona Village Resort, which was destroyed by a tsunami in 2011. Re-use Hawai'i sells lumber and other building materials at their redistribution center at a discounted price if the materials have undergone a two-step quality control. The cost of the operation requires approximately 10 percent of its annual budget from outside sources with donations from local foundations and grants from the State. These funds supported the company's expansion from O`ahu to West Hawai'i (West Hawai'i Today 2019).

There are also a variety of other reuse businesses throughout the island – thrift shops and consignment stores, appliance stores, swap meets, and used book stores that sell used merchandise, such as furniture, rebuilt appliances, clothing, housewares, and books. Many local businesses also accept packing materials such as bubble wrap and foam peanuts.

The DEM website, HawaiiZeroWaste.org, provides a listing of for-profit and nonprofit reuse centers throughout the island with store locations, contact phone numbers, and hyperlinks to available websites.

3.3.2 County of Hawai'i Staffing Levels

Successful delivery of local government waste reduction programs requires devoting an appropriate amount of resources including staffing. The County has demonstrated its commitment to waste reduction by assigning the following staff to County waste reduction and recycling programs:

- One full-time recycling coordinator.
- Two full-time equivalent (FTE) recycling specialists for the HI-5 recycling program.
- Three FTE recycling specialists.

The County recycling staff conducts most education and outreach activities. The County has a contract with a consultant to help develop and enhance the education and outreach programs, as described in greater detail in Chapter 5 Public Education and Information.

3.4 Issues and Concerns

As described above, several source reduction activities are conducted in the County, including programs and initiatives by the County as well as other organizations. There is more that could be done by the County and waste generators to promote changed behaviors that would ultimately reduce the quantity of materials entering the waste stream. The need to implement additional programs and policies is further established by the County's commitment to greater diversion.

3.5 Options for Improvement

Pursuant to HRS 342G-26, an overview of various measures that could be implemented to increase source reduction is provided below. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for the County. Note that the options focus on waste reduction and reuse; education, recycling, and composting programs are discussed in other chapters of this Plan update.

3.5.1 County Source Reduction Practices

The County has an opportunity to serve as a model for the entire island and demonstrate their commitment to waste diversion by implementing comprehensive source reduction policies for all County operations. The County could make a more pronounced commitment to environmentally preferable products. This effort could include an evaluation of current practices at all County offices and buildings, and identification of opportunities for increased source reduction. All County employees could be provided with documents providing information about the County's commitment to zero waste, and ideas of how each employee and department can reduce their waste.

Specific policies and activities that the County could adopt include the following:

- Adopt and implement an environmentally preferable purchasing policy and additional environmentally preferable procurement guidelines. Set environmentally preferable purchasing and recycled content as "defaults" for departments to use in departmental purchases of supplies and equipment not centrally procured.
- Establish a Zero Waste Purchasing Committee with a mandate to develop the County's purchasing policy.
- Include measurable zero waste goals in job descriptions and annual performance evaluations.
- Establish a Green Building Policy and evaluate the extent to which those policies can be encouraged or required for new private construction and major renovation projects.
- Use electronic mail, document storage, and retrieval systems to achieve a "paperless office."
- Accept electronic submittal of all applications and required submittals.
- Provide incentives for staff members who develop and implement new initiatives that reduce waste.
- Promote and encourage in-house composting programs.
- Encourage or mandate the use of reusable mugs, plates, and silverware and install dishwashers in County facilities where feasible.
- Publish major accomplishments and progress of each department on the County website.

The federal government has undertaken various initiatives to include the environment in its purchasing decisions. The County could consider EPA's Comprehensive Procurement Guideline program as a model for helping its employees purchase products that use materials recovered through recycling (EPA 2016b).

Cost Considerations. Many County actions could be accomplished at little or no cost. The initial review of purchasing policies would require staff resources throughout many departments; however, additional staff may not be required. Green building policies will increase the cost of construction somewhat; estimates on the extent of likely increases differ, and many jurisdictions have successfully implemented such policies. Purchasing policies can increase the cost of materials; however, this can be offset by

efforts to eliminate certain products from the waste stream (plastic flatware) or by reduction efforts (goal of a paperless office). The net result would probably be a small percentage increase in costs for many County activities and material purchases.

3.5.2 Business Waste Audits and Reduction Plans

The County currently provides a dedicated page to businesses on their HawaiiZeroWaste.org website. Information on the dedicated business page includes guidance for the handling of hazardous materials and promotion of a business waste reduction plan for environmental benefits as well as savings in disposal costs. The web page also includes links to additional information from other websites including the EPA (e.g., WasteWise Program, Procurement Guidelines), the City and County of Honolulu Department of Environmental Services "How to Conduct a Waste Audit" guide, and Energy Star®. The County would expand their business waste reduction program by teaming up with others (e.g., grassroots organizations such as Recycle Hawaii) to conduct business waste audits, provide outreach, or develop an updated business recycling and reuse guide (the latest version is reported to have been produced by Recycle Hawaii in 2005).

As part of the County's effort to work with local businesses to reduce waste, the County could conduct outreach to local businesses to:

- Encourage retailers and their suppliers to take back products and packaging that are currently difficult to reuse, recycle, or compost. Potential take-back programs could be publicized by posting all cooperating retailers on the County's website and publishing frequent articles and/or advertisements in the local newspaper and County newsletter.
- Teach environmentally sensitive lean manufacturing practices to reduce or eliminate non-reusable packaging, transport containers, and serviceware. This effort could target both organizational processes and retail practices.
- Advertise on the County's HawaiiZeroWaste.org website opportunities for material exchanges to foster business-to-business connections to match unwanted material byproducts or commodities for reuse or recycling as feedstock.

Cost Considerations. The cost of this option would differ depending on the speed of implementation. County staffing levels would need to increase to implement and manage the program.

3.5.3 Construction and Demolition Diversion

As described in Section 3.3.1.4, the County DEM currently works with the DPW and County Planning Department to assist developers with large projects in finding alternative ways of disposing demolition waste other than the landfill, and similarly advises large development proponents through the NEPA process. The County would expand the program to emphasize building deconstruction and support local initiatives for adaptive reuse of materials generated during deconstruction projects. Initiatives could include:

- Require demolition projects to publicize in the local newspaper to solicit salvage of reusable items by deconstruction companies.
- Include a dedicated page on the HawaiiZeroWaste.org website that emphasizes construction and demolition recycling and reuse. It could include "how-to" guidance on deconstruction and a listing of available deconstruction companies on the island.
- Require contractors to separate reusable or recyclable construction and demolition debris from non-recyclable materials as a component of permit conditions.

- Separate ceramic items, such as sinks and toilets from the waste stream, and utilize the crushed material in construction.
- Construct a construction and demolition demonstration salvage yard in East Hawai'i.

Cost Considerations. The cost of this option would differ depending on the speed of implementation. At least initially, there would be some added cost to businesses to conduct audits and change existing material management methods. County staffing levels would need to increase to implement and manage the program.

Chapter 9, Sections 9.7 and 9.8, discuss the option and recommendation to develop a Construction and Demolition landfill with a sorting and reuse area.

3.5.4 Visitor Industry

Because tourism is one of the largest industries in the County, hotels, motels, and other lodging facilities contribute a significant portion of the County's waste. There are a variety of basic measures that these facilities can implement to reduce their waste stream, including:

- Replace disposable products with reusable products (utensils, dishes, cleaning supplies).
- Buy in bulk, when possible.
- Offer newspapers only upon request.
- Change linens only upon request.
- Utilize soap and shampoo dispensers rather than disposable containers.
- Utilize air hand dryers or reusable napkins in public restrooms, rather than disposable.
- Change lighting fixtures to LED (light emitting diode) bulbs.
- Practice grasscycling.
- Implement onsite composting.
- Donate or sell lightly used furniture or appliances instead of landfilling.

This program could be implemented as a sub-element of a broader business waste audit and reduction program (see Section 3.5.2), or as a stand-alone program. The County could seek partner businesses and organizations within the visitor industry to build on existing waste reduction efforts by industry. At least initially, there would be some added cost to businesses to change existing material management methods.

Cost Considerations. The cost of this option would differ depending on the speed of implementation. County staffing levels would need to increase to implement and manage the program.

3.5.5 Reuse Facilities

As described in Section 3.3 Existing Conditions, the County currently contracts seven reuse centers, and one reuse facility is managed by volunteers, which is far greater than the number of facilities in operation at the time of the 2009 Plan. All reuse centers have been successful at diverting household products and, to a lesser extent, construction (demolition and deconstruction) materials from the landfills. The County has three options:

- Expand and develop more reuse centers.
- Improve programs at existing facilities.
- Increase promotion of the many for-profit and nonprofit thrift stores throughout the County.

The Reuse Center at Laupāhoehoe is run by volunteers with assistance from the solid waste facility attendants from time to time to remove large items. The County has considered upgrading the volunteer facility at Laupāhoehoe and contracting the management; however, the amount of overall waste diverted from the landfill is relatively low and resources are better used elsewhere. Instead of investing in new facilities, the County is working with the contractor responsible for managing the existing facilities to improve operations as follows:

- Develop and communicate to residents a list of the highest priority materials to maximize the type and quantity of materials that can be accepted.
- Be selective about merchandise, emphasizing items that are lightly used, clean, and in good condition.
- Improve signage.
- Provide more covered space.
- Improve organization and display of merchandise.

The County could also work collaboratively with the volunteer-based Laupāhoehoe site to increase participation, which has decreased since the initial enthusiasm around the program. If the acceptance of highest priority materials results in greater diversion, expanding the program to other recycling and transfer stations, or upgrading the Laupāhoehoe Reuse Center could be considered.

The County could increase their support of other thrift stores (for-profit and nonprofit) by providing an interactive map showing store locations and providing details on materials accepted on the HawaiiZeroWaste.org website or through other promotional efforts such as radio or other media. This support could focus on stores that divert construction demolition and deconstruction materials because this is a significant portion of the waste stream (estimated at 22.2 percent in 2008).

Cost Considerations. The cost of expanding facilities would depend on the number of facilities constructed, site-specific design considerations, and the resources devoted to staffing and outreach at each facility. The cost of improving the functionality of existing facilities to increase waste diversion would be nominal.

3.5.6 Establish Pay-As-You-Throw System for Residential Discards

Implementing a pay-as-you-throw (PAYT) system creates a financial incentive for residents and businesses to reduce their waste. As reported in the most recent EPA co-sponsored publication, PAYT systems, also known as variable rates programs or user pay, ask households to pay more if they put out more garbage for collection. The EPA asserts that the most effective way for local governments to reduce residential solid waste, increase recycling, and decrease waste-related greenhouse gas emissions is by implementing PAYT programs (EPA 2016c). A 2017 study of 20 municipalities in the State of Maine concluded that *communities with PAYT generated, on a per capita basis, 44.8 percent less trash than those without PAYT.* In this same study it was estimated that communities with PAYT generated approximately 340 pounds of residential trash per capita of municipal solid waste (MSW) per year compared to non-PAYT communities that generated approximately 645 pounds (WasteZero 2015a). PAYT provides a powerful financial incentive for residents to reduce waste discards.

A good example of a smaller jurisdiction in the state of Hawai'i implementing a PAYT program is the County of Kaua'i. In 2014, the Kaua'i County Council passed PAYT Ordinance 975. The ordinance went into effect in July 2015. An important component of the program was the development of an implementation plan that was funded through the EPA Region 9 Solid Waste Management Assistance Grant (County of Kaua'i 2018a).

In the County, this program could be implemented in multiple ways:

- PAYT at County Recycling and Transfer Stations: Charge residents on a volume or weight basis for garbage delivered to County recycling and transfer stations while allowing drop-off of recyclable or compostable materials at no charge.
- Provide Universal Collection with PAYT Rates:
  - Implement universal collection for households in areas of dense populations and charge rural residents on a volume or weight basis for garbage delivered to County recycling and transfer stations, while allowing drop-off of recyclable or compostable materials at no charge.
  - Implement universal collection for households densely populated areas and charge a base fee to all residents (including those who opt out of universal collection or rural populations that are outside the universal collection zones), while allowing drop-off of recyclable or compostable materials at recycling and transfer stations at no charge.
  - Implement universal collection of garbage for all households in the County.

Except for the universal collection program sub-option that would charge a base fee to all residents, the above options have the additional benefit of eliminating misuse of the recycling and transfer stations by non-residential generators. To successfully implement a PAYT program, it is advisable to develop a study or implementation plan to fully understand the system that would work best for the residents of the County. A discussion of each option follows.

3.5.6.1 PAYT at County Recycling and Transfer Stations

PAYT could be implemented at County recycling and transfer stations by establishing rates either proportionally by volume or by weight, which would be charged for discarding materials at each station. Another option could be a flat rate.

Option 1: Bag or Tag Proportional Pricing System

Typical volume rates include some combination of per-bag and per-vehicle fees. Because the County would prefer to avoid security and other issues relating to collection of fees at recycling and transfer stations, this system could be implemented using pre-purchased bags or tags, eliminating the need to collect fees at the recycling and transfer stations. Residents would be provided a pre-determined number of County-approved garbage bags, or tags that can be used for disposing of larger items. Additional bags or tags could be purchased from the County or through local retail outlets.

To implement this option, all recycling and transfer stations would need to have a full-time attendant to monitor residential disposal. In addition, the program would need the following:

- Adequate bins for dropping off readily recyclable materials at, or nearby, the recycling and transfer stations.
- A small building or other structure for an attendant to use while monitoring incoming loads.
- Adequate space to allow for vehicle queuing at the recycling and transfer stations.
- An agreement with retail stores to sell pre-approved bags or tags on behalf of the County.

Option 2: Variable Rate Three-Can System

The County could consider charging residents based on the volume of cans (e.g., 12- ["micro can"], 20-, 32-, 64-, or 96-gallon) they dispose of at their local recycling and transfer station. In this option, residents may haul their rubbish, green waste, and recyclables to their nearest recycling and transfer

station. The onsite attendant would visually count the number, size, and type of cans. Variable rates would be enforced for the type of waste (green waste, rubbish, or recyclables) as well as the number and size of the cans.

This option would require:

- Adequate space to allow for vehicle queuing at the recycling and transfer stations.
- A small building or other structure for an attendant to use while monitoring incoming loads.
- Collection of fees at the recycling and transfer stations.

Option 3: Variable Rate Scale System

The County could consider a PAYT system that is established by weight through the installation of scales at the County recycling and transfer stations. An inbound and outbound scale would have to be installed at the station. Because of the high initial costs of this option, scales could be installed at recycling and transfer stations that experience the highest traffic and disposal volumes. Residents would drive onto an inbound truck-mounted scale, dispose of their waste, drive onto an outbound scale, and pay the attendant for the per pound weight difference.

This option would require:

- Installation of an inbound and outbound scale.
- Installation of a recording system.
- Adequate space to allow for vehicle queuing at the recycling and transfer stations.
- Collection of fees at the recycling and transfer stations.

Option 4: Multi-tiered Pricing

Multi-tiered pricing generates greater revenue for localities (EPA 2016c). Through this system, residents are required to pay a monthly fee for baseline solid waste service. The County may require residents to pay for every bag and/or cart they fill on top of this fee, or they may include up to two or three bags/cans per week into the baseline fee (Solid Waste Association of North America [SWANA] 2007). If residents exceed this amount, they will be required to pay a second tier for additional bags or containers they fill on top of this fee. Residents must then pay a second tier to dispose of extra waste, which may be based on volume (SWANA 2007). Recyclables and green waste could then be collected at a reduced fee or for no charge.

Option 5: Automated Transfer Station Pay Station

The County could install self-service electronic fee payment mechanisms at all recycling and transfer stations that charge a flat fee. The County could also consider installing a self-operating compactor as a component of the system, which would charge customers based on weight.

For example, a gated customer-operated drop box is in operation in rural Skykomish, King County, WA. This facility allows customers to drive up to an automated gate, make payment at a self-service kiosk, and

Automated Rural Drop Box Pay Station in Skykomish, WA Source: King County (2018)

then enter the gated area to dispose of their solid waste into two top-loading drop boxes, each with two stalls. It does not have a self-operating compactor. Recycling facilities are also provided outside the gated area, allowing customers to drop off recyclables without paying a fee. The waste ultimately ends up being transported to a transfer station 50 miles away for eventual disposal at the regional landfill. Because of its remote location, cameras are used to monitor activities, and staff make regular visits for maintenance. King County's Solid Waste Division has formed a partnership with the Road Services Division in which staff working at the adjacent road services facility regularly monitor the site.

Some of the challenges related to the Skykomish self-operating system includes illegal dumping (including in the recycling bins), little to no control of materials that require special handling (e.g., hazardous waste), exceedances of load limits, unwanted visitors (e.g., black bear, people scavenging during afterhours), loss of revenue, and maintenance of bins for proper weight distribution. However, the advantages of the Skykomish rural drop box includes rubbish collection for an underserved community, the availability of recycling, opportunities to educate customers, and the partnership with the Road Services Division.

In the County, potential complications of such a system could include:

- Upfront cost of fee payment technology and compactors at recycling and transfer stations lacking these facilities.
- Upgrades to existing compacting systems for use by the public.
- Maintenance of fee-payment systems and security cameras.
- Administrative costs (although this would be realized in varying degrees with any PAYT program).
- Potential safety issues (people operating compactors).
- Potential for illegal dumping.
- If unstaffed, issues with weight distribution in drop box.

However, the introduction of such a system would have the advantage of less reliance on the general fund, and the potential reduction in recycling and transfer station staffing.

Conclusion

It is possible that not all recycling and transfer stations would have the physical space to accommodate the infrastructure needs for a PAYT system – some stations may need to be closed, relocated, or substantially modified to implement this program. There is the potential to consolidate "wastesheds" to fewer facilities (i.e., closing some and enhancing others based on usage and/or distances from population centers to the facilities). Chapter 8, Section 8.7.6, identifies potential recycling and transfer stations for optional closure.

Implementation of these options would require an aggressive public education and information campaign to ensure that residents understand the rationale for implementing the PAYT program.

Cost Considerations. Estimating the initial infrastructure costs for this option would require conceptual designs at each of the County's 22 recycling and transfer stations. The infrastructure cost could vary considerably depending on site-specific conditions and the extent to which modifications are feasible at each station. The County would need to modify its financial systems to account for the new revenue source.

3.5.6.2 Universal Collection with PAYT Rates

While not unprecedented, the County's current system of providing recycling and transfer stations distributed throughout the County is a relatively uncommon way of providing garbage collection services to residents. PAYT rates could be implemented as part of a move to provide universal garbage, recycling, and perhaps organics collection services to all County residents. Elsewhere in the United States, residential collection services typically are either provided by local government or by the private sector under a contract or franchise arrangement. The Supreme Court of the State of Hawai'i "Konno decision" affirmed the rights of the United Public Workers (UPW) union to perform work that "customarily and historically" had been performed by government workers. However, subsequent to that ruling, the Hawai'i Legislature in HRS 46-36 provided for a "managed competition" process in which local government and the private sector would compete on the basis of efficiency, effectiveness, and price for new government services. Additional research would be needed to decide the best way to proceed with universal collection if this is an option the County would like to implement.

PAYT collection rates can take many forms including using a variable can, metered bag, or metered tag system. The key aspect of this system is to charge a progressive rate for each additional garbage unit collected above the basic service level (for example, one can per week).

Like PAYT at County recycling and transfer stations, implementation of this option would require implementation of an aggressive public education and information campaign to ensure residents understand the rationale for implementing the PAYT program.

Significant upfront planning would be required to assess a wide range of implementation details. The County would need to establish billing systems and a customer service organization, and modify its financial systems to accommodate this new service. The County could elect to assess the potential for reducing property taxes as an offset to the new revenue source.

Cost Considerations. The County of Kaua`i PAYT variable rates are $10 per month for a 64-gallon cart and $18 per month for a 96-gallon cart. Service is once per week. Everyone pays a $6 base fee whether they have County-provided collection service or opt out and only use the County-operated recycling and transfer stations. They provide a 50 percent cost reduction for low-income households, both on the base fee and the rubbish collection fee.

3.5.7 Expanded Home Composting Program

Since the 2009 Plan, the County has decreased emphasis on a public campaign around home composting, which formerly entailed educational workshops and distribution of backyard composting units. The County's home composting promotion is now primarily emphasized on the HawaiiZeroWaste.org website, which includes links to EPA guidance and other resources on backyard composting, and locations on the island where worm bins, worms, and accessories can be purchased. The program could rekindle a more aggressive promotion campaign and a target penetration rate of at least 25 percent of single-family households within 5 years.

Cost Considerations. The County would have to consider the cost for purchase, storage, and delivery of each unit. Existing staff resources would need to be used to develop the plan for how best to distribute the units and to provide suitable promotion and user education.

3.5.8 Expanded Reusable Bag Program

As part of their educational outreach program, the County has conducted Bring-Your-Own Bag (BYOB) promotional events at local grocery stores and at various community events such as Earth Day, during which reusable grocery bags are given to interested residents. To expand this program, the County could significantly increase the number of reusable bags that are distributed to residents, and expand its outreach to encourage participating grocery stores to increase the financial discount for using reusable bags.

Cost Considerations. This option would require additional staff time and funding for additional materials.

3.5.9 Expand Source Reduction Education

A key to successful reuse programs is the education of the staff (government, private for-profit, and nonprofit) who operate the facilities within the program. Once staff have been trained on the basics of how these programs work, they will need to develop systems to implement programs for the public. The methods for providing materials to markets include retail sales, dismantling for recycling, and ensuring materials reach markets accessible to the public.

Chapter 5 Public Education and Information includes a series of proposed enhancements to the County's education and promotion programs.

3.5.10 Establish Extended Producer Responsibility Policy

As previously described, EPR is a policy tool that extends manufacturer's responsibilities to include responsibility for life cycle costs of their products and associated packaging. This approach has been successfully implemented in various communities throughout Europe and Canada, as well as parts of the United States.

When considering the life cycle of a product, manufacturers should take into consideration the environmental footprint of a product, from its beginning to end of life. Through EPR, the responsibilities and life cycle costs of their products and packaging shift from municipalities towards manufacturers. For instance, through EPR, producers analyze the natural resource, energy, packaging, and transportation-associated costs and impacts of their products (MacKerron 2012).

In 2012, 32 states enacted greater than 70 producer responsibility laws, including topics such as batteries, telephones, paint, pesticide containers, carpet, and fluorescent lamps. However, none of these programs took into consideration product packaging (MacKerron 2012). Around the globe, British Columbia mandated a fully funded EPR paper and plastic packaging program by manufacturers in 2014 (Resource Recycling Inc. 2016); after 1 year, the province reported a 77 percent recovery rate. In Europe, since the European Union's adoption of EPR in 1994, 25 member states have enacted national packaging policies and achieved a 65 percent recycling rate in 2012 (EUROPEN 2018).

Some policy statements the County may want to consider include the following:

- Express support for state and federal policies to eliminate subsidies, internalize externalities for virgin material production and wasting, and involve producers in taking physical and/or financial responsibility for their products and packaging through reuse, repair, or recycling.
- Express support for state and County agencies to support product stewardship, by creating a state/counties coalition to work towards EPR, along with other active states.

- Express support for policies designed to relieve local taxpayers from the burden of managing wastes they have no control over. This could include identifying specific product categories that have the greatest impact on local programs.
- Express support for mandatory recycled content, as well as "cradle-to-cradle" product take-back and recycling services. Insist that the cost of the programs be paid by manufacturers and internalized into the cost of their products.

EPR framework policy and legislation can be drawn from successful programs implemented in California, Oregon, Washington, and Minnesota, as well as other areas of the world including Belgium, the Netherlands, and Germany.

Cost Considerations. To implement this option, the County would need to invest some ongoing staff time and potential consulting assistance for research, policy analysis, and drafting legislation. The price of some products affected by EPR programs could increase depending on exactly how EPR was implemented.

3.5.11 Create a Zero Waste Fund

To encourage local innovation and participation, the County would fund community zero waste initiatives with fees levied on landfill disposal. This funding would include leveraging private sector investments by adopting supportive policies and providing technical assistance and support letters for independent financing and/or grants. The more that nonprofits and private companies invest in expansion of reuse, recycling, and composting programs, the less the County needs to invest. The County could also identify and support proposals for state, federal, and foundation grants and loans for local zero waste businesses and service providers.

For example, in Boulder, Colorado, the Boulder County Resource Conservation Division distributes $50,000 annually as part of its Zero Waste Funding Program. Since 1997, they have awarded over one million dollars for education and infrastructure initiatives to businesses, residents, and governments.

Cost Considerations. The cost of this option would depend on the extent to which the County elects to fund this program. Some added staff time would be necessary to develop and administer the program.

3.5.12 Public-Private Partnerships with Community-Based Organizations

A survey of the reuse industry (e.g., Goodwill Industries, Habitat for Humanity) on the island would be beneficial. Other nonprofits or businesses may be interested in participating in reuse programs within the County. The County could convene a meeting of interested parties to determine the level of interest, evaluate what challenges such a program would face, and identify potential mechanisms to assist with initiation of the program.

Independent community-based organizations (CBOs) may see this as an opportunity. They are potentially available to take on repairing and refurbishing as well as dismantling of discarded items into recyclable commodities.

Cost Considerations. Some added staff time would be necessary to develop and administer the program.

3.6 Recommendations

Based on the analysis presented above, and discussions with the SWAC, the County plans to improve source reduction as follows:

1. **Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills, including:**
   - Develop a County ordinance that requires a waste reduction plan be submitted to obtain a commercial or residential building permit. Coordinate implementation with the County Planning Department.
   - Work with other counties to develop EPR policy statements or resolutions expressing strong support for initiatives that require manufacturers of certain products or materials to take responsibility for the life cycle costs of their products. As a component of the EPR policy, implement a campaign to develop EPR for difficult-to-recycle products, and lobby state and federal lawmakers to advance EPR initiatives.
   - Implement a County government source reduction program by implementing policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies.
2. **Investigate a PAYT program or other funding method.** A critical element of the County waste management program is to provide incentives for the public to participate in source reduction and other programs to reduce waste going to landfills. PAYT programs have proven to be a highly successful and cost-effective method of reducing waste going to landfills in many similar communities nationwide. After considerable deliberation by the SWAC about its advantages and disadvantages, this Plan update recommends conducting a feasibility study regarding the implementation of a PAYT program or other funding method. The feasibility study of a PAYT program or other funding method would include the following components:
   - Suite of funding mechanisms and logistics for implementing programs (i.e., capital improvements, administration, self-haul versus collection, or a combination of the two).
   - Education and public outreach campaign (including retail businesses) that would be necessary for the implementation.
   - Pilot program that would be at no cost to the public to introduce the program and identify ways in which the program can be implemented most effectively.
   - Training for County staff to implement the program.
   - "Phasing-in" of the program, which would span over several years.
   - Prevention of illegal dumping.
   - Plan for monitoring and evaluation of program results and participation.

     Note: Chapter 8, Section 8.8 (Recommendation 1) discusses the continued operation and maintenance of recycling and transfer stations until a decision on the best method of collection and transfer is determined, and to also explore alternative funding mechanisms via a feasibility study. Chapter 10, Section 10.6 (Recommendation 1) discusses a Solid Waste System Financial Analysis.

3. **Improve the current reuse facility program.** One of the most popular existing waste reduction programs among County stakeholders is the operation of reuse facilities where unwanted products that are still useful can be made available to others rather than discarded. Several recommendations relating to improving the current reuse program include the following:

   - Work with the contractor to create a list for public distribution, which describes what items are preferable donations.
   - Work with the contractor managing the reuse centers to be more selective about merchandise, emphasizing items that are lightly used, clean, and in good condition. Improve signage, organization, and display of merchandise.
   - Provide more covered space at reuse centers.
   - Collaborate with the volunteer-based Laupāhoehoe Reuse Center to increase participation of volunteers.
   - Continue public-private partnerships with organizations such as Goodwill Industries to develop reuse centers at existing outlets within the County.
   - Consider expanding the program to other recycling and transfer stations and/or upgrade the Laupāhoehoe Reuse Center.

   If improvements to the existing reuse facility program results in greater diversion, expanding the program to other recycling and transfer stations or upgrading the Laupāhoehoe Reuse Center could be considered.

4. **Expand and improve public education and awareness programs.** Stakeholders agreed that education was a key element of implementing source reduction programs within the County. The following are recommendations regarding development of educational programs:

   - Develop a business waste audit and education program to foster source reduction within the local business community.
   - Develop a visitor industry waste reduction education program.
   - Continue reuse education, outreach, and public awareness campaign to encourage public participation and use of the reuse centers.

4. RECYCLING, BIOCONVERSION, AND MARKETS

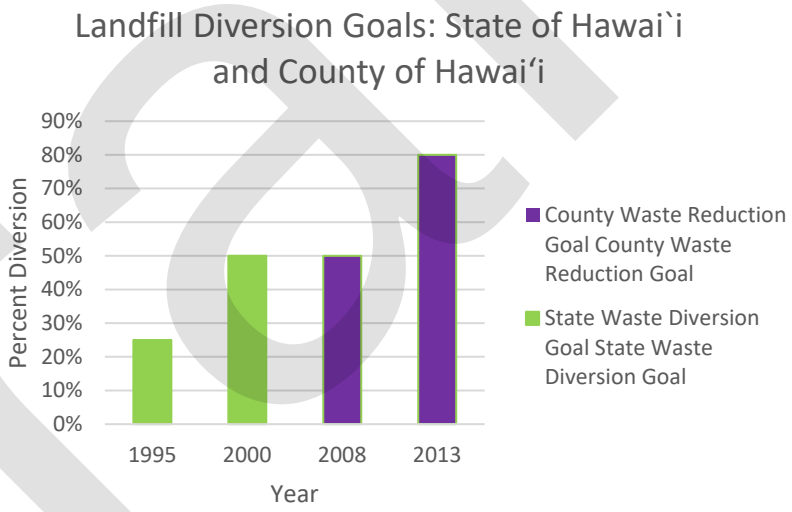
4.1 Introduction

Recycling and bioconversion involve reprocessing materials that would have been disposed as solid waste into new and marketable products. Common recycled materials include beverage containers, paper products, and scrap metal. Bioconversion consists of processing organic materials such as grass, leaves, branches, untreated wood, or food to produce new products, such as compost and fertilizer, using biological means.

This chapter describes existing recycling and bioconversion activities within the County, identifies issues and concerns with respect to current recycling and bioconversion practices, and presents options for achieving the County's recycling and bioconversion goals.

4.2 Background

As discussed in Chapter 3, Source Reduction, the State of Hawai'i prioritizes solid waste management practices and processing methods for each county according to Hawai'i Revised Statutes Chapter 342G-2 (HRS 342G-2). The second priority, as discussed in this chapter, consists of recycling and bioconversion (including composting). Furthermore, as discussed in HRS 342G-3 established a 25 percent waste diversion goal by 1995, and a 50 percent goal by 2000 through source reduction, recycling, and bioconversion.



Recycling and bioconversion practices were first detailed in the original Integrated Solid Waste Management plan created in 1993 and in subsequent updated plans. In 2003, the County passed a resolution with a goal to divert 50 percent of the solid waste from landfills by 2008 and 80 percent by 2013.

4.2.1 Zero Waste

In 2007, the County further enhanced solid waste practices and concepts by adopting Resolution 356-07, a zero waste philosophy toward solid waste management. In 2008, the County passed Resolution 766-08 urging the state to enact legislation to shift costs and responsibilities for waste management from local governments to manufacturers of products and create incentives for product redesign. In 2008, the County contracted with Recycle Hawaii to conduct a zero waste implementation plan (Recycle Hawaii 2009). The Zero Waste Implementation Plan was completed in March 2009. The purpose of this plan was to evaluate resource management options including reuse, recycling, composting, and special discards management, among others, that may help the County achieve its waste reduction goals.

The Zero Waste Implementation Plan included input from 12 stakeholder meetings and a Zero Waste Conference. These were held in September 2008 at multiple locations in the County to present zero waste concepts, and receive input from local residents and business owners about ways to turn currently discarded materials into resources. The plan received input from over 300 participants.

The recommendations of the Zero Waste Implementation Plan have been incorporated into this Plan update, where applicable, based on consensus of the SWAC, and Solid Waste Division (SWD) staff. Greater detail regarding the Zero Waste philosophy and the implementation plan is provided in Chapter 3, Section 3.2.2.

4.2.2 Review of 2009 Plan

Exhibit 4-1 provides a summary of the recommendations from the 2009 Plan relative to recycling, bioconversion, and marketing, and describes the actions taken to achieve each recommendation.

Exhibit 4-1. Status Update of 2009 Plan Recommendations for Recycling, Bioconversion, and Markets

2009 Plan Recommendation	Status
Recycling	
Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates.	In 2016, via Resolution 709-16, the County Council requested the Departments of Environmental Management and Research and Development initiate a feasibility impact study related to extended producer responsibility and incentives. The request was not implemented due to staffing and financial constraints.
Establish a differential tip fee ordinance.	In 2005, Ordinance 05-27 adopted a 25 percent of the landfill disposal fee for green waste and acceptable organics [green waste must be separated from other solid waste to qualify for the discounted disposal fee]. This was formerly codified in 2015 as HCC 20-49(a)(2)(B) and implemented on July 1, 2015.
Establish an ordinance that mandates source separation and recycling.	Difficult to achieve a balanced community-supported outcome in advancing this recommendation.
Develop legislation requiring multi-family dwellings and multi-tenant commercial buildings to have recycling services.	Difficult to achieve a balanced community-supported outcome in advancing this recommendation.
Change County procurement policies to require the use of recycled materials.	Difficult to achieve a balanced community-supported outcome in advancing this recommendation.
Work with County and state legislators and encourage other communities in the region [Hawai'ian counties] to adopt zero waste goals and plans.	Informal discussions have occurred.
Coordinate with legislators and waste managers from other counties to develop a statewide zero waste strategy.	Staff time was not allotted to this recommendation.
Lobby the state to change school waste collection contracts to mandate that recycling services are included.	Informal discussions with the state have occurred.
Complete capital projects to facilitate implementation of expanded recycling programs.	Did not implement due to funding constraints.
Expand recycling opportunities at recycling and transfer stations.	Did not implement due to funding constraints.

Exhibit 4-1. Status Update of 2009 Plan Recommendations (continued)

2009 Plan Recommendation	Status
Improve signage at recycling and transfer stations.	The FY 2018–19 Recycling Program Educational Outreach Consultant Scope of Services includes the redesign of new signage at recycling and transfer stations. The signs are being installed at the recycling and transfer stations.
Reconfigure the East Hawai'i Regional Sort Station Reload Facility for use as a material recovery facility.	Changed goals and direction. County will use the existing facility as a transfer station with limited separation.
Construct a new material recovery (bailing and storage) facility for West Hawai'i.	The County no longer plans to develop a material recovery facility in West Hawai'i.
Allow small businesses to use the recycling and transfer stations to recycle selected materials.	Did not implement. Implementation would require funding and an ordinance to amend County code.
Modify the operating permits of the recycling and transfer stations to accommodate expanded recycling services.	Current operating permits allow more materials to be recycled when and if funding becomes available.
Hire one full-time staff member to serve as a commercial recycling specialist.	No funding available for this position.
Expand business education and outreach programs.	No funds allocated for this project except to provide information on the website.
Expand opportunities to recycle in public areas and during public events.	The SWD offers recycling bins for events.
Install recycling bins in parks and other public areas.	The County has installed recycling bins in some parks and public areas; however, most have been damaged or removed, and many of the recyclables are diverted by individuals seeking income through recycling (e.g., HI-5 program).
Conduct additional recycling events within the community each year.	Did not implement, limited staff. County has reduced the type of materials accepted due to market constraints (e.g., certain plastics).
Implement and expand the Recycling Art campaign in public schools.	In FY 2015, the County canceled procurement of the Recycling Education and Outreach Services contract. The previous contract with the Recycling Education and Outreach vendor expired in 2014-06-30.
Bioconversion	
Promote both large- and small-scale private organics composting operations.	The County is in the process of acquiring a site for a privately managed County facility.
Improve education and outreach programs that promote improved management of organics.	Organics education included in original Request for Proposal (RFP) 3298 and in the original contract. Current lack of funding for business organics management.
Hire one full-time staff member to serve as the organics program coordinator.	Did not implement.
Expand and further develop a master composter program.	The County has considered implementation of a master composter program; it is still being considered.
Develop a training program and guidance materials for farmers.	Did not implement.
Implement a "stop wasting food" program with local food banks.	Did not implement.
Partner with other local groups to establish compost demonstration gardens.	Did not implement.

Exhibit 4-1. Status Update of 2009 Plan Recommendations (continued)

2009 Plan Recommendation	Status
Initiate an onsite composting program for residents and businesses by distributing subsidized units to both residences and businesses.	Earth Machine Composters and Backyard Composting Workshops were provided under the Recycling Education contract, which has since been discontinued.
Conduct a study to evaluate the potential for implementation of a landfill ban on organics.	Did not implement.
Implement added organics management facilities and equipment.	Did not implement.
Add green waste dropoff locations at recycling and transfer stations.	Facilities were added to the Pāhoa, Volcano, Ke'ei, and Waimea Transfer Stations.
Process green waste at select recycling and transfer stations.	Did not implement.
Develop an organics composting facility at the West Hawai'i Sanitary Landfill or other sites.	The County has been actively engaged in planning for a composting facility. An Environmental Assessment (EA) was developed for a proposed site at a former rock quarry adjacent to the South Hilo Sanitary Landfill, and was withdrawn from consideration due to concerns over the location and the potential impacts to the local community. An EA was then completed for a compost facility on 40 acres in the Shipman Industrial Park in Kea'au, and land procurement for 20 of the 40 acres is currently being negotiated. Design work is currently being completed for the facility and the composting facility is slated for operation in 2020.
Investigate opportunities for pilot food waste demonstration projects.	Did not implement.
Marketing	
Enhance local markets for recyclable materials.	The County encourages state or on-island reuse and end- markets for recycled materials. Currently, green waste, glass, paper, and tires are used locally.

4.3 Existing Conditions

According to the County Department of Environmental Management (DEM), the waste diversion rate, signifying the quantity of recycled materials taken as a percentage of total waste generation, has decreased from approximately 36.1 percent in FY 2009–10 to 20.8 percent in FY 2017–18. Exhibit 4-2 provides yearly data of waste generation, recycling, and disposal activities.

The FY 2016-17 diversion rate may be divided into categories to characterize the amount of recycling and disposal by material. The two highest waste diversion rates occur in green waste and metal recycling, at 63.3 percent and 14.2 percent, respectively.

Although the FY 2017–18 current diversion rate is 20.8 percent, there is likely a significant amount of recycling being conducted independently by private businesses that is not being tracked or measured by the County. These recycling efforts from the private sector significantly increase the overall diversion rate, especially in the paper and plastic waste categories.

The status of recycling, bioconversion, and marketing efforts in the County of Hawai'i is described below. As described in Chapter 2, scrap metal recycling facilities contracted with the County were required to clear-out their stockpiles prior to permit expiration. With the facilities no longer in operation, the County limited the scrap metal they would accept and diverted scrap metal to the private

sector–thus, there is a marked decrease in subsidized scrap metal after FY 2012–13. Therefore, although the recycling and diversion rates appear to have decreased, this number is skewed since most scrap metal recycling was diverted to the private sector starting in 2013.

Exhibit 4-2. Historical Generation, Recycling/Diversion, and Disposal and Estimated Diversion Rate, County of Hawai'i

	Tons			
Year	Generation	Recycling	Disposal	Diversion Rate
FY 2009–10	243,719	88,037	155,682	36.1%
FY 2010–11	234,308	67,854	166,454	29.0%
FY 2011–12	243,457	90,508	152,949	37.2%
FY 2012–13	235,483	79,029	156,455	33.6%
FY 2013–14	221,915	55,025	166,890	24.8%
FY 2014–15	239,052	60,028	179,024	25.1%
FY 2015–16	246,679	57,921	188,758	23.5%
FY 2016–17	259,472	64,309	195,162	24.8%
FY 2017–18	283,021	58,825[1]	224,196	20.8%
Percent Change FY 00–09 – FY 07–18				
Total	13.3%	1.6%	44.0%	-48.0%
Average Annual	1.7%	2.5%	4.6%	-6.4%

Source: County of Hawai'i DEM.

Note: The table does not account for non-County-sponsored (private) recycling or diversions. These could include 'big-box' stores (e.g., Costco, Walmart) that ship combined bales of cardboard and plastic to either the West Coast to third-party brokers or to the retailer's distribution center. Contractors or nonprofit groups also sell recycled materials directly to brokers on the mainland.

4.3.1 County of Hawai'i /State of Hawai'i Programs

County of Hawai'i offers recycling services through various state and county programs. The County utilizes recycling and transfer stations as collection points for the majority of recycled material from residents. Recycled material accepted at these locations includes paper products, green waste, scrap metal, metal cans, glass, certain plastics, and redeemable beverage containers through the State of Hawai'i Beverage Container Deposit Program. Mixed recyclables and glass are placed in separate bins through the 2-bin program. The County has also implemented the following measures:

- Maintains a limited number of recycling bins in some parks and public areas; however, most have been damaged or removed.
- Provides technical assistance and bins to event coordinators looking to recycle at major events.
- Manages programs and facilities for green waste and composting.

To encourage recycling and bioconversion activities, the County provides public education and awareness programs for residents. These education programs are discussed in Chapter 5 Public Education and Information. Recycling also encompasses proper diversion of household hazardous wastes, household appliances, and electronics; these programs are discussed in Chapter 6 Household Hazardous Waste and Electronic Waste. Special Wastes, which require special handling or processing, are discussed in Chapter 7.

4.3.1.1 County Recycling and Transfer Stations

The County operates 22 recycling and transfer stations for residents to drop off garbage and at 19 of those stations, residents can drop off recyclables. The Ocean View Recycling and Transfer Station, located in West Hawai'i, is the most recent addition, and accepts HI-5 containers; however, it does not accept 2-bin recyclables. Most of the recycling and transfer stations currently have a 2-bin recycling area, which consists of dropoff bins for mixed recyclables (mixed paper, plastic, metal cans, and cardboard), and a separate bin for container glass. Some of these recycling and transfer stations also serve as collection points for other types of recyclable materials.

Exhibit 4-3 lists the recycling and transfer stations and the materials accepted at each location.

The County has expanded recycling activities at recycling and transfer stations by expanding recycling and reuse centers (RRCs) at various recycling and transfer stations. The Kea`au Recycling and Transfer Station, was the first to be developed into a full-time recycling and reuse center. These centers have been developed at the Hilo, Kealakehe, Pāhoa, Waimea, Laupāhoehoe, Keauhou, and Wai`ōhinu recycling and transfer stations.

Exhibit 4-3. County of Hawai'i Site Characteristics for Existing Recycling and Transfer Stations

Recycling and Transfer Station	MSW	Glass	Mixed Recyclables	Scrap Metal	White Goods	Green Waste	Reuse Center	HI-5 Redemption Center
East Hawai'i								
East Hawai'i Organics Facility (EHOF)[b]	–	–	–	–	–	X	–	–
Glenwood	X	X	X	–	–	–	–	–
Hilo[a]	X	X	X	X	X	–	X	X
Honoka`a	X	X	X	X	X	–	–	X
Honomū	X	X	X	–	–	–	–	–
Kalapana	X	X	X	–	–	–	–	–
Kea`au[a]	X	X	X	X	X	X	X	X
Laupāhoehoe	X	X	X	X	X	–	X	–
Pa`auilo	X	X	X	–	–	–	–	–
Pāhala	X	X	X	X	X	–	–	–
Pāhoa	X	X	X	X	X	X	X	–
Pāpa`ikou	X	X	X	–	–	–	–	–
Volcano	X	X	X	X	X	X	–	X
West Hawai'i								
Ka`auhuhu (Hāwī)	X	X	X	X	–	–	–	X
Kealakehe (Kailua-Kona)[a]	X	X	X	X	X	X	X	X
Keauhou	X	X	X	–	–	–	X	X
Ke`ei	X	X	X	X	X	–	–	–
Miloli`i	X	–	–	–	–	–	–	–
Puakō	X	X	X	X	X	–	–	X

Exhibit 4-3. County of Hawai'i Site Characteristics for Existing Recycling and Transfer Stations (continued)

Recycling and Transfer Station	MSW	Glass	Mixed Recyclables	Scrap Metal	White Goods	Green Waste	Reuse Center	HI-5 Redemption Center
Ocean View	X	X		–	–	–	–	X
Waiea	X	X	X	–	–	X	–	–
Waimea	X	X	X	X	X	X	X	X
Wai`ōhinu	X	X	X	X	**X**	–	X	X
West Hawai'i Organics Facility (WHOF)[b]	–	–	–	–	–	X	–	–

[a]Hilo, Kea`au, and Kealakehe recycling and transfer stations contain separate bins for newspaper and cardboard. [b] Green waste recycling only.

4.3.1.2 HI-5 Beverage Container Deposit Program

The state of Hawai'i enacted a new Beverage Container Deposit Program in late 2004. Otherwise known as the "Bottle Bill," a 5¢ redeemable deposit is placed on each beverage container, as defined under the law. Consumers may then return the container to redeem their 5¢ at any redemption center. Other details of the program include the following:

- A 1¢ non-refundable container fee is assessed for program administration.
- Redeemable containers are marked with a "HI5¢" or "Hawai'i 5¢" label.
- The container size is limited to 68 ounces (2 liters) or smaller.
- The beverage type consists of non-alcoholic drinks (soda, water, coffee, tea, juice) and limited alcoholic drinks (beer, malt beverages, mixed spirits, and mixed wine).
- The container material includes aluminum, glass, bi-metal, and plastic (#1 and #2 only).

In 2009, the HI-5 program's state redemption rate reached a high of approximately 79 percent representing 705 million containers. In FY 2015, the container fee dropped from 1.5 to 1 cent per container resulting in about 68 percent redemption rate representing 647 million recycled beverage containers (HDOH 2015). In FY 2017, the County's estimated HI-5 redemption rate reached approximately 87 percent representing approximately 117 million containers, down from about 89 percent the previous year (County of Hawai'i DEM 2017a).[5]

The County provides Certified Redemption Centers (CRCs) for consumers to redeem their HI-5 beverage containers at select recycling and transfer stations (see Exhibit 4-3 for locations). Additionally, the County loans out recycling bins for collection of HI-5 beverage containers to organizers of any public event. The recycling bins consist of an easy-to-transport, lightweight steel frame that uses a clear bag to

[5] The redemption rate is estimated using data from HDOH on the number of deposit containers redeemed divided by the number of containers sold on the Big Island during FY 2017 based on the de facto population.

hold HI-5 beverages. The County-supplied recycling containers are secured by reservation and availability is on a first-come, first-served basis.

4.3.1.3 Redemption Centers

Since June 2015, 93 CRCs were opened to the public in the state of Hawai'i. Segregated rates allow consumers an efficient method of redeeming container refunds by weight (lb) instead of hand counting. Rates are set by the HDOH. However, consumers also have the option of redeeming their containers by hand count; CRCs must hand count hauls of 200 or less containers upon the request of the customer.

CRCs by city currently exist as follows: Hawai'i —19, Maui—12, Molokai—2, Lanai—1, Oahu—52, and Kauai—8. Exhibit 4-4 illustrates the Office of Solid Waste Management's last update to segregated rates by material type.

Exhibit 4-4. County of Hawai'i Segregated Rates

Material Type	No. of Containers per lb.	Refund Amount per lb.
Aluminum	32	$1.60
Bi-metal	5.9	$0.295
Glass	2.4	$0.12
Plastic (17 fl. oz. or less)	26.3	$1.315
Plastic (mixed sizes)	18.8	$0.94

Sources: HDOH. 2015. Report to the twenty-eighth legislature State of Hawai'i : Annual report on solid waste management.

4.3.1.4 Green Waste Mulching and Dropoff Opportunities

In 2008, the County passed a resolution for an ordinance that prohibits paper and compostable organics from the County Landfills by 2012 (Council Resolution No. 826-08). Thus, in 2016, the County contracted with a private contractor to construct two mulch operation sites: The East Hawai'i Organics Facility (EHOF) in Hilo and the West Hawai'i Organics Facility (WHOF). During FY 2016–17, a Notice to Proceed was approved for the construction of these facilities through a private contractor, and they are now fully operational. EHOF is located on Ho'olaulima Road, which also leads to the East Hawai'i landfill and other County-operated solid waste management facilities. WHOF is located in Pu'uanahulu, adjacent to the West Hawai'i landfill.

Residential customers may self-haul their organics to green waste bins at County recycling and transfer stations (see Exhibit 4-3 for County-managed green waste recycling locations) free of charge. Residential self-haul is restricted to 5 cubic yards or less and under 20,000 gross vehicle weight (GVW) with a maximum of one load per day. For loads greater than 20,000 GVW or that surpass 5 cubic yards, customers are routed to either the EHOF or WHOF. These facilities accept yard waste and untreated wood pallets. Commercial entities, including landscapers and haulers, businesses, and government agencies are required to dispose of their green waste at the EHOF or WHOF (County of Hawai'i DEM 2018a). These entities are charged a per ton disposal fee to offset expenses associated with green waste handling and management, and must have a Solid Waste Facility Disposal Permit with an annual renewal fee. The business fee is 25 percent of the MSW tipping fee at County-operated landfills.

In relation to mulch, a minimum volume is available to residents for no charge, contingent upon availability. For residential and commercial convenience, a mulch pickup area was added to the Kealakehe Recycling and Transfer Station, in addition to mulch pick up at the EHOF and at the WHOF. Mulch must undergo the enhancement process before being available for public use. This consists of a minimum of 15-day processing of mulch, wherein it undergoes a minimum of five rotations held at a temperature of 131 degrees Fahrenheit to eliminate potential invasive species or other unwanted organisms (County of Hawai'i DEM 2018a).

East Hawai'i Organics Facility (EHOF)

The green waste program diverts green yard waste and untreated wood pallet material from the West Hawai'i Sanitary Landfill (WHSL) and the South Hilo Sanitary Landfill (SHSL). In FY 2017–18, green waste comprised approximately 73 percent of all waste diverted from the landfills for approximately 38,000 tons (County of Hawai'i DEM 2018b).

4.3.1.5 Scrap Metal

Scrap metal is often the bulkiest and heaviest material collected at municipal recycling and transfer stations. Recycling scrap metal reduces tipping fees, conserves landfill space, and conserves natural resources by replacing the need for virgin raw materials to produce new metal goods.

Residents may haul their scrap metal (ferrous and non-ferrous) to various County-operated recycling and transfer stations (see Exhibit 4-3). No commercial, government agency, or nonprofit may use these facilities to manage their scrap (Section 4.3.2.4 describes privately owned and operated facilities that accept non-residential scrap). No automobiles, auto/boat/motor parts (including but not limited to engines, motors, transmissions, or other metals with fluids), propane/oxygen/acetylene tanks, or other compressed gas cylinders are accepted at recycling and transfer stations. The scrap metal is sorted by a HDOH-approved contractor and sold to brokers for shipment in domestic and international markets.

To assist with the removal of abandoned vehicles, the County operates an Abandoned Vehicle Removal Program. Under this program, abandoned vehicles may be hauled by a contractor to the Hilo or Kealakehe Recycling and Transfer Station after certain procedures have been followed by the Hawai'i County Police Department (HCPD) and DEM. Section 7.2.10 provides more detail regarding the abandoned vehicle program.

In July 2007, the Hawai'i State Legislature enacted Act 197, which establishes new rules for scrap dealers and redeemers to deter copper theft, a class C felony. The Act requires that dealers obtain a written statement certifying the seller has the lawful right to sell the copper, and the seller must be 18 years or older with valid identification. Paperwork received by the seller from the recycler must be notarized before payment is issued. The County does not buy back copper (Section 4.3.2.4 describes private sector copper recycling and redemption).

4.3.1.6 Tire Program

According to the State of Hawai'i, over 1 million new motor vehicle tires are brought into Hawai'i each year with the majority being used to replace used tires and the remainder arriving on new motor

vehicles (HDOH 2017). County Ordinance No. 07-182 (as codified in HCC 20-46) prohibits the disposal of tires that are whole, cut, sliced, chipped, or shredded at any landfill and all island-wide recycling and transfer stations. The County does not collect any tires at any recycling and transfer station or landfill. It is illegal to drop off tires at any County facility. When consumers purchase a new tire, under HRS 342I-22, they are also charged for its proper end-of-life disposal. Thus, tire companies are required to accept and properly dispose of used tires from their customers. Currently, used tires generated in the County are shipped to O'ahu for processing, either at H-Power or AES Hawai'i, Inc.

When left outside in the elements, old tires collect water and serve as breeding grounds for mosquitos that carry various infectious diseases. In FY 2015–16, during the Dengue fever outbreak, the County collected over 50,000 tires. Both County code and state statute are instrumental to the proper disposal of old tires upon point of purchase.

4.3.1.7 Fats, Oils, and Grease Program

FOGs are accepted at the WHSL subject to a special handling fee. Restricted items include petroleum-based oil, coolants, refrigerants, liquid paints and stains, and process water. Currently, FOGs are accepted at various businesses listed on the County's website on the green waste and motor oil web pages. Residents can take limited quantities of household cooking oil to Pacific Biodiesel Logistics or treat FOG waste at home, through solidification via absorbent materials such as kitty litter or newspaper. Once solidified, this waste may be disposed of in the trash. Resources are also provided on the County's web page on how residents may convert their used oil into biodiesel.

4.3.2 Private Sector Programs

Many businesses in the private sector develop in-house recycling programs. These programs are often not tracked by the County and may constitute a large percentage of recycled materials. Some larger businesses have sophisticated systems to document the amount of recycled material generated, while smaller businesses sometimes do not carefully track the amount of materials that they recycle. The County plans to request data from the private sector to better understand the actual recycling numbers on the island.

4.3.2.1 Curbside Collection of Recyclables

Businesses provide HI-5 beverage container redemption services at their business locations, community centers, and schools, or through mobile redemption units. Contractors and nonprofit groups also pick up paper products, such as mixed office paper, newspapers, and cardboard. The recycled materials are generally sold to brokers on the mainland.

No island-wide or large-scale curbside recycling program is currently implemented in the County; however, several companies offer collection of recyclables in limited areas of the County for both business and residential customers. In addition to trash service, a few haulers are also providing recycling collection service to their customers.

4.3.2.2 Large Retail Business Recycling

Large retailers, such as Walmart, Kmart, Costco, Home Depot, and others, maintain in-house recycling programs at their stores. Cardboard and plastic (plastic bags and shrink wrap) constitute most of the materials recycled at these large retailers. Recycling quantities may range from a couple of bales of combined cardboard and plastic per week up to 20 bales per week for the largest retailers; each bale averages approximately 800 to 1,000 pounds. Depending on the retailer, HI-5 beverage containers, mixed paper, wood pallets, batteries, and light bulbs are also recycled at the stores.

Data provided during interviews conducted with many of the retailers indicate that most of the materials, especially cardboard and plastic, are shipped either to the West Coast to third-party brokers or to the retailer's distribution center. Other recycled materials are picked up by permitted haulers.

4.3.2.3 Green Waste

Green waste facilities on the island are primarily County-operated. Residents may dispose of their organics at the six recycling and transfer stations that accept green waste if their volume is less than the load restriction (see Section 4.3.1.4) and at the two organic facilities (EHOF and WHOF). The County also promotes home 'grasscycling' where grass clippings are used as fertilizer, along with backyard composting where small-scale organics are converted to soil or mulch at residents' properties. The County promotes home composting on their website. To manage larger volumes and to increase their diversion rate, a compost facility that can process food waste, wood pallets, paper, and compostable plastics is planned for operation in 2020.

In 2016, the Hawai'i Department of Agriculture issued a permanent rule, pursuant to Hawai'i Administrative Rule (HAR) 4-72-13, placing a quarantine on ōhi`a lehua (*Metrosideros polymorpha*) and prohibiting the transport of all ōhi`a-containing materials to prevent the spread of ōhi`a-wilt disease, an infection caused by the fungus *Ceratocystis fimbriata* and leading to the mortality of ōhi`a trees (Friday et al. 2015). Because contaminated soil, sawdust, and wood are transmitters of this fungus, transport of these materials is prohibited, unless under permit. Invasive species found in compost include little fire ants (LFAs) and Coqui frogs (County of Hawai'i DEM 2018a). Thus, these organics must be treated under an enhancement process to restrict the spread of invasive species and other organisms.

4.3.2.4 Metals Recycling

Businesses in the private sector with solid waste permits to collect and sort scrap metal at their facilities include Atlas Recycling, Business Services Hawaii, and Big Island Scrap Metal on both sides of the island; as well as Mr. K's Recycling and Redemption in Hilo. Atlas Recycling and Mr. K's Recycling and Redemption are licensed to buy back copper. The metal is sold to brokers for markets in domestic and international markets.

4.3.2.5 Tires

Multiple haulers collect and bale tires and tire parts for shipment to the West Coast or O`ahu for processing into ground and crumbed materials for use as fuel at the H-Power waste-to-energy (WTE) facility. One contractor repurposes tires to make concrete tire blocks used in decorative walls. The contractor is currently attempting to gain approval from the state of Hawai'i to allow contractors to use the tire blocks as a component in structural walls.

4.3.3 Current Material Markets and Market Development Initiatives

Only a small percentage of materials is processed and reused locally, and the cost of the County's recycling program is highly dependent on remote market prices for recycled materials in Asia. Therefore, Hawai'i recyclers are susceptible to market fluctuations due to leaner profit margins originating from high shipping costs, and in recent years, the downward trend in recycling market prices. For example, in 2018, China's government implemented new restrictions on what type of recyclables may be imported into the country. China no longer imports low-grade plastics and unsorted paper. China also aims to increase the quality of recyclables entering China by requiring low contamination. Although the Asian market is in flux, the United States' recycling rate for polyethylene terephthalate (PET #1) plastic bottles

increased from approximately 28 percent in 2016 to about 29 percent in 2017. This indicates the demand is strong enough to continue recycling this product, which is mostly used in textiles and bottles.

With these uncertainties, the County has had to reconsider its target market and list of recyclable materials according to Section 20-31, Chapter 20 of the HCC. On December 1, 2018, the County eliminated #5 plastics (e.g., yogurt containers, margarine tubs), plastic grocery bags, and clam-shell-type plastic (e.g., salad, bento boxes) in the mixed recyclable bins at the recycling and transfer stations. Maui County has also stopped collecting these materials in response to China's ban. The County is currently recycling PET #1 and #2 plastic containers that are in the form of a jar, jug, or bottle.

In comparison, Honolulu diverts 74 percent of waste from landfilling at their H-Power WTE facility through incineration and energy recovery (HDOH 2015). During the development of the 2009 Plan, the County did not intend to pursue this form of diversion because they agreed with Chapter 342G, HRS's definition that incineration does not constitute a form of recycling and considered it too costly to implement. However, the County has not discounted the potential for some form of material recovery and treatment for future implementation (see Chapter 9). With the onset of limited recycling opportunities for some plastics and mixed paper, the County will consider other opportunities for diversion that does not discount an alternative material recovery system.

Examples of local and mainland markets are described below.

4.3.3.1 Mulch and Compost Products

Local businesses, including landscapers, contractors, and public agencies, use mulch and composted materials produced locally. Customers use compost and mulch for both residential and agricultural applications. It is likely that 100 percent of the materials produced through recycling of green waste can be handled locally. The County offers mulch free to residents at the EHOF and WHOF as well as the Kealakehe Recycling and Transfer Station in the mulch pickup area. A new business in East Hawai'i offers food waste collection service for composting. They also provide workshops for home composters.

4.3.3.2 Cooking Oil, Fats, Oils, and Grease

FOGs are accepted at the WHSL for a fee. Restricted items include petroleum-based oil, coolants, refrigerants, liquid paints and stains, and process water. Currently, businesses can dispose of FOGs at various locations listed on the County's green waste and motor oil web pages. The County encourages residents to treat FOG waste at-home, through solidification via absorbent materials such as kitty litter or newspaper. Once solidified, this waste may be disposed of in the trash. Resources are also provided on the County's website on how residents may convert their used oil into biodiesel.

4.3.3.3 Paper

Currently, much of the recycled paper and cardboard generated on the island is shipped to domestic and international markets for reuse. Several local businesses accept newspaper for recycling and produce shredded paper products used primarily by the local agriculture businesses. Businesses interviewed indicated that 100 percent of the materials that they produce through recycling are purchased by local farmers for use in growing and shipping of agricultural products and flowers.

4.3.3.4 Plastics

Some plastic containers (#1 and #2) are included in the HI-5 Redemption Program. As described in Chapter 3, the County has enacted a Plastic Bag Reduction Ordinance, regulating plastic bag and

polystyrene plastic products to reduce the volume of this material and thereby decrease landfilling and pollution-associated costs. Number 1 and 2 plastics are baled and shipped to overseas markets.

4.3.3.5 Glass

Glass is being reused in the County and shipped off island for recycling. On island uses have included crushing for use in local construction projects. Up to 10 percent of aggregate is replaced with crushed glass for 'glasscrete.' Other uses for crushed glass include landscaping, backfill, and drainage, among other things. Currently, the County plans to use crushed glass for the operational layer of new cells at the WHSL.

Pāhoa Recycling and Transfer Station

Several smaller businesses in the County use recycled glass to produce artistic, architectural, or educational products; however, the market for these products is somewhat limited.

The potential exists to develop local markets serving the construction industry that would recycle most or all the glass containers generated in the County. Doing so would require marketing and promotion efforts, changing specifications and regulations, and developing additional processing infrastructure. Products such as glassphalt or reflective materials used in signage could potentially be produced on the island, and require development of infrastructure, equipment, and/or facilities to accommodate the manufacture of these materials.

The HDOH pays redemption center operators 2 cents per container for on-island use, and 4 cents per container for remanufacturing, which translates to shipping and off-island processing because there are no glass remanufacturers on the island. The SWD staff believe that paying more for off-island reuse and remanufacturing than for on-island use is a barrier to developing local markets for glass. HDOH works with each county to operate local glass recovery programs to increase the glass diversion rate from the waste stream. Developing local markets for glass has several benefits, including saving natural resources by not having to mine raw materials, eliminating diesel fuel use associated with shipping glass to off-island markets, and creating local jobs.

The HDOH administers a state-wide glass recovery program funded by an advance disposal fee (ADF). The department collects a 1.5 cent fee per non-deposit beverage glass container from those who manufacture or import glass containers (excluding deposit beverage containers). Those who import or manufacture fewer than 5,000 non-deposit beverage glass containers within a 1-year period are exempt from payment of the 1.5 cent fee; however, are still required to register with HDOH. Exclusions from the program include tempered glass containers, including drinking glasses, cups, bowls, plates, and ashtrays; and/or glass containers holding less than 2.5 ounces intended for human consumption.

4.3.3.6 Metals

There are limited facilities in the County for processing scrap metal. The Kealakehe Metal Salvage Facility closed in 2016 due to onsite lead soil contamination. The bulk of the scrap metal generated in the County is shipped either to O`ahu for processing and subsequent shipment to the mainland, or directly to Asian markets.

In the past half-decade, the price of scrap metal experienced a downturn (Lasky 2018), primarily because the high cost of shipping to distant markets has affected its value. While the scrap metal market is expected to increase in the following years (World Steel Association 2017), this market remains highly variable and subject to fluctuations. In addition to shipping costs, factors such as tariffs and product bans will also affect prices.

4.3.4 County of Hawai'i Staffing Levels

Successful delivery of local government waste reduction programs requires devoting an appropriate amount of resources including staffing. The County has demonstrated its commitment to waste reduction and recycling by assigning the following staff to County waste reduction and recycling programs in the DEM:

- One FTE (full-time employee) recycling coordinator.
- Two FTE recycling specialists for the HI-5 recycling program.
- Three FTE recycling specialists.

4.4 Issues and Concerns

As described above, a number of recycling, bioconversion, and marketing activities have been conducted in the County, including programs and initiatives by the County as well as other organizations. Despite these efforts, the County recycling rate hovers around 20 percent (County of Hawai'i DEM 2018c), which is well below its 2013 target of 80 percent. As described in 4.3.2, private sector recycling programs are often not tracked and may constitute a large percentage of recycled materials. However, more could be done by the County and waste generators to treat materials as resources and further reduce the volume of solid waste delivered to the landfills. The need to implement additional programs and policies is further established by the County's commitment to maximize diversion.

4.5 Options for Improvement

Pursuant to HRS 342G-26, the following subsections provide an overview of various options that could be implemented to improve recycling and bioconversion and solidify markets. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for the County. Note that the options focus on recycling and bioconversion; waste reduction and reuse are discussed in Chapter 3, public education is discussed in Chapter 5, and institutional approaches to collection service delivery (i.e., public versus private) is discussed in Chapter 8.

4.5.1 Residential Curbside Collection and Processing of Recyclables

In this option, the County would collect recyclables from single-family residents or contract with a private collection firm for the service. There is a wide variety of curbside recycling programs in use in North America today. They can generally be grouped into two categories: multi-stream or single-stream systems. A third type, co-collection, in which bags of garbage and recycling are collected in a single vehicle, is

becoming less popular because of contamination concerns and low participation rates. A brief discussion of multi-stream and single-stream recycling and other important considerations is described below.

4.5.1.1 Multi-Stream Recycling

With multi-stream systems, households separate and place recyclables into rectangular containers, bags, or bundles and place them at the curb. The collector lifts materials by hand into multiple compartments on the collection vehicle. Glass is often separated from other materials to avoid high contamination of fiber and fiber processing difficulties that can result when broken glass is present. Most programs sort materials into two or three types of commodities, and five to seven material sorts are done in some programs.

According to a 2016 study, single-stream systems (also referred to as commingled systems) produce 25 percent system loss on average for all steps in the process (mixed recycling facility, processor, mill, and end user). The losses from a system where *all* recoverable materials are collected separately from each other are much lower, at about 5 percent. In a multi-stream recovery system, where most materials are kept separate from each other at the point of collection, a far greater amount of material collected is made into new products or used beneficially; if completely separated, this conversion to new or beneficial products can range between 90 and 99 percent [depends on the material, the level of contamination, and the sorting and processing accuracy] (Ecology 2016).

Advantages

- More thoroughly separating differing types of materials generally results in higher quality recycled material and thus, higher market prices.
- Can raise consumer awareness that sorted materials are valuable resources.

Disadvantages

- Requires more effort by households to sort materials.
- Requires a higher level of effort by haulers, resulting in higher collection costs.

4.5.1.2 Single-Stream Recycling

Single-stream or "commingled" recycling is a system in which all dry recyclables are placed into a single container. The container is oftentimes lifted using a hydraulic lifting arm attached to a collection vehicle. This more automated type of system lowers collection costs. The lowest cost per ton of material recycled is typically achieved by single-stream recycling with fully automated collection in which a single driver can collect material from many stops without leaving the cab of the truck (see photograph below). In a single-stream system, only around 75 to 80 percent of the collected materials are made into new products with 20 to 25 percent ending up landfilled, burned in incinerators, or boilers [energy recovery] (Ecology 2016).

Advantages

- Generally results in the highest rate of diversion of materials from landfill.
- Simpler system for participants to use because all materials are combined in a single bin and no sorting is necessary.
- Lower cost per ton of material recycled because of higher resident participation rates combined with automated collection efficiency (lower collection costs).
- Results in fewer injuries to collection workers and corresponding workers compensation claims because no lifting or handling of materials is required.

Disadvantages

- Much higher contamination of recyclables; significant effort is required to ensure that residents maintain material quality.
- Requires sophisticated materials processing facilities and equipment, as well as good communication with processors and end-use markets to ensure that manufacturing (raw material quality) requirements are met.
- Fully automated systems require higher initial and long-term capital costs because mechanically complex trucks are needed that have more rigorous long-term maintenance requirements.

4.5.1.3 Service Standards

Curbside collection is generally offered on a subscription basis, or made mandatory for some or all single-family residents within a jurisdiction. The County is predominantly rural in character with relatively small urban and suburban areas in Hilo, Kona, Waimea, and a few other locations. Many of the rural areas within the County have steep, unimproved roads not suitable for collection vehicles. Thus, mandatory curbside collection for all County residents is likely to be impractical. Further, longer distances between collection stops will occur in many of the geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. For program cost efficiency, it is recommended that this option include designated zones where curbside service would be mandatory.

For the purpose of developing diversion estimates, a rough analysis of housing units in the 2010 Census Designated Places was conducted. The result was an estimate of 72,894 households (US Census Bureau 2010) that would be served by the program, which is about 84 percent of the estimated 86,778 occupied single-family households in the County in 2017 (US Census Bureau 2018).

Collection frequency could be weekly or bi-weekly. Weekly collection generally is more costly, and can potentially result in somewhat higher diversion from landfill. The collection frequency could be evaluated during a pilot program and determined at a later date.

4.5.1.4 Processing

The processing requirements for the collection program would need to be determined. The economics of material recovery facilities are characterized by substantial economies of scale. It is likely that the

County's most cost-effective strategy is to bale single-stream recyclables and ship them to the mainland for processing (as is currently done by a privately-owned facility with mixed recyclables collected at County recycling and transfer stations). The resulting requirements for a County processing facility would consist of a covered building with space to store incoming materials, one or more balers for densifying materials, and equipment and facilities to load shipping containers for transportation to markets.

It is likely that one or more new processing facilities would be needed to support this program. The cost of developing and operating several smaller storage and baling facilities would need to be weighed against the costs and other impacts of trucks hauling materials long distances to a central facility. The most likely potential locations for such facilities would be in East Hawai'i (Hilo), one in West Hawai'i (Kona), and one in the Waimea area.

4.5.1.5 Other Considerations

There are a number of other factors that would be considered when evaluating curbside recycling:

- Collection is typically performed through a contracting mechanism with a private service provider, although many cities and counties collect recyclables using municipal workers. This decision would need to be made with state contracting laws in mind.
- There are many ways of organizing the collection of garbage, recyclables, and green waste/organics. The program must be integrated with other collection programs. If curbside recyclable collection were implemented in the County, it would be costly to collect both at curbside and at all 22 of the County's recycling and transfer stations.
- Pilot programs and consumer research would be conducted prior to full-scale implementation to develop data that can be used to refine and tailor the program to the needs of the various communities within the County.
- Education and promotion of the program would be critical to success.

Diversion Potential. Curbside recycling has the potential to divert significant quantities of material from County landfills. The extent of diversion could vary significantly depending on the type of program that is instituted and other factors such as those presented in Exhibit 4-5. Some of the more successful curbside recycling programs in the United States report collection rates of 800 to 1,000 pounds of recyclable materials per participating single-family household per year. For example, in 2014, the City of San Jose exhibited curbside collection of 894 pounds per participating household per year (City of San Jose 2015), and Seattle reported dry recyclables collection of 1,086 pounds per participating household per year in 2017 (Seattle Public Utilities 2017). Both jurisdictions have a single-stream system.

Exhibit 4-5. Example of Material Loss and Utilization Rates by Material Recovery Collection System in State of Washington[1]

Collection System for Recoverable Material	Material Loss Rate (percentage)	Material Utilization Rates (percentage)
Commingled/Single Stream (Mixed recyclables)	16.6-31.0	69.0-83.4
Dual Stream (Commingled with glass on the side)	2.0-6.0	94.0-98.0
Source-Separated Materials[1]	1.0-4.3	95.7-99.0
Commingled Construction and Demolition Materials	18.7-26.0	74.0-81.3

Source: Ecology 2016.

[1] Materials kept separate; common for large-scale commercial recovery and residential drop box locations or buyback centers.

In FY 2016, 14,887 tons of dry recyclables were collected from County recycling and transfer stations (County of Hawai'i DEM 2017a), which is approximately 408 pounds per household per year. Using results from the County's 2008 waste composition study (Appendix D), assuming 72,894 households (US Census Bureau 2018) would be served and material capture rates of 80 percent for most recyclables (such as paper, cardboard, and containers), a recycling program could result in additional recycling of 11,910 tons, which is about 327 pounds per participating household per year, or about 735 pounds per participating household per year, including materials currently being collected from County recycling and transfer stations.

Cost Considerations. The cost of curbside recycling ranges significantly for different programs. Factors that influence costs are similar to those that affect the amount of recycling such as:

- Costs increase with the frequency of collection (for example, weekly versus bi-weekly). In a study conducted by the Solid Waste Association of North America, switching from weekly to bi-weekly service can result in a 20 to 40 percent decrease in cost (California Recycle 2016). A 2014 cost-benefit analysis from the City of Austin revealed that switching from weekly to bi-weekly trash collection resulted in a cost savings of approximately 33 percent for customers (City of Austin 2015).
- Subscription versus mandatory service (mandatory collection has a higher total cost and lower cost per household because the travel distance between stops is reduced).
- If recyclable materials are separated versus single-stream, more collection time is required at each stop, thus increasing costs for collection.
- Cost of recycling-only versus a program that also includes curbside collection of garbage and/or organics.
- Costs are higher in more rural service areas (because of longer distances and increased travel time between stops).
- Shipping costs increase with distance to markets.
- Unstable recyclables market.

Information about the extent to which various factors affect the cost of recycling is shown in Exhibit 4-6.

The EPA reports that typical costs for curbside recycling range from $2.70 to $4.90 per household per month (EPA 2016d). However, costs can be considerably higher depending on the contracted hauler in the area and whether they own or operate a landfill or recycling and transfer station. All these costs assume that there is a curbside garbage service in place. Should the County implement curbside recycling in the absence of curbside garbage or green waste collection, costs would be considerably higher because administration, billing, overhead, vehicle maintenance, training, and other costs would be applied only to recycling and would not be spread over the cost of multiple services.

However, as illustrated in Exhibit 4-6, in a study conducted in Ontario consisting of 223 provincial municipalities over a 10-year period, curbside operating costs are affected by various impact parameters. For instance, while single-stream recycling exhibits 50 percent lower management costs than multi-stream systems, single-stream systems also show 49 percent higher operating costs and a 9.6 percent lower market price for recyclables (Lakhan 2015). The County might consider similar factors when determining the feasibility of a curbside program.

Exhibit 4-6. Factors Affecting Curbside Recycling Costs

Program Feature	Cost Increase or Decrease
Single Stream (Program Implementation by 1 Municipality)	$4,101 to $5,122 increase
Curbside Collection	$9,888 to $11,586 increase
Pay-As-You-Throw (Program Implementation by 1 Municipality)	$2,484 to $2,798 increase
Municipal Promotion and Education Expenditures (per household) ($)	$1.20 to $4.80 increase
Population Density per Square Kilometer	$44 to $58 decrease

Source: Lakhan (2015)

As discussed above, the cost of curbside recycling could vary significantly. A curbside recycling-only system, without garbage or yard waste, and including material processing and marketing, would require development of significant collection infrastructure and would be costly. The costs would likely be significantly less if the service was combined with curbside garbage and/or organics collection.

4.5.2 Increase Green Waste Dropoff Opportunities at Recycling and Transfer Stations

As discussed above, green waste can be dropped off at the EHOF and WHOF, and the Kealakehe, Ke'ei, Waimea, Kea'au, Pāhoa, and Volcano recycling and transfer stations. This option would increase the number of recycling and transfer stations that accept green waste.

Diversion Potential. The operation of the EHOF and WHOF, together with the acceptance of green waste at various recycling and transfer stations, has resulted in an organics diversion rate of 73 percent of all waste diverted from the landfill for approximately 38,000 tons in FY 2017-18 (County of Hawai'i DEM 2018c). Additional quantities could be captured with the implementation of a green waste disposal ban, by allowing small commercial customers to participate in the program, and by expanding green waste collection to include food waste.

Cost Considerations. The existing EHOF and WHOF will have continued operational and monitoring costs, which will be in part offset by tipping fees. The introduction of a collection system for food waste will also increase operational costs.

4.5.3 Residential Green Waste Collection and Processing

In this option, the County would collect green waste from single-family residents or contract with a private collection firm for the service. The choice of County collection versus private collection would need to be made with state contracting laws in mind.

In this type of program, materials are typically collected in bags or plastic bins provided by residents or the local government. Types of bags or containers and associated advantages and disadvantages of each type of container follow.

- Plastic bags. Relatively inexpensive, convenient; however, a significant problem for processors because the cost of removing all plastic from the organics results either in contaminated low-quality feedstock, extremely high-cost bag removal methods,

or both. Grass in plastic bags can go anaerobic and become odorous when opened at the compost facility. Most green waste collection programs now prohibit collection of green waste in plastic bags.

- Compostable bags. Somewhat less convenient than plastic bins and expensive over the long term for households, which is likely to lower recovery rates. The bags compost well and avoid the contamination issues associated with plastic bags.
- Plastic bins. Most programs now use plastic containers provided by the local government, or in some cases by the user, and use rolling 30- to 90-gallon carts that are easier to get to the curb than non-wheeled bins.

Bin contents are either loaded by hand (manual) or hydraulically (semi- or fully-automated) into the truck. Most programs use trucks equipped with hydraulic loaders to limit lifting by collection workers, thus reducing injuries and workers compensation claims.

4.5.3.1 Service Standards

Like curbside collection, it is recommended that any green waste collection program would be a mandatory program for more densely populated single-family neighborhoods to increase efficiency and reduce operating costs. Further, it is recommended that the program include rolling carts loaded by using semi-automated or fully-automated equipment.

4.5.3.2 Processing Requirements

The County currently has a successful mulch program at the East Hawai'i Organics Facility (EHOF), West Hawai'i Organics Facility (WHOF), and residential haul to certain recycling and transfer stations (see Exhibit 4-3). Mulching produces a relatively low value product that is less desirable than compost or soil products made from compost. Thus, mulch is available for free to residents at the EHOF, WHOF, or Kealakehe Recycling and Transfer Station (a nominal charge for assisted loading may be instituted). The County is also in the process of developing a compost facility that can process both green waste and food waste. After the compost facility is operational; the County would conduct a cost-benefit analysis of coupling curbside green waste collection with existing method of self-haul to EHOF, WHOF, and recycling and transfer stations.

4.5.3.3 Other Considerations

The other considerations that apply to curbside recycling also apply to curbside green waste:

- A decision would need to be made if collection would be provided by County workers or under a contract with a private service provider consistent with state contracting laws.
- The program must be integrated with other collection programs and with the current green waste services provided at County recycling and transfer stations.
- Pilot programs and consumer research would be conducted prior to full-scale implementation to develop data that can be used to refine and tailor the program to the needs of the various communities within the County.
- Education and promotion of the program would be critical to success.

Diversion Potential. As discussed previously, green waste can be dropped off at the EHOF and WHOF, and the Kealakehe, Ke'ei, Waimea, Kea'au, Pāhoa, and Volcano recycling and transfer stations. Additional quantities could be captured with the implementation of a green waste disposal ban, and by expanding green waste collection to include food waste.

Cost Considerations. The factors affecting the cost of curbside recycling discussed above would also help determine the cost of green waste collection. Costs would depend on the other curbside services provided. For example, the existing garbage and recycling transfer system network will impact the cost of curbside recycling and its associated disposal tonnage.

4.5.4 Add Food and Other Organics to a Residential Curbside Recycling and Green Waste Collection Program

As described previously, the County is in the process of identifying a compost facility site that would accept yard waste, wood pallets, food, paper, and compostable serviceware. The facility would be constructed by a private contractor through a contractual agreement with the County. The finished product would be sold island-wide, with a minimum portion made available free to the public. The compost facility would accept green waste and wood pallets initially and then transition into accepting the food, paper, and compostable plastics allowing time for the County to develop a program for collecting these materials.

Throughout the United States, Canada, and elsewhere, many large and small communities with a commitment to zero waste are modifying their waste collection programs to include food and other organics such as food-spoiled paper. Example cities include Kaua'i County, HI; Boulder, Colorado; and San Francisco, CA:

- Kaua'i County, HI: Adopted a zero waste resolution in 2011 and plans to achieve a 70 percent diversion rate by the year 2023. Implementation of PAYT program has incentivized residents to reduce their waste generation. Also, a volunteer organization, Zero-Waste Kaua'i, supports the ban of materials such as expanded polystyrene (commonly called Styrofoam®), and advocates waste mitigation practices at outreach events and schools (County of Kaua'i 2018b).
- Boulder, CO: A zero waste ordinance was developed in 2015 where all single-family homeowners had to subscribe to a waste hauling service by 2016, and where all multi-family property managers had to provide proper waste disposal for tenants. This ordinance also applied to businesses and stated that there must be proper signage on all bins for recyclables and compostables. Boulder plans on achieving an 85 percent waste diversion rate by 2025 (City of Boulder 2016).
- San Francisco, CA: The City plans to become zero waste by 2020; in 2012, an 80 percent diversion rate was achieved. A mandatory recycling and composting ordinance was passed in 2009 where all residents and commercial businesses had to properly sort their waste in the proper bins. In relation to residential curbside collection, the City enforces a program that provides separate collection of single-stream recyclables, compostables, and trash in three separate bins (EPA 2018a).

These systems require residents to learn new ways of managing food and other organics and program managers must clearly communicate to residents what materials must go in each bin. Most of these systems have a type of variable rate to encourage behavior that minimizes garbage. In general, after initial pilot testing and consumer research, these programs have typically been well-received by

residents. Current research efforts are focusing on ways to increase participation by residents; many programs report a 35 to 40 percent residential organics participation rate (Wake County 2014; SAFE 2016; Hennepin County 2017). Recently, curbside organics recycling has proliferated. According to a waste characterization study conducted by BioCycle of various cities in the United States, between 2009 and 2011, food waste collection expanded by more than 50 percent (Yepsen 2011). In fact, cities such as Portland, Oregon, which also employ a PAYT system, exhibited an organics participation rate of 72 percent in 2013 (City of Portland 2014). Implementation of aggressive PAYT rates is one method communities are using to improve participation rates.

4.5.4.1 Processing

These programs require more sophisticated composting systems. Once food is added to the organics stream, composting must be done with some type of covered system with managed air flows to minimize odors and prevent unsanitary feeding by birds, rodents, and other vermin. See Section 4.5.9 for more information about processing systems appropriate for food and other organics.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming 72,894 households would be served and a 50 percent capture rate of food and wet or food-soiled paper, it is estimated that 20,232 tons of food and other organics would be collected. When combined with recyclables and green waste, the combined system is estimated to result in additional diversion of 32,142 tons, or an amount equivalent to 16 percent of the 195,887 total tons of waste delivered to recycling and transfer stations in 2016. When the 14,887 tons currently being recycled at recycling and transfer stations are included, the program would result in an increase in diversion equivalent to 37 percent of total current waste delivered to recycling and transfer stations.

Note that this is considerably lower than the 50 to 70 percent diversion rates reported by other three-stream programs. This is the result of the following two factors:

- Residents who live in multi-family dwellings and in very rural single-family dwellings would not be covered by the three-stream program, they would deliver materials to the recycling and transfer stations.
- The materials arriving at County recycling and transfer stations include materials rarely set out at the curb by single-family residents on a routine basis, such as construction and demolition debris.

To make an equivalent comparison to other residential communities, the diversion rate was adjusted for these two factors. Including only the 72,894 participating households and typical curbside commodities, the three-stream system could result in an estimated diversion of 68 percent.

Cost Considerations. Rates for three-stream collection service depend on the size of containers residents subscribe to. As examples, San Francisco and Seattle charge approximately $45 per month for service with 32-gallon discard and organics carts (City and County of San Francisco 2018; Seattle Public Utilities 2018); costs are higher if larger containers are desired. These costs include disposal, processing/composting, administration, education, and other costs, including the cleanup and long-term monitoring of closed landfill sites.

4.5.5 Add Food Waste Bins at Recycling and Transfer Stations

Around the United States, local governments are adding food waste bins to their drop-off facilities:

- In 2010, numerous counties in Twin Cities, MN, enacted food waste programs. Hennepin County has combined their food waste collection locations with recycling and transfer stations

(Hennepin County 2018). Other counties in the area, such as Anoka and Ramsey counties, have certain drop-off locations dedicated solely to residential food waste (Anoka County 2018; Ramsey County 2018). Minnesota state law (HF403-SF383) requires yard and organic waste to be disposed of in a compostable or Kraft paper bag, or in a reusable container.

- In Brown County, WI, a pilot program is being run where participants may bring their food waste to one of two drop-off locations. Residents must register with the County to use these locations for tracking purposes (Brown County 2018).

According to BioCycle's annual report, in 2017 there were 67 drop-off programs located in 15 states servicing approximately 6.7 million households. The report also included a survey where 25 out of 30 municipalities stated that they considered their program a success (BioCycle 2017).

Source: Ramsey County (2018). Organics recycling.

The County currently has green waste (yard waste, pallets) bins located at six County-operated recycling and transfer stations. The County is currently considering the best-suited location for a composting facility that will not only process green waste, but also food waste and soiled paper among other compostable materials. Once constructed, food waste bins could be added to recycling and transfer stations with existing green waste bins. The contract with the current licensed hauler of green waste would then be modified to add food waste to the collection agreement.

To address odor and contamination-related concerns, certain practices would be implemented by the County and program participants (Exhibit 4-7). The County could also consider proposing legislation restricting the type of compostable bag that may be disposed of in the food waste bins. For instance, legislation could mandate that residents use a certified compostable bag for disposal at drop-off locations, according to the U.S. Standard ASTM D6400 specification, similar to Minnesota (HF403-SF383) or California (AB1972-SB567) state law. Recycling and transfer station attendants may determine if a bag meets this specification by looking for a Biodegradable Products Institute (BPI) logo on the bag (Biodegradable Products Institute 2018). If the bag does not contain this logo, or if it is not a Kraft paper material, attendants may deny disposal of these uncertified bags into the food waste bins. By limiting contamination in the organics, the ultimate quality and processing of the compost will be significantly improved. To be effective, the program will require rigorous educational and promotional efforts, particularly at the onset.

Exhibit 4-7. Organics Maintenance

Maintenance	Residential Participants	County Recycling and Transfer Stations
Freeze or refrigerate compostables	X	–
Use a BPI-certified compostable container liner and change after each use	X	X
Line the bottom of compost containers with shredded paper	–	X
Rinse compost containers regularly	X	–

The County may consider running a pilot food waste program similar to that in Brown County (Brown County 2018). As part of the program, the County could formulate a recording system for the food waste bins. At the recycling and transfer stations, participants who wish to deposit organics in the food waste bins would be required to sign-in with the onsite attendant. Thus, data pertaining to usage frequency would be ascertained.

Source: City of Charlottesville (2018)

To launch the program, the County could hand out a limited supply of countertop compost bins and a roll of BPI-certified compost liners to residents on a first-come, first-served basis, contingent upon funding availability. As stated in Chapter 5, Public Information and Education, the County plans to expand signage at recycling and transfer stations. As part of this initiative, visually enticing signs could be added near food waste bins. Also stated in Chapter 5, the County plans to update their public information brochures. A brochure could be formulated illustrating acceptable and unacceptable items that may be placed in food waste bins. These brochures could also be handed out at the recycling and transfer stations and at public outreach events.

Diversion Potential. With many residents already accustomed to participating in an organics program, there is the potential for increased diversion of food (and other compostable products), particularly if introduced as a pilot program where residents are already accustomed to hauling green waste (e.g., Kealakehe). After understanding functionality, additional quantities could be captured by increasing the number of recycling and transfer stations that accept food and other compostable products, and the implementation of a green waste and food waste disposal ban.

Cost Considerations. The addition of food waste bins will have associated maintenance, transportation, and processing-related costs. However, by adding food-waste bins to recycling and transfer stations with existing green waste bins, the County will reduce transport-related costs and maximize efficiency for haulers.

4.5.6 Source Separation Ordinance (Mandatory Recycling) and/or Disposal Bans with Differential Tip Fees

A growing number of local governments are adopting policies and legislation that prohibit disposal of recyclable products and/or mandate source separation and/or recycling of those materials. For example, in 2014 Honolulu mandated that commercial businesses and government recycle. Bars were required to recycle glass, restaurants to recycle food waste, and businesses to recycle paper. In 2017, compliance rates in Honolulu ranged from 74 percent for glass, 64 percent for office paper, and 74 percent for food waste (City and County of Honolulu 2018a). In California, state law requires businesses that generate 4 or more cubic yards of waste per week and multi-family complexes (5 or more units) implement recycling programs. They are also required to recycle their organic waste (e.g., food scraps, yard waste). In support of the program, Salinas Valley Solid Waste Authority provides free waste assessments to help these entities improve their recycling programs. Because of the commercial recycling mandate, Greenfield, located in Salinas Valley, exhibited a 152 percent increase in recycled material by the end of 2010 (Institute for Local Government 2011).

Once recycling opportunities for select materials are in place, some policies the County could consider include the following:

- Require residents and businesses to participate in recycling and composting programs. An ordinance could be developed that either requires residents and businesses to source-separate recyclables or bans the combination of designated recyclable or compostable materials with the garbage.
- Ban readily recyclable and reusable materials and products from landfills and/or any future energy from waste facility.
- Ban single-use disposable products from public events and festivals and as many other places as possible.

According to the EPA (EPA 2018b), best practices to consider when formulating a recycling system include:

- Incentives and penalties: Incentivize residents by implementing a PAYT system or via adding additional payments.
- Separate compensation from rates: Allows contractors to base their fees on the number of customers or cost of service rather than flat customer rates.
- Align costs to rates: Instead of funding for solid waste programs to occur primarily via tipping fees, rates could be charged for commercial recycling and composting once the area reaches a high diversion rate.
- Limit or eliminate disposal payments: Limit or discard landfill or recycling and transfer station contractor fees related to waste volume.
- Reward workers for more diversion: Train and reward workers for waste mitigation promotion.
- Require productive market use of yard debris and other organic materials: Require that organics be composted at a compost or anaerobic digest facility, rather than being used as daily cover in a landfill.
- Direct materials to local markets: Route recyclable materials for local use in the community on a conditional basis.

- Education and outreach: Promote waste mitigation efforts in-person, via social media, and via proper signage and literature.
- Equal capacity commercial bin size and frequency: Provide equal capacity for recyclable and compostable bins in comparison to waste bins.
- Equal services for multi-family customers: Contract with multi-family units and waste haulers to provide equal services to that of a single-family resident.
- Source separation requirement or preference: Develop contracts that specify how recyclable and compostable material are separated, based on the area.
- Purchasing preferences (Green Vehicles and Products): Develop contracts that include hauler best management practices related to zero waste such as through fuel-efficient vehicles, the use of recycled plastic and paper products, etc.
- Innovations clause: Develop contracts to allow leeway in recycling programs for potential novel disposal practices and technologies.

Diversion Potential. The County now has a 2-bin program for mixed recyclables (plastic containers, aluminum cans, steel cans, paper, cardboard) and glass-only available at 19 of the recycling and transfer stations. Green waste is also accepted at the facilities listed in Exhibit 4-3. Thus, residents currently have the opportunity to recycle these materials.

These materials would be good candidates for inclusion in a source-separation ordinance or disposal ban. Enforcement would be the main challenge because there is relatively little monitoring and no enforcement authority currently in place at recycling and transfer stations. Prior to enacting the ordinance, the County would conduct an extensive education and promotion program that highlights the reasons for the ordinance and the recycling options available to residents. For a period of 6 months to a year before enacting the ordinance, the County would have signage prominently displayed at each station that announces the pending ordinance and clarifies recycling options.

Once enacted, it is recommended that initial enforcement be less stringent (that is, encourage, but not strictly enforce compliance to minimize conflicts and the potential for illegal dumping). More strict enforcement, such as fining those not in compliance, would require significant changes to the authority and role of environmental management or security employees for the recycling and transfer stations, or subcontracting this function to a suitable security provider. Such changes could be considered if less stringent enforcement proves ineffective.

For the commercial sector, the County could consider a similar ordinance that would apply at its landfills to readily recyclable materials such as cardboard, green waste, and metals. At its landfills, it would accommodate the dropoff of all banned materials for recycling. Dropoff would be free (such as at the recycling and transfer stations) except the County could charge a fee for metals that is less than the fee for garbage (the County started offering this to the commercial sector for green waste in 2015). This would help encourage diverting metals to private recyclers. The ordinance could be enforced by banning these materials from the landfill, with a penalty of two times the regular disposal rate if loads are found containing the banned materials.

In 2009, Seattle mandated food and yard service for all single-family residents, and in 2010 the recycling rate increased by 2.6 percent. In a 2005 survey, only 25 percent of Seattle residents used an organics bin while in 2010, the utilization rate increased to 72 percent (Seattle Public Utilities 2017). Similarly, a green waste and mulch ban from Guam's one operating landfill in 2013 resulted in support from residents, due to the multiple potential applications of compost in the agricultural and commercial sectors (One Guam 2018).

Cost Considerations. To implement this option, the County would need to increase staffing and potentially seek consulting assistance to research, and draft policies and legislation. Additional staffing would be likely required to handle the additional material diverted from the landfill as well as enforcement.

4.5.7 Commercial Recycling and Green Waste Program

While there are some businesses and institutions that currently recycle, there is considerable opportunity to increase recycling from the non-residential sector. Because current markets for most recyclables are in Asia or the U.S. mainland, the cost of shipping recyclables to markets makes recycling less cost-effective for businesses than it is in most U.S. mainland communities. It is likely that to increase the rate of non-residential recycling, the County will need to take regulatory steps to drive the process. Regulatory measures may include the following elements:

1. Mandatory Recycling/Source Separation Ordinance. Adopt a mandatory recycling ordinance that requires all businesses and institutions to recycle an approved list of commodities. That list could include cardboard, metals, green waste, and other select commodities.
2. Business Recycling at Recycling and Transfer Stations. Mandatory recycling could be expensive for smaller firms that do not generate much waste (such as small offices or retail operations). Thus, the County would change the permits that govern its recycling and transfer stations to allow small businesses and institutions to drop off materials. Businesses would still be prohibited from disposing of waste at stations. At stations where space is available, the County would provide additional bins for source-separated cardboard to accommodate small business recycling efforts.

   If accommodating small business recycling at the stations is not acceptable or feasible, the mandatory recycling ordinance would provide an exemption for businesses with less than a certain threshold number of employees (for example, small businesses employing less than 20 persons).
3. Require Collection Firms to Provide Recycling Services through Licensure. License all garbage collection companies with a condition of the license that stipulates they must provide an approved recycling collection service. The required service would be tied to the list of mandatory recyclables. If all firms are required to provide a recycling service, competition would lead to competitive rates for hauling both recyclables and garbage.
4. Develop and Contract for New Processing Facilities. As discussed above for residential recycling, the County would need to ensure that processing and marketing opportunities are available for these materials. The same processing facilities could be used for residential and non-residential recyclables. This would probably include the County issuing an RFP for these services either at County-owned sites and/or allowing contractors to propose sites. Facilities would probably be needed in West Hawai'i, East Hawai'i, and possibly in the Waimea area.

This option would require significant outreach to the business community, and a marketing and technical assistance program. The option would include a reasonable phase-in period so that collection firms can ramp up for the changed requirements. The County could consider implementing an incentive program and/or recognition program for businesses that meet the recycling requirements.

If this program is to apply to state and federal government institutions such as schools, negotiations and consultation with agencies will need to take place. For schools, collection contracts would need to be revised to allow for recycling in addition to garbage collection.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming 80 percent of business and institutions would participate and a 60 percent capture rate for readily recyclable materials and green waste, this program could result in additional recycling of approximately 13,400 tons per year.

Cost Considerations. The County would need to dedicate staff to draft ordinances and to follow through with the required legislative process to enact them, and set aside funds for the promotion and education of the program.

4.5.8 Bioconversion of Food and Other Organics from Businesses/ Institutions

The County's 2008 waste composition study estimated that discarded food makes up 34,000 tons, or 16 percent, of disposal at County landfills. The putrescible nature of food requires more costly and sophisticated collection and processing infrastructure than green waste; however, there are many successful examples on the mainland and elsewhere of organics management programs that incorporate food and other organics as feedstock. This option discusses the potential for collection from non-residential sources.

All material would have to be treated under the enhancement process to restrict the spread of invasive species and other organisms. In 2016, a contract was signed with Hawaiian Earth Recycling to operate a compost facility that can process organics including food waste. Thus, it is expected that the County will have an established treatment facility to process incoming food waste and other compostable materials from businesses and institutions in 2020. The County would need to take the following steps to attract material to the facility:

- Price the tipping fee at the facility less than the tipping fee at its landfills to provide a financial incentive for businesses to separate food.
- Develop an outreach program that would work with collection firms and major food generators to encourage participation well in advance of the facility operation date.
- Be prepared to establish an ordinance preventing food from disposal at major food generators if the first two steps above are not enough to attract material to the processing facilities.

Diversion Potential. Food and other organics, such as waxed cardboard and wet or food-soiled paper, could be collected from businesses and institutions that discard reasonably large quantities of food. Existing hauling routes and schedules would need to be altered to provide a separate service for food and other organics.

Businesses and institutions would need to change work practices to separate food and other organics from garbage. Other communities have found that one significant challenge for businesses and institutions has been finding space on the premises to set out a separate collection bin for organics.

Cost Considerations. The potential need for increased staffing to effectively communicate among County staff, the collection company, and businesses and institutions.

4.5.9 Processing Food Waste Options

Compared to a green waste processing operation, processing food waste requires additional design and operational features to prevent odors and the attraction of birds, rodents, and other vermin. This is typically accomplished as follows:

Membrane-covered system (Everett, WA)

Bunker with roof (Latah Co., ID)

- Receiving food scraps in an enclosure and allowing biodegradation via earthworms (e.g., vermicomposting)
- Receiving collection trucks and preparing/mixing feedstocks in an enclosed building with biofilters and other features to manage air flow and odors.
- Mixing and agitating feedstock daily (unlike green waste where under certain circumstances material can be stored for days at a time). Organic material may be heated to remove potential invasive species and other unwanted organisms, and to speed up the degradation process.
- The bioconversion process requires either more sophisticated electronic controls and/or more sophisticated and meticulous daily operations. Many systems conduct this step of the process in enclosed buildings or vessels. A brief overview of four commonly used bioconversion technologies for food follows.

4.5.9.1 Covered Forced Air

Some relatively recent innovations have taken place to lower the cost of bioconversion with food. These systems include engineered fabric buildings with aluminum frames, air control, and biofilters for receiving and feedstock preparation. The buildings typically range in size from 2,000 to 10,000 square feet.

Once feedstocks are prepared, the material is placed into outdoor windrows with a fabric membrane covers (for example, Gore or Ag-Bag) and aeration systems, or into roofed pole buildings with concrete bunkers, aeration systems, and organic covers (typically finished product). After approximately 30 days, the feedstock is cured in windrows or piles either outdoors or under a covered structure.

These systems have lower capital costs than other systems; however, may require more knowledgeable, experienced operators to maintain final product quality and minimize nuisance odors.

4.5.9.2 Bays, Beds, and Tunnels

Bed composting system

Bays, beds, and tunnel systems are normally constructed inside buildings, and are essentially a variant of a turned windrow system. The feedstock is placed either in a bay formed by two long parallel walls, or in a four-sided reactor bed. The walls of the bay or bed are generally about 6 feet high.

The material is turned down the length of the bay or bed by a machine that is suspended above or rides on rails along the top of the bay or bed. Turning aerates the material, and additional aeration may be provided by a forced air system in the floor of the bay or bed. The turning machine gradually moves the material down the length of the bay or bed and is timed so that by the time the material reaches the end, the primary composting process is largely completed. The product is cured in turned windrows or aerated static piles. As with static piles, the mixture must be perfectly balanced when it is added because there is no further opportunity for amendments to be added. However, odors can be easily controlled because bays and beds are usually constructed inside buildings. Bays and bed systems typically are more expensive than turned windrows and static piles; however, less expensive than in-vessel systems.

4.5.9.3 In-Vessel Systems

In-vessel system (Mariposa Co., CA)

In-vessel systems offer the greatest degree of control over the composting environment. In-vessel systems also have the smallest land requirements, although they are the most expensive technology to design, construct, and operate. An in-vessel system is defined as one in which the composting process is conducted inside a type of sealed container (the vessel) where the environment is highly controlled, and access is restricted (may be aerobic or anaerobic).

In-vessel systems can be either flow or batch reactors. Larger systems consist of permanent chambers installed within a building. Mechanisms are in place to load raw waste into and to remove compost from the chambers. At a minimum, the system includes monitoring systems for temperature and oxygen content and an aeration system. Smaller systems involve the use of portable containers. Modular vessels, which are similar in appearance to international shipping containers, are filled with raw organic waste, sealed, and attached to aeration manifolds and monitoring equipment. Microbes biodegrade the material, and at the end of the primary composting process, the container is disconnected, emptied, and the material is formed into turned windrows or static piles to complete the composting process (curing). A common byproduct of the system includes biogas that may be utilized as energy. The vessel is then available for the next batch of feedstock.

4.5.9.4 Energy Recovery with Wet and Dry Anaerobic Digestion

Significant amounts of energy are contained in food and other organics currently sent to landfills. The Hawai'i Clean Energy Initiative seeks to generate 70 percent of Hawai'i's energy from renewable sources by 2030 (HDOH 2015). The variability in energy prices and concerns over global climate change have led to the development of anaerobic digestion systems for food and other organics. Anaerobic digestion is a proven technology that has been used in the wastewater field for years. The process converts food and other organics to biogas (that can be used to produce electricity or to power vehicles) and dewatered digestate that can be composted and sold for agricultural uses.

In a wet system, incoming materials are loaded into an enclosed building for tipping, pre-sorting, and a series of pre-processing activities to remove recyclable and non-recyclable inorganic elements from the material. Feedstocks are then fed into a hydropulper, which is designed to separate the remaining inorganics from the biodegradable elements and to convert the organics into an organic suspension. The biodegradable organic elements are pumped from the hydropulper to a grit removal system to further remove unwanted materials that may have passed through the hydropulper sieve. The grit-free suspension is then pumped to the anaerobic digester where the digestible material is converted into methane-rich biogas. Non-digestible material is segregated for final curing and stabilization into compost.

Dry systems allow solid materials to be mixed into the biomass, whereas traditional wet digesters make only minimal use of solids. In a dry system, up to 50 percent of the biomass can be solids such as green waste, wood chips, or paper. Biogas is then transformed in block-type thermal power stations into electrical energy and heat. Like the wet system, the digestate residual is cured to convert it into compost or other agricultural products.

Dry anaerobic system (Germany)

The dry systems have the advantage of being relatively cost-effective organics management solutions for relatively small waste streams (as small as approximately 6,000 tons per year). A key to the cost effectiveness of wet or dry systems is proximity to a power user, and/or relatively high prices paid for electricity generation or fuels. The relatively high cost of electricity in the County provides an advantage for this technology locally compared to other areas of the country.

Wet anaerobic system (Germany)

Diversion Potential. Using results from the County's 2008 waste composition study, and assuming capture rates of 50 percent for food, 50 percent for wet- and food-soiled paper, and 10 percent for wood, this program could result in additional diversion of 21,600 tons. Additional carbon may need to be obtained from green waste, wood chips, or other sources depending on the type of processing system selected.

Cost Considerations. The cost of processing food wastes and other organics will vary depending on the type of technology, market conditions, contract terms, permitting requirements, power purchase agreements, and other factors.

4.5.10 Establish a County "Buy Recycled" Policy

This option, also discussed in the draft source reduction section, is important for promoting markets for recycled materials. The County could change its procurement practices to require the use of recycled glass, organics, and other materials to the extent practicable. This would help support the development of local markets for readily recyclable materials. The County would work with local businesses to identify materials that can be reused and recycled as part of County operations.

Diversion Potential. Difficult to quantify; this is a program that would support additional recycling.

Cost Considerations. The County may need to pay a higher price for some recycled products, and would need to devote staff resources to refining its procurement policies.

4.5.11 Marketing Partnership with Other Hawai'i Counties

The County's geographic isolation makes it expensive to ship recyclables to most existing markets. The County could team with the other Hawai'i counties and the state government to investigate joint marketing and market development opportunities. This could include improved pricing for backhauling containers to the mainland and overseas markets, funding pilot programs for new local end uses, or joint marketing of materials to improve market prices and/or lower transportation costs.

Diversion Potential. Difficult to quantify diversion potential; however, this initiative could result in long-term benefits.

Cost Considerations. The County would need to dedicate additional staff to develop and participate in potential studies or pilot programs.

4.5.12 Establish Opportunity to Recycle Legislation

The County could consider developing new requirements for owners and managers of multi-family dwellings and multi-tenant commercial buildings that ensure that all tenants have reasonable access to recycling services and premises-based facilities comparable to single-family dwellings and small businesses. Any such requirements would be best implemented following consultation with the local building industry.

Diversion Potential. Difficult to quantify diversion potential, however this initiative could result in long-term benefits.

Cost Considerations. There would be some cost associated with industry consultation and modifying building codes to support the new requirements. The cost of buildings affected by the legislation could increase somewhat; however, after there is familiarity with the new requirements, impacts on construction project cost would be modest.

4.5.13 Maintain Active State and Regional Profile on Zero Waste Public Policy

The County could work with state and federal legislators and encourage other communities in the region to adopt similar zero waste goals and plans. This effort could include a coordinated effort with regional cooperation to support state and national efforts to adopt:

- Extended producer responsibility.
- Deposit programs.

- Funding of zero waste initiatives through state-wide or regional landfill surcharges and product charges.
- Change school collection contracts to include recycling.
- Full cost accounting for waste disposal.
- Packaging levies (for example, on plastic bags).
- Minimum recycled content standards for additional products.
- Design for the environment programs.
- Green procurement and green building guidelines for the public sector.
- National measuring, monitoring, and reporting in achieving zero waste goals.
- New mechanisms for financial assurance for post-closure liabilities for landfills.

Diversion Potential. Difficult to quantify diversion potential; however, this initiative would result in long-term benefits.

Cost Considerations. There would be cost associated with staff time spent on zero waste advocacy, and modest expenses for supplies.

4.5.14 Other Potential Recycling Opportunities

There are other initiatives that the County could adopt to support recycling, including:

- Improve Recycling Opportunities in County Parks. The County could consider developing a program to provide additional recycling opportunities in all County parks. This could mirror the 2-bin system used at recycling and transfer stations by placing small mixed-material bins and glass-only bins adjacent to all garbage bins at each park. The effectiveness and cost of this program would first be tested with a pilot program. Improvements could include the addition of lock-kits to recycling bins as well as improved illumination systems to deter vandalism.
- Improve Recycling Opportunities on Downtown Streets. The County Public Works Department collects trash in downtown areas of communities such as Hilo and Kailua-Kona. A pilot program, similar to the one suggested above for County Parks, could be implemented to test the effectiveness and cost of providing recycling opportunities at all trash collection locations.
- Expand the Promotion of Event Recycling. The County currently provides technical assistance and event bins to event coordinators looking to recycle at major events. This program could be expanded by developing a list of major recurring events, contacting event coordinators, and working with those coordinators to develop plans to improve recycling. The County would consider providing financial assistance for recycling bins and/or developing an ordinance that requires event recycling and possibly the use of compostable or reusable cutlery. The County could also consider requiring waste reduction and recycling plans for event and facility rental permits.
- Establish a Recycle Art Campaign. The County could establish a Recycle Art campaign, similar to the Art of Recycling School Competition, with the goal of coordinating the efforts of business and public offices and schools to organize and conduct recycle art contests at various venues once per quarter. Examples of places where recycle art could be displayed include bank lobbies, grocery stores, government offices, libraries, schools, airports, and museums.

- Expand Visitor Industry Recycling. Hotels, resorts, and other businesses that service the County's visitor industry are major waste generators. The County could increase its efforts to work with this sector to improve recycling opportunities.
- Explore Opportunities to Develop an Eco-Industrial Park. Eco-industrial parks are clusters of complementary businesses that can make beneficial use of currently discarded materials and products produced by others. Candidates are organics, building deconstruction, salvage, reuse, and repair. Actions by the County could include passing favorable zoning ordinances and/or tax relief to spur on this type of activity.

4.6 Recommendations

Based on the analyses presented above and discussions with the SWAC, the County plans to implement the recommendations listed below to improve the County recycling program. The operating expenditures associated with the recommended actions would likely be funded by a new funding method (e.g., PAYT), property taxes, and tipping fees, and the capital expenditures would be financed by general obligation bonds as discussed in greater depth in Chapter 10 Administration.

The recommendations are divided into two categories, those relating to recycling of non-organic materials (Recycling) and those relating to diversion of organics from landfills (Organics). Implementation of the recycling recommendations may be slower than initially anticipated because of the impact that the world-wide commodity market volatility has had on County recycling revenues.

4.6.1 Recycling

1. **Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates.** In many communities nationwide, experience has shown that updated policies and ordinances are necessary to support new programs designed to treat discarded materials as resources and keep them out of landfills. After reviewing various options, the County decided the following options are best suited to the specific conditions within the County:
   - Thoroughly investigate mandates prior to implementation including assessment of markets (should be well-established), operational viability (solicit input from recycling and transfer station attendants, haulers, landfill operators), and implementation in other jurisdictions with an emphasis on other Hawai'i counties.
   - Establish a differential tip fee ordinance.
   - Investigate the feasibility of establishing a mandatory curbside collection program for some single-family residences.
   - Establish mandatory source separation and recycling ordinance, which would require all businesses and institutions to recycle selected types of materials. This could include implementing landfill bans for select recyclables.
   - Develop legislation that requires owners and managers of multi-family dwellings and multi-tenant commercial buildings to provide recycling.
   - Conduct research and coordinate with legislators and waste managers within Maui, Kauai, and Honolulu counties, to evaluate the potential for combining efforts to develop a statewide landfill diversion strategy.
   - Lobby the state to change school waste collection contracts to mandate that recycling services are included.

2. **Complete capital projects to facilitate implementation of expanded recycling programs.** A common theme expressed during discussions with the SWAC is that the County needs improved facilities to manage recyclables. The County plans to:
   - Modify infrastructure at recycling and transfer stations to accommodate and expand recycling.
   - Improve signage at recycling and transfer stations to provide the public with comprehensive information about recycling opportunities and procedures.
3. **Expand the opportunities for commercial recycling.** The results of the waste stream assessment conducted for this Plan update (Chapter 2) demonstrated clearly that commercial businesses and institutions currently dispose of large quantities of potentially recyclable materials. After deliberation with the SWAC and reviewing programs implemented by other jurisdictions, the County plans to implement the following actions to increase commercial recycling:
   - Allow small businesses to use the recycling and transfer stations to recycle selected materials within limits manageable by the County.
   - Work with the HDOH Solid and Hazardous Waste Branch to modify recycling and transfer station operating permits to accommodate expanded recycling services.
   - Expand education and outreach programs for both large and small businesses to foster participation in commercial recycling programs.
4. **Expand opportunities to recycle in public areas and during public events.** Providing recycling bins in public places and at public events is a very visible way for the County to demonstrate its commitment to landfill diversion. The County plans to implement the following public area and event recycling programs:
   - Install additional recycling bins in parks and other public areas.
   - Conduct additional recycling events within the community each year.
5. **Establish goals that are expressed and measured in terms of environmental impacts.** (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, in addition to tonnage-based landfill diversion or waste recovery goals.
6. **Annually or bi-annually assess existing local and regional markets for materials across the waste stream; study service voids for missed opportunities to recover commodities**. The County could shape strategic action plans around the findings. This process would need to consider community, environmental, and other factors; this would not just be a commodity-driven effort. An initial assessment could consider other destinations for shipping recyclables that have lost value in the current market. For example, the County could consider shipping formerly recyclable materials (e.g., #5 plastics) to the H-power facility in Honolulu if determined economically cost effective (i.e., cost savings, cost neutral) through close coordination and negotiations with the City and County of Honolulu.

4.6.2 Organics

Waste stream studies conducted previously and, as part of this project, have determined that organics comprise a relatively large portion of the waste entering County landfills annually. Diversion of organics was identified as a priority by the SWAC; therefore, the County developed the following actions:

1. **Improve education and outreach programs that promote improved management of organics.** Composting has many benefits and is one area where education and outreach has been shown to be effective at reducing organics households and businesses send to landfills. After considering various options, the County plans to implement the following education and outreach programs:
   - Ensure that the contractor responsible for administering the organics program is meeting contractual requirements.
   - Expand and further develop a master composter program (low priority).
   - Develop a training program and guidance materials for farmers and gardeners.
   - Implement a "Stop Wasting Food" program that would benefit programs such as local food banks.
   - Partner with other local groups to establish compost demonstration gardens at recycling and transfer stations or at other visible locations in the community.
2. **Initiate an onsite composting program for residents and businesses by distributing subsidized units to both residences and businesses.** Data from similar communities indicate that the lowest cost method of keeping organics out of landfills is to manage them on site. This eliminates the need for costly collection or transfer of organics. This is particularly true for the County with many homes in rural areas that cannot be served cost-effectively by collection truck routes. This program would fund subsidized bins for onsite composting of green waste and food waste.
3. **Conduct a landfill organics ban implementation study.**
4. **Implement added organics management facilities and equipment.** Although onsite programs are beneficial, more centralized infrastructure is also needed to provide opportunities for those residents and businesses that are not interested in managing organics on site. After reviewing many options with the SWAC and other stakeholders, the County plans to implement the following programs:
   - Add food waste dropoff locations at recycling and transfer stations that already collect green waste.
   - Formulate compostable bag ASTM D6400-compliance legislation.
   - Add organics/yard waste disposal to existing brochures/signage.
   - Expand the number of dropoff locations for green waste and/or food waste at recycling and transfer stations.
   - Continue operation of mulch facilities at WHSL and SHSL.
   - Investigate organics collection programs, including a residential curbside collection program and recycling and transfer station dropoff facilities. As part of this investigation, perform pilot food waste demonstration projects with the potential for eventual expansion into full-scale food waste management programs.

5. PUBLIC EDUCATION AND INFORMATION

5.1 Introduction

Public education is a critical component of a successful environmental program because it informs citizens about proper solid waste management and reduction methods. The public's understanding of various reuse, recycling, and composting activities are improved through these education and outreach events. Education programs also serve to inform residents of the wide variety of solid waste services and opportunities provided by the County and other entities.

This chapter describes existing public education activities within the County of Hawai'i, identifies current issues and concerns with respect to public education, and presents recommendations that will help enhance educational opportunities.

5.2 Background

5.2.1 Regulatory Context

In accordance with Hawai'i Revised Statutes Chapter 342-G (HRS 342G-26), the public education and information section of an Integrated Solid Waste Plan shall describe the programs that will be used to do the following:

1. Provide comprehensive and sustained public notice of the options for alternative source reduction, recycling, and bioconversion, and for the proper handling of household hazardous and special wastes.
2. Distribute information and educational materials regarding general solid waste issues through the media, schools, and community organizations.

5.2.2 Review of 2009 Plan

Exhibit 5-1 provides a summary of the recommendations from the 2009 Plan relative to public education and information, and describes the actions taken to achieve each recommendation.

Exhibit 5-1. Status Update of 2009 Plan Recommendations for Public Education and Information

2009 Plan Recommendation	Status
Implement a 3-year zero waste education and social marketing program to educate the public and business community about zero waste initiatives and opportunities.	Did not implement due to funding constraints.
Hire one full-time staff member to serve as the zero waste program coordinator.	Did not implement due to funding constraints.
Implement a community-wide social marketing plan.	Did not implement due to funding constraints.

5.3 Existing Conditions

5.3.1 County of Hawai'i Waste Reduction Programs

The County employs several recycling specialists who conduct basic educational activities along with their other duties. In addition, the County contracts with several business entities to coordinate and provide educational activities to the community. The County's main education initiatives include the following:

- Website (HawaiiZeroWaste.org).
- Newspaper advertisements.
- Radio, television, and movie theater advertising.
- Brochures/flyers/posters.
- Community outreach.
- Networking with existing non-profit and community groups (e.g., Recycle Hawaii, Zero Waste Big Island).
- Community events.
- Sporting events.
- School and group tours of the solid waste/recycling facilities.
- Business education (HawaiiZeroWaste.org).
- Person-to-person interaction (emails, telephone calls, interaction with customers at the recycling and transfer stations).

A brief description of each of these initiatives follows.

5.3.1.1 County Website

The Department of Environmental Management, Solid Waste Division (SWD), has its own page on the County's government website. Two links are provided on the SWD's dedicated page. The first link is to the County Public Document portal, which directs the user to solid waste documents and standard forms. The second link is for access to the County's zero waste website, HawaiiZeroWaste.org. The public document portal includes official solid waste documents and operational information, recycling and transfer station locations and operating hours, guidelines, permits, and plans. The HawaiiZeroWaste.org website is a comprehensive public education resource that emphasizes current events and announcements, as well as providing tips and options for residents and businesses regarding:

- Waste reduction, reuse, recycling.
- Detailed facility (e.g., recycling and transfer facilities) information.
- Zero waste initiatives.
- Educational school-oriented resources.
- Event planning resources to increase recycling and reduce litter at special events.

Relating to social media, the SWD will occasionally post information to the Mayor's Facebook page.

Recycle Hawaii, a volunteer-based organization, provides information on recycling and reuse services via its own website. Their site includes general recycling, waste reduction, and reuse information along with specific County program information.

5.3.1.2 Radio, Television, and Print Media Advertising

The County advertises a variety of waste reduction and recycling programs, including Christmas Tree cycling, polystyrene ban, green waste/mulch, 2-bin recycling, reuse centers, tire recycling, household hazardous waste, e-waste, and used motor oil programs. Forms of outreach include the Recycle Guide, signage, flyers, printed media advertisements, banners, radio spots, television advertisements, and movie theater advertisements.

Recycling Education in Movie Theatres

The County is expanding the program to further educate the public about various waste issues and keep them informed of upcoming events.

The County contracted with four local radio station operators in 2019, Spectrum Cable TV and Internet, Regal movie theaters, daily newspaper publishers, and providers of promotional products with the intent to increase solid waste diversion. Topics include proper recycling sorting as well as information related to the do-it-yourself used motor oil program and the harmful effects of polystyrene foam (styrofoam).

5.3.1.3 Flyers

The County and their vendors have prepared flyers that cover a range of waste management topics for public distribution. The flyers, which are the same as the signage posted at the recycling and transfer stations across the island, address various programs that are provided by the County and their vendors, including green waste recycling, composting, plastics recycling, household hazardous waste, used motor oil collection, and the HI-5 recycling program. The flyers are made available to the public at community events, at the various recycling and transfer stations, and at other County solid waste facilities. They are also available as digital pdfs on the County's zero waste website. In early 2019, the County updated flyers related to the used motor oil program; recyclable and non-recyclable materials; and dedicated flyers for cardboard/paper bags, paper/metal cans/plastic, and glass.

5.3.1.4 Community Outreach

The County strives for transparency and in its ongoing efforts to further community outreach. More staff time is devoted to outreach and networking with other groups (non-profit, community, business) whose goals align with waste diversion such as waste reduction, recycling, and composting.

There are clear benefits of collaboration when and where possible and appropriate: building support for a program, disseminating new information, and perhaps, most importantly, it ensures community messaging is accurate and congruent.

In keeping with this theme, the County is developing a Master Recycler Program in collaboration with the non-profits Recycle Hawaii and Zero Waste Big Island. This program will include all aspects of waste diversion, not just recycling. This will be modeled after existing programs such as the Master Recycler Program in Oregon (who have generously offered technical support).

The County has expanded their in-house community outreach program by contracting with a consulting firm to assist with the design and coordination of a program in FY 2019. To reduce contamination in the waste stream, the County is emphasizing outreach related to proper sorting and use of recycling bins.

As described previously, outreach includes the development of a mass media campaign promoting waste mitigation and contamination reduction through the television, radio, movie theaters, and social media. The SWD is developing a Facebook page as an additional opportunity for public connection. Again, this is where networking with existing waste reduction and diversion-oriented groups will provide a much broader audience with accurate and real-time information.

Transfer Station Thrift Store LLC, the company currently responsible for managing and operating the reuse centers at several of the County's recycling and transfer stations, are contractually obligated to provide community education. The Transfer Station Thrift Store, LLC education program includes partnering with Friends of the Children of West Hawai'i, a local non-profit organization, to establish a youth-led education program. The education program includes a resource website (can be accessed via the County's HawaiiZeroWaste.org website); a printed brochure educating the public on landfill waste and measures individuals and groups can implement to reduce waste; monthly community education events at the minimum of one reuse center; and trained Youth Environmental Ambassadors that will speak at community events to raise awareness about landfills and the need for waste reduction.

5.3.1.5 Community Events

The County participates in various community events (e.g., University of Hawai'i, Hilo [UHH] Earth Day Fair) throughout the year aimed at enhancing environmental awareness. An emphasis has been placed on the HI-5 program through the installation of HI-5 recycle bins at larger community events such as the Merrie Monarch Hula festival. Organizations may reserve these bins for their events, subject to availability. Expanded education material related to waste mitigation will be promoted at local sporting and civic events. A County booth will be present at these events to inform the public of their facilities and of landfill diversion practices as well as providing current, up-to-date recycling information.

County DEM Booth: Hawai'i Academy of Arts and Science in Pāhoa

Promotional materials such as magnets, pens, pencils, and reusable bags—all bearing the www.HawaiiZeroWaste.org address—are used to further spread the recycling message.

In addition, nonprofit local groups such as Keep the Hawaiian Islands Beautiful, Recycle Hawaii and Hawaii Wildlife Fund, among others; participate in community events throughout the year, including the Recycle Bowl and the Big Island's Coastal Clean Up. As part of each event, recycling/reuse specialists are available to engage with the public and answer questions.

5.3.1.6 School Programs

The County and its vendors organize a range of waste reduction and recycling programs for the local schools. The County currently offers tours of the landfill, scrap metal and composting facilities, and the recycling and reuse centers for school groups on an as-requested basis.

For schools interested in formulating a school garden, curriculum is provided through the Kohala Center's Hawai'i Island School Gardens Network and the Center for Ecoliteracy. Recycle Hawaii has also provided school curriculum and presentations related to zero waste, recycling, and sustainability.

County DEM: School Education Program

Keep America Beautiful's Recycle-Bowl (Keep America Beautiful 2018) encourages schools to participate in a competition that tracks the weight of their recyclables for 4 weeks. This program encourages schools to increase their recycling rate and to educate students and teachers about waste reduction and sustainability.

The Ocean Conservancy's International Coastal Cleanup Project encourages schools and volunteers to participate in marine waste removal along shorelines. By identifying sources of debris and illustrating the harmful impacts of debris on marine life, students and the public are inspired to properly dispose of their waste.

The Art and Craft of Upcycling through Recycle Hawaii encourages schools and organizations to 'upcycle' materials by reclaiming, recreating, or repurposing them. This program motivates participants to practice sustainable practices by reducing and repurposing their waste through a creative outlet. Submitted art pieces are showcased on the Recycle Hawai'i website.

5.3.1.7 Business Education

The County has specifically helped businesses dispose of commercial waste, such as mercury-containing light bulbs. In relation to proper disposal, the County encourages the formulation of 'Green Teams' where a business designates a group of employees to manage and discuss opportunities related to waste reduction that could ultimately result in cost-savings for the company.

The County has established a polystyrene reduction education and outreach program to educate not only the public about the Polystyrene Foam Container & Food Service Ware Reduction program but also to provide the food service industry information and support during this transition. A flyer is available to businesses explaining how the food service industry can meet the County requirements.

The County has also established a tire recycling educational program that targets both the tire businesses and the public. Tire businesses have been inspected by a County contractor to see if they are abiding with the state requirements. The contractor has provided information on the state requirements

along with posters. Radio and newspaper advertisements along with signs are used to inform the businesses and the public of the program.

5.4 Issues and Concerns

As described above, the County currently invests resources into creative education and outreach programs. However, given the County's commitment to landfill diversion, additional effort could be expended to further reduce the quantities of materials discarded in landfills. The County plans to employ social marketing principles to guide the design and implementation of education programs. Social marketing is the planning and implementation of programs designed to bring about social change. Some of its key concepts include the following:

- The ultimate objective of marketing is to influence action.
- Action is undertaken whenever target audiences believe that the benefits they receive will be greater than the costs they incur.
- Programs to influence action will be more effective if they are based on an understanding of the target audience's own perceptions of the proposed exchange.
- Target audiences are seldom uniform in their perceptions and/or likely responses to marketing efforts and therefore should be partitioned into segments.

Marketing efforts must incorporate all of the "4 Ps," that is:

- Create an enticing "Product"—the package of benefits associated with the desired action.
- Minimize the "Price"—the target audience believes it must pay in the exchange.
- Make the exchange and its opportunities available in "Places" that reach the audience and fit its lifestyles.
- "Promote" the exchange opportunity with creativity and through channels and tactics that maximize desired responses.

Recommended behaviors always have competition that must be understood and addressed. Because the marketplace is constantly changing, program results must be regularly monitored, and management must be prepared to rapidly alter strategies and tactics to optimize the effectiveness of the program.

Other key features of successful education programs that the County would strive to achieve include the following:

- Research different segments of the population who are targeted for programs.
- Maintain a consistent "look" for the program.
- Use a variety of communication methods.
- Keep detailed records of efforts and results.
- Evaluate the impact of education and promotion programs.
- Cross-promote solid waste management activities with other County environmental initiatives.

Relating to the contamination issue, new recycling signs have been developed and installed at the recycling and transfer stations from early 2019 to middle 2019. The new recycling signs are consistent with a standardized format, making it easier for visitors as well as residents to easily identify what and how to recycle.

The County is considering requiring proper signage at businesses and public events. The County plans to expand its technical assistance for businesses to educate and inform them of proper disposal of their solid waste, as well as to encourage their customers of proper recycling and composting practices. At community outreach and school events, brochures and fliers are handed out to inform the public of proper recycling and waste diversion techniques.

5.5 Options for Improvement

Substantial progress in advancing the County's landfill diversion objectives will require enhancements to the County's current education and outreach programs. Implementation of these programs and initiatives will require additional funding for outreach activities. This could be achieved either directly by the County or by contracts with appropriate consultants, vendors, or government entities.

5.5.1 Develop 3-Year Landfill Diversion Education and Social Marketing Plan

To maximize the effectiveness of the County's educational and promotional efforts, a 3-year plan could be developed that identifies the major goals and objectives of the County's landfill diversion education efforts, including specific programs and initiatives that will be implemented to obtain those goals. This 3-year plan would provide a schedule or "blueprint" of activities that will be undertaken to support waste reduction and recycling activities. It would help ensure effective use of staff time and budget as well as offering a benchmark for measuring success.

The 3-Year Landfill Diversion Education and Social Marketing Plan could:

- State the County's key messages (broad goals and specific objectives).
- Identify specific demographic groups or geographical areas the County would like to reach with its messaging. Identify educational programs tailored to target the specific types of materials that are easy to recycle yet are not being diverted effectively, based on the results of the waste stream assessment section of this Plan update.
- Develop improved public awareness programs that publicize current and future waste management and recycling programs.
- Develop improved educational and promotional activities specifically geared toward new programs and initiatives identified in this plan.
- Evaluate the benefit of providing educational and promotional materials in other languages.
- Identify how the County will measure the success of its efforts.
- Estimate the costs of future education and promotion efforts.
- Identify how to promote a change in administration and funding (e.g., PAYT program and fee schedules for residents and businesses).
- Leverage cultural importance of proper waste management on Hawai'i Island–for its community and for tourism.

The plan would address immediate, short- and long-term actions pertaining to the following programs:

- Diversion as an overarching County waste management policy.
- Residential waste reduction and reuse.

- School programs for waste reduction, recycling, and composting.
- Residential recycling.
- Visitor industry waste reduction and recycling.
- Business waste audit and education programs.
- Other business waste reduction and recycling.
- Construction and demolition waste reduction, reuse, and recycling.
- Implementation of alternative funding mechanisms.

Cost Considerations. To implement this option, the County would need to budget for consulting time to assist in the preparation of an education and promotion plan and development of program identification and materials.

Recommendations from the plan would likely result in initiatives that would require funding in subsequent years for plan implementation. The plan would be evaluated and updated every other year.

5.5.2 Conduct Waste Management Attitude Survey

The County would benefit from conducting a market survey to assess public attitudes about waste management in the County. The survey would be used to assess perceptions, attitudes, and behavior of non-users and users towards the County's programs and services. The results could be used to shape messages to target audiences in different communities.

The survey would be conducted over the telephone by a firm experienced in conducting market research. Respondents would be randomly selected from commercially available lists that are specially prepared and which provide telephone numbers in the target geographic area (excluding fax numbers, business numbers, and other non-residential numbers).

Because non-response tends to increase with survey length, the survey would not exceed 10 minutes in length because this tends to be the upper limit of tolerance for surveys. Methods such as using a predictive auto dialer (PAD) and a computer-assisted telephone interviewing (CATI) system would be considered to ensure randomness and survey efficiency.

Cost Considerations. To implement this option, the County would need to budget for consulting time to conduct the market survey. It would also require County staff time to deliver, analyze, and monitor the survey. The specific amount of spending for the survey would be developed as part of development of the 3-year education and promotion plan.

5.5.3 Expand Existing Advertising and Marketing Efforts

The County currently advertises various aspects of its waste management program, such as recycling, through television, movie theaters, radio, print advertising, and outreach at community or special events. These efforts could be expanded to include zero waste programs and initiatives and incorporate new themes or slogans implemented by the County. Expanded television and radio advertising could include paid advertisements, as well as promotional opportunities such as news stories, talk show interviews, and additional special event outreach.

Increasing the number and scope of County participation in community events is also recommended in Chapter 4 Recycling, Bioconversion, and Markets. Expanding participation in community events will create additional opportunities to distribute educational and marketing materials to both residents and businesses.

Cost Considerations. This option could be funded at a variety of levels. The specific amount of spending on added advertising and marketing would be developed as part of development of the 3-year education and promotion plan.

5.5.4 Expand Public and Civic Outreach

The County plans to increase its presence at public outreach events. Events such as high school and college sporting events as well as civic events such as fairs, festivals, and expositions. The County could design a simple, easily transportable booth to further engage the public to learn about waste mitigation, proper waste disposal, and about the recycling and transfer stations. Literature and brochures would be handed out to the public at these events as well as small promotional items such as magnets, compostable pencils, and note pads with the www.HawaiiZeroWaste.org address.

County presence at these events will spread the waste mitigation and sustainability message to the public. Not only will the community learn how and where they can properly dispose of their waste, they can also discover how they are better able to reduce their ecological footprint through recycling and reuse. Expanded outreach at more events will also increase accurate waste disposal on site.

Cost Considerations. Presence at public and civil events would require County staff time, preparation, and analysis.

5.5.5 Expand School Education Programs

The County has a school outreach program that includes several educational initiatives being implemented in the public schools around the island. These existing educational programs could be expanded to incorporate a multi-level approach that is consistently implemented across a range of age groups over time and would integrate zero waste concepts. Potential activities could include recycling and composting initiatives, specific curriculum, field trips, guest speakers, and waste audits.

If the County incorporates recycling as a requirement for the hauling contractors that service schools, as recommended in Chapter 4, it could create opportunities for schools to involve students with the recycling effort on individual campuses.

Cost Considerations. This option could be funded at a variety of levels. Much of the expense would be for added staff time for County staff or contracts with its education vendors.

5.5.6 Expand Business Education Programs

The County plans to further encourage partnerships and sponsorships by local environmental and community groups to help them take ownership of waste management concerns and provide recognition to them for waste reduction successes. The County could expand on its program of technical assistance for individual business owners and business and trade groups, with a focus on reducing both the quantity and toxicity of commercial and industrial discards to the landfill. The County could conduct technical assistance that includes visiting the businesses, and suggesting ideas to further waste mitigation practices, and better inform them of business recognition opportunities. County education staff could collaborate with other agencies that interact with businesses about environmental issues such as air, energy, water, wastewater, and disaster planning to leverage resources and avoid duplication of effort.

Key steps in expanding the County's business outreach programs could include the following:

- Identifying major generators and generating sectors.

- Developing a database of key contacts at individual businesses and organizations.
- Identifying classes of readily recyclable materials and toxics generated by businesses.
- Establishing priorities.
- Developing strategy and preparing education and outreach materials.
- Monitoring effectiveness.
- Revising and refining the program annually based on results of effectiveness analysis.

County education staff could also look to businesses that provide advertising services (such as utilities, transit, newspapers) and search for opportunities for free advertising.

Cost Considerations. This option could be funded at a variety of levels. Much of the expense would be for added staff time.

5.5.7 Develop Visitor Industry Education Programs

Given the significant contribution of the visitor industry to the County's waste stream, it would be beneficial to develop focused educational and promotional programs that specifically target the visitor industry. This could include developing brochures to provide in hotels; adding more recycling bins at airports, beaches, and parks; and installing displays at airports. The County could also provide a list of recommended actions to hotels and resorts outlining measures that they can implement to reduce waste, and contact information for technical assistance. For example, a tip sheet for hotels and motels could be formulated that illustrates best management practices in relation to waste mitigation.

Cost Considerations. This option could be funded at a variety of levels. Much of the expense would be for added staff time.

5.5.8 Evaluate Effectiveness and Continue to Refine Education Programs

The long-term success of the County's education program will be dependent on the extent to which educational and promotional materials can be continually modified to respond to changes in the program. As part of this effort, the County would include ongoing evaluations of the progress and effects of its source reduction and recycling programs. This effort would include evaluating the public's understanding of various programs, establishing benchmarks for success at current levels of effort, and evaluating the effectiveness of education and promotional campaigns.

The information needed to evaluate the effects of an education and promotion program might be gained through:

- Analysis of recycling rates, monthly participation rates, and capture rates.
- Analysis of levels of contamination in recycling programs.
- Analysis of the extent of media coverage.
- Personal interviews.
- Soliciting opinions at community events and meetings.
- Mail, telephone, or dropoff surveys.
- Focus groups.
- Mail-back response cards.
- Evaluation of the number of hits on the County's website.

The County could include evaluation as part of every education and promotion program. Results would be communicated to appropriate audiences including elected officials, interest groups, and the public.

Cost Considerations. A good rule of thumb is that approximately 10 percent of the cost of a program is spent on the program's evaluation to make changes as deemed necessary to ensure success.

5.6 Recommendations

Based on the analysis presented above and discussions with the SWAC, the County plans to implement the recommendations listed below. Many of the options discussed above and other education initiatives, such as those in support of residential and business recycling, visitor industry waste management practices, and organics and composting, are addressed in other sections of this Plan update.

1. **Implement a 3-year education and social marketing program to educate the public and business community about landfill diversion and recycling initiatives and opportunities, including proper disposal and recycling processes to reduce contamination.**
2. **Conduct a waste management attitude residential survey.**
3. **Ensure the County has the staffing available commensurate with the needs of the public outreach program.**

6. HOUSEHOLD HAZARDOUS WASTE AND ELECTRONIC WASTE

6.1 Introduction

Household products exhibiting corrosive, reactive, toxic, or ignitable properties are considered "household hazardous waste" (HHW), as defined by the EPA. These products including, but not limited to, automotive fluids, paints, oils, cleaners, pesticides, poisons, and batteries require special handling, transport, and disposal or recycling methods. These types of wastes present special risks and disposal methods.

Electronic waste (e-waste) consists of any broken or unwanted electronic devices. Computers, VCRs, copiers, stereo equipment, televisions, cell phones, and monitors are examples of common e-wastes. Like HHW, many e-wastes, such as cathode ray tubes (CRTs) from older televisions and monitors, include components that are toxic and restricted from the landfill. This chapter describes the status of the HHW and e-waste collection and disposal system within the County, identifies current issues and concerns, and presents options for achieving the County's HHW and e-waste goals.

6.2 Regulatory Background

The discussion in this section describes the regulatory framework for management of HHW and e-waste.

6.2.1 Summary of Household Hazardous Waste Regulations

According to the definitions in Hawai'i County Code Chapter 20 (HCC 20):

> "Prohibited materials" *include, but are not limited to, paint thinner or solvents; oil base paint waste; automotive waste oil, antifreeze or lead acid batteries; pesticides, herbicides or rodent and insect control chemicals; household cleaner, polish or wax; contaminated soil; medical waste; propane, oxygen or acetylene tanks; diesel, gasoline or alcohol; and, liquids or sludges in containers five gallons or larger, including liquid cooking oil or grease unless mixed with a bulking agent so that it solidifies,* ***and hazardous wastes*** *as defined in 40 Code of Federal Regulations parts 257, 258 and 261. Notwithstanding the foregoing, commercial cooking oil waste and commercial FOG waste are considered prohibited materials in any amount and any form.*

In accordance with HCC 20-40, the County does not allow the disposal of hazardous wastes at recycling and transfer stations or in the landfill. HHW are typically generated in small quantities; as a result, they are exempt from federal and state hazardous waste regulations, according to the Code of Federal Regulations (CFR) 40 Part 261.4, and the State of Hawai'i Administrative Rules (HAR 11-261-4). However, Hawai'i Revised Statutes Chapter 342-G (HRS 342G) requires that integrated solid waste management plans develop programs for the collection of HHW and specifies that the disposal of these materials is the responsibility of the state. Businesses, public agencies, farms, and nonprofits must manage the collection of their waste according to HAR 11-260-1; the County manages the collection of HHW.

6.2.2 Summary of E-Waste Regulations

As of 2010, the Hawai'i legislature enacted Act 13 to encourage recycling of electronics, and mandated manufacturers to establish, conduct, and manage take-back recycling programs for "covered electronic devices" (CEDs). Act 13 was revised in 2011 to include "covered televisions" (CTVs). The HDOH is responsible for implementing the "Hawai'i Electronic Device Recycling Program." Manufacturers of CEDs

sold in Hawai'i must register with HDOH and pay an annual registration fee of $5,000 and must set up recycling plans. Television manufacturers must follow the same protocol except for the fee, which is $2,500 annually. Any manufacturer that sells both CEDs and CTVs are required to pay a combined $7,500 in annual registration fees. The collected fees are used by HDOH to administer the program.

According to Chapter 339D, Electronic Waste and Television Recycling and Recovery Act, a "covered electronic device" or "covered television" includes a computer, computer printer, computer monitor, or portable computer with a screen size greater than 4 inches measured diagonally; and televisions with a viewing screen greater than 9 inches intended for use by a household. The program does not cover certain electronic devices including those that are a component of a motor vehicle, part of a larger part of equipment (e.g., medical diagnostic equipment), or electronic devices in appliances (e.g., refrigerator), nor does it include telephones or global positioning system (GPS) units. Those covered by the program include *any household, government entity, business, or nonprofit organization exempt from taxation under Section 501(c)(3) of the United States Internal Revenue Code, regardless of size or place of operation within the State.*

6.2.3 Review of 2009 Plan

Exhibit 6-1 provides a summary of the recommendations from the 2009 Plan relative to household hazardous waste and e-waste, and describes the actions taken to achieve each recommendation.

Exhibit 6-1. Status Update of 2009 Plan Recommendations for Household Hazardous Waste and E-Waste

2009 Plan Recommendation	Status
Hire a Household Hazardous Waste/Electronics Waste specialist.	Using existing staff to manage the program.
Implement HHW and e-waste public outreach and education programs.	The County promotes HHW collection events when they are scheduled to occur. The County also promotes e-waste through flyers and information on the County's HawaiiZeroWaste.org website.
Explore e-waste take-back programs with state and manufacturers/sellers.	Extended producer responsibility—Funding challenges.
Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of e-waste.	Hawai'i Electronic Device Recycling Program (HEDRP) e-waste recycling extended EPR program was implemented 2010-01-01. Funding challenges.
Evaluate the elements of successful similar programs.	Ongoing
Coordinate with other counties and the state to develop and implement e-waste take-back programs.	Task Force meetings. Lacking in counties of Hawai'i and Kauai.
Coordinate with local retail businesses to facilitate implementation of take-back programs for e-waste.	Did not implement due to staffing constraints.
Assess what legislative actions may be necessary to facilitate storage and handling of hazardous waste products and packaging at various types of collection locations.	Did not implement due to staffing constraints.
Incorporate information about existing and new hazardous materials and packaging take-back programs in the community outreach and education effort.	Funding and organizational challenges.

Exhibit 6-1 Status Update of 2009 Plan Recommendations (continued)

2009 Plan Recommendation	Status
Conduct additional HHW collection events.	Conducted two events at Wai'ōhinu Recycling and Transfer Station (2011-09-03 and 2012-09-08); despite broad awareness, campaign turnout was disappointing. Discontinued.
Explore legislative actions for hazardous products and packaging take-back programs.	Lack of administration support for EPR legislation; lack of legislative support for improving e-waste take-back EPR.
Conduct research to assess what legislation may be required to mandate and manage take-back programs.	Lack of administration or legislative support for EPR legislation.
Coordinate with local retail businesses to develop and implement take-back programs.	Lack of business support for EPR programs.
Assess what legislative actions may be necessary to facilitate storage and handling of hazardous waste products and packaging at various types of collection locations.	Did not implement due to staffing constraints.
Incorporate information about existing and new hazardous materials and packaging take-back programs in the community outreach and education effort.	No new hazardous or e-waste take-back programs to outline for public education.
Explore public-private partnership for local e-waste campaign.	Did not implement due to staffing constraints.

6.3 Existing Conditions

Household hazardous waste in the County is collected on specified collection dates at select recycling and transfer stations during the year. E-waste is collected every Saturday on a rotating schedule at the Wai'ōhinu, Waimea, Kealakehe, and Hilo Recycling and Transfer Stations, and at one permanent location in Hilo.

The County provides public awareness and educates residents on HHW and e-waste programs, promotes HHW collection events, and contracts for the collection of the hazardous products, which are then shipped to the mainland for proper disposal or treatment. The following subsections describe in greater detail the County's existing e-waste and HHW program.

6.3.1 Household Hazardous Waste

An established HHW collection frequency of six HHW collection events per year are held at four of the recycling and transfer stations.

Success at the Hilo and Kealakehe (Kailua-Kona) recycling and transfer stations has caused unacceptable traffic congestion during the HHW collection events. The Hilo and Kealakehe (Kailua-Kona) recycling and transfer stations each historically hosted two HHW collection events per year. The County plans on maintaining the six collection sites, and relocating the Hilo and Kealakehe (Kailua-Kona) HHW collection events to accommodate traffic flow.

Future HHW collection events are currently scheduled for the following specific dates at these four locations:

- Hilo-Ho'olulu Complex (Francis Wong Baseball Stadium)—First Saturday of August and the first Saturday of February, 7:30 a.m. to 2:30 p.m.
- Kealakehe (Kailua-Kona) High School—Second Saturday of August and the second Saturday of February, 7:30 a.m. to 2:30 p.m.

- Pāhoa Recycling and Transfer Station—First Sunday of March, 8:30 a.m. to 3:30 p.m.
- Waimea Recycling and Transfer Station—First Saturday of March, 8:30 a.m. to 3:30 p.m.

HHW collection rates have remained consistent the past 5 years with a marked decrease from years prior (FY 2010 to FY 2012 averaged 136 tons/year while FY 2013 to FY 2017 averaged 58 tons/year). This difference is attributable to residents having greater opportunities for battery disposal at other non-County-managed locations as well as the promotion of Do-It-Yourself Used Motor Oil Collection sites available year-round to residents. Exhibit 6-2 displays the type and quantities of HHW collected from FY 2015 through FY 2017.

Exhibit 6-2. Household Hazardous Waste Collection, County of Hawai'i
(All data in pounds)

Material Collected	FY 2015	FY 2016	FY 2017
Batteries (Automotive and Industrial)[a]	172,430	146,150	113,120
Aerosol Cans	510	915	1,160
Poisons	4,900	13,100	12,300
Acids	600	230	1,350
Bases	165	70	240
Paints and Solvents (Oil Based)	12,500	19,910	24,020
Batteries (Household)	2,400	4,000	3,200
Polychlorinated Biphenyls	10	22	–
Oil and Solvents (Halogenated)	–	–	400
Mercury	75	40	45
Fluorescent Lamps/Bulbs/Ballasts	–	380	1,220
Compressed Gas Cylinders	–	–	360
Miscellaneous	1,175	100	200
Oxidizing Material	240	195	155
Oil (gallons)	3,105	5,310	5,860

Source: Date provide from the County of Hawai'i DEM, multiple years.

[a] After 2013, the County stopped accepting automotive batteries at the recycling and transfer stations due to high disposal costs. However, these batteries are accepted at County-run take-back days where residents may bring in their household hazardous waste free of charge.

The HHW program is free for County residents. It is advertised via signage and flyers at the recycling and transfer stations, newspaper and radio advertisements, and on the County HawaiiZeroWaste.org website. Social media outlets also promote the events such as local community Facebook pages, and non-profits (e.g., Recycle Hawaii). Video feeds such as Big Island Video News promote the events at no cost to the County.

Commercial entities may contact private contractors for hazardous waste storage, recycling, and/or disposal. Residents who cannot come to one of the events or who have items that are not acceptable for collection at the residential events, can contact private contractors to have their HHW disposed for a fee.

6.3.2 E-Waste

The "Computers, Electronics, & Printer Cartridges" page of the County's HawaiiZeroWaste.org website explains why e-waste should be recycled and provides resources for the public to learn more about the

state of Hawai'i Electronic Device Recycling Program. The website lists the locations where items can be recycled free for residents and for a fee for both businesses and residents. The website also provides an inventory of manufacturers and producers that have their own trade-in recycling programs where it is possible that a consumer may get value for the e-waste item towards the purchase of new electronic equipment (or in some cases, may get a return in value without making a purchase [e.g., mobile telephones and accessories]).

The County also recycles more types of e-waste than what is supported by the Electronic Waste and Television Recycling and Recovery Act. The County also recycles VCRs, CD/DVD players, stereo receivers/amplifiers (no speakers), UPS systems, digital cameras, and mobile and landline telephones—none of these items are listed as approved Covered Electronic Devices (CEDs) under the Hawai'i Electronic Device Recycling Program (see Section 6.2.2).

E-waste is accepted at one permanent dropoff site in Hilo, Mr. K's Recycle and Redemption, which is open daily from 8:30 a.m. to 4:30 p.m. Residents can recycle their e-waste for free on Saturdays and must pay a fee of $0.55 per pound on the other days. E-waste accepted includes televisions, computers, laptops, monitors, printers/fax machines/multi-function printers, VCRs, CD/DVD players, stereo receivers/amplifiers (no speakers), UPS systems, digital cameras, and mobile and landline telephones. Microwaves and heating/cooling devices are not accepted. Commercial entities may also recycle e-waste at Mr. K's Recycle and Redemption; however, businesses are normally charged a fee of $0.95 per pound to recycle e-waste Sundays through Fridays, with a discounted rate of $0.55 per pound on Saturdays. In June 2018, Mr. K's Recycle and Redemption held a one-day special event allowing free e-waste collection for everyone, including nonprofits, state/government agencies, and businesses by appointment only. Approximately 73,624 pounds of commercial and 7,932 pounds of County government e-waste were collected during this event.

Free residential household e-waste recycling collection also occurs on Saturdays, on an island-wide monthly rotating basis at four locations:

- Wai'ōhinu Recycling and Transfer Station—First Saturday of every month.
- Waimea Recycling and Transfer Station—Second Saturday of every month.
- Kealakehe (Kailua-Kona) Recycling and Transfer Station—Third Saturday of every month.
- Hilo Recycling and Transfer Station—Fourth Saturday of every month.

These collections are prohibited from accepting e-waste from businesses, agencies, and nonprofits. Rotating e-waste collection sites are open from 9 a.m. to 4 p.m., only on their scheduled days. The list of e-waste accepted at the County facilities, also collected at Mr. K's Recycle and Redemption, are described above. In addition to managing the permanent e-waste collection site in Hilo, Mr. K's Recycle and Redemption collects e-waste from the rotating dropoff sites, then repairs a small portion for resale and/or recycles the material. Other local companies provide e-waste recycling services for a fee.

Many manufacturers and producers of electronics have programs that allow consumers to get value for their products through trade-ins or to simply recycle their e-waste. The County's website lists the retailers and manufacturers with website links to these recycle/trade-in programs (e.g., Walmart, Panasonic, Nokia). The County website also provides contract information for businesses that take-back mobile telephones and accessories (e.g., Sprint, AT&T) and inkjet/toner cartridges (e.g., Office Depot, Target). Local retailers who collect e-waste ship the e-waste to the mainland for recycling at certified facilities. The mainland recyclers segregate the e-waste into glass, plastics, and metals components, which are sold to waste management entities. Exhibit 6-3 presents the total quantity of e-waste collected during the 2010 to 2018 fiscal years.

Exhibit 6-3. E-Waste Collected, County of Hawai'i

Fiscal Year (July 1 through June 31)	Quantity Collected (Tons)
2009-2010	383
2010-2011	200
2011-2012	No e-waste shipped to market
2012-2013	292
2013-2014	155
2014-2015	156
2015-2016	166
2016-2017	229
2017-2018	287

Source: County of Hawai'i DEM, Solid Waste Division. 2018.

As described in Chapter 3, there are seven reuse centers throughout the County sited next to the recycling and transfer stations. Though not classified as e-waste, these centers allow residents to drop off unwanted and still useful small electronic appliances that still have some use left in them. Residents can then purchase the appliances for a nominal fee at the center.

Reuse Center Electronics—Kea'au Recycling and Transfer Station

In 2006, 2008, and 2010; the University of Hawai'i (UH), in conjunction with Apple Corporation, sponsored the Hawai'i Education and Government eDisposal Day. The event allowed residents to dispose of their personal e-waste during a single-day event at locations in Hilo and Kona and two events in Maui (Kahului and Līhue). In 2012, the event was expanded to allow 3 days of e-waste collection from County, state, or federal military branches; small to medium-sized businesses (of less than 100 employees); and non-profit organizations while continuing with single-day event for Hawai'i households. It is estimated that over 5 million pounds of e-waste was collected statewide during these events. The UH is no longer holding these community events; however, they are still recycling university-generated e-waste on a quarterly basis and encouraging reuse through a university-supported "swap meet." The Apple Corporation is still supporting their efforts.

6.4 Issues and Concerns

6.4.1 Household Hazardous Waste

Household hazardous waste presents unique hazards to humans and the environment. Storage, handling, transport, and disposal of hazardous waste require special procedures and equipment.

Currently, there are a limited number of locations for residents and businesses to dispose of HHW. The distance to collection sites, and challenges associated with storage, handling, and transporting HHW may be a disincentive for residents or businesses in rural areas to properly dispose of their waste.

If transfer or landfill staff identify HHW, they take steps to manage it appropriately and keep it out of the landfill. County staff also respond to occasional reports of HHW discarded in remote areas of the County. However, once in a garbage bag or bin, it is very difficult (and expensive) to identify HHW in the waste stream. Despite the County's current efforts to keep HHW out of its landfills, the 2008 County of Hawai'i Waste Composition Study estimated that 527 tons of HHW was disposed of in County landfills in FY 2008. Although the County added two new collection locations for hazardous waste in 2008, the amount of hazardous waste collected has decreased. For example, FY 2010 through FY 2012, HHW collected was approximately 243 tons, and for FY 2015 through FY 2017, approximately 191 tons[6]. With an average of only 87 tons/year of hazardous waste managed between FY 2010 and FY 2017, and the estimated 527 tons disposed of in County landfills in FY 2008, there is a marked need to increase funding to educate the public about this program. [The County spent about $220,096 on its HHW program in FY 2017, of which approximately $11,000 was used towards advertising the program]. Thus, additional education and more convenient opportunities to properly manage HHW would be beneficial. Potential opportunities for improving the existing system are presented below.

6.4.2 Electronic Waste (E-Waste)

The County is charged $0.55 per pound by the vendor to collect, process, and market the e-waste. The County pays for the residential e-waste program through state funding (electronic device recycling fund[7]) and property taxes; however, there is no similar program to address e-waste generated by businesses, schools, or government entities such as the military branches. Although the County provides businesses with a reduced rate on Saturdays, the cost of e-waste disposal remains a disincentive for many private businesses to recycle e-waste, and results in much of the business e-waste being sent to the landfills. A lack of staff assigned to monitoring and enforcement at recycling and transfer stations and landfills contributes to e-waste entering the landfills.

The state of Hawai'i's Electronic Waste and Television Recycling and Recovery Program is a positive step in reducing e-waste disposal although e-waste is not banned from landfills under state or Hawai'i County laws. The City and County of Honolulu have a landfill ban on business and governmental e-waste, while households are exempt. Stronger legislation may be required to deter residents or businesses from disposing of e-waste in ways that result in the waste entering landfills. The HDOH 2016 Report to the legislature underlines several concerns and challenges related to the Electronic Waste and Television Recycling and Recovery Program:

1. The law gives manufacturers too much leeway in recycling programs they offer consumers. With no criteria or performance standards tied to the manufactured-generated recycling plans (which describe collection and recycling procedures), some manufacturers end up implementing

[6] In FY 2009 through FY 2011, a large component of HHW was car batteries; they were not collected under the HHW program in later years. The car battery tonnage was removed for a more accurate comparison to later years of collection.

[7] According to Chapter 339D, Electronic Waste and Television Recycling and Recovery Act, there is an electronic device recycling fund, which is a culmination of fees, payments, and penalties as collected from manufacturers and retailers. The funds are administered through the HDOH, and expended for the sole purpose of implementing and enforcing the Electronic Waste and Television Recycling and Recovery Act.

inconvenient programs that require consumers to do much of the work to recycle their Covered Electronic Devices (CEDs).

2. Most collection programs have been drastically scaled back, or eliminated because of budget constraints, and *comprehensive services are centered on O`ahu because of its population concentration.*
3. Some manufacturers do not put effort in establishing CED recycling programs (as evidenced by the reporting of recycling 0 pounds of CEDs) and other manufacturers are only implementing programs in Oahu, with no comprehensive services to the other islands.

The 2016 Report to the legislature suggests that statutory mandates for minimum e-waste recycling goals and customer convenience are necessary to encourage a state-wide program that is both effective and convenient. The HDOH's plan is to *continue to work with the Legislature to strengthen the program with respect to consistency of service provided across the state, convenience of the recycling programs, long term stability of the programs, and to setting recycling goals.* The ultimate final disposition of e-waste is an important factor to consider with e-waste recycling or disposal. Disposal or recycling of e-waste by uncertified companies can potentially result in discarded e-waste being shipped to third world countries where fewer desirable practices are implemented. Use of certified recyclers can increase costs of recycling or disposal. The County's current program (implemented through Mr. K's Recycle and Redemption) uses recyclers that provide certificates of destruction. The County spent about $165,000 ($0.55 per pound) on its e-waste recycling program in FY 2017–18. State grants are available to help defray the cost of recycling, the County received a $160,000 grant from the state for FY 2018–19 and will receive the same amount in FY 2019–20.

The design of collection facilities for e-waste and HHW must consider special conditions within the County, including invasive species concerns, and operating conditions in areas where the facilities are established. Dangerous conditions (wet and slippery surfaces in high precipitation areas) and the potential for export of invasive species (such as African tree snails or coqui frogs) must be evaluated during design.

6.5 Options

An overview of various options that could be implemented to improve the management of HHW and e-waste follows. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for the County.

6.5.1 Install Permanent Collection Facilities at Recycling and Transfer Stations

Permanent collection facilities at recycling and transfer stations would provide more opportunity for residents to properly dispose of HHW, e-waste, and some special wastes. The facilities could be incorporated into the standard layout design at selected stations. The County has constructed a special waste collection facility at the Pāhoa Recycling and Transfer Station as a component of its upgrade; however, it is currently unused due to staffing deficiencies. Guidelines could be developed for both residential and business use of the facilities.

Facilities are designed with safe work practices in mind for operation of equipment such as forklifts or trailers. Operational plans are established to minimize the risk of injury to workers. In areas with higher rainfall, facility designs include covered or enclosed areas that incorporate measures to prevent invasive species from entering waste storage areas or being transported off site with waste.

Having fixed facilities at recycling and transfer stations would potentially reduce the amount of illegal dumping, and would allow the County to set up a safer and more efficient system for storage, handling, transport, and eventual disposal of the wastes.

Cost Considerations. Permanent facilities for HHW can range significantly in costs depending upon their design and function. If permanent facilities are developed at multiple recycling and transfer stations, the facilities could be smaller and would be less costly. Annual operating costs would depend on how often the facilities are open and the extent to which the programs are successful in attracting HHW.

6.5.2 Implement Additional Collection Events

Additional one-day collection events, combined with promotional campaigns, could potentially increase diversion of HHW, e-waste, and special waste from the landfills. Events could be designed to target a single type or multiple types of waste. Similar to the currently scheduled events, the County could sponsor events that are implemented on an island-wide basis, or community-specific events that are rotated through various geographic areas. The County could conduct such events at fixed locations, or conduct a mobile event utilizing trucks or trailers set up to transport specific types of waste. The County could also set up events that are specific to either residents, agricultural businesses, or commercial and industrial businesses.

For e-waste only, collection events could be accomplished using a trailer or container that would rotate among various recycling and transfer stations. A schedule could be published that documents the days that the service would be provided by location. As an example, a trailer could get to 12 locations each year if it spent a set week every third month at a different station (that is, second week of January, April, and July).

Cost Considerations. Costs for conducting such events would include cost of temporary facilities to store wastes dropped off during the events, costs for promoting the events, and additional training costs for staff who would manage the events and the storage and handling of the waste. Additional expenses would include the cost of any subcontracted waste hauling or disposal firms used to transport and dispose of the waste collected.

6.5.3 Establish E-Waste Take-Back Programs with Manufacturers or Sellers

As described in Section 6.3.2, the Computers, Electronics, & Printer Cartridges page of the County's zero waste website (currently HawaiiZeroWaste.org) does a thorough job explaining why e-waste should be recycled, and provides resources for the public to learn more about the Hawai'i Electronic Device Recycling Program, which includes an inventory of manufacturers and producers that have their own trade-in recycling programs. The County's website lists the retailers and manufacturers with website links to these recycle/trade-in programs (e.g., Walmart, Panasonic, Nokia). The County website also provides contract information for businesses that take back mobile telephones and accessories (e.g., Sprint, AT&T) and inkjet/toner cartridges (e.g., Office Depot, Target). There are also opportunities for corporate sponsorships (e.g., UH program with Apple Corporation, Hawai'i Education and Government eDisposal Day) to promote e-cycling.

The County could potentially apply for grants from manufacturers, or work directly with sellers to establish collection events to promote the concept of producer take-back programs and the general importance of e-cycling.

Cost Considerations. The County already incorporates information about e-waste take-back programs into their educational materials on their HawaiiZeroWaste.org website. They could expand this program by working in conjunction with either sellers or manufacturers to establish take-back programs that involve collection events (similar to the UH/Apple Corporation-sponsored Hawai'i Education and Government eDisposal Day). It would require additional costs for the County to provide staff to initiate and manage such programs. Some costs could potentially be offset by grants provided by the manufacturers or sellers.

6.5.4 Implement Advanced Disposal Fee for E-Waste

The County could implement requirements to collect advance disposal fees on certain types of e-waste. The fee would be collected at the point of sale and would be earmarked to support the management and eventual disposal when the e-waste reaches the end of its useful life. Currently, only California has implemented legislation requiring consumers to pay a fee upon purchase of equipment. The California law applies to purchases of specific types of e-waste items known to contain materials that are considered hazardous upon disposal (primarily televisions, computers, and other types of equipment that use CRTs, liquid crystal displays, or plasma screens). The fee only applies when purchasing new equipment and is used to recycle the types of products covered under the law. Retailers are required to implement the fee system and can capture 3 percent of the fee to cover the costs of implementing the program.

Cost Considerations. Implementation of this type of system would require the County to invest labor costs to draft legislation supporting the requirements, and to implement a program to manage money collected. It is anticipated that implementation of such a program could potentially result in revenue that would partially offset costs the County would eventually spend to manage disposal of e-waste generated at recycling and transfer stations or during collection events. Costs would be incurred by local retailers and manufacturers to establish and administer the program. Consumers would ultimately pay any added cost associated with the fee at the point of purchase.

6.5.5 Explore Public-Private Partnership for Local E-waste Campaign (anything with a plug)

The 2009 Zero Waste Implementation Plan discussed the concept of hand-dismantling electronic components (e-waste) to segregate high-grade metals and segregate working parts rather than shipping materials off island as is currently the practice under the Electronic Waste and Television Recycling and Recovery Act. Currently, e-waste collected on the island is shipped, typically without being pre-sorted, to the mainland for proper disposal. An on-island e-waste campaign would present a potential opportunity to create value-added products, jobs, and tax revenues in the County rather than shipping e-waste off island to benefit another jurisdiction.

There are several ways to initiate on-island hand-dismantling of e-waste:

- Provide financial incentives for local dismantling to a company that is currently shipping bulk e-waste off the island.
- Encourage a joint venture with companies that have established hand-dismantling operations, or have designed their own e-waste processing equipment and may be seeking joint ventures with non-profit organizations or for-profit businesses.
- Apply for a grant to promote green infrastructure jobs.

In this option, the County would study different models for promoting local dismantling of e-waste and convene a meeting of interested parties to determine the level of interest and what help might be needed to move forward. The County could assist them in implementing a process on their own (perhaps with some initial funding support) or issue a request for proposals to develop new services as needed.

Cost Considerations. The cost of an e-waste campaign could vary widely depending on the extent to which the program would require County funding to initiate and sustain. The funding would have to cover an initial study to investigate opportunities.

6.6 Recommendations

Based on the analyses presented above, and the preferences of the SWAC and County staff, the County plans to implement the recommendations listed below. Proposed funding and the timing of implementation for each program are described in Chapter 10.

1. **Ensure enough staffing to operate HWW/e-waste programs successfully.** The current County staffing level is a limiting factor for the implementation of new waste management programs. Whether new programs are implemented solely by County staff or involve subcontractors, additional staff will be necessary to successfully initiate and manage new programs. To expand the HHW and e-waste programs, it is recommended that the County review the staffing needs to make the program successful.
2. **Implement HHW/ e-waste public education, outreach, and public awareness program.** As a component of the additional HHW and e-waste programs, advertising will need to be increased to make the public aware of the events and to encourage participation. The County would expand the existing marketing programs through:
   - Providing event-specific announcements or advertisements.
   - Displaying additional signage at recycling and transfer stations.
   - Expanding outreach programs by conducting community-based educational events at schools or other public institutions.
3. **Research and evaluate elements of successful e-waste/ HHW programs implemented in other jurisdictions and integrate those successes into the County's program.**
4. **Explore e-waste take back programs with state and manufacturers/sellers.** Take-back programs by manufacturers and sellers of e-waste are a cost-effective method to divert e-waste from landfills. Such programs **can** reduce costs of proper disposal for consumers, make it more convenient for consumers to discard their e-waste, and ultimately, provide an incentive for manufacturers to design less toxic and more recyclable products. It is recommended that County staff:
   - Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of e-waste.
   - Coordinate with other counties and the state to develop and implement e-waste take-back EPR programs.
   - Coordinate with local retailers to facilitate implementation of take-back programs for e-waste.
   - Assess legislative actions that may be necessary to improve e-waste programs including demanufacturing, storage and handling, and funding equity.

5. **Conduct additional HHW collection events.** During the development of the 2009 Plan update, a consensus was expressed by the SWAC that periodic HHW collection events were successful and offered the best opportunity for both proper disposal of HHW and diversion of these wastes from landfills. One of the most prevalent comments was that the number and locations of collection events be expanded to create additional opportunities for proper HHW disposal. It is recommended that the County establish 10 to 12 additional HHW collection events per year.
6. **Explore legislative actions for hazardous products and packaging take-back programs.** Take-back programs by manufacturers and sellers of hazardous products are a cost-effective method to divert these types of waste from landfills. It is recommended that County staff:
   - Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of hazardous waste or packaging.
   - Assess what legislative actions may be necessary to facilitate storage and handling of hazardous products and packaging at various types of collection locations, and funding equity.
7. **Explore public-private partnership for a local e-waste campaign (on-island demanufacturing).** It is recommended that the County initiate a study of different models for promoting local dismantling and refurbishing of electronics. As part of the study, the County would convene a meeting of interested parties to determine the level of interest and identify ways that the County can help facilitate development of a locally-based e-waste program. Depending on the economics of on-island dismantling, the County could then evaluate the extent to which it would provide funding to support implementation of a public-private partnership e-waste program.

7. SPECIAL WASTE

7.1 Introduction

As defined in Hawai'i Administrative Rules 11-58.01-03, "Special wastes" means any solid waste which, because of its source or physical, chemical, or biological characteristics, require special consideration for its proper processing and/or disposal. This term includes, but is not limited to, asbestos, used oil, lead acid batteries, municipal waste combustion ash, sewage sludge that is non-hazardous, medical wastes, tires, white goods, and derelict vehicles.

Special wastes typically comprise a significant portion of the total waste stream for most communities. The South Hilo Sanitary Landfill (SHSL) accepts a wide range of special wastes; however, because the site is projected to reach capacity during 2019, steps have been taken to decommission this facility. Thus, the West Hawai'i Sanitary Landfill (WHSL) will receive the bulk volume of special wastes in the County. The logistics of SHSL closure are currently being developed by the County (County of Hawai'i DEM 2017c).

7.1.1 Review of 2009 Plan Update

Exhibit 7-1 is a summary of the recommendations put forth in the 2009 Plan update relative to source reduction, and a description of the actions taken to achieve each recommendation.

Exhibit 7-1. Status Update of 2009 Plan Recommendations for Special Waste

2009 Plan Update Recommendation	Status
Include special waste dropoff and collection areas in the design of new or renovated recycling and transfer stations.	Limited special wastes dropoff opportunities designed/implemented (White Goods).
Continue the current effort to modify convenience center permits to allow white goods recovery at recycling and transfer stations.	Modified certain permits for White Goods acceptance.
Include information regarding the environmental benefits of properly disposing of scrap tires, and current disposal options in the County's education and promotion programs.	HDOH administers the tire/wholesaler scrap tire education program. The County implemented an educational program that targeted both the tire dealers and the public. The County also did multiple inspections of each tire dealer and provided information to the dealer on proper tire management.

7.2 Background

Special wastes are generated by both residents and commercial businesses, and in some cases require special handling or processing to comply with federal and state regulations. As shown in Exhibit 7-2, certain types of special wastes can be disposed of in landfills, with varying levels of documentation depending on the type of waste. Some types of special wastes cannot be disposed of in either the SHSL or WHSL, and require transport to separate recycling, processing, or disposal facilities. The County manages many types of special wastes by establishing dropoff or collection points, and then transporting the waste materials to either the landfill or other recycling or disposal facilities.

The County Department of Environmental Management (DEM) sponsors household annual and bi-annual hazardous waste collection events at select recycling and transfer stations for residential waste. Special wastes accepted at these events include used oil (also accepted at six permanent collection locations), lead-acid batteries, and medication. Waste must be from residential households. Commercial and industrial-generated wastes are managed through the Hawai'i Department of Health (HDOH).

Exhibit 7-2. Special Waste Disposal Requirements

	Accepted at East Hawai'i Landfill	Accepted at West Hawai'i Landfill	Special Storage, Handling, or Disposal Practices Required
Asbestos-Containing Materials	No	Yes	Yes
Used Oil	No	No	N/A
Petroleum-Contaminated Soil	No	Yes	Yes
Used Batteries (lead-acid)	No	No	N/A
Sewage Sludge (non-hazardous)	Yes*	Yes	Yes
Agricultural Waste	Yes*	Yes	Yes (deceased livestock)
Medical Wastes	No	No	N/A
Used Tires	No	No	N/A
White Goods	No	No	N/A
Derelict Vehicles	No	No	N/A

*The EHSL is scheduled to close in 2019.

7.2.1 Asbestos

Asbestos-containing materials (ACM) are currently accepted for disposal at the WHSL in designated areas within the landfill.

7.2.2 Used Motor Oil

The County sponsors a do-it-yourself used oil recycling program. The program is funded by the County, made possible through the donated support of businesses collecting the used motor oil. Under the program, residents can drop off used motor oil at no charge at any of seven collection locations. The oil is accumulated at these collection centers, and then transported to recycling or energy recovery facilities by waste hauling or disposal contractors. During 2015, 2,750 gallons (86.6 tons) of motor oil were collected and either recycled or used in an energy recovery facility (County of Hawai'i DEM 2016a). During the period from January through June 2016, 2,035 gallons (64.1 tons) of used motor oil were collected (County of Hawai'i DEM 2017b).

Potential issues (public health and environmental) with used motor oil disposal include residents disposing of used motor oil into the waste stream that enters the landfills, discarding containers of used oil at the recycling and transfer stations, or discharging used oil to the ground surface.

7.2.3 Petroleum-Contaminated Soil

Soil affected by releases of petroleum products is currently accepted at the WHSL, if it has been chemically profiled and determined to be non-hazardous. The contractor, Waste Management Corporation, reviews chemical profiling data for petroleum-contaminated soil entering the WHSL, and

manages the placement and disposal of this material at the landfill. Petroleum-contaminated soil is not accepted at the SHSL.

7.2.4 Used Batteries (lead-acid)

Used lead-acid batteries are typically recycled by distributors such as auto parts stores or auto service centers. Prior to 2013, specific collection areas for batteries were set up at the Kealakehe, Hilo, and Kea`au recycling and transfer stations. They were transported to their respective base yards and eventually to scrap metal yards or handled as household hazardous waste (HHW). After 2013, the County stopped accepting automotive batteries at the recycling and transfer stations. However, these batteries are accepted at County-run HHW collection events where residents may bring in their HHW free of charge.

Potential issues with used battery disposal include residents disposing of batteries into the waste stream that enters the landfills, discarding used batteries at recycling and transfer stations, or in more remote areas.

7.2.5 Sewage Sludge

Non-hazardous sewage sludge is accepted at the SHSL and WHSL for disposal. The volume of sewage sludge entering the landfills is relatively small. The SHSL receives sewage sludge from the Hilo Wastewater Treatment Plant, and the WHSL receives sewage sludge from two private wastewater treatment plants. Other private facilities, including resorts and a private wastewater treatment plant located in Waimea, recycle sewage sludge by composting the sludge on their properties.

7.2.6 Agricultural and Farm-Generated Waste

Agricultural wastes generated in the County typically include dead livestock, spoiled foods, and green waste. Farm-generated wastes include containers of herbicides, pesticides, or other agricultural chemicals. Currently, the County accepts livestock, or makes arrangements to assist the owner with proper burial of deceased large animals (smaller animals such as cats and dogs are accepted at the landfills). Green waste produced at farms is most frequently used by the farm owners. Green waste is accepted for recycling at the EHOF and WHOF; residential green waste is accepted at select recycling and transfer stations, as described in Chapter 4 Recycling, Bioconversion, and Markets.

The HDOH's pollution coordinator provides guidance for the management and disposal of farm-generated hazardous wastes. Relating to pesticides, conditionally exempt small quantity generators (CESQGs) may contact the state's pesticide branch for disposal information. Triple-rinsed chemical containers are allowed in the commercial solid waste stream (HDOH 2013).

7.2.7 Medical Wastes

Under County of Hawai'i Code, untreated medical wastes are considered "prohibited materials" and are not allowed to be disposed in landfills. Medical wastes that have been pre-treated at the generating facility to remove pathogens and other hazards are permitted to be disposed in the SHSL and WHSL.

To prevent misuse and improper disposal of prescription drugs and sharps, various levels of government have developed pharmaceutical take-back programs:

- The U.S. Drug Enforcement Administration (DEA) offers bi-annual free take-back days for prescription and Over-The-Counter (OTC) pharmaceuticals.

- The County accepts residential prescription drugs at Kona or Hilo's bi-annual HHW collection events, or at Waimea or Pāhoa's annual HHW collection event.
- The State of Hawai'i Department of the Attorney General, HDOH, and the Hawai'i County Police Department (HCPD) administer the Hawai'i Medication Drop Box Program through federal funds. Residents may dispose of their prescriptions in designated boxes located inside the Hilo, Puna, or Kona (Kealakehe) police stations.

Sharps and needles are not accepted at these events. Residents may dispose of their sharps and needles through their medical provider or by properly securing their syringes in a puncture-resistant container and placing it in the garbage. Information on proper disposal of needles and pharmaceuticals are provided on the County's zero waste website.

Some businesses subcontract medical waste disposal to private businesses that specialize in medical waste disposal. Waste disposal practices vary by facility or clinic; currently, there are no required standard practices or documentation procedures. The HDOH is the lead regulatory agency tasked with oversight. In FY 2016–17, an estimated 442 tons of treated medical waste were disposed of at County landfills.

While medical waste management practices are generally effective, County staff members have, on infrequent occasions, observed untreated medical waste at recycling and transfer stations or landfills.

7.2.8 Used Tires

County Ordinance No. 07-182, as codified in HCC 20-46, prohibits the disposal of tires that are whole, cut, sliced, chipped or shredded at any landfill and all island-wide transfer stations. The County does not collect tires at recycling and transfer stations or landfills; it is illegal for residents and business owners to drop off tires at any County facility. Both residential and commercial scrap tires are typically collected and disposed of by automotive service centers during installation of newly purchased tires. Residents can also drop off tires at several local companies that are permitted by the HDOH to conduct tire disposal facilities; these businesses charge a nominal fee to dispose of used tires. Scrap tires on abandoned vehicles are transported by the scrap metal hauler are removed and then transported to a recycling or disposal facility.

Tires generated in the County are shipped to O`ahu for crumbing and subsequent blending with coal at the AES Hawai'i Inc. coal-fired power plant or processed in O`ahu's H-Power waste to energy facility (City and County of Honolulu. 2017). A smaller percentage of the used tires are recycled for use in creation of artistic or industrial products. At least one business in the County has conducted a pilot project that mixed scrap tires and concrete to create blocks for landscaping walls or fences. Nationally, markets are increasingly being developed to use recycled products from tires, including steel alloys from belted tires, rubber products such as playground surfaces or mats, and landscaping products. Local markets for scrap tires are, however, still limited.

Although tires are relatively inert and do not break down quickly when discarded in the environment, discarded tires can trap rainwater and provide an environment that mosquitoes, vermin, or invasive species can thrive in, creating a public nuisance or potential public health concerns. There is a need to promote tire recycling best management practices within the County's public education and information program.

7.2.9 White Goods (Large Appliances)

White goods (large appliances) consist of used appliances including dishwashers, ranges, refrigerators, water heaters, freezers, and other similar domestic appliances. According to the EPA, steel and iron are

the predominant materials in major appliances, and the recycling of these materials avoids the environmental impacts associated with the mining and processing of virgin material (EPA 2016a). Thus, recycling at scrap metal facilities is highly encouraged. Big Island Scrap Metal, located on both sides of the island, Hilo and Kona, currently accept these items.

White Goods Collection—Hilo Recycling and Transfer Station

The County also promotes on its website the Refrigerator Trade-Up "Rid-A-Fridge" Program that offers residents the option to replace and dispose of energy inefficient appliances, contingent upon funding availability. Through this program, rebates are offered to residents to replace their white goods with more updated and efficient models.

Residents may also drop off unwanted white goods at various recycling and transfer stations (Exhibit 7-3). Since 2009, the County has expanded their white goods recycling program by adding reuse facilities to seven more recycling and transfer stations. Dropoffs are allowed at other recycling and transfer stations to keep them from ending up in the transfer trailers and the landfill. The County employees monitor the number of white goods to remain in compliance with permit requirements, and regularly load and recycle them at a scrap metal facility. At those facilities, freon is recovered and recycled in accordance with federal law from appliances such as refrigerators, freezers, and air conditioners.

Exhibit 7-3. Recycling and Transfer Stations that Accept White Goods

Recycling and Transfer Station	White Goods Accepted	Recycling and Transfer Station	White Goods Accepted
East Hawai'i		West Hawai'i	
Glenwood	–	Ka`auhuhu (Hāwī)	X
Hilo	X	Kealakehe (Kailua-Kona)	X
Honoka`a	X	Keauhou	–
Honomū	–	Ke`ei	X
Kalapana	–	Miloli`i	–
Kea`au	X	Ocean View	–
Laupāhoehoe	X	Puakō	X
Pa`auilo	–	Waimea	X
Pāhala	X	Wai`ōhinu	X
Pāhoa	X		
Pāpa`ikou	–		
Volcano	X		

Some retail outlets will pick up used appliances and transport them to scrap metal facilities when a new (replacement) appliance is purchased with the delivery option. However, delivery to remote areas of the island such as North Kohala or Ka`u is not offered by most retail outlets.

The difficulties associated with transporting bulky items such as white goods and limited recycling options may consequently lead to Illegal dumping by residents. Options to improve the white goods disposal process include changing the operation permit for more recycling and transfer stations to accept residential white goods; establishing additional targeted collection days and locations in order to increase the opportunity for residents to properly dispose of white goods; or having mobile collection events.

7.2.10 Abandoned Vehicles

Abandoned vehicles are managed by the County Abandoned Vehicle Coordinator in conjunction with the HCPD. According to HCC 24-199, abandoned vehicles (operational and non-operation) in public right of way are subject to a $250 fine and vehicle removal-associated expenses.

Abandoned vehicles that have been reported to the HCDP are tagged, monitored, and evaluated to assess if they are derelict. If after the monitoring period the vehicle has not been moved, it is considered derelict; the vehicle is then hauled by a County-contracted towing company to one of the two waste metal recovery facilities. If the vehicle is abandoned and not considered derelict, the vehicle is impounded by the County, and an attempt is made to notify the registered owner. Automobile parts may be recycled at the Kealakehe or Hilo Recycling and Transfer Station.

7.3 Recommendations

The current program for special wastes is somewhat limited by the County recycling and transfer station infrastructure. It was agreed through consensus of the SWAC to include functional elements necessary for proper handling of special wastes in new facility plans or designs. Permits will have to be modified to allow the handling and temporary storage of special wastes at recycling and transfer stations, and staff will require training to implement new programs correctly. Further study will be required to develop programs that are adequately protective of human health and the environment. Based on the analysis presented above, and discussions with the SWAC, the County plans to implement the following recommendations to improve the special waste program:

1. **Continue to integrate the Do-It-Yourself Used Motor Oil program within the County's public education and information program.**
2. **Increase the number of recycling and transfer stations that accept white goods. Continue to explore the feasibility of removing the freon at the site to simplify the handling, loading, and transport of white goods.**
3. **Continue to ensure that recycling facilities responsible for dismantling of white goods are trained properly for the recovery and recycling of freon-containing appliances.**
4. **Continue to promote tire recycling best management practices within the County's public education and information program.**

8. COLLECTION AND TRANSFER

8.1 Introduction

The County currently operates a network of 22 recycling and transfer stations where residents can drop off recyclables and solid waste. The County contracts with private firms to transport recyclables from the stations to privately operated processing facilities.

Municipal waste is transported by the County's Department of Environmental Management (DEM) Solid Waste Division (SWD) staff to either the South Hilo Sanitary Landfill (SHSL) or West Hawai'i Sanitary Landfill (WHSL).

This chapter describes current conditions of the existing solid waste collection and transfer system within the County, identifies current issues and concerns, and presents options and recommendations for achieving the County's solid waste collection and transfer goals.

8.2 Background

The County of Hawai'i developed the transfer station system in the 1970s to provide a transition from operating local dump sites to instituting a more centralized landfill system. The transfer stations were initially constructed as inexpensive, temporary facilities to fulfill the immediate needs of residential users by consolidating smaller residential loads into combined larger loads for transfer to landfills. The recycling component of the transfer station was incrementally added beginning in the early 2000s, and the County now refers to the facilities as "recycling and transfer stations."

The 22 recycling and transfer stations operate under Solid Waste Management Permits issued by the Hawai'i Department of Health (HDOH).

8.3 Review of 2009 Plan Update

Exhibit 8-1 provides a summary of the recommendations presented in the 2009 Plan update relative to solid waste collection and transfer, and a description of the actions taken to date to achieve each recommendation.

Exhibit 8-1. Status Update of 2009 Plan Recommendations for Collection and Transfer

2009 Plan Update Recommendation	Status
1) Retain the County's system of recycling and transfer stations. 2) A component of retaining the system includes completing upgrades to address structural deficiencies. 3) Provide expanded services in support of zero waste initiatives.	1) County's MSW system retained. 2) Upgrades to several recycling and transfer stations completed (see below). 3) Zero Waste initiatives include plastic bag/polystyrene foam ban, addition of seven reuse centers.
1) Reconstruct one or more recycling and transfer stations annually, including a new South Kona recycling and transfer station at Ocean View. 2) The County should also consider installing compaction units for recyclables at selected stations. Consider adopting a "satellite" system where compactors would be installed at selected stations, which would accept uncompacted recyclables from nearby stations lacking compactors.	1) Reconstructed Pāhoa, Glenwood, and Volcano recycling and transfer stations. Currently reconstructing Wai`ōhinu/ Ka`u recycling and transfer station. The Ocean View Recycling andTransfer Station is being constructed. 2) Recycling compactor system not implemented.

Exhibit 8-1. Status Update of 2009 Plan Recommendations for Collection and Transfer (continued)

2009 Plan Update Recommendation	Status
Implement full-time staffing and reduced operating hours at recycling and transfer stations; consider closing one or more stations.	Public demand requires more recycling and transfer stations and longer days and hours of operation. Current funding provides limited staffing levels.
Develop a system to license private collection firms. In this program, all firms that collect garbage from residents or businesses would be required to register vehicles, document that the vehicles meet safety requirements, and pay a nominal licensing fee (to cover the cost of licensing).	Currently, collection firms must have an account/permit to dispose at the landfill. A license program has not been developed.
Change permits to allow small commercial businesses to drop off recyclables at County recycling and transfer stations. These permits would make it much more convenient for small businesses in rural areas to recycle. To ensure efficient and safe operations, only trucks below a certain size threshold (for example, less than 1 ton) would be allowed to use the stations.	The increased cost of processing the material is a concern. The County has not added enough funds to take material from the businesses.
Conduct an operational efficiency analysis.	Did not implement. No funds were available for operational efficiency analysis.
Develop a base yard facility and equipment maintenance facility for transfer vehicles at the SHSL.	Constructed a new South Hilo base yard, and not the maintenance facility.

8.4 Existing Conditions

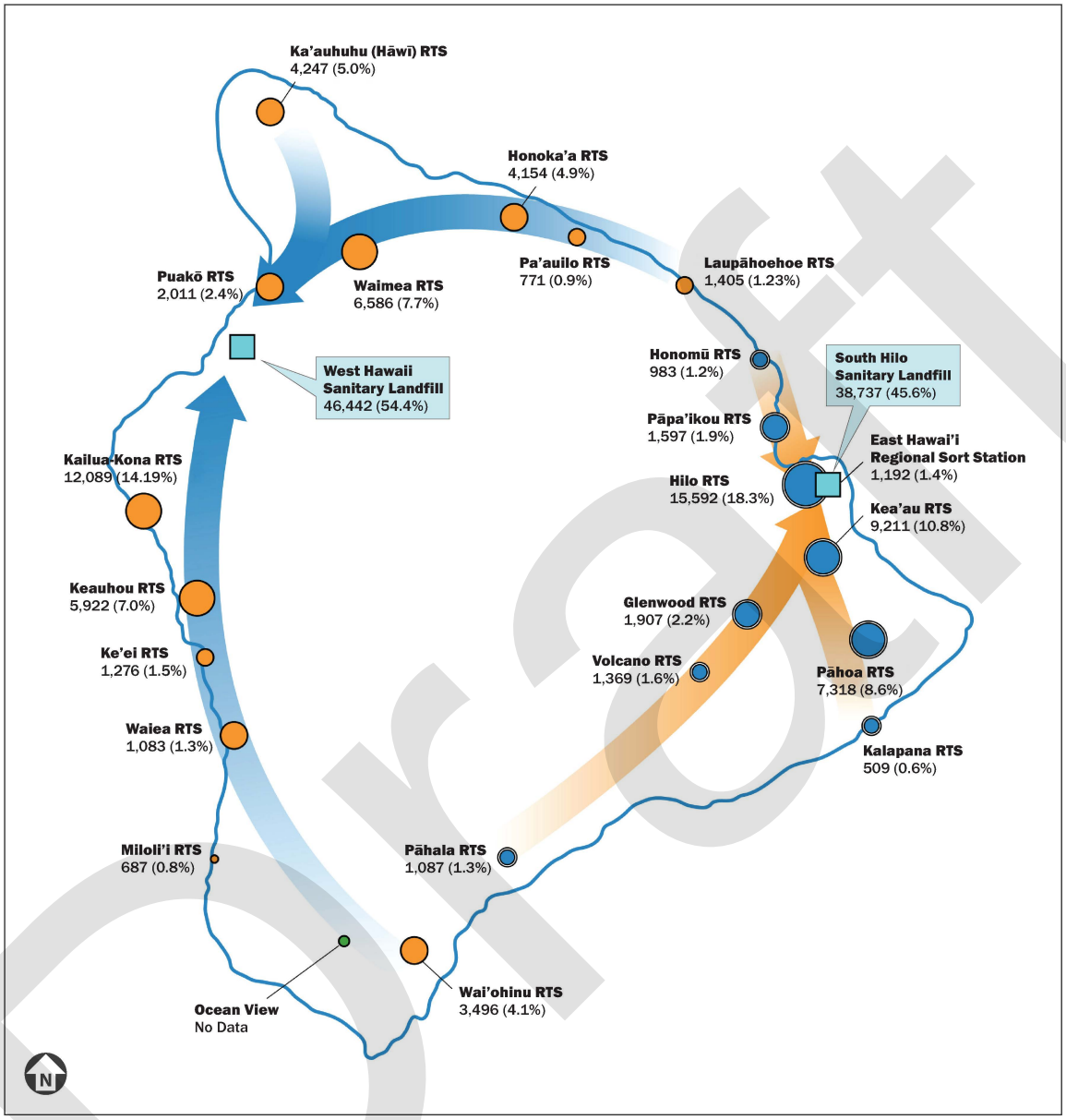
Currently, there is no curbside recycling or garbage pickup provided by the County. Most island residents use the County recycling and transfer stations to dispose of their rubbish. The recycling and transfer stations are geographically distributed for the convenience of island residents. A map showing the relative size of each station as correlated to garbage received (FY 2017–18) is included in Exhibit 8-2.

Private companies provide curbside pickup within limited geographic regions of the island for a fee. Based on residential credit information from the County[8], it is estimated that about 6,000 households currently subscribe to curbside service. This represents approximately 9 percent of the estimated 66,094 occupied households in the County in 2017. Fees for curbside collection quoted by private collection firms appear to range between $20 and $40 per household per month. In 2018, the Honolulu, Kauai County, and Maui County curbside pickup costs for residents were approximately $10, $12, and $18, respectively.

There are several companies that collect garbage from businesses and institutions in the County. Collection rates charged vary by company, the type of service provided, and the distance from the collection point to the landfill.

[8] The County provides credit against tipping fees to collection firms that document waste that is collected from residences.

Exhibit 8-2. Disposal at Hawai'i County Recycling and Transfer Stations FY 17-18



Source: County of Hawai'I DEM SWD

Note: Numbers under transfer station = tons of trash hauled in FY 17-18 and percent of total for County.

Use of the recycling and transfer stations to drop off recyclables or garbage is currently free for residents. At 19 recycling and transfer stations the County employs a 2-bin system for recycling, with limited stations providing a separate bin for cardboard. This system consists of separate roll-off containers to accommodate the recyclables. Currently, most stations have stairs and platforms to allow convenient customer access to the recycling bins. Select stations offer a HI-5 redemption center, and reuse opportunities and/or facilities for the recycling of green waste and metals. The recycling services provided at each station are shown in Exhibit 8-3.

Several of the recycling and transfer stations are used illegally by private recyclers or community groups to drop off recyclable materials.

Pāhoa Recycling and Transfer Station

The County facilitates the use of the recycling and transfer stations as collection points for recyclables to the extent practicable, and intends to eventually upgrade all of the recycling and transfer stations to enhance recyclable collection capabilities.

At the stations, residents deposit garbage into chutes that lead to truck-mounted, compacting containers (except Pāhoa), which are then hauled by SWD staff to the landfill. The County operates and maintains stationary compacting units, truck-mounted compacting units, and a fleet of trucks and compacting containers utilized in the operation of the recycling and transfer station system, and provides part-time security monitoring.

Exhibit 8-3. Services Provided at Hawai'i County Existing Recycling and Transfer Stations

Recycling and Transfer Station	MSW	Glass	Mixed Recyclables	Scrap Metal	White Goods	Green Waste	Reuse Center	HI-5 Redemption Center
East Hawai'i								
East Hawai'i Organics Facility (EHOF)[b]	–	–	–	–	–	X	–	–
Glenwood	X	X	X	–	–	–	–	–
Hilo[a]	X	X	X	X	X	–	X	X
Honoka`a	X	X	X	X	X	–	–	X
Honomū	X	X	X	–	–	–	–	–
Kalapana	X	X	X	–	–	–	–	–
Kea`au[a]	X	X	X	X	X	X	X	X
Laupāhoehoe	X	X	X	X	X	–	X	–
Pa`auilo	X	X	X	–	–	–	–	–
Pāhala	X	X	X	X	X	–	–	–
Pāhoa	X	X	X	X	X	X	X	–
Pāpa`ikou	X	X	X	–	–	–	–	–
Volcano	X	X	X	X	X	X	–	X
East Hawai'i Organics Facility (EHOF)[b]	–	–	–	–	–	X	–	–
Glenwood	X	X	X	–	–	–	–	–

Exhibit 8-3. Services Provided at Hawai'i County Existing Recycling and Transfer Stations (continued)

Recycling and Transfer Station	MSW	Glass	Mixed Recyclables	Scrap Metal	White Goods	Green Waste	Reuse Center	HI-5 Redemption Center
West Hawai'i								
Ka`auhuhu (Hāwī)	X	X	X	X	–	–	–	X
Kealakehe (Kailua-Kona)[a]	X	X	X	X	X	X	X	X
Keauhou	X	X	X	–	–	–	X	X
Ke`ei	X	X	X	X	X	–	–	–
Miloli`i	X	–	–	–	–	–	–	–
Puakō	X	X	X	X	X	–	–	X
Ocean View	X	X		–	–	–	–	X
Waiea	X	X	X	–	–	X	–	–
Waimea	X	X	X	X	X	X	X	X
Wai`ōhinu	X	X	X	X	**X**	–	X	X
West Hawai'i Organics Facility (WHOF)[b]	–	–	–	–	–	X	–	–

Note: Hilo, Kea`au, and Kealakehe Recycling and Transfer Stations contain separate bins for newspaper and cardboard.

8.4.1 Recycling and Transfer Station Features

The stations vary in size, population served, tonnage of waste collected per day, types of waste accepted, and hours of operation. Site characteristics for each recycling and transfer station are presented in Exhibit 8-4.

Except for Miloli'i and Ocean View recycling and transfer stations, rubbish is compacted typically three to four times per day by SWD facility attendants who distribute their time between the different facilities. The Miloli'i Transfer Station has a roll-off container that is hauled twice per week to the WHSL by the SWD. Recycling and transfer station attendants clean and maintain the stations, operate the compactors, periodically monitor haulers for prohibited materials, and report any unusual activity at the stations.

The recycling and transfer stations are permitted to accept only residential rubbish; commercial and hazardous wastes are prohibited at all stations. Commercial businesses frequently use the stations due to a lack of resources for enforcement and/or suitable alternatives for solid waste disposal. Without adequate security measures and enforcement, it is difficult for the County to ensure that all permit requirements are being met. Currently, 21 of the 22 stations are gated and have part-time security guards.

Exhibit 8-4. Site Characteristics for Existing Recycling and Transfer Stations

Recycling and Transfer Station	District	Approx. Population Served	Parcel Size (Acres)	Number of Chutes	FY 2016–17 Tonnage (Tons/Day)	Gated Hours/Days of Operation
East Hawai'i						
Glenwood	Puna	4,300	1.97	1	4.73	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri
Hilo	South Hilo	42,000	72.7	4	40.90	6:30 a.m. - 5:00 p.m. Daily
Honoka`a	Hāmākua	5,100	0.73	1	11.57	6:00 a.m. - 6:00 p.m. Daily
Honomū	South Hilo	3,400	0.84	1	2.71	6:00 a.m. - 6:00 p.m. Mon, Tues, Sat
Kalapana	Puna	1,200	13.2	1	1.22	6:00 a.m. - 6:00 p.m. Mon, Thurs, Sat
Kea`au	Puna	11,700	19.54	2	22.95	6:00 a.m. - 6:00 p.m. Daily
Laupāhoehoe	North Hilo	1,700	1.02	1	2.87	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri
Pa`auilo	Hāmākua	1,800	0.85	1	2.06	6:00 a.m. - 6:00 p.m. Mon, Thurs, Sat
Pāhala	Ka'u	1,700	0.75	1	2.90	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri, Sat
Pāhoa	Puna	9,400	3.77	2	23.34	6:00 a.m. - 6:00 p.m. Daily
Pāpa`ikou	South Hilo	5,800	0.57	1	3.78	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri
Volcano	Puna	2,000	2.19	1	3.81	6:00 a.m. - 6:00 p.m. Mon, Thurs, Sat
West Hawai'i						
Ka`auhuhu (Hāwī)	North Kohala	6,000	17.28	1	11.85	6:00 a.m. - 6:00 p.m. Daily
Kealakehe (Kailua-Kona)	North Kona	21,000	30.32	3	32.41	6:00 a.m. - 6:00 p.m. Daily
Keauhou	North Kona	8,500	5.47	2	15.09	6:00 a.m. - 6:00 p.m. Daily
Ke`ei	South Kona	5,600	11.6	1	3.14	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri
Miloli`i	South Kona	700	0.17	1	2.12	Sunrise to Sunset (not gated) Daily
Ocean View	Ka'u	Temporary site, formal recycling and transfer station on County land in planning stages.				7:00 a.m. - 3:00 p.m. Saturday
Puakō	South Kohala	5,600	8.9	1	5.52	6:00 a.m. - 6:00 p.m. Sun, Tues, Fri
Waiea	South Kona	3,300	2.28	1	2.65	6:00 a.m. - 6:00 p.m. Mon, Thurs, Sat
Waimea	South Kohala	11,700	0.31	2	19.19	6:00 a.m. - 6:00 p.m. Daily
Wai`ōhinu	Ka'u	3,000	31.65	1	9.06	6:00 a.m. - 6:00 p.m. Daily

Source: County of Hawai'i DEM (2017d)

8.4.2 Recycling and Transfer Station Maintenance, Repair and Enhancement

Repairs and maintenance of equipment and infrastructure are currently provided by the County Department of Public Works on an emergency or time available basis. Since 2009, major structural and engineering deficiencies at the recycling and transfer stations have been identified. To prioritize the stations with the most pressing needs for repair and enhancement, the County rated each station in four areas: structural adequacy, functionality, safety, and regulatory compliance. Based on these ratings, the County developed a 5-year repair and upgrade plan, in which major construction projects were planned for select recycling and transfer stations, as explained in Exhibit 8-5. However, most of the recycling and transfer stations lack upgrades to accommodate population growth within nearby communities and to effectively accommodate recycling or reuse. The State Revolving Funds (SRF) is a source of financial assistance on behalf of the water quality projects related to the recycling and transfer stations, many of which involve leachate collection system upgrades.

Exhibit 8-5. Recycling and Transfer Station Condition

	Condition	2018 Status			
Recycling and Transfer Station	**Improvements Following Adoption of 2009 Plan**	**No Deficiencies[1]**	**Minor Deficiencies[2]**	**Intermediate Deficiencies[3]**	**Major Deficiencies[4]**
East Hawai'i					
East Hawai'i Organics Facility (EHOF)	Operations began in 2013. In 2016, enhanced mulching procedures were introduced per Hawai'i Administrative Rule (HAR) 4-72-13 to restrict the spread of invasive species	**X**	–	–	–
Glenwood	Reconstructed in 2015: • Removed deteriorating retaining walls • Added covered concrete docks for drop boxes Reconfigured the site for improved vehicular flow patterns	**X**	–	–	–
Hilo	2017: Constructed and opened new reuse facility	–	**X**	–	–
Honoka`a	No improvements	–	–	–	**X**
Honomū	No improvements	–	–	–	**X**
Kalapana	No improvements	–	–	–	**X**
Kea`au	Remodeled in 2011: • Added reuse area, recycling drop-off area, and green waste bins • Reconfigured and repaved the site for improved vehicular flow patterns Replaced rubbish chutes	**X**	–	–	–
Laupāhoehoe	No improvements	–	–	–	**X**
Pa`auilo	No improvements	–	–	–	**X**
Pāhala	No improvements	–	–	–	**X**
Pāpa`ikou	No improvements	–	–	–	**X**

Exhibit 8-5. Island-Wide Recycling and Transfer Station Condition (continued)

Recycling and Transfer Station	Condition	2018 Status			
	Improvements Following Adoption of 2009 Plan	No Deficiencies[1]	Minor Deficiencies[2]	Intermediate Deficiencies[3]	Major Deficiencies[4]
Pāhoa	Reconstructed in 2011: • Includes sustainable building features and materials (e.g., solar, water catchment) • Designed for improved vehicular flow patterns • Improved signage • Replaced drop-off recycling roll-off box system with covered recycling bin bays (seven total) • Constructed new building for HHW collection/office with restroom • Added public meeting area Constructed a covered bay for MSW and for green waste	**X**	–	–	–
Volcano	Reconstructed in 2015: • Removed deteriorating retaining walls • Added covered concrete docks for drop boxes • Reconfigured the site for improved vehicular flow patterns 2015: Added green waste collection services	**X**	–	–	–
West Hawai'i					
Ka`auhuhu (Hāwī)	No improvements. Removed reuse center.	–	–	**X**	–
Kealakehe (Kailua-Kona)	• 2010: Reconfigured and repaved for improved vehicular flow patterns • 2013: Constructed and opened new reuse facility	**X**	–	–	–
Keauhou	No improvements	–	–	–	**X**
Ke`ei	No improvements	–	–	X	–
Miloli`i	Expanded the concrete pad to accommodate two bins.	–	–	–	X
Puakō	2010: Reconfigured and repaved for improved vehicular flow patterns	–	**X**	–	–
Ocean View	Temporary site on County-owned park parcel. Phase 1 construction for the permanent site, notice to proceed issued February 2019	–	–	–	X
Waiea	No improvements	–	–	–	X

Exhibit 8-5. Island-Wide Recycling and Transfer Station Condition (continued)

Recycling and Transfer Station	Condition: Improvements Following Adoption of 2009 Plan	2018 Status: No Deficiencies[1]	Minor Deficiencies[2]	Intermediate Deficiencies[3]	Major Deficiencies[4]
Waimea	• Reconstructed in 2010, upgrades include: ➢ Recycling area customer accessibility improvements ➢ Site reconstruction for improved traffic flow • 2012: Opened the Waimea Reuse and HI-5 Redemption Center Building • 2015: Added green waste collection services	X	–	–	–
Wai`ōhinu	• 2017: Constructed and opened new reuse facility • Design-build project. Notice to Proceed for reconstruction issued in 2018, first task is design.	X	–	–	–
West Hawai'i Organics Facility (WHOF)	2013: Beginning of operation	X	–	–	–

[1]Recent/Planned upgrades are sufficient through 2029. [2]Deficiencies can be corrected while station in operation. [3]Deficiencies correctable without reconstruction
[4]Deficiencies require reconstruction

The County has placed a strong emphasis on waste diversion. Since 2009, the County has expanded its green waste program. Green waste bins have been added to various recycling and transfer stations. In 2013, the EHOF and WHOF began operation. In their first year, these facilities collected 40,465 tons of green waste representing 63 percent of diverted waste from the SHSL and WHSL (County of Hawai'i DEM 2017a). Although these facilities accept yard trimmings and untreated wood pallets, they do not accept food waste. According to the EPA (EPA 2018c), food waste composes 15.1 percent of MSW—a value exceeding yard trimmings (13.3 percent) and wood (6.2 percent). Thus, in 2014, a request for proposals (RFP) was released for a compost and green waste processing facility that would accept food and yard waste (East Hawai'i Organics Facility). The County plans to develop the facility on the east side of the island as early as 2020.

To further the philosophy of waste mitigation and zero waste, the County has also expanded reuse facilities. Reuse centers have been installed at eight recycling and transfer stations (see Exhibit 8-3); these facilities accept donated reusable items that are then sold for reuse back to the public. Through reuse, negative environmental impacts associated with landfilling and reprocessing are bypassed or delayed. The County has garnered recognition for these improvements and updates. For example, the Solid Waste Association of North America (SWANA) recognized the Pāhoa Recycling and Transfer Station's 2012 improvements for environmental and economic solid waste management. This station accepts green waste, mixed recyclables, glass, and scrap metal, and includes an onsite reuse center and HI-5 redemption center. Waste mitigation is also achieved through the County's white goods program; residents may bring clean empty household appliances to 13 recycling and transfer stations (see Exhibit 8-3).

8.5 Issues and Concerns

The County's network of recycling and transfer stations provides convenient locations for County residents to drop off recyclables and garbage. Residents who prefer curbside collection must make arrangements with a local business providing the service.

When evaluating a curbside service program, the County would assess the need to continue operating all 22 recycling and transfer stations. Curbside service would require significant additional capital start-up and yearly operations costs, and the net cost increase could potentially be reduced by closing some of the County's existing recycling and transfer stations.

As discussed above, the County's existing transfer system was established in the 1970s and most of the stations require significant upgrades to address structural and functional deficiencies. As discussed in Chapter 4, Recycling, Bioconversion, and Markets, it would also be desirable to provide additional opportunities to divert waste from landfill disposal. Many such opportunities would require significant and potentially expensive changes to the existing infrastructure and operations at County recycling and transfer stations.

8.6 Curbside Collection Implementation Considerations

This section provides a discussion of a variety of issues that would be considered when evaluating the merits of the County implementing a residential curbside collection service, including:

- Institutional approaches to service delivery.
- Funding options.
- Service levels.
- Collection technologies.
- Services and service frequency.

Many of these issues were also discussed in Chapter 4 Recycling, Bioconversion, and Markets. References to this chapter will be made as appropriate.

8.6.1 Institutional Approaches to Service Delivery

In the United States, residential waste collection services are provided by both the private and public sectors. Although there are numerous ways to group or categorize different ways of delivering waste collection services, the four most common types of service delivery arrangements currently used in the United States:

1. No government-organized collection service.
2. Local government owned and operated collection service.
3. Non-competitive franchise collection service with rate regulation.
4. Competitive contract collection service.

This section provides a brief discussion that highlights the features of each service delivery arrangement.

8.6.1.1 No Government-Organized Collection Service

This is the method of collection currently in effect in the County, where customers either deliver their own waste to a processing or disposal facility, or select a private business to pick up recyclables and/or

waste at the curb. In many communities, "going to the dump" has long been part of a routine for some residents. Many of these individuals would prefer to make the time to deliver waste materials on their own rather than pay for collection services.

Historically, many communities have given residents the option to either sign up for curbside collection services or to self-haul their materials. The main advantage to self-haul collection is that the (typically smaller) percentage of residents who prefer to self-haul their waste may do so without being charged for a service they do not want or need.

In most industries, having many firms compete for business tends to result in efficiencies and lower costs for consumers. However, this is usually not the case for residential collection of garbage because the benefits of competition are usually overcome by the inefficiencies of having multiple haulers driving down the same street each day.

Trucks must drive greater distances between stops resulting in fewer stops per collection day leading to increased costs. In other words, residential collection service costs can be reduced by regulatory structures that ensure that a product or service is delivered by a single entity.

Another disadvantage of this arrangement is that billing and other overhead costs will also be higher than in-service arrangements in which billing is combined with billing for other municipal services and handled by a single entity. Finally, as communities grow and housing density increases, public health and social considerations become more important; garbage should be removed at least once every 7 days to control flies and odors.

8.6.1.2 Local Government Owned and Operated

Local government collection is most typically performed by city governments although collection is sometimes provided by counties, especially where the county is the most basic level of government. Advantages typically associated with local government collection include the following:

- Local governments have some inherent cost advantages over private firms, such as not having to pay income or other taxes (the County does have to pay the General Excise Tax), the ability to combine overhead costs for collection programs with other existing programs (such as water, power, or sewer), not earning profits, and lower costs of borrowing.
- Local governments may place a higher value on service to customers than private firms.
- When local government collection is provided as part of a utility structure, rate increase proposals are discussed in an open, public forum.
- Local government collection typically includes all households in a city or county allowing for increased efficiency through the economics of contiguity (the contiguous alignment of customers along a service route), and for larger jurisdictions, potential economies of scale.

While local government has some inherent cost advantages, the cost of local government collection is often higher than when collection is provided by the private sector. A comprehensive national survey of collection practices found that local government and privately provided service were of equal cost, on average, for smaller local governments (with a population of less than 20,000), and that privately provided service (with exclusive collection territories) was significantly (up to 37 percent) less costly for

larger jurisdictions with populations of more than 50,000 (Stevens 1980). According to certain reports, privatization of MSW collection may result in a cost savings ranging from 20 to 40 percent for local government (NSWMA 2011). However, privatization may not always be less costly than government collection, as the weak competition between collection companies often reduces cost savings. In fact, a meta-analysis study conducted between 1960 and 2008 across the United States and nine other countries determined no cost difference between public versus private collection (Bel and Warner 2008).

Some other factors that can lead to inefficiency and higher costs for local government collection include:

- Civil service requirements can hamper the ability of supervisors to motivate employees and, if necessary, terminate underperforming employees.
- The lack of the profit incentive removes a powerful motivator toward efficiency.
- Work rule requirements can make it much more difficult for public sector managers to affect a flexible response to changed conditions.
- The initial cost to purchase vehicles and containers and subsequent operation and maintenance costs can be difficult for some communities to finance.

While local government collection can be cost competitive with the private sector, there are many documented cases where local government has cut collection costs significantly by contracting out collection services (Kenny 2013). In summary, it is likely but not certain that local government collection would be somewhat costlier than collection provided by the private sector in the County. If the County were to establish a collection service, it would be critical to ensure good, experienced, proactive management, and the use of appropriate incentives to motivate the behavior of collection personnel.

8.6.1.3 Non-Competitive Franchise with Rate Regulation

In this type of service arrangement, collection is provided by private firms holding franchises that give them an exclusive right to collect waste from all residences within a specified geographic area. The non-competitive aspect of the franchise means that rates are negotiated between the hauler and the state or local government. This is a common arrangement in many communities in the United States. As an example, in the state of Washington, hauler rates are regulated by the Washington Utilities and Transportation Commission (WUTC) for jurisdictions that opt for this collection arrangement.

This method of providing collection service can foster a sense of partnership between the private and public sectors. It is one of the most flexible institutional arrangements, because there is usually an ongoing mechanism for negotiation between the public and private sectors. If conditions change it is often easier to make adjustments to service levels, or add additional services such as curbside recycling programs than other types of service arrangements. For example, local government collection programs are often difficult to change because of civil service agreements. Contract collection is inherently less flexible because a good contract specifies numerous details that are part of a legally binding agreement that can be complex to alter. With an exclusive franchise, the jurisdiction retains flexibility to negotiate change, and the efficiency advantage of contiguous routes.

One disadvantage associated with non-competitive franchises is the lack of competition to establish a true, baseline cost of service. Without competition, local governments must rely on various regulatory measures, rate comparisons with similar-sized operations, auditing methods, and negotiating techniques to try and mandate that collection service providers establish reasonable pricing for services. Often, these efforts result in only modest success; thus, competitive contracting for collection services often is cheaper than a non-competitive franchise collection service. Finally, it is often difficult and costly for governments to secure the expertise to effectively regulate the rates charged by haulers.

8.6.1.4 Competitive Contract Collection Service

The competitive contract arrangement refers to a system in which a city or county goes through a competitive selection process and awards a single contract to the successful firm for the exclusive right to provide collection services in a designated area for a specified period. Assuming there are multiple firms competing for the business, contract collection for exclusive collection zones usually result in lower prices for residential collection services than the other institutional arrangements. This occurs because firms must keep their prices low to be competitive.

However, contract collection is not always the lowest cost institutional arrangement for collection. Higher costs can occur if local governments do not use adequate care in the development, implementation, and administration of the contractual relationship with its contractor. Three key factors that must be present for a community to ensure low cost, high quality service from a competitive contract:

- The procurement process must be structured to ensure that multiple firms bid on the collection zones, and that multiple firms will be willing to bid once the initial contract ends and must be rebid.
- The procurement documents and, in particular, the contract must precisely specify the services required.
- The contracting jurisdiction must devote significant resources to craft a good contract. Once the contract is in place, additional resources are needed to actively monitor and manage contractor performance.

Some disadvantages of contract collection include the following:

- There is added risk associated with contracting because it is difficult to foresee the future and to devise a contractual relationship that protects the interests of the contracting jurisdiction yet leaves the private sector the flexibility to profitably and creatively provide the requested services.
- Customer service can suffer if the contract does not clearly specify service requirements and/or if the contracting jurisdiction does not enforce contractual requirements.
- In some cases, intense competition or intra-firm marketing pressures result in firms bidding prices below the true cost of service. In such cases the local government benefits from low prices; however, there can be protracted difficulties in getting the contractor to perform in accordance with the contract.

The County would need to address many issues when implementing curbside collection using competitive contracts including the following:

- Deciding how many collection zones and contracts are appropriate to establish. To ensure long-term competition and economies of scale, the County would need a minimum of two zones awarded to two different contractors and probably a maximum of three or four zones.
- Developing a complex request for bids or proposals including a good contract that spells out clearly the services to be performed and penalties for non-performance.
- Communicating daily with haulers about ongoing billing, customer service, and equipment or logistical issues.
- Monitoring contractor performance.

In the County of Hawai'i, a 2004 Supreme Court of the State of Hawai'i decision affirmed the right of private sector unions to provide services traditionally performed by the public sector. The Hawai'i State legislature has made provisions to allow for managed competition, in which both the public and private sectors could compete for the provision of public services, such as collection (Supreme Court of the State of Hawai'i 2004).

However, there is no process yet established for such a competition, and it is highly likely that an attempt to enact such a process would result in litigation with an uncertain outcome.

8.6.2 Collection Technology

Curbside collection can use various levels of automation. The traditional approach to collection relies on crews of two to three people to manually toss refuse into collection trucks. To reduce crew sizes, some communities have implemented semi- automated or fully automated collection systems. This requires providing each household with a wheeled container that is rolled to the curb on collection day. Automated collection trucks have lifting mechanisms that empty the rubbish into the truck. This section discusses the relative merits of manual, semi-automated and fully automated collection systems, and their applicability to the County.

8.6.2.1 Manual Collection

Manual collection is the traditional method of collecting materials at curbside. Waste is typically collected by two- or three-person crews in rear-loaded and side-loaded collection vehicles. This arrangement is a common method of collection in the United States, although in some rural areas where the distance between stops is great, one-person crews are sometimes used. Side-loaded vehicles use compartment openings on the driver side of the vehicle rather than at the back, and therefore the driver or crew member does not have to walk as far to unload waste into the truck. For this reason, side-loaded vehicles can be operated somewhat more efficiently than rear-load vehicles when smaller (one- or two-person) crews are used.

To reduce labor costs, many communities are modifying their solid waste collection program to add some level of automation. According to the National Waste and Recycling Association, in 2013, approximately half of all newly purchased waste collection vehicles were fully automated and manned by one person (Rogoff 2015). In Hawai'i, the counties of Honolulu, Kauai, and Maui have transitioned from manual collection to fully automated collection (City and County of Honolulu 2018b; County of Kaua'i 2018b; Maui County Government 2008).

Automated collection vehicles reduce labor costs by allowing for smaller crews; however, this is at the expense of higher capital investment in trucks. Therefore, automated collection is best suited to areas with relatively high labor costs, and manual collection is best suited to areas with relatively low labor costs. Insurance premiums are also higher with manual collection because many workers suffer injuries to backs and shoulders by repetitively lifting waste into the truck. Thus, the appropriateness of manual versus automated collection will depend on the relative cost of labor plus associated costs versus capital costs, and the characteristics of local collection routes.

8.6.2.2 Semi-Automated Collection

In semi-automated systems, the collector wheels the container from the curb to the rear or side of the truck and attaches the container to an automated hydraulic dumping unit (tipper). These systems require special containers that are designed to be compatible with the lifting units. Virtually all the heavy lifting associated with rubbish collection is eliminated; thus, worker fatigue and injury is reduced, and the vehicles can be operated by crews as small as one person. Considering that solid waste collectors have the highest injury rate of any industry nationally, the benefits associated with eliminating lifting can be significant.

Although semi-automatic systems require more time per pickup than manual loading, service time per crew member can decrease because semi-automated systems usually allow for a sizable reduction in crew size. The wheeled containers used with semi-automated and fully automated systems are often perceived by the customer as a more convenient, cleaner collection system, resulting in decreased litter.

For rural customers with long dirt driveways, larger, wheeled containers may be a drawback because they are difficult to load into a personal vehicle to take to the set-out location. In rural areas, customers could be allowed to set out smaller, 30-gallon cans to make it more convenient.

Semi-automated collection has been successful in some communities but unsuccessful and ultimately canceled in others. This type of collection service typically failed due to slower route times, overly stringent container set-out requirements, higher vehicle and container costs, or a perceived reduction in the incentive to recycle because of the larger can sizes. Municipalities with successful semi-automated collection programs devised ways to work around these problems. In some cases, it has been determined that despite the challenges, overall collection costs were less than manual collection because of the reduction in crew sizes, decrease in insurance premiums, and reduced injury rates.

Compared with manually loaded vehicles with two- or three-person crews, semi-automated collection results in longer route times and higher capital costs. Manually loading rubbish into trucks from cans is faster than using semi-automated loading systems. Labor costs can be reduced by reducing the size of the crew per truck; however, capital costs are increased because more trucks may be required to pick up the same quantity of waste.

Semi-automated (and fully automated) collection would be challenging to implement in rural areas of the County because of factors not conducive to automation, including:

- Unimproved roads.
- Lack of curbs or sidewalks for set outs.
- Steep slopes.
- Dense vegetation.

A focused study would be needed to evaluate if semi-automated or fully automated collection (described below) could be implemented effectively in the County.

8.6.2.3 Fully Automated Collection

Although fully automated systems are not as common as semi-automated systems, the number of communities throughout the country that use fully automated collection vehicles is growing. Fully automated systems use one-person side-loading vehicles equipped with a lifting mechanism (collection arm) on the side of the vehicle. The operator pulls up to the container at the curb and controls the entire loading operation from the right-hand driver's seat. The collection arm allows the operator to grasp, empty, and return the container without leaving the truck cab. In certain cases, such as improperly positioned or obstructed containers, the operator may have to leave the cab to respond to a problem.

Fully automated systems have similar advantages to the semi-automated systems discussed in the previous section. Because virtually all lifting is eliminated, the costs associated with worker injury and fatigue are greatly reduced. In addition, there is usually an improvement in collection labor efficiency because fully automated systems use a single person on each truck and the driver does not have to get out of the truck as frequently. Benchmark fully automated collection systems can collect from more than 800 households per day per truck with a single driver. Since commercial containers compatible with fully automated systems are available up to 300 gallons, some communities have lowered collection costs by incorporating commercial accounts on residential routes.

Fully automated systems require cooperation by residents to set out containers in a prescribed way. Implementing fully automated systems presents additional physical constraints as well. Single side of the street routing is required (which will increase miles driven and drive time between accounts). Parking restrictions may need to be instituted, and obstructions (for example, trees, and utility wires) may present problems in certain areas.

Compared with manually loaded vehicles with two- or three-person crews, route times will be longer and capital costs will be greater with either semi- or fully-automated collection.

However, labor costs would decline by reducing crew sizes to one (plus extra replacement drivers for sick days, vacation, and holidays). The total operational collection cost will depend on a community's labor costs and route structure. Because capital costs will be higher and route times slightly longer, the main source of savings compared to manual collection is in labor. Communities that have shifted to automated collection typically have relatively high labor costs. This is an important factor in case studies of automated collection that show an overall reduction in collection costs.

Compared to semi-automated collection, fully automated collection requires trucks that are costlier with higher maintenance requirements. Those costs are typically overshadowed by the cost savings that results from the reduced time per stop. Thus, in most cases, fully automated collection appears to be more advantageous than semi-automated collection.

8.6.3 Service Levels

Curbside service is generally provided in one of two ways:

- Subscription basis—where residents have the option to either subscribe to the service or not.
- Universal collection—where all residents in a jurisdiction or a sub-area of a jurisdiction are charged for curbside service regardless of whether they use the service.

The advantages of a subscription service are that residents are given a choice of whether to pay for the service. The disadvantage is that it makes collection costlier on a per household basis by lengthening the distance between stops on a route. Universal collection has just the opposite set of advantages and disadvantages: residents no longer have a choice and are required to pay for a service; yet, per household costs are lower.

This issue was discussed in Chapter 4 Recycling, Bioconversion, and Markets. The County is predominantly rural in character with relatively small urban and suburban areas in Hilo, Kailua-Kona, Waimea, and a few other locations. Many of the rural areas within the County have steep, unimproved roads not suitable for collection vehicles. Thus, mandatory curbside collection for all County residents is likely to be impractical. Further, longer distances between collection stops will occur in many of the geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. While there is no binding constraint against implementing a subscription service, the fact that the County has many geographically dispersed rural communities suggests that designating specific geographic zones where curbside service would be mandatory would make more sense than mandating island-wide collection.


PHOTO: REHRIG

8.6.4 Service Frequency

Most collection systems now include both garbage and recycling and many offer green waste services. Some communities are taking the next step toward zero waste and are diverting food and other organics from the garbage at curbside. Considering the County's commitment to increasing landfill diversion, if the County elects to make the substantial commitment to begin offering curbside collection services, it would make sense to offer curbside collection of recyclables.

Some communities in hot and humid climates offer garbage collection service twice weekly. This is significantly more expensive than weekly collection and this practice seems to be less common; weekly collection of garbage is typical in most communities.

Recyclables are typically collected either weekly or bi-weekly. Weekly collection generally is costlier and may result in higher diversion from the landfill. However, as discussed in Chapter 4, the evidence of increased diversion from weekly collection versus bi-weekly collection is weak and is not consistent in all jurisdictions. Organics (e.g., yard and food waste) collection services are offered in a wide variety of service frequencies including weekly, bi-weekly, monthly, and seasonally.

The most aggressive approach to diversion at curbside is a three-stream system in which food and other organics (which could include green waste) is collected weekly and garbage and recyclables are collected either weekly or on alternative weeks.

8.6.5 Funding Options

There are several ways that the County could pay for a curbside collection service, including:

- Property taxes.
- Direct billing.
- PAYT program.

8.6.5.1 Property Taxes

This is how solid waste management expenditures are currently funded. Thus, it would be relatively simple for the County to continue with this method and would potentially streamline implementation of a new service.

The main disadvantage of this funding method is that it would provide no information to customers about the cost of the program. The lack of information for consumers about program costs would indirectly eliminate one way of providing incentive to program managers to keep service costs low. To educate the public on program costs, the County could separate the costs of waste management services on property tax bills. This would be relatively simple for the County to implement and would provide some information to customers about the cost of curbside collection, and potentially other waste management services.

8.6.5.2 Direct Billing

The County could provide curbside collection and other waste management services in a similar manner to utility services, such as water or electricity, and send bills directly to customers. This is a very common arrangement in the United States. The main advantages of this type of system are to provide better information to customers about the cost of the collection service, and to indirectly provide incentives to provide services more efficiently.

To implement this type of system, the County would need to hire personnel, establish computer-based systems for the program, and conduct considerable public education. Ongoing customer service would need to be provided to address disputes about services and billing, and for collection of unpaid bills.

8.6.5.3 Pay-As-You-Throw

As discussed in Chapter 3, Source Reduction, PAYT can take many forms including using a variable can, metered bag, or metered tag system. The key aspect of this system is to charge a progressive rate for each additional garbage unit collected above the basic service level (for example, one can per week). In other municipalities, PAYT has proven to be a highly effective method of reducing waste and increasing the use of recycling and organics diversion programs.

Implementing a PAYT system for residential garbage collection service or at existing recycling and transfer stations would require implementation of an aggressive public education and information campaign to ensure that residents understand the rationale for implementing the PAYT program. Significant upfront planning would be required to assess a wide range of implementation details. The County would need to establish billing systems, a customer service organization, and modify its financial systems to accommodate this new service. The County could elect to assess the potential for reducing property taxes as an offset to the new revenue source. See Chapter 3 for a dedicated discussion of PAYT options.

8.7 Options for Improvement

The County's system of recycling and transfer stations is a unique system that has served the County well for more than 30 years. Options for improving that system follow.

8.7.1 Add Curbside Collection

The challenges associated with implementing curbside collection of recyclables (as discussed in Chapter 4 Recycling, Bioconversion, and Markets) would also apply to collecting garbage. Mandatory curbside collection of garbage for all County residents is impractical because of the County's predominantly rural

character and the many areas with steep, unimproved roads not suitable for collection vehicles. Further, longer distances between collection stops will occur due to the large number of geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. For program cost efficiency, it is recommended that this option include designated zones where curbside service would be mandatory.

Cost Considerations. The cost of curbside collection of garbage would depend on many factors including the type of collection vehicles used (manual versus semi-automated versus fully automated), the number of rural households included in the program (increased distance between collection stops), and the institutional arrangement (for example, public versus private). A collection study would be required to further explore opportunities for this type of service.

The cost of curbside collection would be offset somewhat by reducing the amount of waste that would be transported from recycling and transfer stations to landfills. This may be achieved by increasing the diversion rate through increased recycling and composting endeavors. The County's full complement of recycling and transfer stations would be somewhat less necessary if curbside collection were implemented. However, it should be recognized that the rural residents not easily served by curbside service are dispersed geographically throughout the island and still need convenient locations to dispose of recyclables and garbage.

8.7.1.1 Collection Sub-Options

This section explores several different opportunities for residential curbside collection as collaborated between the County and the SWAC. While there are many possible methods of implementing collection service, the sub-options considered in this section reflect current opportunities and constraints that exist in the County, including:

- The County transfer system provides reasonably convenient service for all households, and there is no County-sponsored curbside service.
- About 9 percent of County households receive garbage service from private companies that compete for customers with little County involvement.
- Few companies currently provide curbside recycling for residences (in part because there are very few locations they could take the materials collected).
- Universal curbside collection of garbage for all County residents is impractical because of the County's predominantly rural character and the many areas with steep, unimproved roads not suitable for collection vehicles.
- State law may preclude the County from engaging in franchises or contracts with private sector collection firms.

The following sub-options provide an increasing level of change, potential benefits and costs, and implementation difficulty:

A. Retain existing system.

B. License all collection companies.

C. License existing collection companies and require every-other-week recycling.

D. County offer collection services using County crews.

E. Exclusive franchises for private sector collection.

Note that in all these options, collection service would be optional for residents. A universal collection service would be more efficient than an optional service because it would result in more stops per hour of collection. However, in most areas of the County the total cost for universal collection would probably be quite high when combined with a means of providing service to the many rural residents that are spread out widely throughout the County. To serve these residents, the County would need to retain many of its existing stations (perhaps ten to 15 of the existing 22 stations) or provide an additional collection service (such as bins located on main roads where residents could dispose of their waste). It is possible that universal collection could be implemented in Hilo or in select areas on the western side of the County at the same time recycling and transfer stations that serve those areas could be closed. This could be evaluated at a later date; however, in most areas of the County, the sum total of universal curbside collection and maintaining recycling and transfer stations for more rural areas is likely to be cost-prohibitive compared to any advantages it might provide.

A. Retain Existing System

In this option, the existing system would be retained. Residents who would prefer curbside collection would make arrangements with a collection company.

This system would have the advantage of simplicity by just continuing existing practices at no additional cost to the County: those living in more urbanized areas of the County have the service available to them. Some disadvantages of this option include:

- Many areas of the County are currently not served because of the difficulty of profitably serving customers outside of more densely populated areas.
- The current collection system is relatively inefficient with both low route densities and the potential for multiple companies collecting from homes on the same street.
- This system is somewhat less compatible with recycling because persons receiving garbage collection still would have to go to a recycling and transfer station to drop off recyclables.
- There is currently no standardization of services and no control over the type and condition of vehicles used by haulers.

B. License All Existing Collection Companies

In this option, the County would pass an ordinance requiring all companies collecting garbage or recyclables from residents to obtain a "material collection license." The County would place certain conditions for obtaining a license such as: paying a small annual fee, obtaining a "license sticker" to be displayed on each vehicle used for collection purposes, and require proof of annual safety inspections of each vehicle.

The County could then assist in the promotion of collection service by licensed haulers by listing haulers name and phone numbers on its website and in promotional material. This would inform the public about the services available.

Other than requirements associated with licensure, collection companies would be free to engage in operations as they see fit including where and when to offer service, the method of set-out, and the price of the service.

There would be a small initial cost to prepare the ordinance and develop the licensing program, then a small annual cost to license each vehicle. Part or all the annual cost of the program could be paid through licensing fees.

C. License All Existing Collection Companies and Require Bi-Weekly Recycling

This option is similar to Option B, with an additional requirement that licensed haulers also offer a bi-weekly recycling service, and submit documentation about the method of collection for County approval. Materials collected must match the list of materials accepted in the County's 2-bin recycling system at its recycling and transfer stations.

To implement this option, the County would need to ensure there are places for haulers to deliver recyclables; at a minimum, facilities would be needed on the west and east sides of the island. This could be accomplished at the South Hilo sort station, or at a private facility or facilities on the west and east sides of the island, and possibly Waimea.

This option would have the advantage of increased recycling. It would, however, increase the cost of curbside service and probably result in some customers discontinuing collection service.

D. County Collection Services Using County Crews

In this option, the County would establish a new section of collections, and implement weekly curbside collection of garbage and every-other-week collection of recyclables County-wide. Private sector collection from 1-unit detached housing would no longer be allowed. It is assumed that this would be an optional service available in areas of the County that could be reasonably served by a collection vehicle (The 2009 Plan estimated that this would be about 70 percent of all 1-unit detached housing). The County would need to ensure that processing facilities are available for the west and east sides of the island, and possibly Waimea. Collection options would need to be studied further including an economic analysis.

Customers who do not sign up for collection service would continue to use the remaining recycling and transfer stations.

This option would have significant implementation challenges, some of which include:

- Hiring additional staff and procuring vehicles, carts, and equipment.
- Hiring consulting expertise with an individual or firm that has expertise in establishing a collection operation.
- Establishing a billing mechanism to charge customers for the service.
- Establishing base yards for vehicles and carts in two or three locations on the island.

The County would need to estimate the cost of collection service, including start-up costs, and then decide if it would be provided at cost or at a subsidized rate.

E. Exclusive Franchises for Private Sector Collection

In this option, the County would establish two to four franchises in which a collection company would have the exclusive right to collect waste and recyclables from residential customers. Currently, it is estimated that there are only about 6,000 customers that currently subscribe to collection service. Considering that a single truck in a somewhat rural system can collect from 200 to 600 customers each day on a route (depending on route density), the franchises would be small initially. Thus, more than a few territories would be very inefficient to implement.

The service would be optional for residents, and presumably with an exclusive territory, costs would fall compared to existing rates and the number of customers served would probably grow through time. All companies would be required to offer a similar service, ideally using the same type of cart, with weekly collection of garbage and every-other-week collection of recyclables. The County would need to ensure that processing facilities are available for the west and east sides of the island, and possibly Waimea.

It is uncertain if this could be implemented under current state law. If the County were to implement this option, the County would probably face a legal challenge from the union that serves County workers. Thus, the County would need to test the legality of this approach. It might be able to proceed by engaging in a managed competition process in which the County could also vie for franchises in competition with private collection firms. The County would need to receive approval from the state to engage in such a process. Thus, there is some legal work to be done prior to determining if this option could be implemented.

Assuming implementing this option is legal, there are many ways that franchises could be awarded. It would be challenging to develop a method of assigning franchises that is perceived as "fair" by all existing collection companies: many (or all) of them are likely to oppose any particular franchise award method. One approach would be to have firms bid a price per month for collection service in each zone (i.e., bids would differ in each zone). The lowest price offered in a zone would be the winning bid. The County could then set a County-wide rate that all residents would pay for collection services. The County would then pay (or receive a payment from) the collection firm for the difference between the bid price and the County-wide rate paid by residents for service in each franchise territory. The collection firm would bill and collect the County-wide rate from residents who elect to sign up for the service.

The County would need to establish rate review capabilities and establish a process for firms to adjust bid prices as costs change in the future. This would include reviewing the justification for any proposed rate increases. The County would continue to set the actual rate paid by residents. That rate could be set so that the County breaks even or it could subsidize the collection service as it prefers.

In this option, some County recycling and transfer stations would remain open for those that prefer to not pay for curbside collection.

The main advantages of this option are providing a way of improving the efficiency of service provision (only one firm passing down a residential street), standardized services County-wide, increased recycling, and flexibility and choice for residents.

Some disadvantages of this approach include: existing collection firms would lose the ability to provide services as they see fit, and significant administration and legal expertise would be required for implementation and to regulate rates. Implementing this approach would require project management and specific expertise. It would probably take the County a year or more to put into place and would probably require hiring a project manager and/or using consultants to provide specific expertise.

Cost Considerations. The cost of this option would depend on many factors as described above.

8.7.2 Change Permits to Allow Small Businesses to Recycle at Transfer Stations

In the 2009 Plan, the County attempted to change the operating permits for each station from a convenience center to a recycling and transfer station. This change would have eliminated a 40-cubic-yard per day delivery maximum and would have allowed non-residential customers to access the stations. Yet, the County encountered difficulties in the permit change process with the HDOH.

If the County reconsiders the permit change process, this option would allow non-residential customers to use the recycling services at each recycling and transfer station. Non-residential customers would not be allowed to deliver rubbish at the stations. This policy would provide more convenient recycling opportunities for small businesses throughout the County within limits manageable by the County.

Cost Considerations. Under this option, the amount of recyclables that would be delivered to recycling and transfer stations is uncertain. The County would anticipate increased costs associated with handling

and transportation for increased tonnage. The County would also need to invest in additional signage, education, and promotion of this new policy. This would require the County to identify a system to bill commercial haulers for recycling at the recycling and transfer stations. Although the commercial haulers would be required to pay into the recycling system, they would ultimately realize a cost savings in the reduction of landfill tonnage.

8.7.3 Continue Progress Towards Reconstruction of Stations in Need of Repair

As shown in Exhibit 8-5, 11 of the County's 22 recycling and transfer stations have major engineering deficiencies requiring reconstruction, and another two have intermediate engineering deficiencies that can be addressed while the station is operational. As described in Exhibit 8-5, the County has made improvements to the following facilities since the adoption of the 2009 Plan:

- Glenwood–Reconstructed in 2015.
- Kea`au–Remodeled in 2011.
- Kealakehe–Reconfigured and repaved in 2014.
- Ocean View–Planned and designed, phase 1 construction in early 2019.
- Pāhoa–Reconstructed in 2011.
- Volcano–Reconstructed in 2015.
- Waimea–Remodeled and reconfigured in 2010.
- Wai`ōhinu–Awarded contract for reconstruction in 2019.

Cost Considerations. If the County plans to implement a curbside service program, station upgrades and reconstruction would be planned with this service in mind.

8.7.4 Increase Attendants' Monitoring of Recycling and Reduce Operating Hours at Recycling and Transfer Stations

The County could improve recycling by increasing attendants' presence at the recycling roll-offs at each station. The attendants would encourage customers to separate recyclables and provide information about different ways residents could reduce the amount of waste going to landfills.

Currently, the County stations are open for 12 hours (except for Hilo [10.5 hours], Ocean View [8 hours] and Miloli'i [sunrise to sunset]). The feasibility of reducing operating hours is challenging because the County has concerns about reducing operating hours due to high public demand for disposal service. The County could consider conducting a customer survey to provide feedback regarding staffing levels and hours of operation to understand the needs of the customers and the cost of operation. Past surveys have shown customers want increased hours for recycling and transfer stations however including survey questions regarding additional recycling information / education at the sites would help define future needs.

Cost Considerations. The cost of the initial survey to the residents would be a nominal fee. If it results in the County providing full-time attendants at each station with existing staff, there would be station attendant staff that could perform functions currently done by private security guards. Thus, the County could significantly reduce or eliminate the cost of employing private security guards.

8.7.5 Add Full-Time Attendants, Reduce Operating Hours, and Implement PAYT at Recycling and Transfer Stations

As discussed in Chapter 3, PAYT systems provide a powerful incentive to reduce waste and increase reuse and recycling. It is possible that the introduction of a PAYT system at recycling and transfer stations would be a step in incentivizing a curbside collection program. This option includes a PAYT program, with full-time attendants and reduced operating hours.

The County would need to devote considerable upfront resources to educate residents about the reasons for the new program and to explain how the new program works.

Further, it is recommended that this type of program be phased in with a 3- to 6-month grace period during which bags or tags would be collected; however, no one would be turned away for not using the appropriate bag or tag.

Illegal dumping is always a concern, although results from around the country have shown that long-term increases in illegal dumping from PAYT programs are rare. The County may need to consider increasing enforcement authority for the DEM or other County agencies to allow them to levy fines against those caught engaging in illegal dumping practices.

Cost Considerations. See Chapter 3, Section 3.5.6.1 for details on the implementation of PAYT at Recycling and Transfer Stations, including cost considerations.

8.7.6 Reduce System Costs by Closing Select Stations and Reducing Operating Hours

In this option, the County would close some stations and reduce the operating hours of some stations that remain open. The money saved could be used to increase waste reduction, reuse, and recycling or used to lower the amount of money collected from property taxes for solid waste management purposes.

This option would include closing the following ten stations (Exhibit 8-6):

Exhibit 8-6. Station Closure Options

Closed Stations	Closest Remaining Station(s)
Glenwood	Volcano
Honomū	Laupahoehoe, Hilo
Kalapana	Pāhoa
Ke`ei	Keauhou
Miloli`i	Keauhou, Oceanview, Wai`ōhinu
Pa`auilo	Honoka`a, Laupāhoehoe
Pāhala	Wai`ōhinu
Pāpa`ikou	Hilo
Puakō	Waimea, and new facility planned at WHSL

This option would require an aggressive public education program that stresses the reasons for closing some stations. As discussed above in the PAYT option, the County would need to educate residents and increase enforcement to prevent illegal dumping. It is likely that some residents would continue trying

to drop off waste at closed transfer stations for some time until residents become comfortable with the new arrangement. The County would need to plan for this and increase its budget for enforcement and cleanup crews.

Cost Considerations. With ten fewer stations, a reduction in operating hours, allowing for the added cost of full-time attendants, and providing budget for increased enforcement, it is estimated that this option could result in significant annual cost savings.

8.7.7 Lower Transportation Costs by Compacting Recyclables

In FY 2017–18, the County spent about $960,000 transporting recyclables from recycling and transfer stations to processors. The transportation costs could be lessened thereby reducing the volume of material transported by compacting recyclables prior to transportation from stations. Two possible methods of compaction include:

- Convert one garbage chute to handle recyclables at larger stations with multiple garbage chutes (Kea`au, Pāhoa, Hilo, Waimea, Kailua, Keauhou).
- Breakdown/flatten cardboard boxes.
- Use compactor drop boxes at stations for mixed recyclables.

8.7.7.1 Converting One Garbage Chute to Accept Recyclables

In this option for stations with more than two chutes, one chute would be designated for accepting recyclables only as depicted in the adjacent photo). Once dropped into the chute, materials would be compacted in the County's 75-yard compaction trailers, using the same operational methods currently used for garbage.

The Kea`au, Waimea, and Keauhou stations each have two chutes for garbage, the Kailua station has three, Hilo station has four, and Pāhoa has two transfer trailers. Where only two chutes are available, it may be difficult to devote one chute entirely to recyclables; long lines may form during peak conditions for disposal. Signage would need to be changed, public education would be needed, and a full-time attendant would need to be present on-site to ensure that only recyclables went into the chute designated for recycling. This concept might work better at the Kailua, or Hilo stations where converting one chute would leave multiple shoots still available for garbage. Transportation cost savings from compacting at the Hilo Recycling and Transfer Station may be small because mixed recyclables are transported a short distance for processing in Hilo.

In summary, this concept appears to be feasible at the Kailua station, and might be feasible at the Kea`au and Waimea stations. The County would likely conduct a pilot program to test its effectiveness.

8.7.7.2 Use Compactor Drop Boxes at Stations for Mixed Recyclables

The County could increase truck payloads and lower transportation costs by installing stationary compactors at each station for recyclables. This system would include a compaction unit and a charging hopper (two cubic yards is a typical size) that residents would place their recyclables into. When the charging hopper is full, an operator would activate compaction and material would be pushed into an enclosed drop box.

For safety, the system should be key- or code-operated so that only trained operators would be able to engage the compaction unit.

Enclosed drop boxes come in many sizes, and a 40-cubic-yard box is recommended to allow containers to stay at stations for longer periods of time before they needed to be hauled. The installation would require pouring a concrete pad to support each compactor and building a safe and convenient platform around the charging hoppers for customers. County equipment operators (or a station attendant) would have to routinely operate the compaction units to compact recyclables as they currently do for the County's garbage trailers. In FY 2017–18, the uncompacted mixed recyclables hauled from recycling and transfer stations averaged about 4.5 tons per 40-cubic-yard bin. This type of unit at County stations could probably achieve an average compaction ratio somewhere between 3:1 and 5:1 for mixed recyclables.

Cost Considerations. Converting garbage chutes to accept recyclables would probably require one additional site attendant at each station (to ensure that materials are placed in the proper chute). There would be a small initial cost for extra signage, education, and promotion.

The cost of compacting recyclables would need to be taken into consideration. If the County were to install one compaction unit at each station and purchase various containers, the total initial capital cost would be properly budgeted. In subsequent years, amortization of these units and containers would also be equated into future budgets. When considering the added annual maintenance cost of about 5 percent of capital and labor costs for staff, it is uncertain if installation of compactors at all stations would be cost-effective given the current recycling rates at County recycling and transfer stations.

However, it is important to note that many options considered in the Plan update (such as mandatory recycling, PAYT, allowing non-residential recycling) would increase the quantities of mixed recyclables accepted at stations. The larger the volume of recyclable materials transported, the more likely compaction will be cost-effective. Another option to consider is installing the units only at selected stations. The County could adopt a "satellite" system at which compactors would be installed at stations that would accept uncompacted recyclables from stations more distant from processors.

8.8 Recommendations

Based on the analyses presented above and discussions with the SWAC, the County plans to implement the recommendations discussed below. Implementation issues related to these activities are discussed in Chapters 3, 4, and 5.

1. **Retain the County's system of recycling and transfer stations; however, also explore alternative funding methods via a feasibility study as discussed in Chapter 3 recommendations (Recommendation 2).** Until a decision is made on the best method of collection and transfer,

the County will continue to maintain and upgrade recycling and transfer stations to address structural deficiencies and provide expanded services to divert waste from the landfill.

Note: Chapter 10, Section 10.6 (Recommendation 1) discusses a Solid Waste System Financial Analysis.

2. **Reconstruct one or more recycling and transfer stations annually.** The decision discussed above to maintain the County's recycling and transfer system will require repair and/or reconstruction of the recycling and transfer stations. After considering other County funding needs, it is recommended that the County fund at least one reconstruction each year.

3. **Consider 'Satellite' compaction units for recyclables at select stations.** The County would also consider installing compaction units for recyclables at selected stations. This would include consideration of adopting a "satellite" system where compactors would be installed at selected stations, and those stations would accept uncompacted recyclables from nearby stations with no compactor.

4. **Reduce operating hours at recycling and transfer stations and consider closing one or more stations.** Reduce operating hours at recycling and transfer stations, and consider closing one or more stations. In Chapters 3, 4, and 6, a number of proposed programs are recommended for implementation at County recycling and transfer stations. It will be imperative that County staff are present during station operating hours to inform users of the various recycling, reuse, organics, and other programs available. As more services are provided, it will become prohibitively expensive to keep recycling and transfer stations open 10 to 11 hours per day, 362 days per year. The County could consider closing select recycling and transfer stations if the benefits of increased services in some areas are deemed to be less than the cost of providing that service. To start this process, the County would consider conducting a customer survey to provide feedback regarding staffing levels and hours of operation to understand the needs of customers.

5. **Change County code to allow small businesses to drop off recyclables at County recycling and transfer stations within limits manageable by the County.**

6. **Conduct an operational efficiency analysis to lower costs.** The County would continue to monitor the cost of its recycling and transfer network, including contracting with a third party to conduct an efficiency analysis and identify potential opportunities to lower costs.

9. RESIDUALS MANAGEMENT

9.1 Introduction

Residuals refer to materials remaining after source reduction, reuse, recycling, and bioconversion. Residuals management is the final treatment and/or disposal of the waste that cannot be economically used in any other way. The County of Hawai'i provides landfill disposal for residual materials at the West Hawai'i Sanitary Landfill (WHSL) located in Pu`uanahulu and the South Hilo Sanitary Landfill (SHSL) located in Hilo. The SHSL is projected to reach capacity by 2019 and plans have been initiated for its final closure. Refuse from the SHSL will be routed to the WHSL upon the SHSL closure. For residents, the common forms of residual materials sent to landfill are household rubbish, or municipal solid waste (MSW), and DIY construction and demolition waste. Businesses and institutions send a wide range of different non-hazardous residual materials from their daily operations.

This chapter describes current conditions of the existing residuals management system within the County, identifies current issues and concerns, and presents options for managing residuals after source reduction, reuse, and recycling.

9.2 Review of 2009 Plan Update

Exhibit 9-1 below provides a summary of the recommendations put forth in the 2009 Plan update relative to residuals management, and describes the actions taken to achieve each recommendation.

Exhibit 9-1. Status Update of 2009 Plan Recommendations for Residuals Management

2009 Plan Update Recommendation	Status
Develop a conversion technology facility.	Between 2006 and 2014, the County issued several RFPs to vendors who could potentially design, construct, and operate a waste to energy (WTE) facility. The County's evaluation of proposals during this time determined that a mass burn WTE facility was the most commercially and technically feasible option. The County rejected a proposal in 2008 due to higher than expected costs. Advanced diversion technology (e.g., WTE, pyrolysis) must demonstrate that it is environmentally and economically feasible, and the technology has a verifiable and viable commercial track record (a minimum of 5 years) for handling of municipal solid waste, before it will be considered by the County.
Truck waste from the SHSL to the WHSL.	The County plans to re-route waste from the SHSL to WHSL during 2019.
Investigate the feasibility and cost of expanding the SHSL. to a northwest parcel adjacent to the landfill or to a rock quarry located next to the SHSL site.	Not implemented due to high costs and Hawai'i Department of Transportation, Airports (DOTA) Division and the Federal Aviation Administration (FAA) restrictions on landfills within 10,000 feet of an airport using turbojet aircraft.
County to conduct a more in-depth evaluation of the feasibility and cost of re-configuring the reload facility at the SHSL and trucking waste to the WHSL.	The County conducted evaluations of trucking residuals to WHSL. The County will continue to look at means and methods to maximize the load.

Exhibit 9-1. Status Update of 2009 Plan Recommendations (continued)

2009 Plan Update Recommendation	Status
County to conduct a more in-depth evaluation of the feasibility and cost of a new lined landfill in the existing quarry site adjacent to the current SHSL that would provide an estimated fifty (50) or more years of additional disposal capacity.	A study was performed and it was determined that this option is unfeasible due to proximity to the airport, among other considerations. Instead, residuals will be shipped to WHSL.
County to prepare a master planning document for the WHSL and SHSL facilities.	1) The County is preparing a plan focused on reconfiguring circulation, scalehouse location, and other facilities in anticipation for additional residuals entering WHSL from the SHSL. 2) In 2012, the County commissioned a Hilo Landfill Feasibility Study. In 2017, the Cover System Alternatives Evaluation for SHSL was prepared, and in 2018 the EA and subsequent Finding of No Significant Impact (FONSI) was issued by the County Department of Environmental Management (DEM) on behalf of the South Hilo Sanitary Landfill Final Closure. Because it was determined in the Hilo Feasibility Study that expansion of the Hilo landfill is unfeasible, there is no need to proceed with a master planning document during this planning period. Near the conclusion of the 30-year monitoring and maintenance period of the closed landfill, there will be a need to develop a plan on behalf of the future use of this site.
County engage in a dialogue with other Hawai'i counties about the potential for mutually beneficial joint solutions.	Some contractual efforts with Waste Management have been made between Hawai'i Community College, University of Hawai'i, Kaua'i County, and County of Hawai'i
County conduct a feasibility study of remediating the closed Kailua-Kona landfill.	The County is still dealing with ongoing issues associated with the closed landfill's subsurface fires. A feasibility study is still on the horizon for the required 30-year post-closure remediation efforts.

9.3 Existing Conditions

Currently, residual waste from the eastern part of the County is disposed of at the SHSL, and waste from the western part of the County is disposed of at the WHSL. Residential residual waste is accepted at no charge at 22 recycling and transfer stations and transported by County Solid Waste Division (SWD) staff for disposal at both landfills. In 2018, commercial disposal of residual waste generally required a landfill disposal permit through the DEM and a landfill tipping fee of $108 per ton. Per County of Hawai'i Code, tipping fees may be waived when it is "in the best interest of the County," including one-time events for community organizations, nonprofit organizations, or private property owners who are remediating illegal dump sites that they did not create. The status of each landfill is described in the following sections.

9.3.1 South Hilo Sanitary Landfill Closure

2018 South Hilo Sanitary Landfill

The SHSL is located in Hilo, approximately 1 mile east of Kanoelehua Avenue and one mile south of the Hilo International Airport. The landfill is accessed via Leilani Street and an unnamed access road. The County of Hawai'i owns and operates the SHSL, and the DEM estimates that the landfill has been in operation since the 1970s. The landfill facility is located on approximately 40 acres, the majority of which is used for municipal solid waste disposal. The landfill is established on a former quarry and is unlined. The landfill accepted approximately 75,400 tons in FY 2017–18, an average of approximately 6,300 tons per month.

The County will permanently close the SHSL when it reaches capacity in 2019. In 2012, the County commissioned a Hilo Landfill Feasibility Study, which determined that design and expansion of a landfill on the Hilo side of the island was not feasible, and shipping to the WHSL was both feasible and cost effective. In 2018, an Environmental Assessment (EA) and subsequent Finding of No Significant Impact (FONSI) was issued by the DEM on behalf of the SHSL final closure and shipping to the WHSL. The primary drivers for shipping to the WHSL include:

- Limited capacity at the existing SHSL.
- Significant constraints to expanding the existing SHSL (e.g., proximity to Hilo International Airport).
- Significant constraints to establishing a new landfill in East Hawai'i.

Thus, the landfill will be closed and residual waste will be hauled from the East Hawai'i waste stream to the WHSL in Pu'uanahulu (Exhibit 9-2). A 30-year closure and monitoring program has been developed for the SHSL. Plans include slope stabilization, installation of a gas ventilation system, and an improved stormwater system (County of Hawai'i DEM 2017c).

To continue to provide service to residents on the east side of the island upon the SHSL closure, the County will convert the East Hawai'i Regional Sort Station (EHRSS) in Hilo to not only accept recyclable and reusable material, but also MSW. On a limited basis, the County has started hauling residuals from the EHRSS to the WHSL.

9.3.2 West Hawai'i Sanitary Landfill

The WHSL is located southwest of Waikoloa at Pu`uanahulu in the North Kona District (Exhibit 9-2). The County of Hawai'i owns the WHSL and County personnel operate the landfill. The WHSL is operated by Waste Management of Hawai'i under a contract with the County.

2018 West Hawai`i Sanitary Landfill

Waste Management is currently responsible for construction of new cells, environmental monitoring, and closure and post-closure activities.

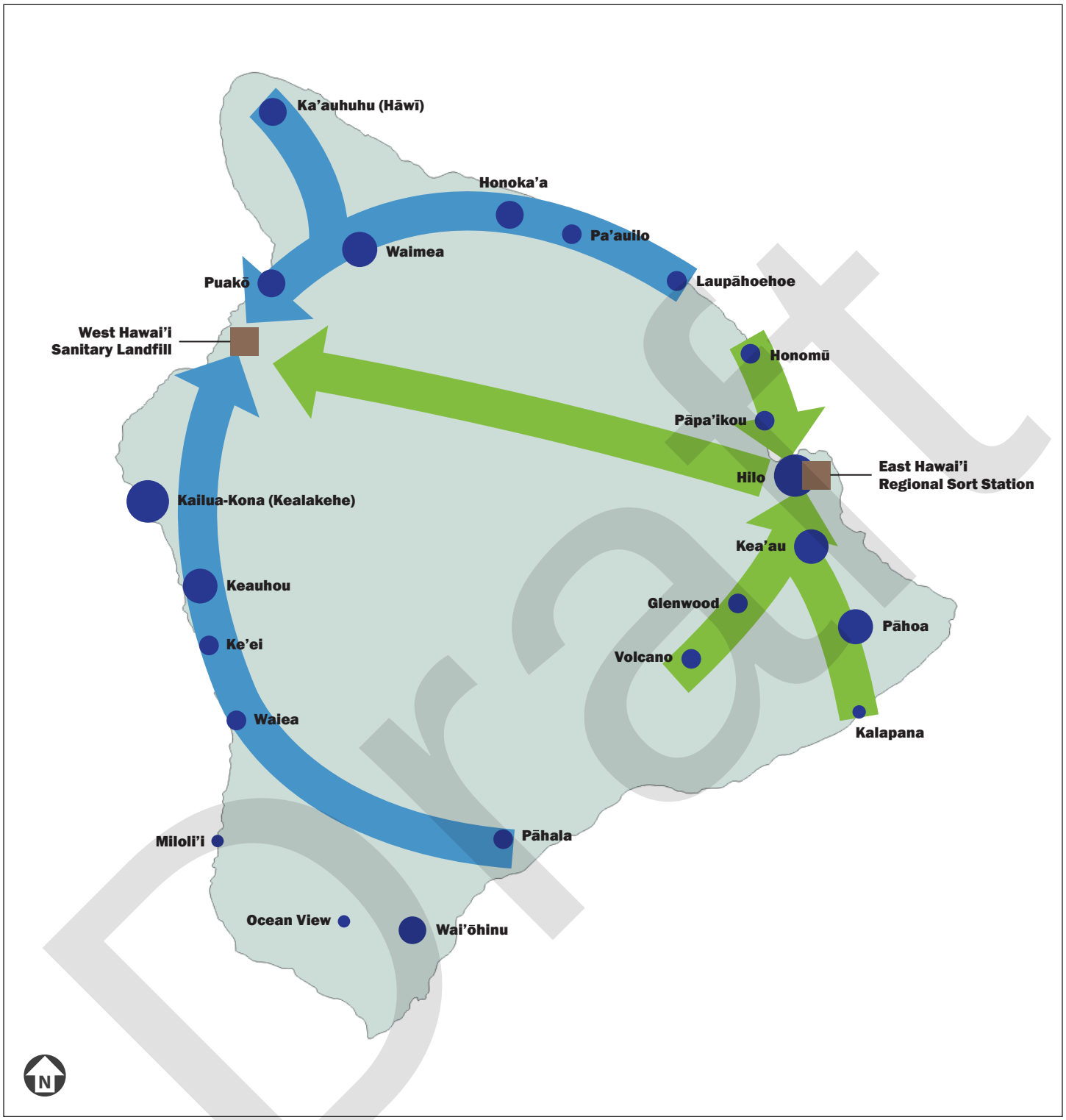
The WHSL facility has been in operation since its construction in 1993, and is located on approximately 300 acres, of which 149 acres are currently permitted for landfill activities. The WHSL is a Resource Conservation and Recovery Act (RCRA), Subtitle-D landfill[9] (40 CFR Section 257.2) as administered through Hawaii Administrative Rules Chapter 58.1 (HAR 58.1). The landfill is lined with a geomembrane, and has an engineered leachate collection system. To comply with the U.S. Environmental Protection Agency (EPA) Clean Air Act, a new landfill gas collection and recovery system was installed in 2013. The landfill accepted approximately 12,000 tons per month or 150,000 tons in FY 2018. The landfill has 23 cells currently permitted, of which 10 have been filled, and one (Cell 11) is active. Waste Management is in the process of preparing Cell 12 for the next phase of disposal. As reported by the County in a 2019 Solid Waste Advisory Committee (SWAC) meeting, the WHSL has an estimated 100 years of life remaining at current recycling rates (Exhibit 9-3). If the community manages their waste responsibly by reducing, reusing, and recycling; the life expectancy could exceed 100 years. As forecasted in Chapter 2, the community would experience an average increased diversion rate of 8 percent through 2039 if approximately 50 percent of food waste is diverted when the proposed compost facility is in operation in 2020.

As described in Section 9.3.1, in 2012, the County commissioned a Hilo Landfill Feasibility Study, which determined that the expansion of a landfill on the Hilo side of the island was unfeasible and shipping to the WHSL was both feasible and cost effective.

In preparation of hauling waste to WHSL, the County Council adopted resolutions 310-17 and 311-17. Resolution 310-17 authorizes the payment of a multi-year lease for five trailers and 311-17 authorizes the payment of funds for five semi-tractors.

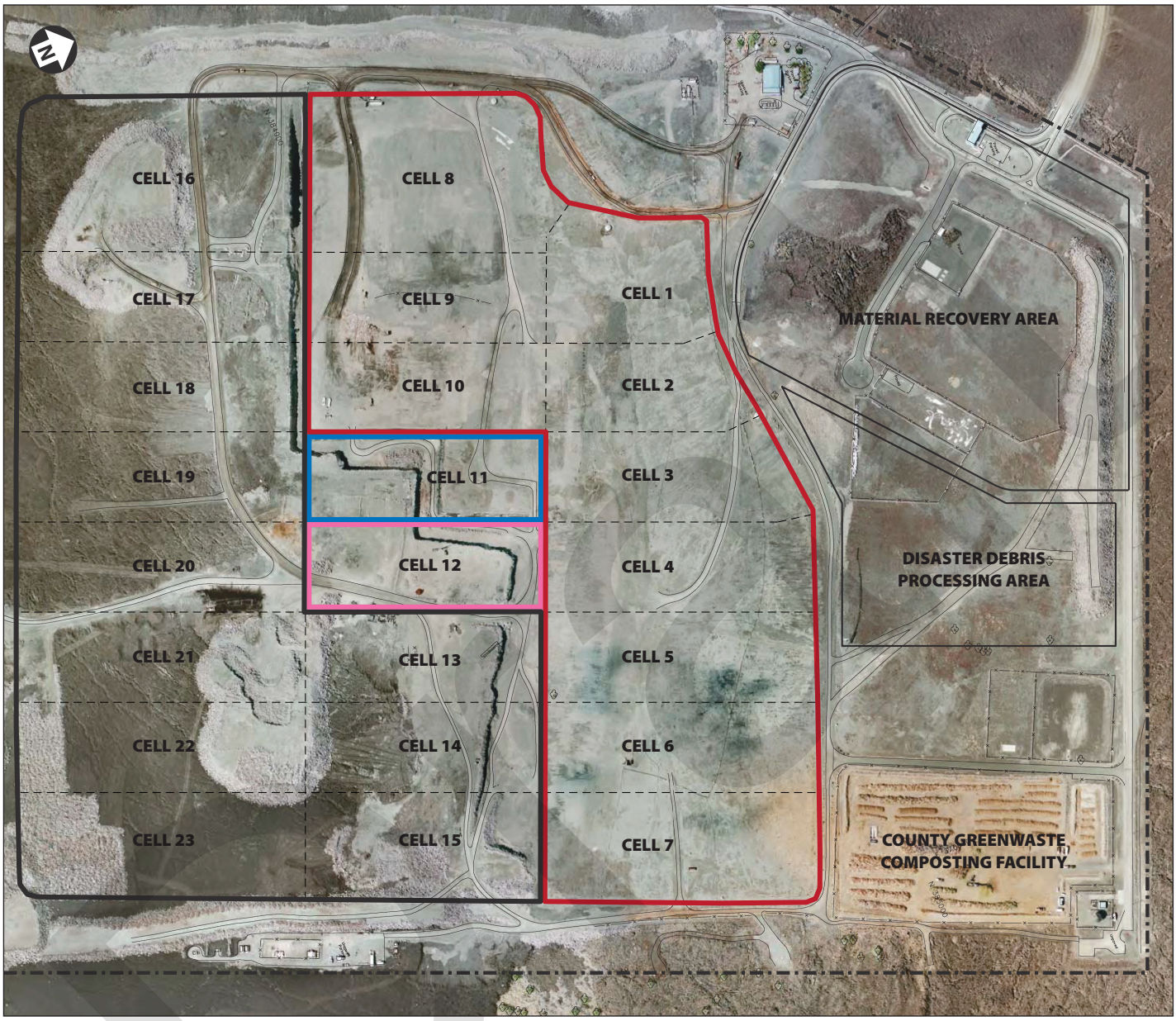
In anticipation of the SHSL final closure, the County is preparing a master plan focused on reconfiguring circulation, scalehouse location, and other facilities in anticipation for additional residuals entering the landfill.

[9] *Non-hazardous solid waste is regulated under Subtitle D of RCRA. Regulations established under Subtitle D ban open dumping of waste and set minimum federal criteria for the operation of municipal waste and industrial waste landfills, including design criteria, location restrictions, financial assurance, corrective action (cleanup), and closure requirement. States play a lead role in implementing these regulations.* (EPA 2018d)



Source: County of Hawai'i DEM SWD

Exhibit 9-2
Generalized Haul Route From
East Hawai'i Regional Sort Station



Source: County of Hawai'i DEM

COMPLETED BUT NOT YET CLOSED
ACTIVE CELL
CELL CONSTRUCTION IN PROGRESS
CELLS STILL TO BE EXCAVATED

Exhibit 9-3
West Hawai'i Sanitary Landfill Configuration

9.3.3 Landfill Disposal Fees

Under Ordinance No. 18 5, the County amended HCC 20 to increase the landfill disposal fees. Ordinance No. 185 reads as follows:

> *The purpose of this ordinance is to increase disposal fees to cover costs incurred by the Solid Waste Division of the Department of Environmental Management for services it provides to the residents of and visitors to Hawai`i County. The County of Hawai`i' s Integrated Resources and Solid Waste Management Plan complies with state mandates of waste reduction and provides a path to provide solid waste disposal services for all, including the operation of all transfer stations and recycling operations. The current plan requires capital improvements, new equipment, maintenance of existing equipment, as well as improved service.*
>
> *The County seeks a healthy economy that requires intelligent and efficient solid waste management and disposal. Presently, the General Fund subsidy is substantial. Adoption of these changes will reduce the Solid Waste Division' s dependence on the General Fund as well as provide the groundwork for implementation of the updated plan.*

In July 2018, landfill disposal fees increased to $108 per ton. Rates by vehicle size and volume, which apply when weights cannot be obtained, were increased to $65 per vehicle for light trucks, $109 for medium trucks and $194 for large trucks. For all other vehicles, disposal fees were increased to $36 per cubic yard for compacted material, and $22 per cubic yard for non-compacted material. Special handling fees (for handling asbestos) increased to $108 per truck load (or a fraction thereof). The fee schedule is set to change in subsequent years, with specific rates established through 2022.

9.3.4 Evaluation of SHSL Capacity Replacement

Because the SHSL was near its permitted capacity and planned closure date, in 2003 the County began a focused evaluation of potential options for future disposal of residual waste on the east side of the island. One potential component to the overall solid waste management approach was to develop waste reduction technology (WRT). Thus, in 2004, the County Council adopted Resolution 218-04 that *supports solid waste landfill diversion through waste reduction technology with procurement criteria that matches Hawai'i County policies, needs and waste stream, and delineates next actions.*

In 2006, the County initially evaluated five different waste reduction technologies: mass burn incineration (mass burn), incineration using refuse derived fuel, aerobic composting, thermal gasification, anaerobic digestion, and bio-refining. During the process, aerobic composting was found to be unsuitable due to the potential for offensive odors; and bio-refining was found to be unproven and likely not commercially viable technology. In addition, the evaluation concluded that anaerobic digestion was not suitable "because it could only deal with a limited portion of the waste stream and did not yet have a sufficiently viable commercial track record dealing with a municipal solid waste stream like that of Hawai'i." Thus, it was determined that either mass burn or thermal gasification, both WTE facilities, were the most viable waste reduction technologies.

Between 2006 and 2014, the County issued several RFPs to vendors who could potentially design, construct, and operate a mass burn or thermal gasification WTE facility. The County's evaluation of proposals during this time determined that a mass burn WTE facility was the most commercially and technically viable option. Notably, a mass burn WTE facility was identified as having the potential to reduce the volume of processed solid waste by 90 percent, reduce weight by 70 percent, and would have air emissions below EPA standards.

In March 2008, Wheelabrator Technologies Incorporated (a wholly owned subsidiary of Waste Management) was selected to develop a mass burn WTE project by the County. In response, Wheelabrator submitted a detailed cost proposal to design and construct a mass burn WTE facility to replace the SHSL. After evaluating the Wheelabrator submittal, the County Council rejected the WTE proposal largely because of concerns about higher than anticipated costs for the facility. In 2014, a third RFP was issued for WTE facility proposals, and was withdrawn prior to the selection process.

As described in Chapter 4, in consideration of alternative methods for waste reduction to more advanced technologies, the County contracted with a private contractor in 2016 to construct two organics management sites: the EHOF and WHOF. During FY 2016–17, a Notice to Proceed was approved for the construction of these facilities through a private contractor and both facilities are now operational. The County has also been engaged in developing a compost facility that not only handles green waste, but also food waste and other compostables, to divert a larger volume of waste from the SHSL and WHSL. In 2016, an RFP was issued for the construction of a Compost and Green Waste Processing facility, and an Environmental Assessment (EA) was prepared that considered a proposed site at a former rock quarry adjacent to the SHSL. The EA was ultimately withdrawn from consideration due to concerns over the location and the potential impacts to the local community. Three new sites are under consideration, with the composting facility slated for operation in 2020.

A chronology of County waste reduction technology procurement dating back to 1995 is provided in Appendix E.

9.4 Issues and Concerns

Since the 2009 Plan, establishing a place for disposal of residuals from East Hawai'i when the existing SHSL closes was a key residuals management issue. As described in Section 9.3.1, the County will continue to provide service to residents on the east side of the island upon the SHSL closure. The County will convert the EHRSS in Hilo to not only accept recyclable and reusable material, but also MSW. The County started hauling residuals from the EHRSS to the WHSL in 2019. The County no longer considers hauling and landfilling residual waste from East Hawai'i an issue.

The County considers the potential for private sector development of residuals management facilities without County involvement a policy issue. Section 9.4.1 considers how those facilities could affect flow control and contractual obligations with landfill management companies that currently or may be under contract to the County in the future.

Section 9.4.2 includes the long-term management of the closed Kailua-Kona and Waimea landfills.

Finally, in December 2018, the County recycling program revised the materials accepted due to changes in the global recycling market. The County eliminated #5 plastics (e.g., yogurt containers, syrup bottles, margarine tubs), plastic grocery bags, clam shell-type plastic (salad, bento, fruit, etc.) in the mixed recyclable bins at the recycling and transfer stations. In addition, the price of mixed media paper (all paper that is not cardboard) dropped significantly in the last few years. With uncertainties in the global market, the County will need to consider other opportunities to dispose of formerly recycled materials that end up in the waste stream, following a concerted effort of public outreach to encourage residents to reduce and reuse these materials. Section 9.5 describes existing recovery and treatment technologies and recovery and treatment options for the County that have the potential to capture these formerly recycled materials.

9.4.1 Private Facilities and Flow Control

Many government jurisdictions in the United States have flow control laws in effect to ensure that materials flow to facilities in which they have significant capital investment and/or other interest. They are common in jurisdictions with capital intensive WTE facilities.

In 1994, the U.S. Supreme Court ruled in the "Carbone decision[10]" that a town's flow control ordinance discriminated against interstate commerce by favoring a privately owned local facility over out-of-state private facilities. This decision put the legality of state and local government flow control lawsaffecting public facilities in question. In April 2008, this issue was resolved when the Supreme Court ruled that state and local government laws directing locally generated wastes to publicly owned waste facilities do not discriminate against interstate commerce[11]. This decision appears to establish the right of counties to establish flow control ordinances directing locally-generated wastes to publicly-owned facilities.

In the County, a private waste processing firm, BioEnergy, has expressed interest in developing a relatively large WTE recovery facility for processing the residuals it collects from businesses and institutions. There are reasons to believe that this may not be a desirable for the County. A flow control ordinance is one way that the County could ensure that residual materials flow to facilities that are County owned, or operated under contract to the County.

A flow control ordinance protects the County against several risks associated with the private sector developing facilities without explicit County approval. Some of those risks include:

- Because of the County's relative isolation and small size, the potential barriers for local private collection firms who wish to establish operations in the County are perhaps higher than on the mainland. It is possible that a single private firm with a large national market share and its own recovery facility could potentially keep collection costs higher than would otherwise exist in a more competitive environment.
- Allowing a private firm to develop a large recovery facility reduces the County's flexibility to adopt waste reduction programs. County policy makers could be in the unenviable position of having a large firm facing financial losses if the County were to require aggressive recycling or bioconversion from businesses and institutions.
- The County would lose some degree of control and flexibility for choosing the recovery and disposal technology that best meets the needs of the entire County.

At this time, the BioEnergy Hawaii still has issues it must resolve to secure land and permits. The County continues to monitor the progress of this facility. If it appears that the facility will be developed, the County will evaluate whether it is in the County's best interests to allow the facility to proceed, or whether it will establish a flow control ordinance to keep the flow of waste in the County system.

9.4.2 Closed Landfills

9.4.2.1 Kailua-Kona

The Kailua-Kona Landfill was a municipal solid waste landfill that operated from the late 1970s until it was closed in 1993. The landfill occupies approximately 20 acres and is located east of the Queen Kaahumanu Highway approximately 3 miles north of Kailua-Kona in the North Kona District. Subsurface fires from

[10] C&A Carbone v. Town of Clarkstown, 511 U.S. 383

[11] United Haulers Association v. Oneida-Herkimer Solid Waste Management Authority, No. 05-1345

waste material have been documented at the landfill since 1991. During final closure of the landfill, a final cover system of 30-mil polyvinyl chloride (PVC) geomembrane liner and 2 feet of cover soil were installed in 1993. The cover has undergone damage from subsurface fires and intrusive investigations to evaluate options for extinguishing the fires. Temperature and gas monitoring occur periodically as part of the post-closure monitoring

Subsurface waste combustion continu.es to be a concern at the landfill. The County and its engineering consultants are monitoring the current condition and extent of the subsurface fires and developing options for subsurface fire suppression.

The once rural setting surrounding the landfill is being developed including a Hawai'i County Police Department (HCPD) station, Kealakehe High School, West Hawaii Civic Center, State Judiciary Complex, and Kealakehe Recycling and Transfer Station. There are also plans for an affordable housing neighborhood in the future. A regional park is in the draft NEPA environmental assessment phase. Although there have been no recent complaints from neighbors since the County began proactively managing the site, long-term management plans for the landfill are being evaluated by the County. Management plans being considered include:

- Relocation of the Waste: The waste could be relocated to West Hawaii Sanitary Landfill; however, there are major health and safety concerns with digging into the landfill and moving the waste. While this alternative is extremely expensive, it is considered clean closure and will no longer require post-closure monitoring and maintenance, and the land can be used for another purpose.
- Construction of a New Engineered Cap: Construction of an engineered cap could limit oxygen infiltration into the waste mass and limit the current "chimney effect" that is occurring at the landfill now. This alternative would not eliminate post-closure monitoring; however, it would lessen maintenance costs.
- Implementation of a New Technology: The County is currently looking into technology being used to extinguish subsurface coal fires. The technology works by injecting a foam mixture into the waste mass. The foam consists of a biodegradable fire retardant and is injected using nitrogen gas. The foam wets and cools the area of combustion. This is considered interim mitigation.

9.4.2.2 Waimea

The Waimea Landfill is in Lalamilo, in the South Kohala district, and consists of a single, unlined landfill cell. The landfill was established in the late 1960s at a former quarry site, has an area of approximately 9.28 acres, and is located on land parcels owned by the State and the County. Landfilling activities ceased during 1986, and the landfill was closed in 1987. A cover of several feet of fine soil was placed over the top of the landfill. Records indicate that the quarry was originally excavated to an approximate depth of 30 feet, and that approximately 35 feet of rubbish was landfilled at the site.

Based on past investigations, filling and grading activities have been completed over portions of the landfill and have extinguished subsurface fires by limiting the amount of influx of oxygen to the subsurface of the landfill.

Currently, post-closure monitoring is being performed on a quarterly basis. The County and state are currently in the discussion phase on the required word to "sunset" the post-closure monitoring requirements. Additional cover material may be added to seal the landfill from the atmosphere to prevent combustion and to provide stormwater control measures. Once the HDOH agrees with the plan, the parcel can be used for other uses.

9.5 Material Recovery and Treatment Facilities Overview

This section provides 1) a background description of EPA's waste management hierarchy and worldwide trends regarding recovery and treatment of residuals (Section 9.5.1), 2) an overview of recovery and treatment technologies (Section 9.5.2). Recovery and treatment options for the County are discussed in Section 9.5.6.

9.5.1 Background

The EPA's integrated waste management hierarchy (EPA 2018e) includes the following four components, listed in order of preference:

1. Source reduction (or waste prevention), including reuse of products and on-site (or backyard) composting of yard trimmings.
2. Recycling, including off-site (or community) composting.
3. Energy recovery.
4. Treatment and Disposal.

More broadly, there is an intermediate step to integrated waste management after the first "3Rs" of source reduction, reuse, and recycling (including bioconversion), the "4th R" that can be referred to as recovery or treatment. For the foreseeable future, after source separation, reuse, recycling, and bioconversion are completed, there will be residual materials that must be managed. Currently, that residual material is disposed of in County landfills.

Throughout the world, there is a trend to implement additional treatment of these residual materials prior to landfill disposal using processes such as waste to energy (WTE) or mechanical-biological treatment (MBT). Locally, Honolulu's WTE facility reduces approximately 90 percent of its waste volume and has saved approximately 500 acres of landfill space since its construction (SWANA 2014). Treatment consists of applying some combination of mechanical, biological, chemical, or thermal processes to the

material prior to landfill disposal to recover energy and additional useful materials, and to remove organics from the residuals that are sent to landfill. The objectives and benefits of recovery and treatment include the following:

- Recovering additional materials for recycling that remain in discarded materials after the source reduction, reuse, and recycling.
- Recovering the inherent energy remaining in discarded materials after source reduction, reuse, and recycling.
- Stabilizing the organic fraction of residuals to minimize greenhouse gas emissions and other air emissions from organics that remain after source reduction, reuse, and recycling.
- Reducing the volume and toxicity of materials sent to landfill.
- Preserving land and extending the lifespan of existing landfills.

Recovery and treatment facilities (often more narrowly referred to as conversion, emerging, or alternative technologies) are in the planning stages in many United States jurisdictions. A recent assessment of alternative technologies is included in Exhibit 9-4 below.

Exhibit 9-4. Technologies Proposed in Recent U.S. Alternative Technology Procurements

Finding Description	Advanced Thermal Recycling	Thermal Conversion	Biological Conversion
Diversion Rate	Expected Diversion: 90% Worst-Case: 80%	Expected Diversion: 90% Worst-Case: 80%	Expected Diversion: 80% Worst-Case: 50%
Air Emissions	Air emission control systems available to limit emissions to well-below regulatory limits	Systems expected to result in emissions below regulatory limits	Emissions lower than thermal technologies due to lower operating temperatures
Wastewater Generation	No significant difference among technologies		
Solid Residue Generation	Generation of bottom ash, boiler ash, and fly ash. Assuming bottom ash is recycled, about 5% of incoming material will be landfilled	Similar to advanced thermal recycling systems	Generation of unmarketable residuals consisting of 15-40% of the total throughput

Source: City of Los Angeles, Department of Public Works (2005).

Outside the United States, many other countries are implementing recovery and treatment technologies prior to landfill disposal. The European Union initiated a circle economy plan wherein they aim to achieve 65 percent recycling of municipal waste and to restrict MSW landfilling to 10 percent by 2030 (European Parliament 2017). Implementing technologies to meet these requirements is projected to significantly reduce greenhouse gas emissions from landfilling in the European Union. Recovery through thermal means is widespread in Japan and other Asian countries, and new recovery/treatment facilities are currently being developed in Canada, Australia, and New Zealand.

9.5.2 Overview of Recovery and Treatment Technologies

There is a tremendous variety of possible recovery and treatment options for municipal solid waste currently in operation or under development. They range from options with a long, successful track record in the United States and elsewhere (such as mass burn WTE facilities) to potentially promising new technologies in various stages of testing and development (such as the flash carbonization process being developed at the University of Hawai'i, Manoa). There are various ways of grouping recovery and treatment technologies for MSW; however, this Plan update classifies them into the following three groupings:

- Thermal.
- Mechanical-Biological Treatment.
- Other.

The "other" technologies refer to a wide variety of different processes (and process elements) that are in various stages of development such as thermal depolymerization, hydrolysis, autoclave, and flash carbonization. At this time, there are no commercial-scale facilities processing MSW using these technologies in the United States and very few that are currently operated at a commercial scale elsewhere in the world. Thus, while these technologies could be investigated further, they are not assessed further in this Plan update.

9.5.2.1 Thermal Technologies

For the purposes of this discussion, thermal technologies have been grouped into the following five main categories: mass-burn, refuse-derived-fuel (RDF), gasification, pyrolysis, and plasma arc. A summary of each type of technology follows.

Mass-burn. These facilities are by far the most common recovery technology currently utilized in the United States and around the world. In this system, residual materials are loaded from a pit into a furnace with little or no pre-processing. The materials are combusted, and the heat is used to produce electricity and/or steam. In fact, European countries such as Sweden and Denmark have the capacity to treat 100 percent or more of their MSW through incineration (European Parliament 2017). In the United States, 70 mass-burn facilities utilize 14 percent of waste destined for landfilling (Seltenrich 2018). As discussed above, the County conducted a procurement process for a waste reduction technology to replace the SHSL and selected mass-burn WTE technology. This technology was selected mainly because of its long, successful, track record for processing MSW.

The main advantages of this technology are its proven and reliable operating history, the ability to expand, and the environmental benefits that result when WTE output are used to displace power that would otherwise be generated by fuels such as oil or coal.

A main disadvantage of this technology is that the upfront money necessary to construct a mass burn WTE facility is considerable, and it may take several years before the economic benefits are realized. According to the EPA, a small new plant typically requires at least 100 million dollars to construct (EPA 2017b).

Refuse-Derived-Fuel. Reduced-Derived Fuel (RDF) facilities include front-end pre-processing to recover materials and produce a fuel that is sent to a combustion unit to generate electricity and/or steam. The H-Power facility in Honolulu is a good example of this type of technology.

Compared to mass burn WTE facilities, RDF facilities can result in increased recovery of recyclable materials. On the other hand, the pre-processing requirements add complexity to the system and there are more types of materials that cannot be burned in an RDF plant than in a WTE facility. In part because of these distinctions, RDF plants are somewhat less popular than WTE facilities. However, the cost, reliability, and performance of this technology is relatively like that of mass-burn facilities.

Gasification. Gasification facilities differ from mass-burn and RDF plants because they focus on creating a synthetic gas that can be used to produce energy, and the gasification process uses very limited amounts of oxygen. Materials are first shredded and or sorted to ensure consistent sizing, and then are fed into a gasification chamber. The gasification process heats materials to very high temperatures (1,650ºF to 2,200ºF) where chemical reactions take place to form a synthetic gas from the organic fraction of the materials and a glass-like slag from the inorganic fraction. Some systems reclaim recyclables prior to gasification, or control the chemical process in order to produce usable products from the inorganic fraction after the gasification step. After cleaning, the gas can be burned directly in an internal combustion engine or turbine, or used to create a synthetic fuel. The gas is usually used to generate electricity or as a vehicle fuel. The process used to create the gas typically uses only enough oxygen to produce the desired temperatures.

This technology has some key advantages compared to typical WTE facilities including:

- A variety of process features provide opportunities for fewer air emissions.
- The syngas created is potentially more efficient than direct combustion of MSW because it can be combusted at higher temperatures or even in fuel cells.
- The technology appears to scale down to smaller sizes more efficiently than WTE facilities, potentially making it more applicable to smaller communities working toward a goal of zero waste.

Some disadvantages of this technology include:

- Service intervals are typically on the order of a few months for the plants, requiring frequent plant shutdowns to maintain and clean the reactor.
- Lack of successful commercial demonstration in the United States (few examples worldwide) and related uncertainties surrounding the cost and long-term effectiveness of the technology.

- Environmental permitting regulations are unclear or nonexistent.
- Public education is needed to overcome negative perceptions of thermal technologies.

Pyrolysis. Pyrolysis refers to the chemical decomposition of a substance by heating in the absence of oxygen. Pyrolysis typically occurs at temperatures ranging from 750ºF to 1,650ºF. The composition of the pyrolytic product is changed by the temperature, speed of process, and rate of heat transfer. Lower pyrolysis temperatures usually produce more liquid products and higher temperatures produce more gases. Pyrolysis is used frequently in the chemical industry, for example, to produce charcoal, activated carbon, methanol and other chemicals from wood, and to produce coke from coal. For MSW, pre-processing steps are required that include separation and screening to remove contaminants, shredding to reduce particle size, magnetic separation to remove conductors, classifying to refine, drying to increase the calorific value, and (in some systems) pelletizing to obtain homogeneity.

The products resulting from the pyrolysis process are a synthetic gas and/or liquid and a char. The gas is burned in a secondary combustion chamber, then is typically passed through a boiler for heat recovery. Although some oxygen may be used for combustion of the gas to destroy organics, the combustion takes place in a gaseous phase requiring much less oxygen than incineration. This results in the formation of much less nitrous oxide and soot from the power generation process.

There were many attempts in the United States to scale up this technology from pilot scale demonstration plants during the 1970s and 1980s, and none of the plants were able to overcome challenges associated with maintaining a sealed chamber to keep air out, adjusting the process to match the variability of the MSW inputs, and competition with landfills and WTE facilities. Recently, interest in this technology has increased; however, it remains to be seen if it will become commercially viable in the United States.

The advantages and disadvantages cited above for gasification also generally apply to pyrolysis, with various advantages and disadvantages associated with specific processes and vendors.

Plasma Arc. Plasma arc technology, developed for use in the metals industry in the late 1900s, uses intense heat (over 7,000ºF) to break down feedstocks into elemental byproducts. Plasma is a collection of free-moving electrons and ions that is typically formed by applying a large voltage across a gas volume at reduced or atmospheric pressures.

MSW is fed through this gas, changing the organic fraction into elemental compounds such as hydrogen, oxygen and carbon, and the inorganic fraction into a glass-like vitrified mass that is claimed to be highly resistant to leaching.

An estimated 22 plasma arc waste processing facilities exist around the world, notably in Japan, France, and by the United States Navy (Circeo 2009).

The advantages and disadvantages of this technology are like those of pyrolysis and gasification. One additional advantage of this system compared to the others is the more complete breakdown of

materials has the potential to result in the lowest possible percent of residuals sent to landfill. One drawback of the technology is the high electric power requirements for the torches, which may make it more difficult to obtain net energy benefits from this technology. To address this, some developers are using the plasma arc after an initial gasification step.

9.5.2.2 Mechanical-Biological Treatment

Mechanical-Biological Treatment (MBT) describes the integration of processes normally found in material recycling facilities (MRFs), RDF (refuse-derived-fuel), plants, and composting plants. A key feature of the process is using the activity of microorganisms to create a stabilized output. This can be accomplished either in the presence of oxygen (aerobically; that is, composting) or in the absence of oxygen (anaerobic digestion). The output of the process is typically either stabilized organic matter (compost or landfill cover), biogas (for fuel), or drying (for producing a refuse-derived-fuel).

Like thermal technologies, there are many different MBT processes, systems, and vendors. In 2017, Europe had an estimated 570 active MBT facilities in 2017 resulting in the diversion of 55 million tons of residual waste (O'Brien 2017). The operation of these facilities can further zero waste endeavors. Mixed municipal solid waste (MMSW) composting is a type of MBT facility that has been tried by various jurisdictions in the United States.

While MMSW composting is a type of MBT, these "first generation" plants developed in the 1980s and 1990s usually consisted of just an initial shredding and/or biological drum treatment and aerobic composting. There are numerous examples of failed MMSW composting operations resulting from high costs, ongoing equipment breakdowns, odor concerns, and/or an inability to market the compost end-products. Many of the new European MBT plants are more sophisticated than first generation MMSW composting plants, and United States composters are continually modifying and optimizing systems; however, there are challenges that must still be overcome. Examples of challenges with this technology include the Pine Top, Arizona, MBT plant, which was converted from accepting MSW to accepting only source separated organics, because of equipment maintenance issues and the challenge of finding markets for the compost it produced. The largest MBT plant in North America, in Edmonton, Alberta, has faced challenges related to equipment failures and maintenance, and the City is considering modifications to its current process to produce an RDF product, or other alternatives to improve the economics of the plant. However, the feasibility of this option is improving, in 2017 the first functioning MBT facility in the United States was opened in West Virginia. The end-product will be used as a clean-burning alternative to coal (Recycling Production News 2016).

Recent experience with European MBT plants has resulted in many similar technical problems initially, with low throughput capacity caused by machine overload or breakdown and higher operational costs than expected due to high maintenance and service requirements. There have also been challenges during mechanical separation. Many of the problems encountered at European plants have been solved, and nearly all of the European facilities are running at their expected capacities, and in some facilities, this has resulted in significantly higher than anticipated operation costs. One common weak point at MBT facilities is the final biological treatment process, which is often designed like a composting process. Managing odors and meeting material specifications is an ongoing process that requires constant attention.

All MBT processes involve waste input and control, mechanical preparation, biological and/or thermal treatment, and product conditioning. Waste input and control normally consists of manually removing oversized and hazardous materials. Mechanical processing can include minimal separation or shredding, or sophisticated sorting of the inbound waste into biodegradable material, recyclables, and contaminant streams. Sorting is usually done with dry processes, and it can also involve wet processes, such as

flotation and hydro-pulping. Depending on the quality and market demand, the recyclables are typically sold. Paper fibers, textiles, rubber, plastics, and residual organics can be used as RDF.

The biological stage of the MBT process can either be aerobic composting or anaerobic digestion. The outputs of this process can be either a synthetic gas, RDF, or compost. The quality of the compost will depend on the specific process used and the ability to separate metals, plastics, glass fragments, and toxic materials from the organic fraction. However, in general, the compost produced from an MBT process is of lower quality than compost produced from source-separated organic material such as green waste or food waste. Some plants produce multiple types of compost and target products for specific applications such as agricultural use, site remediation, or landfill cover. Some processes result in large quantities of residuals (up to 50 percent) that must be landfilled.

Like the thermal recovery options, there are many different processes and systems used in MBT plants. For the purposes of this Plan update, MBT systems are classified into three groups:

- Biological treatment with RDF for combustion.
- Biological treatment with composting.
- Anaerobic digestion.

A brief overview of each type of MBT system follows.

Biological treatment with RDF for combustion. A popular approach in Europe is to do relatively little up-front sorting, and use the heat released from aerobic breakdown of organics to dry the materials. Metals and inert materials are then removed, and paper fibers and plastics are made into RDF. The value of this fuel is relatively high and can be used as a substitute for fossil fuels in a wide range of applications, including power stations and vehicle fuel. The process also produces composted material that can be landfilled. Through this process, a 65 to 90 percent diversion rate may be achieved (Arsova 2015).

Biological treatment with composting. In this process, relatively little mechanical pre-processing is done upfront and materials are fed into a long, rotating drum (made by companies like Bedminster and Dano) where the MSW is processed for 1 to 4 days. The combination of the mechanical rotation and the beginning of the biological degradation of the organic material allow a reduction of the organic fraction size and good mechanical separation of the organics from physical contaminants. At the end of the process, the organics are sent to composting. The inorganic fraction is either sent directly to a landfill or sorted further to recover recyclables depending on whether markets exist for the sorted materials. This process achieves a 50 percent diversion rate and does not produce biogas, rendering energy recovery inplausible (Arsova 2015).

Anaerobic digestion. Anaerobic digestion uses anaerobic bacteria to break down material without oxygen. This technology is well established for treating outputs from wastewater treatment plants, dairy farms, and other sources of relatively homogenous organic material. It is now beginning to be applied to source-separated organics and MSW.

To treat MSW using anaerobic digestion, organics must be separated from inorganics and prepared into a slurry appropriate for the digesters. This separation process has proved to be challenging at many facilities processing MSW and organics. Various technologies exist for

the initial separation process that use water, screens, magnets, separators, and shredders in various combinations.

During the digestion process, about two-thirds of the biodegradable organic matter is transformed into a biogas composed mainly of methane and carbon dioxide. The remaining one-third comes out of the process as a digestate that must be treated using an aerobic curing phase (composting) to stabilize it prior to landfilling. Anaerobic digestion systems for MSW treatment are limited in the United States, which may be due in part to the relatively low cost of fossil fuels in the United States in comparison to Europe, where anaerobic digestion technology is more widely used due to high fossil fuel prices, high tipping fees, and government incentives (Edwards et al. 2016). [European Union Directive requires union members to reduce landfilled organics by 65 percent by 2020 (Rogoff et al. 2014).]

According to a study performed in 2014, many factors come into play regarding the viability of an anaerobic digestion system as a large-scale MSW disposal option in the United States, including the need for:

- Significant centralized source of high-quality organic waste.
- High energy costs (higher revenue for facility).
- Limited land for siting a compost facility.
- Lack of conventional WTE facilities.
- Markets for residual (compost) or an outright ban on organics in landfills (Rogoff et al. 2014).

It has also been reported that aerobic composting MBT systems (e.g., biological treatment with RDF for combustion) are likely to cost 30 percent less than anaerobic digestion treatment systems for both low and high capacity systems (Arsova 2015). Additional costs may include landfilling of unmarketable residual waste, daily operation, and maintenance fees.

In 2017, the EPA developed a co-digestion economic analysis tool 'CoEAT' that helps users (e.g., municipal managers) quantify the cost to benefit analysis of processing organics including parameters such as:

- Fixed and recurring costs.
- Solid waste diversion savings.
- Capital investments.
- Biogas production and energy savings.

In recognizing the need to better understand anaerobic digestion facilities, the EPA is also conducting a study that collects data from operators of anaerobic digestion facilities for 3 years (data collection began in 2015). To date, they have published survey results from three types of systems: stand-alone food waste digesters (multi-source and industry-dedicated), on-farm digesters that co-digest food waste, and digesters at water resource recovery facilities that co-digest food waste. The survey establishes the number of anaerobic facilities processing in the United States and their locations, and their processing amounts and available capacity. Other information gathered includes non-food waste processed, feedstock types and sources, tipping fees, pre-processing and de-packaging processes, operational specification, and biogas production. At the time of the survey, none of the three systems surveyed is in operation in the State of Hawai'i. The final reporting of EPA's anaerobic digestion study findings is expected to conclude in 2019 or 2020 (EPA 2018f).

9.6 Recovery and Treatment Options for the County of Hawai'i

It is important to note than no currently known recovery or treatment technology will remove 100 percent of residuals from the municipal waste stream: thus, for the foreseeable future, landfill capacity will be required for residuals generated in the County. As the expansion of the SHSL is no longer viable, the County has at least two other landfill disposal options: trucking East Hawai'i residuals to the WHSL at Pu`uanahulu, or barging residuals to another Hawai'ian island, or to the mainland. As previously described, the County will begin re-routing MSW to the WHSL in 2019. A recovery and treatment facility could play an important role in decreasing the volume of solid waste landfilled at the WHSL.

A new recovery and treatment facility will likely cost considerably more than the cost of trucking East Hawai'i waste to the WHSL. Thus, a central question to evaluate when assessing whether to develop a recovery and treatment option is:

Do the environmental benefits of these facilities outweigh their additional cost?

The following recovery and treatment options for consideration are discussed below.

R-1 Study Recovery and Treatment Technology

R-2 WTE Facility for all County Residuals; Ash and Bypass Materials to WHSL

R-3 One or More Modular WTE Facilities in Rural Areas; Ash and Bypass Waste to WHSL

R-4 Develop MBT Facilities at the SHSL and/or WHSL Sites

9.6.1.1 R-1 No Action; Study Recovery and Treatment Technology

In this option, the County would take no immediate action toward developing a new recovery or treatment project. The County would instead assess the change in volume of residuals after the proposed organic composting facility in Hilo is fully operational (slated to accept food waste and other compostable materials beyond yard waste in 2020). Further, the County would engage in a dialogue with other Hawai'i counties about the potential for joint solutions. For example, the County may consider shipping materials that were formerly recyclable (e.g., #5 plastics) to the H-Power facility in Honolulu if determined economically cost effective (i.e., cost savings, cost neutral) and through close coordination and negotiations with the City and County of Honolulu. If deemed necessary, these efforts could be followed by a study that emphasizes the identification of appropriate recovery and treatment technology sizing options for the County.

Advantages	Disadvantages
Reduces the risk of unsuitable sizing of recovery and treatment technology	Continued reliance on landfilling as the County's singular residuals management for a few more years.
Reduces the risks associated with being at the leading edge of a new technology, such as technology failure or unexpected cost increases.	

Cost Considerations. The cost would be nominal since the County would only investigate recovery and treatment options if it is determined that the proposed compost facility and/or the possibility of shipping waste to the H-Power Plant in Honolulu would not markedly increase the quantity of waste diverted from WHSL.

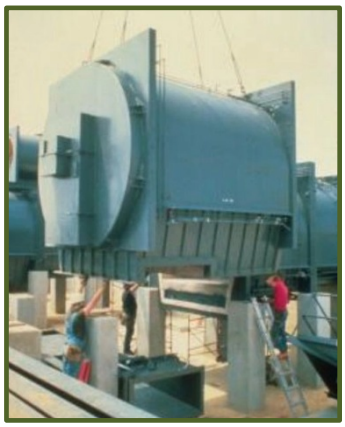
9.6.1.2 R-2 WTE Facility for all County Residuals; Ash and Bypass Materials to WHSL

In this option, a new procurement would be conducted by the County seeking to develop a large WTE facility that could accept residuals from the entire County. This would require a siting study to determine where it would be located; typically, the closer such a plant is located to the primary population and employment centers in West Hawai'i, the lower the associated operating costs.

Advantages	Disadvantages
Reliable, long-term recovery technology	Considerably higher cost than landfill
Environmental benefits, including reduced greenhouse gas emissions from displacing electricity from oil-fired combustion units and additional recycling of metals	The facility would provide a disincentive for aggressive additional waste reduction and recycling, which goes against zero waste principles
Preservation of land, and landfill capacity	Emissions and costs associated with trucking rubbish to the plant
Reduced potential for water quality impacts from landfilling unstabilized residuals, and reduced volatile organic compound emissions	WTE facilities burn waste resources that can be recycled or composted in a well-integrated system
Economies of scale of a larger facility would result in lower costs than a smaller facility	

Cost Considerations. The cost of large WTE would probably be less than smaller facilities due to economies of scale. This cost savings, however, could potentially be offset by the cost of transferring and trucking waste materials to the facility.

9.6.1.3 R-3 Modular Incinerators in Rural Areas; Ash and Bypass Waste to WHSL



Much of the County is rural in character, and the County incurs considerable cost transporting residuals from its recycling and transfer stations to the landfill. One option to consider would be to procure and develop one or more small, modular incinerators in rural areas. This would dramatically reduce transportation costs and has the potential to be a cost-effective recovery system that could be located at one or more of the County recycling and transfer stations.

While there are relatively few such units used to process MSW in the mainland, there are more than 1,000 modular incinerators serving rural areas, military facilities, and hospitals around the world. These facilities can be good recovery systems for smaller, remote locations. These systems generally cost less in installed cost per ton-day than larger, mass burn WTE facilities; however, they do not have the longevity of those facilities and can cost more to operate on a per-ton basis.

In this type of system, MSW is loaded into a surge chamber using a rubber tire bucket loader. The door that seals the lower chamber is then opened and waste is injected into the combustion chamber. Additional waste can be loaded into the surge chamber after the lower chamber door is closed. It is assumed that the unloading floor would accommodate two unloading stalls plus some room for separated bulky waste that would need to be transferred separately in transfer trailers or drop boxes to a County landfill.

The lower chamber operates at about 1,850°F, while the upper chamber operates at about 1,450°F for reducing air pollution emissions. There is no grate in this unit. Air is applied at a rate that is less than necessary to complete combustion resulting in essentially a gasification or pyrolysis process. The partial combustion products pass into an afterburning secondary chamber that will ensure successful burn out of particulate combustion gases. Air is supplied by outside blowers to provide correct combustion for a given application to meet local emission standards. Controlling the lower chamber gas velocity is important in this process to maintain a quiet combustion area. Ash is removed using a roll off box that when filled can be transported to the landfill.

These systems can be used to recover steam and/or generate electricity. Successful electricity generation depends on access to existing electric system infrastructure and a power utility that is a willing partner.

For the purposes of sizing and developing cost estimates, this option assumes the following:

- The facility would be located at the Wai`ōhinu Recycling and Transfer Station, which would accept waste from other surrounding recycling and transfer stations.
- The waste stream assessment forecast in 2009 estimated that 18 tons would go to the facility on an average day (assuming the recycling rate at that time). Thus, a 20-ton-per-day unit would provide adequate capacity for peak flows; yet, it would not be oversized if significantly more waste is reduced or recycled.
- The facility would be staffed by two to three County employees each day. A front-end loader would be needed to separate bulky materials and load residuals into the unit.
- Improvements to the recycling and transfer station would be required including a small (10,000 square feet) building with a tip floor and a bulky waste load out chute. This could be integrated with planned improvements to the Wai`ōhinu Recycling and Transfer Station.
- About 10 percent of the residuals received would be bulky wastes not appropriate for incineration—these would be transferred to the WHSL.
- Thirty to 35 percent of the incoming material by weight would need to be transported to the WHSL as ash.

Advantages	Disadvantages
Reduction of about 20 percent of total system transfer truck miles and reduced landfilling of organics would result in less air pollution and greenhouse gas emissions	While the system should be able to meet EPA air quality requirements, some air pollutants would result from the incineration process
Potential for additional metal recovery for recycling after combustion	Likely community opposition
	Capital and operating costs are uncertain at this stage–would need an RFP process to confirm
	A new technology and system would require additional training and skills for County staff

Cost Considerations**.** It is estimated that this option will have a range in cost and will be highly influenced by site specific considerations, particularly installation of the unit in a relatively remote area. Additional research and/or RFP process would be required to refine this estimate much further.

This estimate includes capital and operating costs minus transportation cost savings. In 2020, it is estimated that this facility would eliminate about 20 percent of the miles currently driven by the County's recycling and transfer station trailer fleet.

Costs associated with landfilling will be substantially decreased.

It is assumed that the project would be combined with a reconstruction of the Wai`ōhinu Recycling and Transfer Station.

It is possible that electricity sales could be profitable for this facility, and considering its remote location, it would be safe to assume no cost for the equipment necessary to generate electricity and no revenues from energy sales.

9.6.1.4 R-4 Develop Mechanical Biological Treatment (MBT) Facilities at the WHSL Site

As discussed above, there are a handful of Mechanical Biological Treatment (MBT) facilities operating in the United States and numerous facilities operating elsewhere in the world. While MBT facilities are not as "proven" as WTE or RDF facilities, there is enough operating history for the County to consider developing one or more MBT facilities. It would be prudent for the County to consider initially developing a facility for East Hawai'i because there will be fewer residuals received at the EHRSS compared to WHSL and these materials would not have to be transported.

This option would require additional study, and an RFP process. Through that process, the County could decide on the desired outputs from the process (RDF, biogas, compost), assess markets for recovered materials, and evaluate the implications for landfill operating practices. It is possible that the facility could be developed at the SHSL site, potentially making use of the reload facility in some capacity.

Advantages	Disadvantages
Reduced greenhouse gas emissions	Much higher cost than landfilling
Reduced potential for water and air pollution from landfilling	Higher risk of system failure leading to higher than anticipated costs compared to WTE or landfill disposal options
Additional recovery of materials not reused or recycled prior to reaching the plant	Systems have many moving parts and will require specialized operating expertise, sound preventive maintenance, and vigilant on-going odor management practices
Beneficial use of materials not otherwise recovered such as electricity, vehicle fuels, compost, landfill cover	
Preservation of current landfill capacity and reduced need for additional land for landfill activities	

Cost Considerations**.** This option would have a wide range in costs. These costs would be influenced by multiple different types of MBT systems currently available, wide ranges in the reported cost of these systems, and challenges in translating those costs to the County. The results of a conceptual design of two MBT facilities (one for East Hawai'i and one for West Hawai'i) would also have an associated cost. In general, lower cost systems:

- Achieve lower material recovery.
- Send more residual materials to landfills.
- Are in rural areas so that odor controls are less critical.
- Produce residual materials that must be landfilled.

9.7 Landfill Disposal Options

The County's progress toward waste reduction and any decision on whether to implement a recovery or treatment option will not eliminate the need for landfill capacity for the foreseeable future. At planned recycling rates, and taking into account the 2019 closure of SHSL, WHSL has approximately 100 years of remaining life (2119). As more materials are reused or recycled, or if a recovery facility is developed, the capacity of WHSL will be extended.

The following two landfill disposal options address both short-term and long-term considerations.

9.7.1 Improve Existing Infrastructure and Operations

Because the WHSL will receive East Hawai'i's waste upon the closure of the SHSL, another option includes improving the operation and monitoring of WHSL. The public has various concerns related to environmental degradation, odor, and impacts to the tourism industry; some of these issues can be resolved through the implementation of innovative technology at the landfill. Potential improvements are described below.

9.7.1.1 Update Infrastructure at the WHSL and EHRSS

The County will continue to conduct periodic evaluations as needed to improve facility operations and efficiencies at WHSL and EHRSS in response to changes in flow patterns and increased volume. Activities could include:

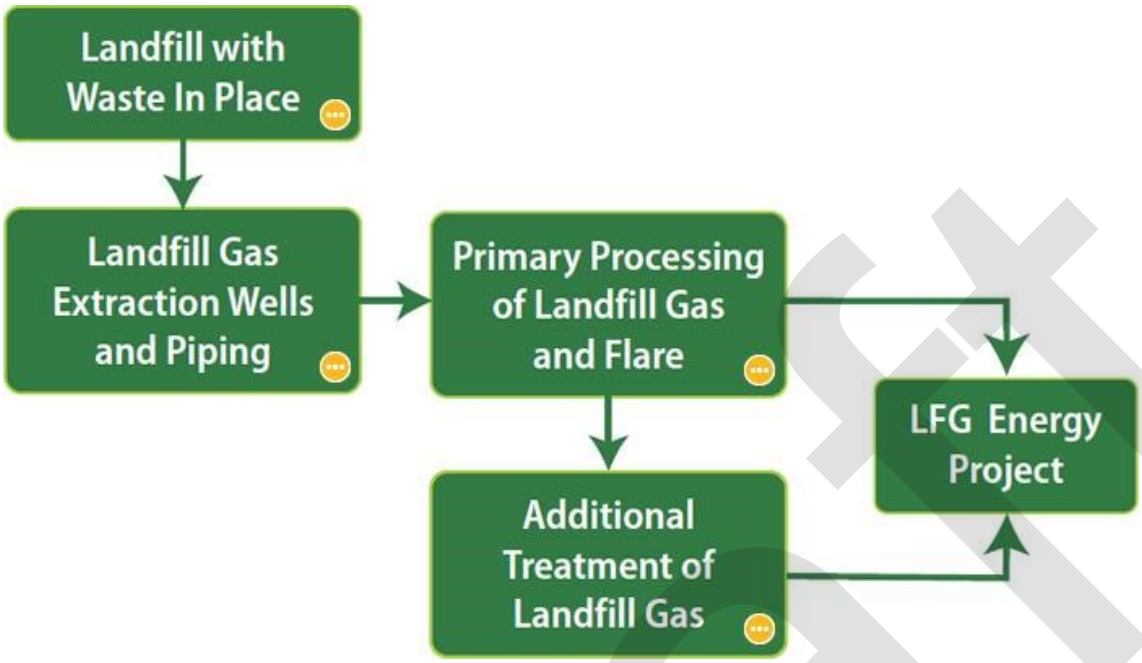
- Integrate compaction into the floor space of the EHRSS.
- Reconfigure circulation, scalehouse location, and other facilities at WHSL to handle the additional residuals.

Cost Considerations. The County SWD already has funding allocated via the County Capital Improvements Program for EHRSS facility upgrades.

9.7.1.2 Landfill Gas to Energy

Once landfilled, waste undergoes anaerobic digestion, wherein microorganisms break down organic matter and release products such as carbon dioxide and methane (Exhibit 9-5). Landfills constituted 14.1 percent of United States methane emissions in 2016 (EPA 2018g). Methane is approximately 28 to 37 times more potent as a greenhouse gas than carbon dioxide (EPA 2017a). This gas may be collected, compressed, and isolated (Silva dos Santos et al. 2018). Once isolated, methane may be used to run gas turbines and fuel cells as an energy source (California Energy Commission 2018) or as compressed gas for services vehicles.

Exhibit 9-5. Landfill Gas to Energy Schematic



Source: EPA (2018f)

The collection and conversion of methane not only will mitigate the greenhouse gas emissions, it will also decrease odors from the landfill. The volume of methane may be tripled through the addition of water to a landfill through an acceleration of the decomposition process (FirmaTek 2017), leading to increased energy generation as well. The County already collects landfill gas at WHSL. Instead of combusting the methane in a flare, this gas could be converted to energy, an effective, environmentally friendly means of recovering the resource.

Cost Considerations. As the landfill owner, the County could receive revenue from the sale of electricity generated from the landfill gas and could possibly be eligible for revenue from renewable energy and tax credits and other incentives. These potential revenue sources could help offset capital costs.

9.7.1.3 Odor Control

In addition to landfill gas, odors from landfills are often generated from leachate. Leachate contains relatively high concentrations of organic matter, sulfur-based compounds, heavy metals, and chlorinated salts (Berihum 2017) resulting in odorous compounds. Because of its generally low pH, leachate often contains high concentrations of acidic odor-causing compounds (Goldstein 2005 et al.).

Although odors are not an issue at this time, if they are in the future due to changed surrounding land uses or increased volume of residuals, landfill odors may be managed in various forms:

- Water-Soluble Misting: Liquid or solid waste can be treated through the application of mists containing antibacterial disinfecting compounds (Berihum 2017). For instance, Odor Management Industries has developed a product called Ecosorb that uses a non-hazardous mixture of plant-based material, surfactant, and water to absorb odor-causing molecules and deodorize the surrounding air (OMI Industries 2017).
- Enzyme Protein Misting: When odor molecules contact enzyme/protein solutions, a chemical reaction occurs, changing the odor-causing chemical's molecular structure and eliminating the odor-causing scent (Peter 2014). These enzymes may also be applied through a mister.

- Lime: The application of lime to leachate, animal waste, and sludge solidifies waste and can reduce odor from acidic compounds (Goldstein 2005 et al.).

Cost Considerations. Cost of alternative odor control mechanisms varies depending on the desired application, and would be assessed if there is a future need–the current system of combusting methane is effective in reducing odors at this time.

9.7.2 Construct a Construction and Demolition Landfill with a Sorting and Reuse Area

As defined in Hawai'i Administrative rules 11-58.01-03: "Construction and demolition waste" means solid waste, largely inert waste, resulting from the demolition or razing of buildings, of roads, or other structures, such as concrete, rock, brick, bituminous concrete, wood, and masonry, composition roofing and roofing paper, steel, plaster, and minor amounts of other metals, such as copper. Construction and demolition waste do not include cleanup materials contaminated with hazardous substances, friable asbestos, waste paints, solvents, sealers, adhesives, or similar materials.

Construction and demolition (C&D) waste commonly contains inert materials including cement, concrete, bricks, wood, and ceramics. These materials may be recycled and used as aggregates for embankments, layers of foundation, road foundations, and asphalt (Mei et al. 2014). Materials of significant market value, such as metals, may be sold to specialized recyclers while other materials such as aggregates and wood may be ground at the C&D facility and sold or used in a beneficial manner (Harler 2014). Developing a specialized C&D landfill with a sorting and reuse area would provide an opportunity to divert materials that would otherwise be landfilled.

This section discusses existing C&D material handling facilities in the State of Hawai'i, mechanisms to increase diversion, management options, and benefits.

9.7.2.1 Existing C&D Material Handling Facilities–State of Hawai'i

The State of Hawai'i currently has one privately owned C&D landfill located on Oahu. The C&D landfill and recycling facility is owned and operated by PVT Land Company. According to the company website, at full capacity, the facility processes up to 1,775 tons and diverts up to 1,420 tons of debris daily for reuse and recycling instead of landfilling the material. Of the 1,755 tons of processed material, approximately 42 tons is metal, 900 tons is feedstock for energy production, and 840 tons includes rock, concrete, and dirt. The remaining unrecyclable material (200 tons) is landfilled. The feedstock is stockpiled for eventual use in a gasification facility. At the time of this Plan, PVT Land Company is preparing to relocate their operations to 179 undeveloped acres across the road from the existing operations. The new facility would be expanded to include two materials recovery and processing lines as well as the installation of an enclosed gasification unit and photovoltaic panels to power operations. The project is currently in the planning and environmental approval phase, and will require a Special Use Permit because the proposed activity is not consistent with the zoning of the site (State Land Use Agricultural District) (PVT Land Company 2019).

Although not a C&D landfill, Hawai'i Materials Recycling in Maui accepts concrete, concrete block, asphalt, rock, dirt, and sand. The facility is sited so that it can use reclaimed water from the island's wastewater treatment plant.

9.7.2.2 Diversion Mechanisms

For an effective program, the County would need to consider methods to maximize the diversion rates of C&D waste. These methods are discussed in Chapter 3, Section 3.5.3. The options include building

permit requirements, establishing mandates to prevent certain materials from disposal at the landfill, or setting specific recycling rates for C&D. As discussed in Chapter 4, Section 4.5.1, the County could explore opportunities to develop an Eco-Industrial Park that includes clusters of complementary businesses (e.g., organics, building deconstruction, salvage, reuse, and repair) through favorable zoning ordinances and/or tax relief in conjunction with the C&D landfill.

In the City of Seattle, new construction, remodeling, and demolition activities are banned from disposing of asphalt paving, bricks, and concrete; metal; cardboard; new construction gypsum scrap; and unpainted and untreated wood. In 2020, the City of Seattle plans to add carpet, plastic film wrap, and tear-off asphalt shingles to the banned items list. The program is implemented by first requiring projects with work areas greater than 750 square feet to develop a waste diversion plan as a component of building permit applications. To demonstrate compliance, the City requires all demolition projects and new construction and remodeling (that entail demolition) that receive a building permit to submit an electronic waste diversion report within 60 days of final inspection. The success of the program is highly contingent on a robust network of Seattle-certified salvage and source-separated recyclers, including mixed-waste recyclers and disposal facilities (City of Seattle 2019).

9.7.2.3 Management Options

With C&D representing a significant proportion of the MSW waste stream, there is an opportunity to divert these materials from disposal and to manage them into productive uses.
C&D can be managed in the following ways.

- Recycled–Material separated for recycling.
- Reused–Materials that have or can be salvaged or reused on the same or other construction projects.
- Beneficially Used–Material that is not recyclable or reusable can be used for other purposes, such as unpainted and untreated wood used as feedstock for biomass-mass burners or for groundcover (dog runs), pathways, or temporary roads.
- Disposed–Material permanently placed in a landfill where it could be used as Alternative Daily Cover (ADC) in lieu of dirt or soil to cover landfill garbage.

9.7.2.4 Benefits

The benefits to limiting the disposal of C&D materials include:

- Provides the largest contribution to job, wage, and tax revenue from C&D recycling, followed by ferrous and non-ferrous metals (EPA 2016a).
- Reduces purchase and disposal costs.
- Provides a tax benefit if recovered materials are donated to a qualified 501(c)(3) charity.
- Reduces transportation costs if materials are used on site.
- Reduces environmental impacts associated with the extraction and consumption of virgin resources and production of new materials.
- Conserves landfill space.

Cost Considerations. There would be upfront costs to plan, design, and construct the landfill and sorting and reuse area; however, when in operation the County would charge a tipping fee, and repurposed C&D products would also generate revenue.

9.8 Recommendations

As described previously, the County studied various alternatives to expand the existing SHSL or to find an alternative landfill site in East Hawai'i, and determined several significant constraints would interfere with these efforts. Therefore, trucking and disposal of waste to the existing WHSL is the County's singular residual waste disposal option at the time of Plan development. With a final decision on landfilling, and based on the analyses presented above and discussions with the SWAC, the County plans to implement the following residual management strategies during the next planning period.

1. **Consider recovery and treatment technology (e.g., WTE, pyrolysis) if**: (1) other waste diversion approaches (e.g., proposed compost facility in Hilo, shipping of market-driven unrecyclable materials to the City and County of Honolulu) are cost prohibitive, (2) it can be demonstrated that it is environmentally and economically feasible, and (3) the technology has a verifiable and viable commercial track record (a minimum of 5-years) for handling municipal solid waste.
2. **Investigate the feasibility of a landfill with a sorting and reuse area for construction and demolition materials.**
3. **Update infrastructure at the WHSL and EHRSS.** The County will continue to conduct periodic evaluations as needed to improve facility operations and efficiencies at WHSL and EHRSS in response to changes in flow patterns and increased volume. Activities could include:
   - Integrate compaction into the floor space of the EHRSS.
   - Reconfigure circulation, scalehouse location, and other facilities at WHSL to handle the additional residuals.
4. **Engage in a dialogue with the state/counties about joint solutions** (e.g., Discuss with City and County of Honolulu, the shipping of market-driven unrecyclable materials to their H-Power WTE plant).

10. ADMINISTRATION, FUNDING, AND IMPLEMENTATION

10.1 Introduction

The current solid waste management programs, as discussed in previous sections, are primarily administered and funded through various state grants, property taxes, and tipping fees. Departments within the County of Hawai'i develop their budgets on an annual basis. The budgets and funding are submitted by the mayor's office and approved by the County Council.

This chapter describes current conditions of the existing administration and funding within the County, identifies current issues and concerns, presents options currently under consideration by the County, and provides a recommendation for implementation.

10.2 Review of 2009 Plan Update

Exhibit 10-1 below provides a summary of the recommendations put forth in the 2009 Plan update relative to administration, funding, and implementation, and describes the actions taken to achieve each recommendation.

Exhibit 10-1. Status Update of 2009 Plan Recommendations for Residuals Management

2009 Plan Update Recommendation	Status
Establish Solid Waste Division (SWD) Operating Expenses	Ongoing
Establish Capital Improvement Fund Expenditures	Ongoing
Projection of Solid Waste Fund Revenues and Expenses	Maintained existing funding mechanisms with increased tip fees

10.3 Existing Conditions

The County accounts for revenues and expenses for solid waste management in its solid waste fund. Revenues are received from state and county sources. The state provides grants and subsidizes programs, such as glass recycling, e-waste recycling, and the beverage container deposit program (HI-5). State funding is generally allocated based on County population or County's budgetary requests to the state for program administration. The sources of solid waste funding from the County primarily include revenues transferred from the general fund and revenues from fees associated with solid waste disposal at the landfills. In addition, the County typically finances large capital improvement projects with general obligation (GO) bonds.

Budgets for the solid waste fund and capital improvement program are created on an annual basis and approved after a review process by the mayor's office and the County Council that includes public testimony.

10.3.1 Solid Waste Fund Revenues

Exhibit 10-2 presents FY 2017–18 actual and FY 2018–19 budgeted revenues for the solid waste fund. The main sources of revenue are discussed below.

Exhibit 10-2. Status Update of 2009 Plan Recommendations for Residuals Management Solid Waste Fund Revenue

Revenue Category	FY 2017–18 Actual	FY 2018–19 Budget
Federal Grants		
Total Federal Grants	5,267	0.00
State Grants		
Glass Recycling Program	35,751	111,876
E-Waste Recycling	45,000	160,000
Beverage Container Deposit Program	300,013	452,153
Lava 2018–State	1,756	0.00
Solid Waste		
Landfill Tipping Fees	11,415,595	11,600,000
Landfill Permit Fees	18,230	20,000
General Fund		
General Fund Balance (Previous Year)	0.00	4,385,252
Transfer from General Fund	19,483,277	19,281,770
Miscellaneous Revenue		
Charges for Services–General Government	0.00	0.00
Sale of Equipment	12,965	0.00
Sundry Revenues–Current Year	1,767	0.00
Sundry Revenues–Prior Year	6,629	0.00
Certified Redemption Center	204,625	226,104
Total Solid Waste Fund	**$31,530,874**	**$36,237,155**

Note: Figures have not been finalized by the County and are pending approval.

A summary of the funding methods used in FY 2017–18 and projected for FY 2018–19 is shown in Exhibit 10-3.

Exhibit 10-3. Solid Waste Fund Revenue Summary, Percent of Total

	Percent of Total	
	FY 2017–18 Actual	FY 2018–19 Budget
General Fund	62%	53%
Tip Fees	36%	32%
Other	2%	15%
Total	100%	100%

10.3.1.1 State Programs

Glass Recycling. The glass recycling program consists of glass containers not included in the state Beverage Container Deposit Program. The program is administered through the state and is subsidized with an advance disposal fee (ADF), currently at 1.5 cents per container. The state allocates funds from this program to the counties based on the population size of each island and distributes these funds on a quarterly basis.

Beverage Container Deposit Program (HI-5). The Beverage Container Deposit Program is a state-administered program, which places a 5¢ redeemable deposit on each beverage container, as defined under law. Consumers may then return the container to redeem their 5¢ at any redemption center. A 1¢ non-refundable container fee is assessed to support the costs of recycling and program administration. Any funds that are not redeemed by consumers may be distributed to County-based programs. The County submits a list of requests to the state on annual basis, outlining budgetary needs for HI-5 projects and program administration.

Electronic Device and Television Recycling Law. The Electronic Device and Television Recycling Law (Chapter 339D-7.5) reinforces product stewardship by requiring manufacturers of electronics to run recycling programs to comply with local government regulations. Manufacturers of covered electronic devices (CEDs) sold in the state of Hawai'i must register with HDOH and pay an annual registration fee of $5,000 and must set up recycling plans. Television manufacturers must follow the same protocol except for the fee, which is $2,500 annually. Any manufacturer that sells both CEDs and covered televisions (CTVs) are required to pay a combined $7,500 in annual registration fees. The state allocates funds from this program to the counties based on the population size of each island and distributes these funds on a quarterly basis. According to HDOH, these programs have been scaled back because of budget constraints (HDOH 2015).

The State Revolving Fund (SRF) program. The SRF program assists local governments in the financing the construction of water pollution control projects necessary to prevent contamination of our groundwater and coastal water resources and to protect and promote the health, safety and welfare of the citizens through awarding of low interest loans. Since the 2009 Plan, the County has benefited from the SRF to finance stormwater-related projects at their recycling and transfer stations.

The County may request additional funds during the year for more redemption centers, shelters, bins, or public awareness programs.

10.3.1.2 County Programs

Landfill Tipping Fees and Permit Fees. The County generates revenue from solid waste disposal through landfill tipping fees and permit fees. In 2018 non-residential customers paid $108 per ton of solid waste to the landfill, and for customers that dispose of waste on a routine basis, a $25 one-time annual fee is assessed for account setup and administration costs. Businesses, agencies, farms, and non-profits are subject to a $27.00 per ton tip fee for source-separated green waste.

Customers may also pay special handling fees on non-routine disposal of solid wastes that require additional personnel or costs for disposal (i.e., solid waste that requires special storage, handling, or disposal practices such as asbestos or petroleum-contaminated soil).

Transfers from the General Fund. The primary revenue source for County solid waste programs is transfers from the General Fund. Property taxes account for the largest portion of the General Fund. Other fund sources include hotel/tourism taxes, public service company taxes, interest on invested funds, and any carryover of the General Fund balance from the prior year. Each County department

forecasts its budgetary needs for the year, and the Mayor's office and County Council approve the budgets pending a review process.

10.3.1.3 Other Programs

Abandoned Vehicle Program. The abandoned vehicle program is funded directly from a portion of the vehicle registration fee. The program receives $25 per registered vehicle to pay for program administration, towing companies, and scrap metal vendors.

Residential Hauler Credit. Vendors that charge a fee for residential waste pickup may qualify for a residential hauler credit. To qualify, the vendor must have a physical address of each customer. The annual credit to the vendor is determined by the annual number of single-family accounts multiplied by a factor of 1.5 (tons per year per customer) multiplied by the landfill tipping fee (e.g., $108/ton).

10.3.2 Solid Waste Fund Expenses

FY 2017–18 (actual) and FY 2018–19 (budgeted) expenses for the County solid waste fund are shown in Exhibit 10-4. Expenses have been grouped into categories that reflect the main solid waste functions provided by the County. The expense groupings shown were prepared by an allocation process in which greater than 500 lines of expenditures were assigned to functions using appropriate, available data and professional judgment by County staff.

Exhibit 10-4. Solid Waste Fund Expenses

	FY 2017–18 Actual	FY 2018–19 Budget	Percent of Total	
			FY 17–18	FY 18–19
SWD Operations	13,642,032	15,383,194	43%	43%
West Hawai'i Sanitary Landfill	9,326,825	12,647,456	30%	35%
Recycling Programs	6,570,097	8,046,505	21%	22%
FY 2016–17 Encumbrances	5,416,274	0.00	17%	0%
FY 2017–18 Encumbrances	-3,873,145	0.00	-12%	0%
FY 2017–18 Fund Balance for Future Years	448,790	0.00	1%	0%
Total	$31,530,874.37	36,077,155.00	100%	100%

Note: Totals may not add because of rounding.

As shown, budgeted expenses for FY 2018–19 are higher than FY 2017–18 actuals. Expenses are projected to increase because of inflation, waste stream increases, increased staffing at recycling and transfer stations, tariffs, import bans, and substantial reductions in forecast prices received for recycled materials. Also, due to the 2018 Kilauea Volcano lava event, many properties were devalued, which resulted in the loss of real property tax revenues, the main source of taxes to the general fund. As shown in Exhibits 10-2 and 10-3, the general fund is the primary source of revenue for the management of solid waste in the County.

Exhibit 10-5 provides the SWD's prioritized capital improvement funding request as submitted to the County Council. These improvements have been included in the Capital Improvement Program forecasts

shown later in this section. As shown, the County also made provisions for SHSL closure requirements. Closure and post-closure requirements for the WHSL are the responsibility of the County's contractor.

Exhibit 10-5. Projected Solid Waste Capital Improvements

Project	Prior Funds Allocated	Estimated Cost (in thousands)						
		FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	Total
South Hilo Sanitary Landfill Closure	$678	$20,000	$0	$0	$0	$0	$0	$20,678
Rural Recycling and Transfer Station Reconstruction	$9,874	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$21,874
Closure of Cesspools at Solid Waste Facilities	$100	$1,100	$0	$0	$0	$0	$0	$1,200
East Hawai'i Organics Processing Facility	$100	$10,401	$0	$0	$0	$0	$0	$10,501
Hilo Scrap Metal Site Remediation	$0	$0	$7,000	$0	$0	$0	$0	$7,000
West Hawai'i Materials Recovery System	$0	$0	$500	$0	$0	$0	$0	$500
Replacement of Kona Baseyard Building	$0	$0	$500	$0	$0	$0	$0	$500
Replacement of Hilo Disposal Area	$0	$0	$0	$0	$3,000	$0	$0	$3,000
Replacement of the Kona Disposal Area	$0	$0	$0	$3,000	$0	$0	$0	$3,000
East Hawai'i Regional Sort Station (EHRSS) Reload Facility Upgrades (for future transfer of waste to WHSL)	$0	$0	$0	$700	$0	$0	$0	$700
Ongoing WHSL Gas Collection and Control System	$2,651	$2,000	$0	$0	$0	$2,000	$0	$6,651
Stormwater Improvements for East Hawai'i Transfer Stations	$0	$0	$17,500	$0	$0	$0	$0	$17,500

10.4 Issues and Concerns

As discussed in prior sections, the County is considering several potential changes to the current waste management program. Some of the options currently under consideration could be implemented relatively easily and integrated as part of the County's existing waste management system. Other options will require more significant changes including new infrastructure, new administrative positions within the County, coordination with other County agencies, community outreach, behavioral changes by the public (paradigm shift), and in some cases, will require passage of policies, ordinances, and legislation requiring public and commercial participation.

A central issue for the County is determining the best policies and procedures to fund both existing and new waste management programs and initiatives. Currently, residential customers can deliver waste to County recycling and transfer stations at no charge, while commercial haulers must pay tipping fees at the landfills. As shown in Exhibit 10-4, the FY 2017–18 County general fund provides approximately two-thirds of the revenue used to fund current solid waste expenses (excluding debt financing for major infrastructure). This aligns with the 2009 Plan update. However, general fund transfers supporting solid waste expenses are expected to drop to around 50 percent in FY 2018–19 compared to about 60 percent in FY 2017–18. This is attributable to excess monies from the FY 2017–18 general fund that are expected to carry over to FY 2018–19, and to a lesser extent, an increase in state grant contribution to the glass recycling, e-waste, and beverage container deposit programs.

In FY 2017–18, about 36 percent of the funding was derived from landfill tipping fees, and in FY 2018–19, tipping fees are estimated to contribute closer to 32 percent. Except for a projected lessened reliance on the general fund in FY 2018–19, these percentages are relatively unchanged from those reported in the 2009 Plan update. This indicates that few changes to the overall funding structure have occurred since the last planning effort, although tipping fees have increased from $85 to $108 per ton during the past 5 years. According to Ordinance No. 185 (Appendix F), which amends HCC 20 of the, the landfill charge rate per ton cannot exceed $116 in 2022. Exhibit 10-6 shows a breakdown of the landfill charge rates through 2022 (Ordinance No. 185).

Exhibit 10-6. Landfill Charge Rates 2018-2022

2018	2019	2020	2021	2022
$108	$110	$112	$114	$116

The funding mechanisms, administration, and types of programs and legislation required to implement modifications to the existing waste management program will depend on the options selected for implementation in this Plan update. It is likely that additional regulations will be necessary to successfully implement changes to the County's current program and to encourage changes in the current patterns of waste disposal by both the public and commercial businesses.

Three key issues facing the County that may require legislative changes include:

- Increasing diversion by thinking of waste as a resource and reducing wasteful behavior.
- Minimizing or eliminating illegal dumping.
- Reducing contamination at the recycling and transfer stations and green waste facilities.

In addition to legislation and ordinances, community outreach and education will also be necessary to effect a change in public perception of the issues surrounding waste management, and thereby influence established behavior patterns. As community involvement and concern for waste-related environmental stewardship increase, it is expected that acceptance of additional fees and regulation regarding waste disposal practices will become more widely embraced by the public and commercial sectors.

As part of the Plan update process, the County is evaluating potential options and setting both recommendations for waste management. To successfully expand and adapt the current county-wide waste management program to meet its goals, the County will need to:

- Make decisions regarding the path forward according to the Plan's recommended priorities.
- Take advantage of best practices and lessons learned from other jurisdictions regarding funding and administration mechanisms, and related legal and regulatory requirements.

The County must also consider the potential implications of various existing Federal, State, and County regulations on the implementation of the waste management program.

10.5 Administration and Funding Options

Many of the options being considered in previous chapters of this Plan update would require changes to existing methods of administering and funding programs. Some administration and funding options for consideration follow.

10.5.1 Establishing Solid Waste as an Enterprise Fund

As discussed above, about two-thirds of the County's expenditures for solid waste management are currently funded by the County's general fund which is primarily supported by property taxes. There are some disadvantages associated with the current funding system, including:

- Property tax funding provides no financial incentive for residents to reduce waste.
- Using property taxes to fund solid waste services can be perceived as unfair because property tax collections are not correlated specifically with the types and volumes of waste generated, potentially leading to inequitable subsidization.
- It can be somewhat more challenging to manage solid waste programs based on funding allocation of money from the general fund, because the money in the general fund may be redirected towards other pressing county needs.

Another funding mechanism for solid waste systems costs commonly used in many communities is to establish a self-sustaining enterprise fund. An enterprise fund can be supported primarily by user fees, dedicated taxes, or dedicated property taxes. Some advantages often cited for enterprise funds include:

- Promoting fairness by charging specifically for waste composition and volume disposed.
- Reducing burden on the general fund.
- Requiring more sensitivity to customer's needs.
- Allowing managers more discretion; however, still holding them accountable to customers.
- Running government more like a business.

The main disadvantages cited for enterprise funds is that they can be regressive and place a burden on the poor by increasing the amount they must pay for an essential service like waste management. Enterprise funds also may be more cumbersome to administer (management of financing) and politically unpopular for those with the expectation that solid waste is subsidized through the general fund. Several factors would be considered to establish an enterprise fund system:

- Determine local authority (i.e., Can the County legally charge solid waste management user fees?).
- Gain support from decision makers.
- Decide the appropriate type of user fees to support the enterprise fund.
- Perform full cost accounting to identify and report costs of operation, including the preparation of a long-range budget.
- Educate the public.

10.5.2 Separating Solid Waste Management as a Line Item on Property Taxes

The County could provide additional information to customers about the cost of managing solid waste by adding a separate line item on property tax bills outlining the amount of the tax used to fund solid waste services. A possible breakdown might include the three primary categories of expenses shown in Exhibit 10-3: SWD Operations, West Hawai'i Sanitary Landfill, and Recycling Programs. The addition of a line item on property taxes would be an interim step to educate the public on the breakdown and costs of solid waste management.

10.5.3 Establish PAYT System at County Recycling and Transfer Stations

As discussed in greater detail in Chapter 3, there are several ways that the County could implement a PAYT system at recycling and transfer stations. A PAYT program may be implemented via:

- Charging residents' solid waste by weight through the addition of scales at County recycling and transfer stations while accepting dropoff of recyclable or compostable materials at no charge.
- Charging residents' solid waste by volume where residents pre-purchase tags and/or bags that they would then place their waste in and haul to their nearest recycling and transfer station.
- Charging residents' solid waste by volume being disposed of, while allowing dropoff of recyclable or compostable materials.
- Implementing universal curbside collection of garbage for all households in the County where practical.

Two methods that would minimize staffing requirements at the stations include a "tag" or "bag" system. In a tag system, property owners would be issued tags along with their semi-annual property tax bills that could be used as "currency" for delivering waste, and extra tags could be available for purchase at County offices or retail outlets. Arrangements would need to be made for renters not served by a building collection service.

A bag system would consist of requiring all residents to put waste into a standard type of plastic bag that would be available for purchase at County offices and/or retail outlets.

There would be many implementation challenges associated with this system. An extended phase-in period would be necessary accompanied by an intensive public education program. A PAYT program could be a user fee option integrated into an enterprise funding program (see Section 10.5.1). This program has been shown to work in other jurisdictions on the mainland and in Hawai'i (e.g., Kaua'i).

10.5.4 Modifications to Existing Programs and Practices

The County could consider modifications or improvements to existing programs that may increase revenue instead of changing funding mechanisms (e.g., enterprise fund):

- Seek more non-user-fee funding (e.g., federal grants, opportunities such as SRF).
- Increase recycling rates through improved operations (e.g., public outreach, transfer and recycling station upgrades).
- Determine adequacy of handling fees on non-routine solid wastes (e.g., asbestos, petroleum-contaminated soil).

- Increase participation of the hotel/tourism industry through tax incentives or other mechanisms.
- Determine adequacy of the registration fee for the abandoned vehicle program.
- Reevaluate the residential hauler credit program.
- Regularly review and, when appropriate, renegotiate the WHSL contract.

10.5.5 Illegal Dumping Prevention

Illegal dumping of household and commercial waste can have a variety of potential negative impacts. Hazardous chemicals generated from illegally dumped waste can contaminate groundwater and surface water, potentially affecting both human health and aquatic habitats. Flooding can result from blockage of streams and drainage culverts. Property values can be affected by illegal dumping, economic impacts resulting from costs of clean up can affect County resources, and illegal dumping degrades quality of life –the beauty of the island for residents and visitors. Additional efforts to prevent illegal dumping would be particularly important if the County were to implement a PAYT program or dramatically increase the tipping fee.

This section describes existing regulations at the federal, state, and local level. It also describes illegal dumping prevention measures within the County, issues and concerns, and options to deter illegal dumping that have the potential to bolster the County's existing prevention system.

10.5.5.1 Regulations

At the federal level, Statute 42 United States Code (USC) 6928(d)(2)(B) & (C) of the Criminal Provisions of the Resource Conservation and Recovery Act (RCRA) indicts offenders who knowingly treat, store, or dispose of hazardous waste without a permit with penalties up to 2 years of incarceration and a $50,000 per day in fines.

The County regulates "littering" and the state regulates "illegal dumping." The state defines illegal dumping as the illicit disposal of solid waste that is equal to or greater than 1 cubic yard. The County's litter law does not quantify what is considered litter; therefore, it could be less than or greater than 1 cubic yard.

In accordance with Hawai'i Revised Statutes Chapter 342H (HRS 342H), illegal dumping could be subject to enforcement action and administrative civil penalties up to $10,000 per day. Those who knowingly dispose of solid waste equal to or greater than 1 cubic yard and less than 10 cubic yards are subject to criminal penalties (petty misdemeanor) up to $25,000 per day for each offense. If illegal dumping is equal or exceeds 10 cubic yards, it is considered a class C felony and potentially subject to $50,000 for each separate offense. If illegal dumping is suspected, a complaint can be filed with the State Department of Health, Solid and Hazardous Waste Branch, State Department of Attorney General Investigations Office, District Health Office located in Hilo, or Hawai'i County Police Department (HCPD).

The current County of Hawai'i code (HCC 20-8) contains provisions that prohibit littering. In the past five years, revisions such as Ordinance 12-1, aimed at reducing plastic bag littering and pollution, have been enacted to further reduce contamination. These provisions cover the materials commonly encountered in the municipal waste stream and prohibit discarding or disposing of these materials on either public or private property. Violators may be fined up to $1,000 and/or not more than 200 hours of community service for each offense. Cost recovery for cleanup is also allowed under the current County code.

10.5.5.2 Countywide Illegal Dumping Prevention

The County's HawaiiZeroWaste.org website provides a wealth of information related to illegal dumping including:

- A link to "Trash Free Hawai'i" website, an initiative by the State of Hawaii Department of Transportation, Highways Division, O`ahu District's (HDOT Highways) Storm Water Management Program, which seeks to reduce litter entering the storm drains that ultimately enter the ocean.
- State of Hawai'i's regulations, including information related to potential hazardous contaminants that may be within commercial or industrial waste from small quantity generators.
- Education of the potential health consequences of open dumps (illegal dumps).
- Actions that can be carried out by private land owners, contractors, and "everyone" to address and prevent illegal dumping, including reporting procedures.
- A link to a brochure that describes how to conduct a community cleanup of a dump site.
- Contact information for the County Department of Public Works, Highways Maintenance Division, to request rubbish removal in County right-of-way.
- Information emphasizing the role of small businesses in the handling of hazardous materials, including a link to HDOH guidance and other resources.

The County also holds six household hazardous waste collection events per year at well-known and well-publicized locations—twice a year in Hilo and Kona, once a year in Waimea and Pāhoa. Chapter 6 provides further information regarding the handling of hazardous waste.

The 501(c)(3) non-profit, Keep the Hawaiian Islands Beautiful website, provides an online litter "hotline" as another avenue to report illegal dumping. The non-profit's mission emphasizes the engagement of individuals to take a greater responsibility for improving the community environment and preserving the beauty of the Hawai'ian islands. Solid waste initiatives and recycling, beautification, and litter prevention and control are activities emphasized by the non-profit.

10.5.5.3 Issues and Concerns

Regardless of the existing regulatory framework and "grassroots" approach to prevent illegal disposal of rubbish, illegal littering or dumping still occurs, notably along roadways in more rural areas, on vacant lots, and in gulches with major roadways crossing them or near industrial facilities. Enforcement of existing illegal dumping and litter laws is challenging due in part to the rural nature of the County.

Currently enforcement of the County code is the responsibility of the HCPD. Because littering is not one of the higher priorities for HCPD, many of the violators who litter are not caught or penalized. DEM staff do not have the training or legal authority to enforce litter laws. The County would increase its potential liability if it required DEM employees to enforce policy, even within the confines of County recycling and transfer station properties.

10.5.5.4 Options to Prevent Illegal Dumping

Illegal Dumping Prevention Studies

It is anticipated that passing ordinances or legislation that requires the public to pay for waste disposal on a per unit basis may, in the short term, increase the occurrence of illegal dumping. Studies conducted in rural areas of Kentucky concluded that when additional fees were implemented for public waste disposal, illegal dumping increased, especially in areas where a higher percentage of the population had low or poverty-level incomes. However, most jurisdictions implementing programs such as PAYT reported only short-term increases in illegal dumping, and a decline to pre-implementation rates of incidence within the first 1 to 2 years after implementation. Exhibit 10-7 presents four programmatic areas the EPA has suggested focusing on for preventing illegal dumping.

Exhibit 10-7. Four Programmatic Areas for Preventing Illegal Dumping (EPA 1998)

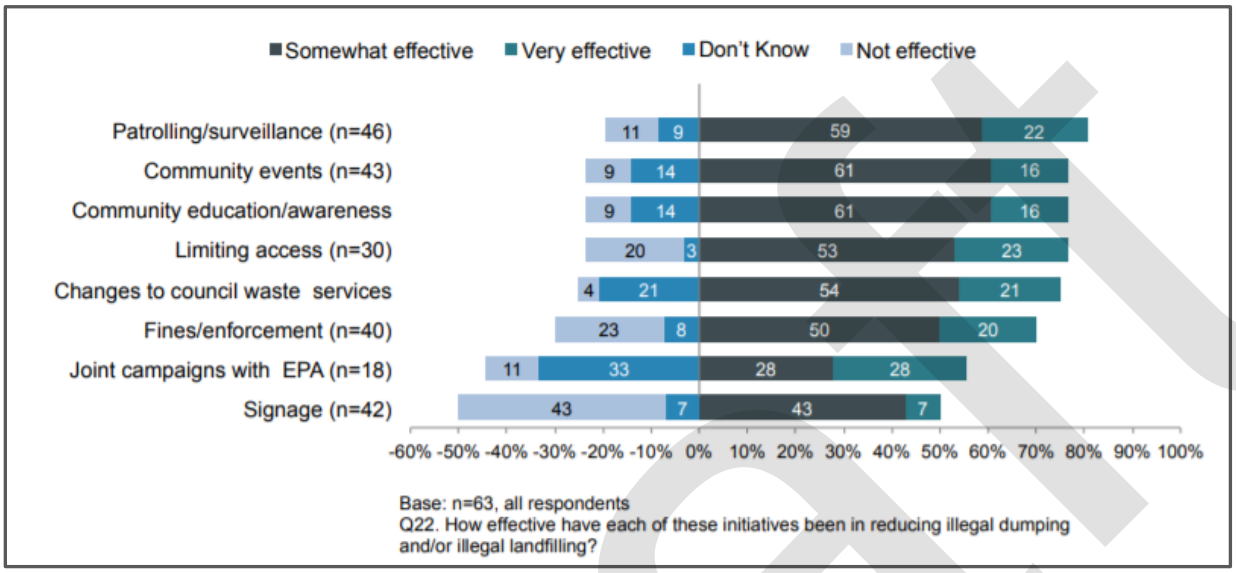
***Cleanup Efforts*.** Cleanup projects will require a coordinated planning effort to ensure that adequate resources and funding are available. Once a site has been cleaned, signs, lighting or barriers may be required to discourage future dumping. Signs should indicate the fines and penalties for illegal dumping, and a phone number for reporting incidents. Landscaping and beautification efforts may also discourage future dumping, as well as provide open space and increase property values.
***Community Outreach and Involvement*.** This may be the most important tool in ensuring that this practice is effective. The organization of special cleanup events where communities are provided with the resources to properly dispose of illegally dumped materials increases the understanding among residents of illegal dumping impacts and supplies opportunities to correctly dispose of materials which may otherwise be illegally dumped. Integration of illegal dumping prevention into community policing programs or use of programs such as Crime Stoppers may also be an effective way to increase enforcement opportunities without the additional cost of hiring new staff. Producing simple messages relating the cost of illegal dumping on local taxes and proper disposal sites will aid in eliminating the problem. Having a hotline where citizens can report illegal activities and educating the public on the connection between the storm drain and water quality, and other potential hazards associated with dumping refuse into streams or drains will decrease disposal of waste into streams or storm drain inlets.
***Targeted Enforcement*.** This tool involves the use of ordinances to regulate waste management and eliminate illegal dumping through methods such as fines, cost recovery penalties for cleanup, and permit requirements for waste management activities, to name a few. These fines and penalties can be used to help fund the prevention program or to provide rewards to citizens who report illegal dumping activities. Other recommendations for this tool include training of staff from all municipal departments in recognizing and reporting illegal dumping incidents, dedicating staff who have the authority to conduct surveillance and inspections, and writing citations for those caught illegally dumping.
Tracking and Evaluation. This tool measures the impact of prevention efforts and determines if goals are being met. Using mapping techniques and computer databases allows officials to identify areas where dumping most often occurs, record patterns in dumping occurrence (time of day, day of week, etc.), and calculate the number of citations issued and the responsible parties. This allows for better allocation of resources and more specific targeting of outreach and education efforts for offenders.

Source: EPA (1998)

The New South Wales Environmental Protection Agency conducted a report on illegal dumping including an online survey consisting of 63 government authorities, 100 trade and industry authorities, and 1,009 community members. Respondents were given various methods to reduce illegal dumping and were asked to rank their effectiveness. Patrolling and surveillance were viewed as the most effective, with 81 percent of participants responding that the method was 'somewhat or very effective'. Community outreach and education was viewed by 77 percent of participants as 'effective', and fines/enforcement were viewed by 70 percent of participants as 'effective.' Relating to joint campaigns with the New South Wales EPA, 56 percent of local government authorities stated the method was 'very effective', while signage received the least support with 43 percent of respondents stating the method was 'not

effective' (NSW 2015). Exhibit 10-8 graphically depicts the outcome of the illegal dumping survey performed by the New South Wales EPA.

Exhibit 10-8. New South Wales Survey on Illegal Dumping (North South Wales 2015)



Source: NSW (2017)

Illegal Dumping: County's Options

A combination of passing more severe penalties for illegal dumping, targeted enforcement actions by HCPD, establishment of new community outreach and participation programs, and other actions found to be successful in other jurisdictions may help to curb illegal dumping in the County. Potential actions that may be considered for the County to prevent illegal dumping are listed below.

- Civil and Criminal Penalties. Develop legislation that sets more severe civil and criminal penalties for illegal dumping activities than what is legislated by the state (HRS 342H). Legislation could be worded such that the penalties increase with the egregiousness of the violation, and based upon a weight, volume, or types of material that are dumped, and location of illegal activity (that is, higher penalties for dumping into streambeds). Legislation could require violators to pay for consequential damages and cleanup costs resulting from specific violations.
- Targeted Enforcement. Work with the community and the HCPD to develop a targeted enforcement program. Incentives could be offered for monitoring and reporting of illegal dumping to authorities, and methods could be developed for periodically evaluating illegal dump sites for evidence of the identity of the violators. Legislation supporting prosecution of violators based on the evidence of ownership at the time of the violation derived from dumped materials may need to be developed to effectively implement such a program.
- Community Education, Outreach, and Involvement. Develop programs with school and community groups or organizations to emphasize prevention, and conduct periodic clean ups of illegal dump sites, to raise community awareness and involvement in reducing illegal dumping activities.
- Install Signage at Problem Areas. Install signage where illegal dumping typically occurs listing the more severe civil and criminal penalties for violators to curb future dumping. This process may

be completed in conjunction with the planned re-signing at recycling and transfer stations, as stated in Chapter 5, Public Education and Information.

- Increase Security at Recycling and Transfer Stations. Hire full-time attendants to monitor the recycling and garbage facilities to deter potential violators. Install a fence around Miloli'i to reduce illegal dumping during non-operating hours.
- Small Quantity Generator Program. Inform small businesses how to best dispose of their hazardous waste to reduce illegal dumping and contamination. Businesses who are small quantity generators (SQGs) and produce between 100 and 1,000 kilograms per month of hazardous waste may accumulate waste for up to 180 days without a permit. As described in Section 10.5.5.2, the County provides information and guidance targeting businesses (SQGs) on their HawaiiZeroWaste.org website. This program could be bolstered by initiatives such as County interaction with small businesses through meetings and site visits.
- Recycling and Transfer Stations. Allow small businesses to utilize the recycling and transfer stations for recycling (see Recommendations, Chapters 4 and 8).

10.6 Plan Recommendation

This Plan does not outline funding projections for the 10-year planning timeframe. This is primarily due to fluctuations in markets and uncertainties regarding the outcomes of programs that will be operational early in the planning period (e.g., shipping residual waste exclusively to WHSL, organic composting facility in Hilo). Instead, the County plans to continue with the current system of funding most operating expenditures using property taxes and tip fees until the outcome of programs are better understood. Based on the analyses presented above and discussions with the SWAC, the County plans to implement the following residual management strategies during the next planning period:

1. **Prepare a Solid Waste System Financial Analysis.** Prepare the analysis to align with programs identified in this Plan and to achieve less reliance on the general fund. Major capital expenditures would continue to be funded through general obligation bonds. The planning effort would also consider methods and costs associated with the discouragement of illegal dumping, particularly because there is a correlation between this undesirable activity and the implementation of a PAYT program, for example.

   Note: Chapter 3, Section 3.6 (Recommendation 2) discusses the analysis of a PAYT program or other funding mechanism for source reduction. Chapter 8, Section 8.8 (Recommendation 1) discusses the continued operation and maintenance of recycling and transfer stations until a decision on the best method of collection and transfer is determined, and to also explore alternative funding mechanisms via a feasibility study.

2. **Regularly review and, when appropriate, renegotiate WHSL contract.**

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Appendix A

SWAC Meeting Summaries

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

MEETING MINUTES

Monday, March 19, 2018
10:10 a.m. to 12:39
Hawai'i County Building
Puna Conference Room #1501
25 Aupuni Street
Hilo, HI 96720

Committee Members present:	Staff present:
Georjean Adams	Keyra Wong, Deputy Corporation Counsel
Steven Araujo	William Kucharski, Director
Barbara Bell	Diane Noda, Deputy Director
Paul Buklarewicz	Gregory Goodale, SWD Chief
Robert Ely	Tina DeMello, Secretary
George Hayducsko	Mary Fujio, Assistant Secretary
Alan Okinaka	
Adam Scharf	

1. INTRODUCTORY REMARKS

Opening and introductory remarks were made by Gregory Goodale at 10:10 a.m.

Mr. Goodale introduced himself as the Solid Waste Division Chief for the Department of Environmental Management and expressed his appreciation to all the members for being a part of the Solid Waste Advisory Committee (SWAC) and for making the commitment to help the County. He explained he is not technically a part of this group but wants to welcome everyone and express appreciation for the Mayor appointing everyone and everyone accepting to be a part of this committee.

Mr. Goodale introduced the following people: William Kucharski, Director of Environmental Management, and Diane Noda, Deputy Director of Environmental Management; Mary Fujio and Tina DeMello, who work with the Department and will be helping and assisting at these meetings; Keyra Wong, Deputy Corporation Counsel; David Tarnas, who will be helping with facilitating these meetings; and Dennis Lee, who is the Senior Project Manager Dennis Lee and a consultant with Wesley Segawa and Associates (WSA), which is the prime consultant for this project.

Mr. Goodale turned it over to Director William Kucharski to say a few words.

Mr. Kucharski thanked everyone for being part of this committee. It is an important effort on the County's part to plan and planning is important. He thanked the members

for volunteering to be on the committee, because the plan is critically important to the County and the people who live here. His door is always open, and if there are any issues, don't hesitate to ask him. .

2. INTRODUCTION OF COMMITTEE MEMBERS AND STAFF

George Hayducsko gave an overview of who he is. Most of his career was in Wisconsin, where he worked for three different counties and designed two recycling programs. He has over 30 years of experience from landfills to waste to energy, and he designed two successful recycling programs. He hopes his experience will help Hawai'i County in this process. He thanked all of the members for being here and taking time out of their day to volunteer for the community in helping making the recycling and solid waste programs better. He asked the committee to introduce themselves and explain their role today and connection with solid waste and recycling.

Barbara Bell: She was the Executive Director for Recycle Hawai'i before Paul Buklarewicz for a couple of years. She was also on the last two SWAC commissions and through that became the Director of Environmental Management, from where she retired in 2007.

Adam Scharf: He works currently at Pohakuloa Army Training Area as the Program Manager of Solid Waste and Recycling for the United States Army on the Big Island. Pohakuloa manages over two million pounds of refuse a year and began a quality recycling program 38 months ago. They were at a five percent diversion rate, diverting waste from the County of Hawai'i's landfill. They are tracking 63 percent of all refuse generated at Pohakuloa and diverting it from the County's landfill by way of composting (food waste, grind and chip wood and turn it into organic matter). They also manage all the metals, ferrous and nonferrous. He has a lot of boots–on-the-ground experience in building programs, approaches, and techniques to approve diversion rates. He recognizes the importance of this committee, and that's why he had volunteered to be a part of it. He does a lot of data analysis and analyzes the waste stream on a regular basis to come up with metrics and posts and tracks the data to ensure they are always tracking who the large contributors are and what they are contributing, and then build programs around that and measure improvements. He knows he would be of value to this committee to help build a better plan for the next ten years.

Georjean Adams: She is currently retired and is the Vice President and secretary for Recycle Hawai'i. She is also on the board of the homeowners Association for where she lives at Mauna Lani Resort. She started her life as a Junior Bureaucrat with EPA after graduating college and worked with a group that defined what hazardous waste was. Then she got a job at 3M, where the focus was on product stewardship/lifecycle management, trying to figure out how to make sure that products that 3M makes do not cause issues upon disposal. She has been active with the American Chemical Society and has worked as an independent consultant for three years. She brings an industrial perspective, working with companies and their products and issues on how to manage

waste through the commercial stream. As a resident of this island, she wants to keep it the best and make it better.

Steven Araujo: He owns and operates D&D Rubbish Service and have been doing it for twenty-five years. He started back when Steven Yamashiro was mayor and has seen the changes from that time until now. He does believe in some of the programs and is also a realist, asking questions such as is it going to work? How much is it going to cost the taxpayer, is there an actual benefit? And how is this going to affect his business and the rest of the rubbish businesses?

Paul Buklarewicz: He has been the executive director for Recycle Hawai'i for the past 15 years. Recycle Hawai'i is a 501(c) (3) nonprofit. Education is the primary mission, and resource management recycling promotion. He has been facilitating, initiating and expediting a lot of the recycling programs here on the island (E-waste collection, used motor oil, home composting) and along with Barbara served on the last go around of the Solid Waste Advisory Committee ten years ago.

Keyra Wong: She is a deputy corporation counsel and advises DEM, DPW and the Real Property Tax Division. Her capacity here is to help this committee and provide legal advice.

Robert Ely: He is a retired chemical engineer and environmental engineer and is 77 years old. Right now he is fully employed as a consultant in a project that has nothing to do with what the SWAC is about. He provided some background on projects he has worked on --the design and management of Chem's Security Systems Hazardous Waste Landfill at Arlington Oregon; Casmalia Hazardous Waste Landfill in Casmalia California; he worked for Zeffro, which is based in Wisconsin, as a manager of process design on sludge management systems; he helped design the anaerobic digestive systems for Alaska Lumber and Pulp in Sitka Alaska; he got involved heavily in the Ainakoa Pono Project and came in contact professionally with Bill Kucharski when Bill was with AECOM; and during the last go around with the incinerator, he worked for Covanta as a consultant looking at both political aspects and technical aspects. He is hoping to lend professional expertise to this group.

Alan Okinaka: He is a retired manager from GTE Hawaiian Tel. He was formerly an electrical engineer and initially managed technology but ended his career managing people. He feels the least certified with anything to do with solid waste management, but being a part of the committee is privileged to be a part of group that is trying to manage something that is very difficult to solve. Has two compost piles and embraces 1, 2 and 5 plastics for recycling. He gets upset if he has more than one 32 gallon bag of trash every week and flattens all corrugated boxes down religiously.
Mr. Okinaka asked how the Environmental Management Commission, the Solid Waste Commission and the Department of Environmental Management interact. Mr. Goodale responded that Bill Kucharski and Diane Noda oversee the Department of Environmental Management and the two divisions that are within it, which are the Solid Waste Division and the Wastewater Division. The Environmental Management

Commission's members are also appointed by the mayor, and it is more of a formal commission that address solid waste management issues as well as wastewater management issues. The SWAC takes on solid waste management by itself and is required by the State of Hawai'i to develop an updated plan every ten years.

Ms. Noda explained that the Environmental Management Commission is created by the County Code, and part of its duties are to advise the Department on solid waste and wastewater programs, including waste reduction strategies, recycling, litter control, community involvement, and other issues. The Solid Waste Advisory Committee is created by State law, and its limited purpose and limited duration is only until our revised solid waste plan is submitted to the State Office of Solid Waste Management. The deadline for this is November 2019. A consultant has been hired to submit the plan. She explained the binders they were given included HRS Chapter 342G which addresses the Integrated Solid Waste Management Plan. It establishes that each County is to have a committee appointed by the mayor. This committee is convening because the ten-year mark is next year.

3. STATEMENTS FROM THE PUBLIC

None

4. ELECTION OF CHAIR AND VICE CHAIR

Mr. Buklarewicz nominated George Hayducsko as chair and Ms. Bell seconded the nomination, and all voted in favor.

Ms. Adams nominated Mr. Okinaka as vice chair; Ms. Bell seconded the nomination; and all voted in favor.

Ms. Noda explained that the Charter points out that for an advisory committee, you would need a majority of those present to make any action valid, and for a committee of eight members, they will need five for a quorum.

5. NEW BUSINESS

a. Orientation by Office of the Corporation Counsel on:

(1) Sunshine Law

Ms. Wong provided a brief overview of the Sunshine Law. It applies to this committee because this body was created by State statute; and committees, boards and commissions created by State statute are subject to the Sunshine Law. According to the County Charter, Section 13-20, this committee is subject to open meetings provisions. This committee has broad discretion to make decisions and form public policy. They have to protect the public's interest and the right to know about the committee's decision-making and deliberations. The Sunshine Law requires no discussing board

business outside of an open meeting. Every meeting must be open to the public, unless there is an executive session or limited meeting as allowed by statute. Boards must provide notice, accept testimony, and keep minutes; and they cannot consider matters not included on the agenda. This becomes important because people from the public may testify on matters not on the agenda. If that happens, it would be the chair's role to tell that person it is not on the agenda. Committee members also should not allow a discussion to get tangential, because the public would not have had the right of notice and would not have known that would have been discussed. Basically, they cannot discuss issues that are not on the agenda.

Mr. Scharf asked whether, if they were working on a component of this project and he had a question for Mr. Okinaka, he could call him and ask the question or if he had to ask it at an open meeting. Ms. Wong said it had to be at a meeting. Two members are allowed to discuss matters but cannot commit to voting on anything.

Mr. Okinaka whether the committee has the authority to accept public testimony on something that isn't on the agenda, and Ms. Wong said they would have to amend the agenda by 2/3 votes to accept the topic. If it's a reasonably important topic that would affect a number of people it cannot be added to the agenda, and it could be placed on the next agenda. It is up to the chair's discretion.
Mr. Buklarewicz said that Ms. Adams is on the Board of Directors for Recycle Hawai'i, and he is not on the board but attends the meetings. If the SWAC has discussion on something that is also discussed at the board meetings, he and Ms. Adams may need to recuse themselves. Ms. Wong said that if they discuss matters in the board meetings that somehow relate to the SWAC and its purpose, then he should not participate in that discussion. If the SWAC is going to make a decision which would impact how he does his business, he should recuse himself from voting on that decision.

Ms. Wong continued with her Sunshine Law presentation, as follows:

- "open meeting" requirement. Every meeting will be an open meeting and all persons will be permitted to attend unless otherwise provided by in the constitution. Portions of meetings can be closed if they go into executive session or for other limited exceptions. All meetings will need to be held in a public place, and board shall take official action and votes in public. They cannot vote in executive session. .

- If someone is disrupting a meeting to where the meeting cannot carry on, the chair has the discretion to remove that person.

- Any interested person may submit written or oral testimony on any agenda item. Most boards set a reasonable time limit of 3 minutes.

- The notice and agenda must list all items that the Board intends to consider, and the agenda must be sufficiently detailed as to provide the public with

adequate notice. The notice and agenda must be filed with the county clerk at least six days prior to the meeting.

- An agenda may be amended with a 2/3 votes of all members, but an item of reasonably major importance which would affect a significant number of people cannot be added. It would need to go on the next agenda.

- The Sunshine Law does not apply to social events attended by board members in which board business is not discussed, and it does not apply to non-board members. There should be no discussion with non-board members regarding matters discussed in closed sessions.

- Two board members may discuss board business outside of a meeting to seek information so long as no commitment to vote is sought or made. Beware of serial communications--the language is found in HRS 92-2.5a.

- Other permitted interactions: Ms. Wong described other permitted actions pursuant to the Sunshine Law.

- Executive meetings are closed to the public. A motion to enter executive session shall be stated in open session, and a two-thirds vote of the board members present is necessary in order to go into executive session.

- Minutes are required to include the, date, time and place of the meeting, members absent or present, the substance of what was discussed, votes taken, and any other information that any member wants to add to the minutes. Executive minutes may be withheld, and minutes may be transcribed or summarized by notes taken.

Ms. Wong said that if the rules are not followed and someone brings an action within ninety days, a person could actually be charged with a misdemeanor and then removed from the board.

(2) Rules of Procedure

Ms. Wong explained that the SWAC will follow the general rules of procedure formulated by a combination of the Robert's Rules of Order, the County Charter, and the Hawai'i Revised Statutes.

A quorum is the majority of the members of the board or committee, which would be five for the SWAC. Prior to calling the meeting to order, the chairperson has the duty to determine whether quorum is present. If quorum is not present, the chairperson either waits until there is one or, if it is known that quorum is not going to be met, than the chairperson calls the meeting to order, announces the absence a quorum, and entertains a motion to adjourn. However, you can still receive testimony and presentations on the agenda items, and question testifiers and/or presenters, provided

that no deliberation, and no decision-making or voting is made until the next meeting. Members shall create a record of the testimony or presentation, and this would be presented in the minutes before deliberation or decision-making at the next meeting, the board is required to present a copy of the testimony and presentations received at the canceled meeting, and the committee has an opportunity to report to the other members who weren't there about what was said.

If a member is not able to make it to a meeting, please call the department and let them know in advance.

Mr. Okinaka asked whether, if a member of the public submitted a large document with their testimony, if it needed to be accepted, and Ms. Wong said they would need to receive and accept the whole testimony and document.
Ms. Wong explained that Robert's Rules and general procedures provide for order, decorum, fairness, efficiency and clarity. Generally when there is a motion, it is then seconded, then there is a discussion, and then you call for the vote. For boards advisory boards such as SWAC, the affirmative vote of the majority of those who are present at the meeting shall be sufficient to make any action valid.

The chair's role is to be the manager of the meetings, and the chair cannot make motions or second any motion. The chair can only recognize the motion and the second. The chair must maintain a neutral position to provide credibility for rulings, protection of minority positions, and to maintain the public's trust. Active participation on of the chair taints the ability to properly manage the meetings. The chair has to manage the meeting, help it be productive, and demonstrate the power of process. The chair may relinquish his or her duties to the vice chair, and it would be best to do so prior to deliberations taking place. However, the ability to relinquish shall not be used frequently and cannot be used back and forth for convenience. The acting chair must accept limitations for the agenda item, keep the peace, and maintain order and decorum. Leadership and conflict resolution is required both for board members and anyone in attendance. Public participation should be encouraged, but the rights of one person should not trump the rights of the rest. It is easier to maintain order if all parties believe that the chair is being a fair and reasonable person without predispositions.

Everyone should know their role as a board member. The members set the pace. When motions are made, they should be valid, clearly articulated, and easy to understand. Avoid getting involved in personality issues, respect others who have the floor, and wait your turn. If a member wants to make a statement or motion, raise a hand to get the chair's attention and wait until called upon by the chair. Addressing others casually is okay; but using surnames is recommended. Keep the meeting on track and don't rely on the chair to keep discussion focused. If discussion becomes repetitive or irrelevant, state as much to the chair as a point of privilege, and the chair should redirect deliberations or call for the vote.

Ms. Wong said she has a cheat sheet on the Robert's Rules available.

Mr. Scharf asked about the process for a special field trip, and Ms. Wong said it would count as a limited meeting. The State would need to be asked for permission, and the limited meeting would be closed to the public. Minutes would be required. Members can discuss but cannot vote. If the SWAC wants to have a site visit, they need to make a request to the Corporation Counsel, who will help get permission from the State. There is a requirement to advise the public of the limited meeting and that it is closed for the public.

Chair Hayducsko called for a five-minute recess at 10:58 a.m.

The meeting reconvened at 11:07 a.m.

b. Solid Waste Division program overview.

Chair Hayducsko gave an overview of the County's recycling and solid waste programs using a PowerPoint presentation. The main points are summarized below.

HI5 Deposit Beverage Container Program – Certified Redemption Centers

- We have 11 County sponsored sites at the transfer stations.
- There are 8 private Certified Redemption sites around the County.
- The HI5 Beverage Container Redemption Program for FY 2016-2017 diverted 6,071 tons of recyclables from the County's landfill.
- The HI5 percent redemption rate for Hawai'i Island is 87%.
-

2-Bin Recycling

- The 2-Bin program consists of 2 distinct collection bins: a Mixed Recycling bin and a Glass bin
- The 2-Bin Recycling program for 2016-17 diverted 5,990 tons of recyclables from the County's Landfill.
- Signage is provided at the 2-Bin sites at the transfer stations, but they are seeing quite a bit of contamination at the sites, when the public does not abide by what recyclables are to be put into the containers. Education is critical and needs to be done constantly or you will lose the effectiveness of the program.

Mr. Ely asked if there is any data available as to the cost of these individual segments of the program? Mr. Hayducsko said yes, there is cost associated and it is tracked.

Mr. Scharf asked why there is a drop off in 2Bin recycling and Mr. Hayducsko said the containers are sometimes not available to the public because they are full, and they are trying to address that. Mr. Scharf said residents can be lazy, and there is a culture in the home to dispose of trash in whatever way is convenient. Traffic flow could be another problem. Chair Hayducsko said these are things that they will need to look at and address.

Ms. Bell asked what the contamination is percentage wise and whether they had done a waste comp study recently, and Chair Hayducsko said he was not sure and that a

waste comp study had not been done for ten years. They are not anticipating doing one.

E-Waste Recycling

- E-Waste Recycling for FY 2016-17 diverted 235 tons
- The County Electronic Waste Recycling Program for residences in Hilo, Kealakehe, Waiʻōhinu and Waimea
- The County contracts with Mr. K's. At Mr. K's it is free for residences on Saturdays (the County subsidizes on Saturdays), and there is a reduced rate on Saturday for commercial entities. Sunday to Friday there is a fee for both residence and commercial entities.

Household Hazardous Waste (HHW)

- Over 2,882 participated in HHW during FY 2016
- FY 2016-17 collected 53 tons of materials
- There are 4 locations Island wide: Hilo – twice a year, Kealakehe – twice a year, Waimea – once a year and Pāhoa – once a year.

Mr. Okinaka asked how much it costs to run a day of collecting hazardous waste, and Chair Hayducsko said it costs around $50,000 per event. The contractor required to provide personnel and move items collected off island. There is no disposal site on the island.

Scrap Metal/White Goods/Automobiles

- Scrap Metal/Automobiles(AV) for FY 2016-17 diverted 9075 tons

Used Motor Oil

- 16,547 gallons of Used Motor Oil was processed for FY 2016-17
- The County has volunteer Used Motor Oil collection sites, island wide.

Mr. Ely asked what is meant by "processed", and Mr. Hayducsko said it means what is received and taken for re-use--It is not just collected and stored, it is being utilized.

Tire Education

- They are educating tire vendor throughout Hawaiʻi County of their obligation to charge customers for acceptance and disposal of used tires.

Mr. Goodale wanted to make full disclosure regarding tire education. They had received a notice of violation regarding tires, and as part of a settlement with the state they developed the tire program, which communicates to the retailers their obligation to take used tires. The fee has to be charged regardless. It has produced relatively beneficial results, but a main task is making sure everyone knows about it.

Green Waste

- Greenwaste received in FY 2016-17 in East Hawaiʻi – over 10,000 tons; in West Hawaiʻi – just under 30,000 tons.

- The current commercial tipping fee to dispose of Greenwaste is $21.25 per ton, which is 25% of the current tipping fee. There is no charge for residential customers

Mr. Okinaka asked what the County does with the greenwaste, and Chair Hayducsko said they contract with HER to grind up greenwaste and create mulch. In East Hawai'i, they contract to make enhanced mulch which destroys vectors. In West Hawai'i they don't make enhanced mulch due to the lack of vectors in the mulch. Both sites are tested for fire ants on a monthly basis.

Reuse Centers

- The reuse program helps to ensure usable materials are diverted from the County landfills.
- The Reuse Centers diverted 350.66 tons from the landfill during FY 2016-17

Education and Outreach

- The program focuses on educating the community about the value of recycling, reuse programs and diversion of materials from the County landfills.

Transfer Stations

- There are 22 transfer stations island wide
- Landfill tonnage for FY 2016-17: South Hilo Sanitary Landfill 72,247 tons (36,291 Commercial, 35,956 County); West Hawai'i Sanitary Landfill 122,915 tons (78,892 Commercial, 46,023 County)

c. Preliminary Discussion on Goals and Objectives.

Mr. Scharf said it would be great to bench mark where they are today, to provide a baseline for today as a part of setting goals.

Ms. Adams asked how they are going to scope and update what was done ten years ago and suggested they compare numbers from ten years ago, which would be interesting. Would be interesting to compare what those numbers were ten years ago.

Mr. Araujo said he would like to see the cost of Recycling Program contracts, and Ms. Bell said they would like all available data.

Mr. Okinaka said they should look at new methods, landfill mining – metal, plastics that can be recycled; devices/containers developed for safe back yard burning; bon fires – clear out acres and have bon fires. HOW ABOUT: Mr. Okinaka said they should look at new methods of landfill mining, looking at what metal and plastics can be recycled and whether there are objects that can be safe for backyard burning. They could clear out land and have large bon fires.

Mr. Scharf said there is food waste technology that turns food into pig/chicken feed.

Chair Hayducsko said he doesn't want anyone to be hesitant to throw out any thoughts or proposals. As a group it's good to throw out ideas.

Mr. Buklarewicz said the Zero Waste Implementation Plan on the Recycle Hawai'i website shows that 90% of the plan was adopted into the ISMP.

Chair Hayducsko said the objective is to update the ISWMP, not to rewrite it. They all want to protect the land and environment. For the schedule, they were thinking of having monthly meetings, and then completing and submitting the plan to the state by the end of 2019. There will be draft plans the consultants will present to the SWAC for review and debate. There is a lot to do.

Mr. Ely expressed concerns about what the consultants would be doing, whether they would be reporting to the SWAC on a regular basis, and what their timeline was for a first draft. Mr. Goodale said they could provide the scope of work and what they expect to get for the money they are paying the consultant. The SWAC will have a lot of influence over the direction the plan takes. He would arrange to have the consultant contract available for the SWAC's review.

Mr. Lee explained that he worked for the consultant, and they had been hired to do basically four tasks: first is the design process--the methodology to determine how they are going to do the update. The second is to present a preliminary draft. The third task is to conduct public hearings, and the last is to finalize the draft and submit to the Department of Health. There is a schedule with detailed tasking, general tasking, and milestones for each task along with the scope.

d. Discussion on frequency of meetings, best time and day to meet, and location.

With Mr. Tarnas' assistance, the group settled on the second Wednesday of every month, from1:00 p.m. to 3:00 p.m. for their regular meetings, or at such other date, time, and place as may be specified by the SWAC.

Motion and Vote: Msr. Bell moved to meet on the second Wednesday of every month, starting on April 11, 2018, from 1:00 p.m. to 3:00 p.m. in Hilo, unless otherwise noted. Mr. Scharf seconded the motion, and all members voted aye.

e. Decide on date, time, and location of next meeting.

- See above.

6. ADOURNMENT

Motion and vote: Mr. Scharf moved to adjourn the meeting, Ms. Adams seconded the motion, and all members voted aye.

The meeting adjourned at 12:39 p.m.

Respectfully submitted:

_____

Tina DeMello, Secretary

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

Meeting Minutes

Wednesday, May 9, 2018
1:10 p.m. to 3:21 p.m.
Aging and Disability Resource Center (ADRC)
1055 Kino'ole Street, Suite 101
Hilo, HI 96720

Committee Members Present:

Georjean Adams
Barbara Bell
Paul Buklarewicz
Robert Ely
George Hayducsko, Chair
Alan Okinaka, Vice Chair
Adam Scharf

Not Present:

Steven Araujo

Staff Present:

Keyra Wong, Deputy Corporation Counsel
Diane Noda, Deputy Director
Gregory Goodale, Solid Waste Division Chief
Gene Quiamas, Environmental Compliance Specialist
Tina DeMello, Secretary
Mary Fujio, Assistant Secretary

Others Present:

Dwight Miller, Consultant
Neal Fukumoto, Consultant
Dennis Lee, Consultant

1. CALL TO ORDER

Chair Hayducsko called the meeting to order at 1:10 p.m.

2. APPROVAL OF MINUTES

Mr. Buklarewicz said a correction was needed on page 11, where there is a reference to "Mr." Bell rather than Ms. Bell.

Motion and vote: Ms. Bell moved to approve the minutes as corrected, Mr. Okinaka seconded the motion, and all members present voted aye.

3. STATEMENTS FROM THE PUBLIC

There were no members of the public present.

4. UNFINISHED BUSINESS

a. Distribute a copy of the 2009 County of Hawai'i Integrated Resources and Solid Waste Management Plan ("IRSWMP") update to the Committee Members

Chair Hayducsko distributed copies to the members who so requested. Ms. Adams said she would like copies available for members to view at all future meetings.

b. Overview by George Hayducsko of the Diverted and Landfill Tonnage and the Cost of Recycling Programs.

Chair Hayducsko gave a PowerPoint overview on the percentage and tonnage of materials managed and diverted from the landfill. He also gave an overview of the cost of the recycling diversion programs.

The main points of his presentation are summarized below:

- FY 2016-17 Tonnage of Materials Managed
  - Landfill: 195,162
  - Greenwaste: 40,465
  - Other Reuse & Recycling Programs: 19,330
- FY 2016-17 Percentage of Materials Managed
  - Landfill: 76%
  - Greenwaste: 16%
  - Other Reuse & Recycling Programs: 8%
- FY 2016-17 Tonnage of Materials Diverted from the Landfill
  - Greenwaste: 40,465
  - Metal/Automobiles: 9,075
  - Glass: 4,935
  - Old Corrugated Cardboard (OCC)/Paper: 3,575
  - Plastics (1,2 &5): 1,043
  - Reuse Centers: 350
  - E-waste: 235
  - Household Hazardous Waste: 93
  - Used Motor Oil (UMO): 24
- FY 2016-17 Percentage of Materials Diverted from the Landfill
  - Greenwaste: 68%
  - Metal/Automobiles: 15%
  - Glass: 8%
  - Old Corrugated Cardboard (OCC)/Paper: 6%
  - Plastics (1,2 &5): 2%
  - Reuse Centers: 1%
  - E-waste: less than 1%
  - Household Hazardous Waste: less than 1%
  - Used Motor Oil (UMO): less than 1%
- Diversion Program Contracted Expenses and Cost per Ton (Utilizing FY2016-17 Disposal Report Data)
  - Greenwaste Contracted Expenses: $4,205,675
    Cost per Ton: $104
  - Metal/Automobiles Contracted Expenses: $945,338
    Cost per Ton: $104
  - 2-Bin Recycling Contracted Expenses: $1,018,060
    Cost per Ton: $170

- Reuse Centers Contracted Expenses: $211,209
  Cost per Ton: $603
- E-waste Contracted Expenses: $192,071
  Cost per Ton: $817
- Household Hazardous Waste Contracted Expenses: $220,406
  Cost per Ton: $2,370
- Used Motor Oil (UMO) Contracted Expenses: $25,723
  Cost per Ton: $1,072

Ms. Bell asked whether there was a landfill cost per ton, and Mr. Goodale replied that it cost approximately $145 to put a ton into the landfill.

Vice Chair Okinaka asked whether the contracted expenses discount the fees that are paid to take things to the landfill, and Chair Hayducsko said no, that it is the cost the County pays to the contractor. It is the cost to the County.

Mr. Buklarewicz commented that the increase in cost for e-waste went up about 3 cents per pound. Recycle Hawai'i had pulled in 225 tons in a 12-month period, and it was about 38 cents per pound. This is based on a 3-year average for both East and West Hawai'i.

Ms. Bell said that at some point she would like to know the net prices of greenwaste minus tip fee. She would like to see the overall cost to determine whether the greenwaste tip fee is too high or too low. Chair Hayducsko answered he would have that number for the next meeting.

Mr. Buklarewicz asked whether the Used Motor Oil (UMO) figure includes what is collected at the Household Hazardous Waste Collection (HHWC) events, or whether it is separate. Chair Hayducsko said the chart they were looking at shows the UMO collected by both the DIY UMO vendors, and the UMO collected at the HHWC events is listed under the HHWC event. Mr. Goodale explained that the County is charged by the gallon for the UMO collected by the UMO vendor at the UMO volunteer collection sites, and the County is charged primarily a lump sum for all the waste collected during the HHWC events.

Mr. Okinaka asked how DEM determines the tonnage of greenwaste, and Chair Hayducsko said there is a scale that weighs all the greenwaste. If the greenwaste comes from a business, there will be a charge for it. If it comes from a transfer station through the public, it is weighed but there is no charge.

5. NEW BUSINESS

a. Overview by George Hayducsko of the 2009 IRSWMP

Chair Hayducsko handed out a draft on the status of Hawai'i County's 2009 IRSWMP and explained that it shows items recommended in that plan and the status of those recommendations. Some recommendations were implemented, and some were not. The status is not yet updated on all the recommendations that are listed. As an example, he pointed out a recommendation to expand and improve public education and awareness. The status shows that there has been no dedicated public education and awareness program since June 2014.

Mr. Buklarewicz commented that education is the most important factor if the population is to recycle. Chair Hayducsko agreed that education is critical and explained that DEM's website is maintained, facility tours are provided, and they issue press releases, advertise, and do presentations. However, they do not have staff to design an education program.

Mr. Scharf asked whether the consultant will be writing a new draft plan or will be working from the former plan. Mr. Miller explained that this is a great tool to determine how we implemented the current plan, and a new plan will be produced to follow through.

Vice Chair Okinaka asked whether they would get a breakdown of what was not implemented from the old plan, and Ms. Adams asked about they would be reevaluating the old recommendations and solutions. Chair Hayducsko replied that they would be coming up with ideas, and the ideas will be put in front of staff and the consultants for inclusion into the plan.

b. Overview by George Hayducsko of the 2-Bin Recycling Program

Chair Hayducsko gave a presentation on recyclable materials and explained that having clean recyclables is always important and highly recommended, and more so now that China and other Asian countries are allowing very little contamination. There is a lot of contamination, however, in DEM's 2-bin recycle bins. HI5 items should be recycled at certified redemption centers rather than be placed into the 2-bin recycling bins.

Plastic containers numbered 1, 2, and 5 are accepted in the 2-bin recycling containers. It is important for people to look at the number on these containers before putting them into the bins at the transfer stations. Education is critical.

The County contracts with Business Services Hawai'i (BSH) to collect, transport, process, and market the recyclables from the 2-bin recycling program. BSH takes the recyclables back to their facility, where individuals sort out the materials in a sorting line. HI5 glass bottles get shipped intact off the island, as required by the Department of Health. 2-bin glass gets recycled and used on the island.

County recycling staff inspects that the HI5 cans and bottles are labeled properly at both retail locations and Certified Redemption Centers (CRCs).

Chair Hayducsko announced a short break. Recess was held from 1:56 p.m. to 2:02 p.m., at which time he called the meeting back to order.

c. Presentation by the Department of Environmental Management's Consultant regarding the ISWMP Rewrite Methodology

Chair Hayducsko introduced our Dwight Miller, who would be providing the plan outline and schedule.

Mr. Miller explained that he is with Parametrix and has been in Hawai'i for about 32 years. He worked on Maui's SWMP back in the early 1990s and has worked on miscellaneous parts of plans since then. He does a lot of solid waste planning as well as a full spectrum of solid

waste work in facility planning, design construction, and so on. He said that Chair Hayducsko's earlier handout on the recommendations from the 2009 plan and status informs the current SWAC as they go forward into the 2019 plan. They are essentially learning from the 2009 plan on what was recommended, how the recommendations were implemented, what could not be implemented, and then using all that information coming into the new planning effort.

1) Plan Outline

Mr. Miller provided a PowerPoint of the plan outline and summarized the topics. Several SWAC members provided comments during the presentation.

- Solid Waste Priorities and Practices with reference to Hawai'i Revised Statutes Section 342G-2.
  - Landfill and Transfer Stations – Support System
  - Recyclers require a higher grade of material

- Background on fiscal year 2017 on landfill and waste diversion.
  - Solid Waste Annual Reports
  - Diversion Incentive Program, where the County used to pay for data. There is no longer a financial incentive for businesses to provide data.
  - Chair Hayducsko said he hopes to ask commercial entities for recycling data.
  - Require recyclers to provide recycling data; it takes a really long time for data to get into the system.

- Ms. Bell said she would like at least the last ten years of annual reports.

- Background on Demographics and Projections
  - Project out waste stream
  - Increase per capita - population per capita per day in ten years
  - County of Hawai'i (COH) population percent change estimate (2010-2017): 8.3%
  - State percent change estimate (2010-2017): 5.0 %
  - COH projected growth rate (2010-2040): .5%
  - State projected growth rate (2010-2040): .8%

- Background on Tourism
  - Tourist projection (2015-2040): 7.5 million - just under 10 million

- Summary Status of 2009 Recommendations: What does it mean and what do we see going forward:

  1. Funding constraints
  2. Commodity Markets - limited recycling opportunities
  3. Tip fees implemented
  4. Expanded greenwaste drop-off
  5. Enhanced Household Hazardous Waste (HHW) and E-Waste Programs
  6. Reconstructing transfer stations - HOVE and Wai'ōhinu

7. Closing the South Hilo Sanitary Landfill (SHSL); transferring waste to the West Hawai‘i Sanitary Landfill (WHSL)

- SWAC's Role
  - Recommendations utilizing the current status of existing conditions
  - Alternatives development
    - Doing the planning process for the next ten years
    - What more can be done on island? Greenwaste; compost; food waste; organics; composting programs
      - Mr. Scharf suggested pig feed.

- Ms. Adams said she would like to look at a change of technologies and smaller units.

- Planning Approach
  - Involving the SWAC; gathering ideas and how they will work
  - Developing a pragmatic plan by implementing recommendations
  - Maintaining and implementing the plan

- Ms. Adams recommended bringing in someone from Kaua‘i to talk about curbside pickup. Mr. Goodale agreed it would be good to evaluate curbside service and the areas where it could be implemented, given the rural nature of the island.

- Mr. Miller added that a 23% diversion rate with a system that does not have curbside service or mandatory recycling is really great.

- Public Review: DOH review and public to comment

- Public Review and Completion

- Action Items
  - Short-Term
    - Background
    - Field Visits
    - Alternatives Development
  - Mid-Term
    - ISWMP Review and Update
    - Interim Draft Review
  - Long-Term
    - Preliminary Draft Review
    - Final Draft Review
    - Public Hearings

Mr. Miller explained that the SWAC will bring ideas to the table, and he will be providing a printout of the methodology, a memorandum, a review of past recommendation, data collection, infrastructure and human infrastructure, and develop a draft by November. The

SWAC will take field trips and have additional meetings. Topics will be reviewed around the key areas as opposed to working on a chapter at a time.

Mr. Scharf asked Mr. Miller what his best success story was, and Mr. Miller responded that in Washington, he did a back-to-back plan. It was a very realistic and up front plan, and it included recycling and facility improvement. He also worked on a study of curbside collection of recyclables and trash pickup for an urban county.

Mr. Scharf asked Mr. Miller whether it is hard to convince a community to implement new technology into the infrastructure and whether he had insight on that. Mr. Miller said you don't want to hang the whole plan on technology. A feasibility study would help to get deeper on waste characteristics so they would know what they're dealing with.

Chair Hayducsko explained that he had asked the committee members to delete/recycle the contract that was sent to them earlier via email and replace it with the hard copy provided today, as the copy sent via email has proprietary information.

Vice Chair Okinaka asked for clarification about the term "update the plan" and whether it was assumed the former plan is quite solid and the backbone for how solid waste management will be addressed for the next several decades. Chair Hayducsko said he feels the current SWAC will help design the best plan they can with today's knowledge. The plan is something that is never truly finished, as new ways of doing things always come along. They will do their best to look into the future, figure out what to do, and provide the roadmap.

Mr. Goodale added that a lot of different methodologies have been looked at on disposing of trash, recycling, and diversion; and the reality is that over the years there has not been a lot of change. DEM sees the update to the plan as incorporating whatever new technologies would make sense. Some methodologies have gotten better, and they need to figure out how the County can do better. No one wants to look at the plan as just maintaining the status quo or being stagnant. The update is to make it better for the whole County. It is a state mandate for the plan to be updated every ten years, but the reality is that the plan is looked at and used frequently by DEM. His copy of the plan is dog-eared and tagged all over. The overall system, however, can always be improved. He does not want the program to be inflexible or rigid.

2) Schedule

Mr. Miller provided the schedule via PowerPoint and said it would be emailed to the members.

d. Discuss proposed limited meeting and site visit for June 13, 2018: The proposed sites to visit on June 13, 2018 are Pāhoa Recycling and Transfer Station, Kea'au Recycling and Transfer Station, Hilo Recycling and Transfer Station, South Hilo Sanitary Landfill, East Hawai'i Organics Facility and East Hawai'i Regional Sort Station. Areas of these site visits would be potentially dangerous to the health and safety of the public and impracticable for the public to take part in all sections of these site visits, it is recommended that the Committee approve a limited meeting for the site

visits pursuant to Hawai‘i Revised Statues § 92-3.1, subject to concurrence and approval of the director of the Office of Information Practices.

Motion and second: Ms. Adams moved that the committee approve a limited meeting on June 13, 2018, for informational and education purposes and for the committee members to gain an understanding of the County's various facilities and how each one operates. The proposed sites are the Pāhoa, Kea‘au, and Hilo Recycling and Transfer Stations, the South Hilo Sanitary Landfill, East Hawai‘i Organics Facility, and East Hawai‘i Sort Station. As the areas of the proposed site visits would be potentially dangerous to the health and safety of the public and impracticable for the public to take part in, it is recommended that the Committee approve a limited meeting pursuant to HRS 92.3-1, subject to the director of the Office of Information Practices and, she would add, Pele. Vice Chair Okinaka seconded the motion.

Ms. Bell asked why the public could not be invited, and Ms. Wong explained that realistically, it is impracticable for the public to be present for this limited meeting and there are potential dangers. Mr. Goodale added that only commercial haulers go into the sort station, and that from a logistics and safety standpoint, the meeting should be limited. DEM does provide opportunities for groups to tour the facilities upon request.

Vice Chair Okinaka called for the question.

Vote: All members voted aye except for Ms. Bell.

Ms. Wong said that if the meeting was a regular meeting, it would also need to be ADA compliant.

Chair Hayducsko proposed to amend the agenda to discuss having a similar site visit in July on the west side of the island, and he asked if anyone would move to amend the agenda to add this.

Motion and vote: Ms. Bell moved to amend the agenda to discuss a similar limited meeting and site visit in July in West Hawai‘i. Vice Chair Okinaka seconded the motion, and all members voted aye.

The facilities to be visited in West Hawai‘i were discussed. Chair Hayducsko said they would have staff available to explain what they would be viewing.

Ms. Bell said that as she is the closest resident to the Puakō Transfer Station, they can either start or end the tour there and have refreshments at her home.

Motion and vote: Ms. Bell moved that the committee approve a limited meeting on July 11, 2018, for informational and education purposes and for the committee members to gain an understanding of the County's various facilities and how each one operates. The proposed sites are the West Hawai‘i Sanitary Landfill, West Hawai‘i Organics Facility, the RMP used motor oil drop-off, and the Waimea Recycling and Transfer Station. Vice Chair Okinaka seconded the motion, and all members voted aye.

Vice Chair Okinaka asked what a sanitary landfill is as opposed to an unsanitary one. Chair Hayducsko said a sanitary landfill is engineered to protect the environment. Mr. Goodale added that the biggest advancement is the daily covering of the waste.

6. FUTURE AGENDA ITEMS

Vice Chair Okinaka said he would like to learn about some new technologies that are being deployed, not just nationwide but in the world, to handle solid waste. He would like to know their effectiveness, not just economically but in keeping communities safe and healthy.

Mr. Scharf said the lieutenant colonel at his base is interested in meeting with Mr. Goodale and Chair Hayducsko to discuss possibly partnering with the County on reducing operating costs. He has some very good ideas and lots of information to share. It may also make sense for him to speak with the SWAC.

Ms. Adams suggested having Bioenergy Hawai'i speak with them. They are in the permitting process to provide a waste-to-energy and recycling facility on the west side of the island, and they are looking at different technologies to implement at the site.

7. ANNOUNCEMENTS

Chair Hayducsko said the next regular meeting needed to be scheduled and asked if the second Wednesday in August (August 8) would work for everybody, at the same location. The date was agreed upon.

Discussion was held on what time the limited meetings in June and July would start and where they would meet. Mr. Hayducsko said the information would be sent out once they had it finalized.

8. ADJOURNMENT

Motion and vote: Mr. Buklarewicz moved to adjourn, Mr. Scharf seconded the motion, and all members voted aye.

The meeting adjourned at 3:21 p.m.

Respectfully submitted:

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Tina DeMello, Secretary

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

MINUTES OF LIMITED MEETING AND SITE VISITS
June 13, 2018
12:15 p.m. to 4:12 p.m.

Committee members present:	Staff and others present:
George Hayducsko, Chair	Joseph Kamelamela, Corporation Counsel
Alan Okinaka, Vice Chair	Keyra Wong, Deputy Corporation Counsel
Georjean Adams	Gregory Goodale, Solid Waste Division Chief
Steven Araujo	Mary Fujio, Assistant
Barbara Bell	Kiana Suganuma, Student Intern
Robert Ely	Dwight Miller, of Parametrix, Inc.
Adam Scharf	Neal Fukumoto of Wesley R. Segawa & Associates

12:15 p.m.: Chair Hayducsko called the meeting to order and announced all who were present. He stated that after they finished lunch, everyone was to meet outside at the van which had been arranged to provide transport.

Mr. Goodale added that safety vests would be provided to everyone where necessary.

12:28 p.m.: The group departed the Department of Environmental Management at 345 Kekūanāoʻa Street, Suite 41, Hilo, in a County of Hawaiʻi van.

EAST HAWAIʻI SANITARY LANDFILL:

Arrival time: 12:40 p.m.

Mr. Goodale drove to the top of the landfill, where everyone got out. He explained they were standing on the last section of the landfill, which would be closing late this year or early next year. He spoke about what the workers were doing and how the rubbish was compacted, drained, and covered after work each day. Once the landfill closes, it will be covered with a top similar to Astroturf. The DOT will not allow the County to expand the landfill in Hilo because of how it attracts birds, which are a problem at the nearby airport. Also, it will be cheaper to truck the rubbish to West Hawaiʻi than to build a new landfill.

EAST HAWAIʻI REGIONAL SORT STATION:

Arrival time: 1:13 p.m.

The sort station is a large metal building in which some the rubbish from the transfer stations is dumped. When time permits, staff will sort OCC, metal, and other recyclable material out of the trash. The remaining trash is picked up by a loader and placed into a trailer for transportation to the West Hawai‘i Sanitary Landfill.

EAST HAWAI‘I ORGANICS FACILITY:

Arrival time: 1:30 p.m.

Greenwaste is dropped off at this facility. The material is loaded into a machine which grinds it up into small pieces. The material is then laid out in windrows until it reaches a high enough temperature (130°) to kill invasive species. It is called enhanced mulch. Pallets are only accepted if they are made of untreated wood. There is no charge to drop off residential greenwaste. It costs $60,000 to $80,000 per month to operate the facility.

HILO RECYCLING AND TRANSFER STATION:

Arrival time: 1:42 p.m.

Mr. Goodale explained that the building in the front of the group is the HI-5 Redemption Center, across is the Reuse Center, and behind is the 2-bin system.

The group departed the East Hawai‘i facilities at about 1:45 p.m. and drove back to Hilo, where Mr. Kamelamela was dropped off at his office at 1:55 p.m. Keyra Wong replaced Mr. Kamelamela in the group.

PĀHOA RECYCLING AND TRANSFER STATION:

Arrival time: 2:30 p.m.

Everyone looked at the Thrift Store as well as the various recycling bins, trash chutes, and the greenwaste area. Mr. Goodale said the asphalt paving included recycled glass, and they were trying to incorporate some reusable product landscaping at the facility.

KEA‘AU RECYCLING AND TRANSFER STATION:

Arrival time: 3:22 p.m.

Everyone looked at the Thrift Store (two large tented structures), and viewed the various recycling bins.

At 3:53 p.m., the van headed back to the Department of Environmental Management. En route, Chair Hayducsko said that for next month’s field trip, the plan was to meet at the office again, and Ms. Adams and Ms. Bell would be picked up at the Waimea landfill, which is closer to where they lived. More detailed information would be provided as the date approached. Ms. Bell reminded everyone they were invited to her home for refreshments afterwards.

Motion and vote: Ms. Adams moved to adjourn, Ms. Bell seconded the motion, and all members voted aye.

The meeting adjourned at 4:12 p.m.

Respectfully submitted:

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Mary E. Fujio, Assistant

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

LIMITED MEETING MINUTES AND SITE VISITS

July 11, 2018
8:30 a.m. to 3:15 p.m.

Committee members present:

George Hayducsko, Chair
Alan Okinaka, Vice Chair
Georjean Adams
Barbara Bell
Paul Buklarewicz

Staff and others present:

Gregory Goodale, Solid Waste Division Chief
Gene Quiamas, Environmental Compliance Specialist
Tanya Buckley, Recycling Specialist II
Sherri Izuno, Recycling Specialist II
Kiana Suganuma, Student Intern
Dwight Miller, of Parametrix, Inc.
Neal Fukumoto of Wesley R. Segawa & Associates

8:30 a.m.: The group departed the Department of Environmental Management at 345 Kekūanāo'a Street, Suite 41, Hilo, in a County of Hawai'i van. The group consisted of committee members Hayducsko, Okinaka, Bucklarewicz, as well as Gregory Goodale, Dwight Miller, and Kiana Suganuma.

Mr. Goodale added that safety vests would be provided to everyone where necessary.

WEST HAWAI'I SANITARY LANDFILL:

Arrival time: 10:03 a.m.

The group met committee members Adams and Bell at the office and had a meeting with all committee members and staff listed present. There was discussion about the history of the landfill and an overview of the landfill in regards to acreage and the division of cells. It was also noted that this particular landfill is lined. The group proceeded to the top of the landfill for further discussion.

WEST HAWAI'I ORGANICS FACILITY:

Arrival time: 11:24 a.m.

Green waste is dropped off at this facility. Greenwaste is loaded into a grinder which grinds the material into mulch. Committee Chair Hayducsko led the discussion regarding the differences of the mulch process here at the West Hawai'i Organics Facility compared to East Hawai'i Organics Facility (EWOF). It was discussed that because there is very little moisture and it is hotter than Hilo, they do not need to process the mulch the same way as the EHOF. The facility also collects untreated and unpainted pallets, as they also do at the (EHOF). Sherri Izuno created a handout that shows a summary of the costs and volumes of commodities for the facility.

PUAKO RECYCLING AND TRANSFER STATION:

Arrival time: 11:43 a.m.

Mr. Goodale provided an overview of the 2-bin system at this location, and staff provided an overview of the other components of the site.

After leaving the Puakō Recycling and Transfer Station, the group convened at Ms. Bell's home for lunch.

WAIMEA RECYCLING AND TRANSFER STATION:

Arrival time: 1:13 p.m.

Mr. Goodale and Tanya Buckley explained how the Waimea location works in regards to the 2-bin system. Mr. Goodale also noted that a new Greenwaste drop-off was created, which is favored by residents and located towards the bottom of the transfer station. The group then looked through the reuse store and proceeded back to the van.

The group departed for Hilo, and the other Committee members (Ms. Adams and Ms. Bell) proceeded to go home.

The van arrived back in Hilo at 3:15 p.m.

Respectfully submitted:

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George Hayducsko, Chair

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

Meeting Minutes

Wednesday, August 8, 2018
1:02 p.m. to 3:05 p.m.
Aging and Disability Resource Center
1055 Kinoʻole Street, Suite 101
Hilo, Hawaiʻi 96720

Committee members present:

Georjean Adams
Steven Araujo (arrived at 1:14 p.m.)
Barbara Bell
Paul Buklarewicz
Robert Ely
George Hayducsko, Chair

Staff and others present:

Mary Fujio, Director's private secretary (DEM)
Dennis Lee, Wesley R. Segawa & Associates, Inc.
Dwight Miller, Parametrix (via phone)
Gene Quiamas, Environmental Compliance Specialist (DEM)
Katheryn Seckel, Parametrix
Keyra Wong, Deputy Corporation Counsel

Not present:

Alan Okinaka, Vice Chair
Adam Scharf, Member

1. CALL TO ORDER

Chair Hayducsko called the meeting to order at 1:02 p.m. He pointed out that a correction was needed on agenda item 5.a. The July site visit occurred on July 11, 2018, not on July 7, 2018.

2. APPROVAL OF MINUTES OF:

a. May 9, 2018, Meeting

Motion and second: Ms. Bell moved to approve the minutes, and Ms. Adams seconded the motion.

Chair Hayducsko said a correction needed to be made. Mr. Scharf was incorrectly listed as not present; however, he was present and made comments.

Mr. Buklarewicz wanted a correction made on page 3, where he said Recycle Hawai'i pulled in 225 tons of e-waste in a 12-month period at 38 cents per pound. He clarified that this is based on a 3-year average for both East and West Hawai'i.

Motion and vote: Ms. Adams moved to approve the minutes with the corrections, Ms. Bell seconded the motion, and all members voted aye.

b. June 13, 2018, Limited Meeting and Site Visits

Motion and second: Ms. Bell moved to approve the minutes, and Ms. Adams seconded the motion.

Ms. Adams noted that the phrase "commissioners present" needed to be replaced with "committee members present."

Motion and vote: Ms. Bell moved to approve the minutes as corrected, Ms. Adams seconded the motion, and all members voted aye.

c. July 11, 2018, Limited Meeting and Site Visits

Motion and second: Mr. Buklarewicz moved to approve the minutes, and Mr. Ely seconded the motion.

Chair Hayducsko pointed out that again the word "commissioners" needed to be replaced with "committee members" wherever it appeared.

Motion and vote: Ms. Adams moved to approve the minutes as corrected, Ms. Bell seconded the motion, and all members voted aye.

Chair Hayducsko introduced Katheryn Seckel, who is with Parametrix and works with Dwight Miller. He explained that Mr. Miller would be participating in today's meeting by phone, as he was not able to be there in person. He will be able to hear and can jump in if he needs to.

3. STATEMENTS FROM THE PUBLIC

No one from the public was present.

4. UNFINISHED BUSINESS

a. Distribute and discuss the "Draft Status of Hawai'i County's 2009 IRSWMP" recommendations.

Chair Hayducsko explained that he and Ms. Seckel would be tag-teaming on the various agenda items.

Ms. Seckel passed out two handouts, one a timeline for the report and the other a workbook for recommendations and options. She explained that the 2009 plan had extensive work put into it and is a good plan. She clarified that the SWAC's task is not to create a new plan, but to revise the plan with current and new information. It was brought to her attention that the process needed to move forward a little faster, so the timeline is aggressive but doable, given that they are revising the plan and not doing a total revamp.

Ms. Seckel said she is working with Dwight Miller for Parametrix. She explained her background and history in solid waste planning, and how it runs in her family. She created the *SWAC Workbook for Recommendations and Options* ("workbook), which is closely tied to the schedule and is designed to help the members make decisions. The objective is to engage the SWAC and County into looking at options and recommendations for the 2019 plan by starting with the 2009 plan. Since the members have visited the solid waste sites and are savvy on the current County conditions, they can focus on options and recommendations.

She explained that the members were being given homework, and they would have two weeks to do it. They were to look through the 2009 plan and make decisions. She provided instructions on how to use the workbook, which includes each recommendation in the 2009 plan, the chapter to find them, and the status of each recommendation. Their help is needed to determine whether to retain or remove a recommendation, and provide context and their own ideas. They can expand as much as they want.

Several members had questions about how to use the workbook, and Ms. Seckel and Chair Hayducsko provided answers. Chair Hayducsko said that if a member was interested only in certain sections of the plan, he/she could concentrate on those sections. They did not need to go through every single chapter and recommendation, but could focus on what they were most interested in.

It was decided the workbook needed to be made fillable so that members could type in their comments and ideas. The font also needed to be made bigger to make it more readable. Ms. Seckel said she would have someone at Parametrix convert the workbook into something the members could work with.

Ms. Wong reminded the members that they needed to do their homework on their own, without interacting with other members. At an open meeting, they can discuss everything.

Ms. Seckel stated that after she receives their input, the County will also provide input. At the September 12, 2018, meeting, the County and SWAC will come together.

She transitioned to the timeline handout, which showed the schedule. It goes chapter by chapter, showing when rough drafts are to be prepared, submitted to the County, and then to Parametrix by the County with comments. They are working with the County to make sure they

are accurately depicting existing conditions and want to get a somewhat complete draft to the SWAC before they start reviewing those existing conditions. They have already prepared rough drafts on several chapters.

Looking at the timeline, the SWAC members will have two weeks to look through and provide comments to the County on Chapters 3 through 7. The County will review and digest the SWAC's input. They will meet on September 12 to deliberate again and talk about options and recommendations. Parametrix will be paralleling them, working on an interim draft that will ultimately go to the SWAC for review. As the interim draft is being worked on, the SWAC will be making decisions on Chapters 8 through 10. Parametrix is slated to provide the interim draft on November 9, 2018. The SWAC will meet on November 14, 2018, where they can talk about their impressions and bring up any red flags. They County and SWAC will review and combine their comments together on the interim draft and submit it to Parametrix on November 23, 2018, and Parametrix will start working on the next draft, which will go to the State Department of Health ("DOH") by December 14, 2018. The DOH will have 90 days by law to review the preliminary draft. The SWAC does not have a meeting scheduled during the time the DOH will be reviewing the preliminary draft. A meeting will be scheduled as they get closer to the process.

Chair Hayducsko explained that the drafts Parametrix prepared so far are only on existing conditions, which need to be updated to show what is presently going on—how many transfer stations exist now, how many recycling sites, etc.

The SWAC members were instructed to do their homework and submit their recommendations and options to Mary Fujio by August 22, 2018.

Discussion was held on whether there is a way to prioritize recommendations, as some are definitely more important than others. Chair Hayducsko said they needed to figure out a mechanism on how prioritize as a group. Ms. Seckel suggested that to help prioritize, they could reflect on the goals that were established in the plan. All of the goals are on two pages, and perhaps they could prioritize based on the seven bullets there.

Ms. Adams asked why "resources" was not in the title of the plan now, and Chair Hayducsko said they are following what the state is calling the plan. The contents will be the same.

5. NEW BUSINESS

a. Summary by George Hayducsko of the June 13, 2018, and July 11, 2018, Limited Meetings and Site Visits and discussion regarding facility conditions.

Chair Hayducsko briefly summarized the SWAC's site visits. At the June visit they spent some time at the landfill itself, receiving an overview of the process. They also stopped by the sort station, where haulers and businesses dump their rubbish. While remaining in the van, they drove by the organics facility, the HI-5 Redemption Center, and the 2-bin recycling area. Then they visited the Pāhoa Recycling and Transfer Station and viewed the system there, and then made a quick stop at the Kea'au Recycling and Transfer Station.

On July 11, 2018, they visited the west side. First they saw the West Hawai‘i Sanitary Landfill, where Greg Goodale and Gene Quiamas provided an overview. They then saw the West Hawai‘i Organics Facility, and then the Puakō Recycling and Transfer Station. They had lunch at Ms. Bell's home. Their last stop was at the Waimea Recycling and Transfer Station, where a major issue is the heavy wind.

He heard from the members that signage and education are problems. Signs need to be updated, and more education is needed. The SWAC's goal as a committee is not to micro-manage but to make sure information, such as the signage and education issues, gets into the report.

He went around the table and asked each member for their thoughts from the site visits.

Ms. Bell said there has to be a way to have the security guards or transfer station attendants help educate people when they dispose of their trash. She knows there are union issues, but it is not acceptable when she goes to the Puakō Transfer Station and sees the worker just sitting there in his truck.

Mr. Buklarewicz said he still wonders why he can't bring his used motor oil to the transfer stations.

Mr. Ely said he uses the Kea‘au Transfer Station frequently and would say that about a third of the time, the bins are overflowing. In addition, there is a new contractor handling the Reuse Center, and the changes made there have not been for the better. Mainly, it is very messy.

Ms. Adams said she has the same comments as the others. There is a separate need for education. It is easier to throw things away than to recycle. She was sorely disappointed at the sort station in Hilo, because there is a lot of commercial waste that could be recycled. The signage also needs improving. There needs to be constant awareness and training. People just don't know what can and cannot be done. Management needs to be more on top of things. At the Waimea Transfer Station, which she uses, it is often overflowing. Pressure needs to be put on the people who run the thrift stores.

Mr. Araujo said he echoes everybody. The regional sort station was originally built as a reload station before Mayor Kim's administration, and he doesn't know how it got changed. The County needs better personnel management at the transfer stations, sort station, and landfills. Scrap iron and oil still get dumped. He sees commercial vehicles dumping their loads at the transfer stations. The recycle and reuse areas are like wayward thrift stores, with rusty and open containers of paint. A lot of the items people donate end up in the landfill because they are not stored properly. The County needs better contracts with vendors. Vendors need to be held to their responsibilities. The greenwaste system, on the other hand, is working perfectly and is nice and clean.

Chair Hayducsko thanked everyone for their comments.

b. Status of plan development and schedule.

Chair Hayducsko said this was already discussed, but if they had any questions, Ms. Seckel was there to help. Ms. Bell asked for clarification on when their work would be done, and Ms. Seckel answered that the SWAC is to try to complete their work in December. They may need to meet again, depending on the degree of comments received from the DOH.

c. County's proposed recommendations discussion.

(1) Proposed East Hawai'i Organics Facility update.

Chair Hayducsko asked Gene Quiamas to update them on the status of this new project. Mr. Quiamas said the EA is done and waiting to be published.

Chair Hayducsko presented several slides, showing a map of the project location and an aerial photograph of the area. He also showed slides of a typical process flow diagram, a conceptual site plan, an "unwinding device" and blower unit, and covered windrows. The proposed site is on about three acres at the Shipman Industrial Park. The facility is to be operated by Hawaiian Earth Recycling. The conceptual plan has a waste receiving area, biofilter, scale, office, and windrows. The composting will be aerobic. It will be a closed, controlled system and is on the high end for composting.

Ms. Adams asked where the organics will come from, and Chair Hayducsko said a lot of the material will be greenwaste and foodwaste. Exactly where the additional material will come from or how it will get to the facility has not yet been identified. The vendor has told the County they can make compost with what they have, but the County should look into capturing additional tonnage of organics and how to collect and transport the organics.

Chair Hayducsko said if the SWAC is concerned about how the organics facility will get the waste, they should include it in the report. Does a study need to be done to figure out where the material will come from? Can the food be picked up every day? These are a few of the questions that could be answered in a report.

The next slide showed the minimum annual tonnage which the County guarantees to HER and the tonnage guarantee starting July 1, 2020.

Ms. Bell asked if there was a contractor to build the facility and run it, and Chair Hayducsko said the County would be building it, and there would be a contract for the management and operation.

Mr. Quiamas said the draft EA is to be published on August 23, 2018. As soon as the County receives the funds, they will go into the design of the facility. The design is relatively simple. The vendor will need to go through some testing to ensure the compost being made meets the criteria set by the U.S. Composting Council. From there, the County can start taking in material for composting. The drop-dead date is July 1, 2020.

Mr. Araujo asked if the County bought the parcel from Shipman, and Mr. Quiamas said Shipman's indications are they want to lease. However, everything hinges on the outcome of the final EA. The land acquisition and design cannot be completed until the final EA is done.

Mr. Araujo said the intersection by Shipman Industrial Park is very dangerous, and it will be bad if the general public has to go there. Mr. Quiamas said the DOT has a project to fund and signalize that intersection during the next fiscal year.

(2) New technologies.

Chair Hayducsko said some members had asked him to check out BioEnergy Hawai'i. He has been playing phone tag with Guy Kaniho. He will try to get some information about the project and perhaps have Mr. Kaniho give a short presentation on it.

Ms. Seckel said there are a lot of new technologies out there, but they are very specific as to size of community, population centers, how much waste is generated, and what is trying to be done. The SWAC need to narrow what they want to look at—are they looking to reduce greenhouse gas emissions? Improve the sorting of recyclables? Improve the sorting of solid waste residuals before going to the landfill? Once the Committee identifies what needs to be improved, then a study can be done.

Ms. Adams asked if the waste characterization was going to be updated, and Chair Hayducsko said there is no plan to do a waste characterization study for the plan. However, if the SWAC recommends it, they can make that suggestion. Ms. Seckel said there was a 2008 study referenced in the 2009 plan, and she believes it would have similar results now.

Ms. Adams said she was just asking the question, as she wonders whether things have changed enough to warrant another study.

Mr. Araujo said that being a hauler, he feels how tonnage is calculated is wrong. It is the volume that should matter, not the weight. The landfill is not getting too heavy—it is getting too full.

Chair Hayducsko said waste composition studies are useful, but he is concerned because they always get just a snapshot of the waste, whatever was dumped in that timeframe. The waste could be very different in another hour.

Dwight Miller (via speakerphone) asked to weigh in on this. He said a waste characterization study could be done, focusing on those areas of greatest interest. Some major demographic and social changes have occurred in the past 10 years, particularly with online shopping and the packaging with that, and the types of plastics being used. A study would help get a better feel for the recyclables that are to go into the various facilities being proposed. He would like to do a waste characterization study and focus on those areas of particular interest to the County and where the best opportunities are for pulling material out of the landfill.

Mr. Araujo said before a waste characterization study is done, they may want to go back and look at previous studies done. One was done before the initiation of the tipping fee. The company that did the study went through and weighed everything that went into the landfill.

Ms. Bell said there was also a study done in 2002.

(3) Other potential options of emphasis for waste diversion: construction and demolition, cardboard, promotion and education.

Ms. Seckel that for a waste composition study, they would try to identify particular low-hanging fruit. In looking at the 2008 study, cardboard was an item that could use a better system. Not all transfer stations have the option of separating cardboard, so an idea that could be integrated into the plan is to separate cardboard at all stations.

The committee members discussed ideas on how to implement having cardboard recycling at all the transfer stations.

On construction and demolition, Ms. Seckel said it could stay on the island, as far as reusing materials from construction projects in new projects—such as reusing concrete. The permitting process could require commercial developers to do some sort of waste reduction plan. It has become more regulated across the nation. There are a lot of opportunities to reuse C&D material on the island.

Ms. Bell wondered how C&D material could be reused on the island, and Mr. Buklarewicz said there is an Oahu company that will be hiring in Kona to market C&D material. There is a big market for it.

Mr. Miller said there is some material, such as drywall and clean wood, that would have a strong market in certain locations. There are definitely opportunities to use it. It is also better to use a lot of this material, such as concrete and asphalt, as an inert fill rather than have it go to a mixed landfill where it is just mixed in with other garbage, which does not take advantage of the inert characteristics. When construction companies start identifying the materials they are generating, then markets will develop with vendors who will actually start using the material. It would also be good to have pre-demolition or pre-construction recycling plans for commercial projects so the recyclers out there can see what materials will become available and secure them for their recycling facilities. If the message gets out that materials are available, markets can be developed around them.

Regarding education and outreach, Chair Hayducsko provided an overview on what is being done this year. They have a budget to do education and outreach, but it concerns him that not enough is being done. They currently have $85,000 budgeted for the education and outreach project discussed. In developing the outreach, the first thing is to decide what message they want to get out to the public—it needs to be a message that reaches peoples' hearts. It should be simple to update their handouts and publications.

The next step is to develop signage at the transfer stations, which is on their schedule to do. Another step is to reach out to the community, through radio ads, TV, public service

announcements, and the newspaper, on how to use the recycling bins. They will be reaching out to schools to see if there can be public service announcements addressed at sporting events. He would also like to air PSAs at movie theaters.

The members discussed whether a local video designed to educate could be done.

Regarding the collection of used motor oil, Chair Hayducsko said they can do a better job of promoting this program.

d. Status of 2009 Plan and new options and recommendations – moving forward.

Chair Hayducsko said they have covered this already. He reminded the members to send their homework and any ideas to Mary Fujio, who will collect them and forward them on to Parametrix.

6. ANNOUNCEMENTS

Chair Hayducsko announced the next meeting: September 12, 2018, at the same time and place.

7. ADJOURNMENT

Motion and vote: Ms. Bell moved to adjourn, Ms. Adams seconded the motions, and all members voted aye.

The meeting adjourned at 3:05 p.m.

Respectfully submitted:

Mary E Fujio

Mary E. Fujio
Private Secretary to the Director

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

Meeting Minutes

Wednesday, September 12, 2018
1:01 p.m. to 3:50 p.m.
Aging and Disability Resource Center
1055 Kinoole Street, Suite 101
Hilo, Hawaiʻi 96720

Committee members present:
Alan Okinaka, Vice Chair
Robert Ely
Barbara Bell
Paul Buklarewicz
George Hayducsko, Chair
Steven Araujo (arrived at 1:05 p.m.)

Staff and others present:
Mary Fujio, Director's private secretary (DEM)
Keyra Wong, Deputy Corporation Counsel
Gene Quiamas, Environmental Compliance Specialist (DEM)
Tina DeMello, Clerk III (DEM)

Others present:
Katheryn Seckel, Parametrix (via phone) Consultant
Nancy Cook Lauer, West Hawaiʻi Today reporter

Not present:
Georjean Adams, Member
Adam Scharf, Member

1. CALL TO ORDER

   Chair Hayducsko called the meeting to order at 1:01 p.m.

2. APPROVAL OF MINUTES OF: August 8, 2018, Meeting

   Motion and Vote: Ms. Bell moved to approve the minutes, and Mr. Okinaka seconded the motion. All members voted aye to approve minutes.

3. STATEMENTS FROM THE PUBLIC

   No statements from the public

4. UNFINISHED BUSINESS

a) Discussion on the June 13, 2018, and July 11, 2018, Limited Meetings and Site Visits by Committee members who were absent from the August 8, 2018, meeting.

Chair Hayducsko explained that committee members spent a lot of time on tours in June and July and mentioned that since Mr. Okinaka and Mr. Scharf were not able to make the last meeting he would like to give them the opportunity to give their thoughts, concerns, or if they had anything to share with the committee.

Mr. Okinaka started with the top thing that he RETAINs thinking about is the fact that we call the sort station a sorting station; and that he feels that the facility should be made into a sorting station. When Mr. Okinaka observed the sort stations operation on the tour, he felt that the sort station is simply a place to load trucks indiscriminately. He observed that there was a lot of plastics and metals that were loaded into the truck that went to the landfill. He thinks it is a good idea for sorting out recyclables. He suggested a robotic sensing sorting system, where the machine could pick out recyclable materials and that it would be more rapid and accurate. Mr. Okinaka explained that the robotic sensing system would detect metals and plastics and then sort it out of the trash before getting loaded into the trucks that would going to the landfill. Mr. Okinaka believes that sorting is a good idea and we need to do it. He was very disappointed to see that it was called a sorting station when it is more of a transfer station.

Mr. Okinaka really likes the reuse stores. He would like to know how we could get the public to know more about the County's reuse stores. He suggested that the reuse stores have an online catalog with a list of what items the stores have available for sale.

Mr. Okinaka stated that he agrees with a lot of the comments made in the last meeting minutes. He agrees that the transfer stations and recycling areas need more signage. He observed that there are a lot of bins in the recycling area with a mixture of things and that he doesn't blame the public for putting the wrong items into the wrong bins due to the lack of signage.

Mr. Okinaka would like to see if the committee could find a way to reuse plastics of all sorts. He stated that it would be good to have the possibility to recycle, reuse and reengineer plastics here on the island instead of sending it off island. He wanted to advise the committee that China is not taking dirty plastics any more.

Ms. Bell's overriding thought is that the security guards at the transfer stations could provide recycling education/help. She would like to suggest maybe we could start gentle and have the security guards offer to help break down a cardboard boxes to put into the recycling bins.

Chair Hayducsko advised that the Solid Waste Division currently have two employees on light duty posted at the recycling area on both the east and west side of the Island.

He explained that the light duty employees are educating the public about recycling. He said that we are seeing a good return for the time spent out there. He also advised that the workers are directing commercial entities/businesses not to use the residential transfer stations and informing them of what alternatives are available for them. Chair Hayducsko stated that it is working out really well and it would be nice to have someone at the recycling areas at the transfer station semi full time.

Mr. Okinaka asked if it were possible to not make our transfer stations look so dumpy. He felt that the Pāhoa, Waimea and Kea'au transfer stations looked nice. But, he also felt that Puakō and Hilo transfer station looked dumpy and depressing. He was wondering if there was a way to make the transfer stations look better.

Chair Hayducsko advised that the Department does have a schedule on improving each site. However, Chair Hayducsko doesn't know the actual schedule but, wanted to assure the committee that there will be improvements to each site over time.

Mr. Buklarewicz advised the committee that the sort station was originally designed as just one small component of a large system approach. He also explained that a few years back both he and Ms. Bell had attended a brainstorm meeting at the Naniloa Hotel that was facilitated by the late Jim Channon. He went on explaining that at that meeting there were drawings made of a big circular Resource Recovery Center. He also explained that the Resource Recovery Center included composting and windrows, as well as reuse operations and recycling. Mr. Buklarewicz said that the sort station was just one piece and that's probably why it is not being used for the purpose that it was originally intended for.

Chair Hayducsko let everyone know that Kathryn Seckel with Parametrix attending today's meeting via conference phone.

b) Review, discuss and categorize Chapters 3-7 of Hawai'i County's 2009 ISWMP Recommendations and Options.

Chair Hayducsko handed out the survey result of the SWAC Workbook of Recommendations and Options for Chapters 3 – 7. Chair Hayducsko wanted to thank the committee members on the feedback given and that there were a lot of excellent comments and concerns noted. And he advised that the committee would be going over the chapter references today. He estimated that there would be 93 items to go through. He also explained that when going through the workbook they would be agreeing on either retaining recommendations or removing recommendations.

Chapter 3" Source Reduction

Chapter Reference 3.5.2 and 3.6 (1) –

Develop County policies or ordinances that mandate cert actions to be taken to reduce the source of waste currently entering landfills – **RETAIN**

Develop ordinances requiring that a waste reduction plan be submitted to obtain commercial or residential building permits – **RETAIN**

Chapter Reference 3.5.9 and 3.6 (1) -

Develop EPR policy statements or resolutions expressing strong support initiatives that require manufacturers of certain products or materials to take responsibility of the life cycle costs of their products – **RETAIN, but reword and refocus and combine with reference below.**

Ms. Bell suggested dropping it because County probably does not have any resources to do this and that this would be more of a State effort.

Mr. Ely also agrees with Ms. Bell and stated that at this level we would be wasting our time and this should be done further up the food chain.

Ms. Bell said that County policy statements and resolutions do not carry enough weight for this action to be effective.

Chair Hayducsko explained that as a County, it is good to work with other Counties in the state and as a group they should pitch what is agreed upon to legislature.

Chair Hayducsko also explained that there are a few EPR Programs that the County is working with right now which includes the Bottle Bill, HI5 Program; the E-waste Program where we are receiving money from the manufacturers to manage our e-waste; Advance Disposal Fee for glass, which importers pay per container. It does take an enormous amount of time to implement an EPR program; but, it can be effective once implemented because it forces manufacturers to be more responsible and look at the whole process especially if they have to take the back their product.

Ms. Bell would like to recommend that the solid waste and/or recycling staff to get together each year and make a list and pick off a project or two. She suggested to maybe start with tires; and said that there could be at least fifteen things to put on a list.

Mr. Araujo suggested to RETAIN this section but re-wording it to make it more realistic. He suggested to word it as a future project; list a time span in the wording that would make it more acceptable.

Ms. Bell asked if there is a time frame for the recommendations section; and if we are we prioritizing recommendations in the workbook.

Chair Hayducsko answered that he and Katherine are working a procedures and hoping to have a procedure established by next meeting.

Mr. Okinaka asked what is the initial thought or purpose of this section.

Chair Hayducsko explained that this section is to make manufacturers more responsible for their products with the hope to make remanufacturing easier. The hope would be that, manufacturers would make their products less toxic and make it easier to recycle. Also, hoping to put the responsibility on the manufacturer to recycle their product; rather than the government.

Implement a campaign to develop EPR for difficult-to recycle products, and lobby state and federal lawmakers to advance EPR initiatives – **RETAIN, but reword and refocus and combine with chapter reference above. Focus on finding ways to communicate to State and Federal Lawmakers as well as working together with other counties to prioritize a list.**

Chapter Reference 3.5.1 and 3.6(1)

Implement a County government source reduction program, by implementing policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies. – **RETAIN**

Chapter Reference 3.5.5 and 3.6 (2)

Implement PAYT program or other funding method – **RETAIN**

Ms. Bell commented that this is a critical section and that we need to move in this direction.

Mr. Araujo believes that if we start charging people to throw away their rubbish at the transfer stations, that people will be dumping trash all over the place. He sees illegally dumping daily even though going to the transfer station is free. He feels that there should be some kind of strategy for this program.

Ms. Bell commented that it would take at least two years of education to get people to understand. Starting with step 1 – start by issuing a sticker for your bag, but it's free. Then the stickers would be $.05 cents, then $.25 cent to $4.00. She suggested to start with a slow approach.

Mr. Buklarewicz commented that when doing research on any successful PAYT program; that you would see a spike in illegal dumping; but, it would level off after a while. He said that the people that choose to illegally dump will continue dump illegally and that would be problem to be addressed separately.

Mr. Araujo would like to know who will be responsible for the trash that is being illegally dumped. He would like to know if it would it be the government that will be responsible to pick it up and dispose of it or would it be the landowner, who would need to pay a tipping fee to throw it away? He said that this should be a thing that is really thought out before implementing.

Chair Hayducsko suggested that as a group we could recommend doing a study and look at what options are out there and at the same time get the communities involved.

Chapter Reference 3.5.4 and 3.6(3)

Expand reuse facilities, including improving and expanding services at the existing facilities located at Kea'au, Laupāhoehoe, and Keauhou, and construction of new reuse facilities at other recycling and transfer stations. – **RETAIN**

Ms. Bell would like to suggest to improve reuse facilities and that she doesn't believe that we need to add more facilities.

Chair Hayducsko said that the reuse facilities already provide great service and that it would not hurt to provide better service to the community by having better facilities.

Mr. Buklarewicz suggested that we should expand services in areas such as Household Hazardous Waste; instead of having occasional twice a year programs. He suggested that we should train reuse facility operators to accept Household Hazardous Waste type material.

Mr. Okinaka thought for expanding services meant that the public would bring stuff in to the reuse centers and the staff would repair it, then selling it.

Chair Hayducsko explained that items that are donated are sold as is, and that there is no mass repair area available at the reuse facilities.

Chapter Reference 3.5.11 and 3.6(3)

Develop public-private partnerships with organizations such as Goodwill Industries to develop reuse centers at existing outlets within the County. - **Reword to continue to develop partnerships with organizations…**

Mr. Araujo would like to get more clarity because there is no details involved. If the County would make a partnership with an organization; would the public than be taking the materials to the counties facilities, or the organizations facilities, or half and a half?

Chair Hayducsko said that at this time the County is listing organizations such as Goodwill as an entity to donate reusable items to on our website.

Mr. Okinaka asked how is what the Goodwill Industries doing anything different from what the County's reuse centers are doing.

Chair Hayducsko said that he felt that both entities provide similar service, but said that the transfer station is a one stop shop for many people. He stated that it is convenience for people to donate their items at a transfer station reuse stores when they get rid of their trash.

Chapter Reference 3.5.2 and 3.6(4)

Develop a business waste audit and education program to foster source reduction within the local business community. **RETAIN**

Chair Hayducsko noticed that in one of the comments questioned if the County had enough capacity, and he assumes that the comment was referring to staffing. He explained that the County doesn't have adequate staffing to do business outreach and education. . It is hard to get everything done that we are currently trying to achieve. There is a business workbook out there that we should give to businesses to use. He asked if there was any discussion from the committee.

Mr. Okinaka said that when you have source reduction, that the idea is to really reduce the amount stuff that comes in.

Mr. Araujo said that consumers generate trash because they purchase the trash and that whatever we buy comes with rubbish. He explained that the main thing that everybody buys is food. Mr. Araujo said that when he was growing up he remembered that they would purchase their meat wrapped in pink paper and that today when we buy meat in the store, we get Styrofoam and a plastic wrapping. Why do we need the Styrofoam, why do we need the plastic wrapping? He said if we eliminate those items we would have a three point source reduction. He also said that in this education program we should educate consumers and supermarkets on island and statewide.

Ms. Bell wondered if DOH had changed their regulations to eliminate the pink paper wrapping. Ms. Bell would like to recommend that we encourage or inform businesses to utilize the business workbook.

Mr. Araujo suggested that we should educate the business owners, local and statewide. Take for instance the government enforced a Styrofoam band and pissed off everybody, and that is what you don't want to do. You want to ease in on the approach so businesses can be relaxed and be compliant.

Chair Hayducsko would like to RETAIN this section and work with businesses.

Chapter Reference 3.5.3 and 3.6(4)

Develop a visitor industry waste reduction education program that includes promotional events or advertisements targeting specific sectors of the visitor industry. **RETAIN**

Chapter Reference 3.5.8 and 3.6(4)

Develop a reuse education, outreach, and public awareness campaign to encourage public participation and use of the reuse centers. **Reword to remove Develop and change to continue to.**

Chair Hayducsko read a comment from the committee members under remove as recommended notes that the reuse centers really should sell themselves. Chair Hayducsko

said that other programs need advertisement constantly and agrees that if you have a good program, it really should sell themselves.

Ms. Bell said that it is not a bad recommendation, but is very broad approach outreach and public awareness.

Chair Hayducsko agrees with Ms. Bell. He said that it don't need to develop but to continue public awareness.

Ms. Bell said that an ideal plan or recommendation would be a couple pages and referenced to discuss and this workbooks feels really unreal to her.

Mr. Okinaka said that this falls in line with one of the things that he had recommended and suggested that a data base to what's available at the reuse centers would be a great idea.

Chapter 3: Source Reduction - Options that didn't become a recommendation

Chapter Reference 3.5.6

Expand the home composting program with aggressive promotion campaign with at least a 25 percent single-family households target in five years **RETAIN as an option.**

Chair Hayducsko said that this was a very successful program for Recycle Hawaii.

Ms. Bell felt that this was the most beneficial program for reducing source reduction into the landfill. Ms. Bell asked if households will be taking food waste to the County's composting locations.

Chair Hayducsko explained that it hasn't been identified on how we are going to be collecting the residential food waste; a study hasn't been done and that we don't know how much food is out there.

Ms. Seckel added that Parametrix did some research per Chair Hayducsko' s request and found that there are quite a few areas across the continuous united states that have transfer site systems for composting. Other states provide a place for people to dump their food waste specifically. She also added that there are specific systems in place where they provide the people with compostable bags or people purchase the bags. She explained that it does occur and has been successful. There are a lot of rules and a lot of education behind it; but, it is happening.

Chair Hayducsko suggested that we should do a study on how to capture the food waste for the County's compost facility.

Mr. Araujo said that we should leave this as an option. He said that when looking at the whole composting option, he feels that it won't work. He said that there isn't enough rubbish to make compost and we are going to end up with mulch. He said that we should really focus on the program.

Chapter Reference 3.5.7

To expand the reusable bag program, the County could significantly increase the number of reusable bags that are distributed to residents, and increase its outreach to encourage participating grocery stores to increase the financial discount for using reusable bags. **Remove option**

Chapter Reference 3.5.9

Build capacity and knowledge among local governments, and build relationships with stakeholders, to bring about producer financed and managed systems for product discards, including, but not restricted to, products covered by the Universal Waste Ban. **Remove option**

Provide a forum for the exchange of information regarding existing and proposed EPR programs. **Remove option**

Provide effective leadership on EPR initiatives in California and develop a prioritized list, with timelines, of future EPR programs. **Remove option**

Chair Hayducsko would like to RETAIN the strategy from the first page in regards to EPR.

Ms. Bell asked what we are going to do with the committee's comments that was suggested, she said that she feels that a lot of the comments are really good. She wanted to know if the comments were going to be included as part of the plan.

Ms. Seckel answered that it isn't unheard of to included comments into the plan and that it wouldn't be a problem to include it into the appendix. She said that it would be good and that it would add value if people could see the chain of thoughts throughout this process.

Ms. Bell was hoping to have some of the comments worked into some of the language of the recommendations.

Ms. Seckel agreed that we could include some of the comments, but may not include every comment into the body. She believes that if it is going to add value and context, that it is something be thoughtful about.

Educate elected and appointed officials and other decision makers on the benefits to local government of EPR. **Remove but added to EPR section on the first page**

Chapter Reference 3.5.10

In order to encourage local innovation and participation the County could fund community zero waste initiatives with fees levied on landfill disposal **Remove option**

Chapter 4: Recycling, Bioconversion, and Markets

Chapter Reference 4.5.5, 4.6.R (1) and 3.5.2

Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates **– RETAIN**

Chapter Reference 4.5.5 and 4.6.R (1)

Establish a differential tip fee ordinance encouraging landfill users to recycle by charging higher fees for certain recyclable material. – **Reword**

Chair Hayducsko suggested to change language to encourage landfill diversion. We should structure our tipping fees induce or increase fees as needed.

Mr. Buklarewicz advised that on the island of Oahu, if customers brings in a load with majority of recyclables in it; they would not only get rejected from disposal but could also get banned from disposing at the landfill.

Chapter Reference 4.5.5, 4.5.6(1), 4.5.9 and 4.6.R (1)

Establish an ordinance mandating businesses and institutions to recycle select materials. **– RETAIN**

Ms. Bell personally believes that we should mandate majority of recyclable materials.

Mr. Araujo would like to RETAIN this section. Mr. Araujo believes that we should put definitions on what can and should be recycled, and make it clear for the public. He said that we should have a list of common things that can be recycled.

Mr. Okinaka would like to add a list of businesses that recycle items as well what happens to the end product. His example would phonebooks he would like to list where they can be taken to and what the materials are being turned into.

Chapter Reference 4.5.10 and 4.6.R (1)

Develop legislation requiring multi-family unit's owners to provide recycling services. **– RETAIN**

Change County procurement policies to require the use of recycled glass, organics, and other materials to the extent practicable. – **Remove from recommendation to option**

Chapter Reference 4.5.8 and 4.6.R (2)

Work with County and State legislators and encourage other communities in the region to adopt zero waste goals and plans. **– RETAIN**

Chapter Reference 4.5.11 and 4.6.R (2)

Conduct research and coordinate with legislators and waste manages within Maui, Kauai, and Honolulu Counties, to evaluate the potential for combining efforts to develop a statewide zero waste strategy. **– RETAIN and combine with Chapter Reference 4.5.8 and 4.6.R (2) above**

Lobby the State to change school waste collection contracts to mandate that recycling services are included. **– RETAIN**

Chapter Reference 4.6.R (3)

Complete capital projects to facilitate implementation of expanded recycling programs. **– RETAIN**

Chapter Reference 4.5.5 and 4.6.R (3)

Expand recycling opportunities at recycling and transfer stations by modifying infrastructure to accommodate recycling processes. **- RETAIN**

Improve signage at recycling and transfer stations. **- RETAIN**

Chapter Reference 4.5.3(2) and 4.6.R (3)

Reconfigure the East Hawai'i Regional Sort Station Reload Facility for use as a MRF while the SHSL is active. **Remove indicating that it is going to be used as a transfer station**

Chair Hayducsko advised that facility will be used as a transfer station to transport waste to the west side when the landfill closes.

Chapter Reference 4.5.6(4) and 4.6.R (4)

Construct a new materials recovery (bailing and storage) facility for West Hawai'i. **- REMOVE**

Chapter Reference 4.5.6 and 4.6.R (4)

Expand opportunities for commercial recycling. **- RETAIN**

Chapter Reference 4.5.6(2) and 4.6.R (4)

Allow small businesses to use the recycling and transfer stations to recycle selected materials. **- RETAIN**

Ms. Bell thinks that pay as you throw will resolve issue with businesses using the residential transfer stations.

Chapter Reference 4.5.6(3) and 4.6.R (4)

Modify the operating permits of the recycling and transfer stations to accommodate expanded recycling services by working with the HDOH. **- RETAIN**

Chapter Reference 4.5.6 and 4.6.R (4)

Hire one full-time staff member to serve as commercial recycling specialist. **– REMOVE**

Mr. Okinaka asked what a recycling specialist is.

Chair Hayducsko explained that we have 2 HI5 recycling specialist that manages HI5 island wide. There is also 2 recycling specialist that manage other programs island wide i.e. Household Hazardous Waste and composting (just to name a few). There are 5 people total in the County's recycling section.

Expand business education and outreach programs for large and small businesses. – **RETAIN**

Chapter Reference 4.5.12(1) and 4.6.R (5)

Expand opportunities to recycle in public areas and during public events. – **RETAIN**

Install recycling bins in parks and other public areas. – **RETAIN**

Chapter Reference 4.5.12(3) and 4.6.R (5)

Conduct additional recycling events within the community each year. – **RETAIN**

Chapter Reference 4.5.12(4) and 4.6.R (5)

Implement and expand the Recycling Art campaign in public schools. – **REMOVE**

Chapter Reference 4.5.3(3) and 4.6.O (2)

Improve education and outreach programs that promote improved management of organics. – **RETAIN**

Chapter Reference 4.5 and 4.6.O (2)

Hire one full-time staff member to serve as the organics program coordinator. – **REMOVE**

Chair Hayducsko explained that our contract with Hawaiian Earth Recycling requires HER to provide marketing and education. He said that this section can be reworded to say that we are already doing this.

Ms. Bell wants to make sure that not too much organic materials are going into the landfill. She would like to also confirm that organics program is going as intended.

Chapter Reference 4.5.5 and 4.6.O (2)

Expand and further develop a master composter program. – **RETAIN combine with 3.5.6 (first option under chapter 3)**

Ms. Bell believes there is a need for a home composting program; so the county program doesn't see the waste.

Chapter Reference 4.5 and 4.6.O (2)

Develop a training program and guidance materials for farmers – **RETAIN**

Mr. Araujo suggested to change word farmers to gardeners

Implement a "stop wasting food" program with local food banks. **– RETAIN**

Partner with other local groups to establish compost demonstration gardens at recycling and transfer stations and other community locations. **– RETAIN**

Mr. Buklarewicz explained that the Laupāhoehoe School included composting as part of their curriculum, and that it is also happening in schools in Kohala. The way the county got involve was to partnership with Recycle Hawai'i by providing composters to schools and communities.

Chapter Reference 4.5.10 and 4.6.0 (3)

Initiate an on-site composting program for residents and businesses by distributing subsidized units to both residences and businesses. **– RETAIN**

Chapter Reference 4.5.5 and 4.6.0 (4)

Conduct a study to evaluate the potential for implementation of landfill ban on organics. **– RETAIN reword to investigate banning organics from the landfill**

Chapter Reference 4.5.6(4) and 4.6.0 (5)

Implement added organics management facilities and equipment **– Reword and combine with next 2 chapter references below**

Mr. Buklarewicz suggested to have mulch pick up available at rural transfer stations.

Chapter Reference 4.5.5 and 4.6.0 (5)

Add green waste drop-off locations at recycling and transfer stations. **– RETAIN**

Chapter Reference 4.5.1 and 4.6.0 (5)

Process green waste drop-off locations at select recycling and transfer stations. **– RETAIN**

Chapter Reference 4.5.7 and 4.6.0 (5)

Develop an organics composting facility at the WHSL or other sites. **RETAIN and reword to maintain/continue organics facility at the WHSL.**

Chapter Reference 4.5.5 and 4.6.0 (5)

Investigate opportunities for pilot food waste demonstration projects for the eventual expansion into full-scale food waste management programs. **– RETAIN**

Mr. Araujo believes that the County is missing a lot of steps to ensure that the composting facility receives an adequate amount of food to make compost.

Mr. Buklarewicz did a food waste study with Mr. K's Drive Inn and found that the food waste would need to be mixed in with other material or it will burn(kill)the plants.

Chapter 4 Recycling, Bioconversion, and Markets – Options that did not become recommendation:

Chapter Reference 4.5.2

Develop of a curbside collection program for the processing of recyclables from residents. **– RETAIN as an option and change the word Develop to Research and Investigate.**

Mr. Araujo believes that we should define recyclables.

Ms. Bell believes that we should do a pilot program.

Chair Hayducsko said that we would need to do a study and investigation on curbside recycling.

Chapter Reference 4.5.3

Integrate greenwaste into a residential curbside recycling and greenwaste collection program. **– RETAIN and move to Recommendation to include option below**

Chapter Reference 4.5.4

Integrate food and other organics into a residential curbside recycling and greenwaste collection program. **– RETAIN and combine with option above**

Chapter Reference 4.5.9

Coordinate with other Hawai'i counties and State government for potential market development opportunities. **– RETAIN as an option**

Chapter Reference 4.5.12(5)

Expand visitor industry recycling at hotels, resorts, and other businesses that service the Hawai'i County visitor industry. **– RETAIN as an option – combine with previous chapter in regards to visitor industry.**

Chapter Reference 4.5.12(6) and 4.6.O (1)

Promote both large and small scale private organics composting operations by modifying zoning rules and County codes. **– RETAIN as an option**

Chapter Reference 4.5.12(7), and 3.5.1

Source reduction related to C&D waste, extended producer responsibility, pay as you throw system, and zero-waste fund. **– Did not decide to RETAIN or REMOVE**

Ms. Bell Moves to approve the discussion and results of Chapters 3 and 4; Mr. Araujo 2nds the motion. All in favor voted aye. Motion Carries

5. NEW BUSINESS

a) Chair Hayducsko has not secured a short presentation with Bio Energy and will continue to pursue a meeting.
b) By Friday the committee will be getting the task for Status of 2009 Plan and new options and recommendations for Chapters 8 – 9

6. ANNOUNCEMENTS

Next meeting is scheduled for October 10, 2018 at the ADRC Training Room at 1055 Kinoole Street, Ste#101 Hilo, HI 96720.

7. ADJOURNMENT

Motion and vote: Mr. Buklarewicz moved to adjourn, Mr. Ely seconded the motion, and all members voted aye.

The meeting adjourned at 3:50 p.m.

Respectfully submitted:

_____

Tina DeMello

Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

Meeting Minutes

Wednesday, October 10, 2018
1:00 p.m. to 3:52 p.m.
Aging and Disability Resource Center
1055 Kinoole Street, Suite 101
Hilo, Hawai'i 96720

Committee members present:
Adam Scharf
Alan Okinaka, Vice Chair
Robert Ely
Paul Buklarewicz
George Hayducsko, Chair
Georjean Adams

Staff present:
Diana Mellon-Lacey, Deputy Corporation Counsel (in place of Keyra Wong)
Tina DeMello, SWD Clerk
Greg Goodale, SWD Chief (arrived at 1:17 p.m.)

Also present:
Greg Larson, Cost of Government Commission
Dayday L. Hopkins, Cost of Government Commission
Jenipher Jones, Cost of Government Commission
Daniel H. Cunningham, Member of the public
Paul Montague, Member of the public

Not present:
Barbara Bell, Member
Steven Araujo, Member

1. CALL TO ORDER:

   Chair Hayducsko called the meeting to order at 1:00 p.m.

2. APPROVAL OF MINUTES: September 12, 2018, Meeting

   Mr. Buklarewicz noted that a correction was needed on page 4 and 5 in the extended producer responsibility section the word manufacturer is spelt five times as manufacture. Mr. Okinaka caught the same thing.

Mr. Okinaka said that a lot of the comments made by members says that we feel or we felt as if it were an unqualified observation and said that the comments are qualified statements.

Mr. Buklarewicz also noted that a correction of the word choose should be in place of the word chose in regards to illegal dumping.

Motion: Vice Chair Mr. Okinaka moved to approve the minutes; Mr. Buklarewicz 2nd the motion.

Vote: All members preset voted aye to approve the minutes with the corrections.

3. STATEMENTS FROM THE PUBLIC:

For the record, Chair Hayducsko read a statement received by email in regards to pay as you throw program:

Email read: I just read the article in the West Hawai'i Today that said the Solid Waste Advisory Committee is proposing a pay as you throw program. If you want to increase recycling, you must have a better recycling program and empty your bins more frequently. Also, the photo shows a woman throwing out her recyclables in a plastic bag. Another trash bag is seen in the photo. These are not recyclable items. Hawai'i County is the worst place that I have lived for recycling. I would like to get on the Solid Waste Advisory Committee to try to make a better program for everyone. Thanks, Paul

One member of the public, Daniel Cunningham, had signed up to testify.

Daniel H. Cunningham: Mr. Cunningham brought a book with him titled Seasteading; he explained that the book goes into deep depth on the subject of 3D printing and he sees that is the only future for our children of this aina. Mr. Cunningham explained that he has been going to public meetings for over thirty years and he's been hearing same things and same problems over the years and he believe there needs to be an increased value in trash. He said that the only way that he sees an increase value in trash is through 3D printing and creating a local economy where recyclables such as plastic bottles can be made into local building materials where it has twice the value and the people would be more inclined to recycling it. He said that Seasteading is book written by Joe Quirk and said that it is a science book. He also said that it is written in layman's terms and that there is a lot of science in it that he has never heard of. He said that it is a very impressive book and he recommends anybody to please check this book out and he thinks that this book could answer solid waste problems. He said that the technology of 3D printing is moved to where you can make any aviation part for any airplane high tech alloys involving very high-quality 3D printing. He suggested to implement 3D printing locally to where we could make anything and we would not need to have anything shipped in with Matson. Mr. Cunningham said that if 3D printing becomes a reality of this aina and we colonize the ocean and turn this island back into a bird sanctuary and he believes that it is the only way to truly create a future for our children.

4. UNFINISHED BUSINESS:

4a. Bio Energy Hawai'i presentation.

Chair Hayducsko explained that the Bio Energy Hawai'i representative was unable to make it to this meeting. He also explained that a committee member had asked if they were able to reach out to Bio Energy Hawai'i on their own as an individual or committee member and he doesn't see anything wrong with that. He said that we could reach out to people in that industry and find out more information. Chair Hayducsko said that because of the sunshine law we shouldn't do it as a group. Ms. Mellon-Lacey clarified that we can't conduct any discussion about this group's business or discuss anything that would be moved towards a vote or promise any specific direction; but, as an individual for informational purposes is fine.

4b. Cost of Government (COG) Commission presentation on their purpose and goals.

Greg Larson: Mr. Larson is a commissioner for the Cost of Government Commission here to do a presentation he is here along with Dayday Hopkins and Jenipher Jones who are also COG commissioners. Mr. Larson explained that the COG commission has nine members in their group total and he is here representing the Sanitation sub-committee that included both himself and Ms. Hopkins. He also advised the SWAC members that Ms. Jones is the Chair person for the COG commission. Mr. Larson handed out documents on what he is going to cover today. He explained that the COG commission is tasked with the study of all County Departments, Commissions and Boards and to look into the finance and cost of everything that the County's government is doing. Mr. Larson said that when looking at the County's finances in whole the COG commission is focusing on specific portions that would make the heaviest effect. He went on explaining that the commission is looking at each Department individually and they have chosen a number of individual Departments to scrutinize and get more information than what is readily available and that one of those they are looking into is Solid Waste. He asked for the committee to look at the last page of the handout that list the last COG recommendations for the Department of Environmental Management. The COG goal is to coordinate more with departments and committees to find out what those goals are and reinforce those with the COG's report when done with information gathering. He advised that they are there to gather information and support the SWAC so we would have more voices going in the same direction and he said that they believe that it is there best tool to have something positive happen. COG goal here today is to gather information and take it back to their commission, but most importantly they are here to support our SWAC. Mr. Larson said that Ms. Hopkins had put together a list of questions for the Department to generate discussion. Chair Hayducsko advised that he would take the questions back to the Department and ask them to respond to the questions from the COG.

5. NEW BUSINESS:

a. Review, discuss and categorize Chapters 5–9 of Hawai'i County's 2009 Integrated Solid Waste Management Plan's (ISWMP) Recommendations and options.

Chapter 5: Public Education and Information

Chapter Reference 5.5.1 and 5.6 (1)
Implement a 3-year zero waste education and social marketing program to educate the public and business community about zero waste initiatives and opportunities. **- RETAIN, but change 3-year zero waste to ongoing landfill diversion.**

Chapter Reference 5.5.1 and 5.6 (2)
Hire one full-time staff member to serve as the zero waste program coordinator. **- RETAIN, but reword to appropriate staff.**

Chapter Reference 5.5.4 and 5.6 (3)
Implement a community-wide social marketing plan. **- RETAIN, DEM website and Mayor's page**

Chapter 5: Public Education and Information – Options that didn't become a recommendation

Chapter Reference 5.5.2
Develop unified promotional material, including a theme, slogan, and/or logo. **- RETAIN as an option**

Chapter Reference 5.5.3
Conduct a waste management attitude survey to assess public attitudes about waste management in the County. **- MOVE to recommendations.**

Chapter Reference 5.5.4
Expand existing advertising and marketing efforts, such as through expansion of the County's website and increasing participation at community events. **- RETAIN as an option**

Chapter Reference 5.5.5 and 4.6.R (5)
Expand school education programs to incorporate a range of age groups and zero waste concepts. Mandate hauling contractors that service schools to haul recyclables. **- RETAIN as an option**

Chapter Reference 5.5.6
Expand business education programs to include expanded educational material as well as individual technical assistance for business owners and trade groups. **- MOVE to recommendations**

Chapter Reference 5.5.7
Develop visitor industry educational and promotional programs and materials. **- RETAIN as an option**

Chapter Reference 5.5.8
Evaluate effectiveness and continue to refine education programs. Evaluation may include analysis of the public's understanding of various programs, establishing benchmarks for success,

and evaluating the effectiveness of education and promotional campaigns. **- MOVE to recommendations**

Chapter 6 – Household Hazardous Waste and Electronic Waste

Chapter Reference 6.5 and 6.6 (1)
Hire a Household Hazardous Waste/Electronics Waste specialist. **- RETAIN, reword to staff necessary as needed**

Chapter Reference 6.5 and 6.6 (2)
Implement HHW and e-waste public outreach and education programs through event-specific announcements, additional signage, and expanded outreach programs in the community. **- RETAIN**

Chapter Reference 6.5.3 and 6.6 (3)
Explore e-waste take-back programs with State and manufacturers/sellers. **- RETAIN**

Chapter Reference 6.5.3 and 6.6 (3)
Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of e-waste. **- RETAIN**

Chapter Reference 6.5.3 and 6.6 (3)
Evaluate the elements of successful similar programs implemented in other jurisdictions during the planning process. **- RETAIN**

Chapter Reference 6.5.3 and 6.6 (3)
Coordinate with other counties and the State to develop and implement e-waste take-back programs. **- RETAIN**

Chapter Reference 6.5.3 and 6.6 (3)
Coordinate with local retail businesses to facilitate implementation of take-back programs for e-waste. **- RETAIN**

Chapter Reference 6.5 and 6.6 (3)
Assess what legislative actions may be necessary to facilitate storage and handling of e-waste at various types of collection locations. **- RETAIN**

Chapter Reference 6.5.2 and 6.6 (3)
Incorporate information about existing and new e-waste take back programs in the community outreach and education effort. **- RETAIN**

Chapter Reference 6.5.2 and 6.6 (4)
Conduct additional HHW collection events. **- RETAIN**

Chapter Reference 6.5.4 and 6.6 (5)

Explore legislative actions for hazardous products and packaging take-back programs. - **RETAIN**

Chapter Reference 6.5.3 and 6.6 (5)
Conduct research to assess what legislation may be required to mandate and manage take-back programs. - **RETAIN**

Chapter Reference 6.5.3 and 6.6 (5)
Coordinate with local retail businesses to develop and implement take-back programs. - **RETAIN**

Chapter Reference 6.5 and 6.6 (5)
Assess what legislative actions may be necessary to facilitate storage and handling of hazardous waste products and packaging at various types of collection locations. - **RETAIN**

Chapter Reference 6.5 and 6.6 (5)
Incorporate information about existing and new hazardous materials and packaging take-back programs in the community outreach and education effort. - **RETAIN**

Chapter Reference 6.5.6 and 6.6 (6)
Explore a public-private partnership for a local E-scrap campaign. Potentially initiate a study of different models for promoting local dismantling of electronics. - **RETAIN**

Chapter 6: Household Hazardous Waste and Electronic Waste – Options that didn't become a recommendation

Chapter Reference 6.5.1
Install fixed (permanent) collection facilities at recycling and transfer stations. - **RETAIN as an option**

Chapter Reference 6.5.4
Implement an advanced disposal fee for certain types of e-waste. - **RETAIN as an option**

Chapter Reference 6.5.5 and 3.5.4
Add e-waste product exchange and re-use centers at recycling and transfer stations. - **RETAIN as an option**

Chapter 7 – Special Waste

Chapter Reference 7.4.1
Include special waste drop-off and collection areas in the design of new or renovated recycling and transfer stations. - **RETAIN**

Chapter Reference 7.4.2
Continue the current effort to modify convenience center permits to allow white goods recovery at recycling and transfer stations. - **RETAIN**

Chapter Reference 7.4.3
Include information regarding the environmental benefits of properly disposing of scrap tires, and current disposal options in the County's education and promotion programs. **- RETAIN**

Chapter 8 – Collection and Transfer

Chapter Reference 8.7.1.A and 8.8.1
1) Retain the County's system of recycling and transfer stations. 2) A component of retaining the system includes completing upgrades to address structural deficiencies and to 3) provide expanded services in support of zero waste initiatives. **- RETAIN**

Chapter Reference 8.7.3, 8.7.7.2, and 8.8.2
1) Reconstruct one or more recycling and transfer stations annually, including a new South Kona recycling and transfer station at Ocean View. 2) The County should also consider installing compaction units for recyclables at selected stations. Consider adopting a "satellite" system where compactors would be installed at selected stations, which would accept uncompacted recyclables from nearby stations lacking compactors. **- RETAIN**

Chapter Reference 8.7.4, 8.7.6 and 8.8.3
Implement full-time staffing and reduced operating hours at recycling and transfer stations, and consider closing one or more stations. **- RETAIN**

Chapter Reference 8.7.2 and 8.8.4
Develop a system to license private collection firms. In this program, all firms that collect garbage from residents or businesses would be required to register vehicles, document that the vehicles meet safety requirements, and pay a nominal licensing fee (to cover the cost of licensing). As discussed in Chapter 4, Recycling, Bioconversion, and Markets, an added requirement of the license would be that all licensed firms must offer a recycling service along with its garbage service. **MOVE to option**

Chapter Reference 8.7.2 and 8.8.5
Change permits to allow small commercial businesses to drop off recyclables at County recycling and transfer stations. These permits would make it much more convenient for small businesses in rural areas to recycle. To ensure efficient and safe operations, only trucks below a certain size threshold (for example, less than one ton) would be allowed to use the stations. **- RETAIN**

Chapter Reference 8.7.6 and 8.8.6
Conduct an operational efficiency analysis. **- RETAIN**

Chapter Reference 8.7.8 and 8.8.7
Develop a base yard facility and equipment maintenance facility for transfer vehicles at the South Hilo Sanitary Landfill. **- MOVE to option**

Did not finish Chapter 8 and 9 Chapter References

b. Review the ISWMP schedule.

Did not Review ISWMP Schedule

6. ANNOUNCEMENTS:

Next meeting is scheduled for November 14, 2018 at the ADRC Training Room at 1055 Kinoole Street, Ste#101 Hilo, HI 96720.

7. ADJOURNMENT:

Motion and vote: Mr. Buklarewicz moved to adjourn, Ms. Adams seconded the motion, and all members voted aye.

The meeting adjourned at 3:52 p.m.

Respectfully submitted:

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Tina DeMello

Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

Meeting Minutes

Wednesday, November 14, 2018
1:01 p.m. to 4:03 p.m.
Aging and Disability Resource Center
1055 Kino'ole Street, Suite 101
Hilo, Hawai'i 96720

Committee members present:
Alan Okinaka, Vice Chair
Robert Ely
Paul Buklarewicz
George Hayducsko, Chair
Georjean Adams
Barbara Bell
Steven Araujo (arrived at 1:25 p.m.)

Staff present:
Diana Mellon-Lacey, Deputy Corporation Counsel (in place of Keyra Wong)
Tina DeMello, SWD Clerk
Greg Goodale, SWD Chief (arrived at 2:02 p.m.)
Dwight Miller, Parametrix
Katherine Seckel

Also present:
Paul Montague, Member of the public
Glen Hisashima, Member of the public

Not present:
Adam Scharf, Member

1. CALL TO ORDER:

   Chair Hayducsko called the meeting to order at 1:01 p.m.

2. APPROVAL OF MINUTES: October 10, 2018, Meeting

   Mr. Buklarewicz noted that a correction is needed to the word groups on the top of page 2.

   Motion: Ms. Adams moved to approve the minutes; Mr. Ely 2nd the motion.

   Vote: All members preset voted aye to approve the minutes with the corrections.

3. STATEMENTS FROM THE PUBLIC:

No statements from the public.

4. NEW BUSINESS:

a. Bio Energy Hawai‘i Presentation

Chair Hayducsko explained that Bio Energy Hawai‘i was not here today and is uncertain if they would be able to provide a presentation to the committee.

5. UNFINISHED BUSINESS:

a. Review, discuss and categorize Chapters 8–9 of Hawai‘i County’s 2009 Integrated Solid Waste Management Plan’s (ISWMP) Recommendations and options.

Chapter 8 – Collection and Transfer

Chapter Reference 8.7.1.B
License and promote all existing collection companies **RETAIN**

Chapter Reference 8.7.1.C
License all existing collection companies and require bi-weekly curbside recycling. **RETAIN**

Chapter Reference 8.7.1.D
Establish a new collection department and crew to implement weekly curbside collection of garbage and bi-weekly collection of recyclables, prohibiting private collection businesses. **RETAIN**

Chapter Reference 8.7.1.E
Establish an exclusive franchise for a collection company to collect MSW from residential customers in an area. **RETAIN**
RETAIN ABOVE CHAPTER REFERENCES UNDER CURBSIDE COLLECTION STUDY

Chapter Reference 8.7.5
Add full time attendants, reduce operating hours, and implement a PAYT at recycling and transfer stations. **REMOVE**

Chapter Reference 8.7.7.1
Converting on garbage chute into a mixed recyclables container to then be transferred into the compaction trailer. **REMOVE**

Chapter Reference 8.7.7.2
Install a stationary recycling compactor at each of the recycling and transfer stations for recyclables. **MOVE TO RECOMMENDATION**

Chapter 9 – Residuals Management

Chapter Reference 9.6.3 and 9.7.1(1)
Develop a conversion technology facility. **REMOVE**

Chapter Reference 9.7.3(1)
County to conduct a more in-depth evaluations of the feasibility and cost of re-configuring the reload facility at the SHSL and trucking waste to the WHSL. **REMOVE**

Chapter Reference 9.7.3(2)
County to prepare a master planning document for the 1) WHSL and 2) SHSL facilities.
RETAIN, reword to continue facility planning

Chapter Reference 9.7.3(2)
County engage in a dialogue with other Hawai`i counties about the potential for mutually-beneficial joint solutions. **RETAIN**

Chapter Reference 9.7.3(2)
County conduct a feasibility study of remediating the closed Kailua-Kona landfill. **REMOVE**

Chapter Reference 9.5.2, 9.5.2.1
R-1. No Action; Wait to Assess Success of Current Conversion Technology Projects **RETAIN, reword for County to continue to evaluate landfill and transfer technology options. Agree to consolidate all chapter 9 references below with this reference**

Chapter Reference 9.5.2, 9.5.2.2
R-2 WTE Facility for East Hawai`i; Ash and Bypass Materials to SHSL

Chapter Reference 9.5.2.3
R-3 WTE Facility for all County Residuals; Ash and Bypass Materials to WHSL

Chapter Reference 9.5.2.4
R-4 Modular Incinerators in Rural Areas; Ash and Bypass Waste to SHSL and WHSL

Chapter Reference 9.5.2.5
R-5 Develop mechanical biological treatment (MBT) Facilities at the SHSL and/or WHSL Sites

Motion to approve Chapters 8 and 9: Ms. Bell moved to approve decision and discussions made in Chapters 8 and 9; Ms. Adams 2nd.

b. Review and discuss Chapter 10 recommendations

Mr. Miller summarized Chapter 10 recommendations and evaluated source of funds available to Hawai‘i County.

c. Review, discuss and categorize proposed "new options" results from workbook exercise Chapter 3-9.

- *Recommendation to add educational and additional resources to the Departments website*
- *Recommendation to identify resources and source reduction and post on Departments website*
- *Recommendation to incorporate teaching of life cycle thinking in schools and communities*

By consensus the SWAC agreed to the 3 above recommendations

d. Discuss expectations of Interim Draft Review, which will include prioritization exercise.

Did not review or discuss Interim Draft Review.

e. Review the ISWMP schedule.

Did not review ISWMP schedule

6. ANNOUNCEMENTS:

   Next meeting is scheduled for December 12, 2018 at the ADRC Training Room at 1055 Kino'ole Street, Ste#101 Hilo, HI 96720.

7. ADJOURNMENT:

   Motion and vote: Ms. Bell moved to adjourn, Mr. Okinaka seconded the motion, and all members voted aye.

   The meeting adjourned at 4:03 p.m.

Respectfully submitted:

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Tina DeMello

Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAI'I

Meeting Minutes

Wednesday, January 9, 2019
1:14 p.m. to 4:01 p.m.
Aging and Disability Resource Center (ADRC)
1055 Kino'ole Street, Suite 101
Hilo, Hawai'i 96720

Committee members present:
George Hayducsko, Chair
Alan Okinaka, Vice Chair
Paul Buklarewicz
Steven Araujo
Georjean Adams
Barbara Bell

Staff present:
Diana Mellon-Lacey, Deputy Corporation Counsel
Tina DeMello, SWD Clerk
Dwight Miller, Parametrix by phone
Katherine Seckel, Parametrix by phone

Not present:
Adam Scharf, Member
Robert Ely, Member

1. CALL TO ORDER:

   Chair Hayducsko called the meeting to order at 1:14 p.m.

2. APPROVAL OF MINUTES: November 14, 2018, Meeting

   Motion and vote: Ms. Bell moved to approve the minutes; Ms. Adams 2nd the motion. All members preset voted aye to approve the minutes.

3. STATEMENTS FROM THE PUBLIC:

   No statements from the public.

4. NEW BUSINESS:

   a. Bio Energy Hawai'i Update:

   Chair Hayducsko opened the discussion stating that multiple committee members had attempted to reach out to Bio Energy Hawai'i and was not successful with having Bio

Energy Hawai‘i attend to provide a presentation. Our members reached out by leaving phone messages and sent multiple emails to request for a presentation.

b. <u>Review, discuss and recommend changes to Chapters 2-6 of the Integrated Solid Waste Management Plan's (ISWMP):</u>

Chair Hayducsko explained that the format being utilizing today shows the Chapter, Page, Line No. and Comments. Chair Hayducsko would like to have a consensus by chapter of changes and have a motion by chapter approving edits, changes, etc.

CHAPTER 2 – WASTE STREAM ASSESSMENT

<u>Motion and vote:</u> Page 2-5, Line 11: Eliminate reference to plastic bags having any impact on this section. Ms. Adams moves to eliminate reference to plastic bags, Ms. Bell 2nd the motion.

<u>Motion and vote:</u> Mr. Okinaka moves to accept edits, changes, and deletion for Chapter 2; Ms. Bell 2nd the motion, and all members voted aye.

CHAPTER 3 – SOURCE REDUCTION

<u>Motion and vote:</u> Ms. Adams moves to accept edits, changes, and deletions for Chapter 3; Ms. Bell 2nd the motion and all members voted aye.

5. <u>UNFINISHED BUSINESS:</u>

a. <u>Review the ISWMP Schedule:</u>
Review, discuss and recommend changes to Chapter 4-10 of the ISWMP next meeting.

6. <u>ANNOUNCEMENTS:</u>

Next meeting is scheduled for February 13, 2019 at the ADRC Training Room at 1055 Kino‘ole Street, Ste#101 Hilo, HI 96720.

7. <u>ADJOURNMENT:</u>

<u>Motion and vote:</u> Mr. Buklarewicz moved to adjourn, Mr. Araujo 2nd the motion, and all members voted aye.

The meeting adjourned at 4:03 p.m.

Respectfully submitted:

_____
Tina DeMello
Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

Meeting Minutes

Wednesday, February 13, 2019
1:03 p.m. to 3:39 p.m.
Aging and Disability Resource Center
1055 Kinoʻole Street, Suite 101
Hilo, Hawaiʻi 96720

Committee members present:
George Hayducsko, Chair
Alan Okinaka, Vice Chair
Paul Buklarewicz
Georjean Adams
Barbara Bell

Staff present:
Diana Mellon-Lacey, Deputy Corporation Counsel (in place of Keyra Wong)
Tina DeMello, SWD Clerk
Sanne Berrig, DEM SWD Recycling Specialist I
Katherine Seckel, Parametrix by phone

Also present:
Nancy Cook Lauer, WHT Reporter

Not present:
Adam Scharf, Member
Steven Araujo, Member

1. CALL TO ORDER:

   Chair Hayducsko called the meeting to order at 1:03 p.m.

2. APPROVAL OF MINUTES: January 9, 2019, Meeting

   Motion and Vote: Ms. Adams moved to approve the minutes; Mr. Buklarewicz seconded the motion. All members present voted aye to approve the minutes.

3. STATEMENTS FROM THE PUBLIC:

   No statements from the public.

4. UNFINISHED BUSINESS:

a. Review, discuss and recommend changes to Chapters 2–9 of ISWMP

Chapter 4 – RECYCLING, BIOCONVERSION, AND MARKETS

Motion and Vote: Ms. Bell moves to accept edits, changes, and deletions for Chapter 4 as discussed; Ms. Adams seconded the motion and all members present voted aye. Motion carries.

Chapter 5 – PUBLIC EDUCATION AND INFORMATION

Motion and Vote: Ms. Bell moves to accept edits, changes, and deletions for Chapter 5 as discussed; Mr. Buklarewicz seconded the motion and all members present voted aye. Motion carries.

Chapter 6 – HOUSEHOLD HAZARDOUS WASTE AND ELECTRONIC WASTE

Motion and Vote: Mr. Buklarewicz moves to accept edits, changes, and deletions for Chapter 6 as discussed; Ms. Adams seconded the motion and all members present voted aye. Motion carries.

Chapter 7 – SPECIAL WASTE

Motion and Vote: Ms. Adams moves to accept edits, changes, and deletions for Chapter 7 as discussed; Ms. Bell seconded the motion and all members present voted aye. Motion carries.

b. Review the ISMP Schedule

Review, discuss and recommend changes to Chapters 2 – 10 of the ISWMP.

5. ANNOUNCEMENTS:

Next meeting is scheduled for March 13, 2019 at the ADRC Training Room at 1055 Kinoʻole Street, Ste#101 Hilo, HI 96720.

6. ADJOURNMENT:

Motion and vote: Ms. Bell moved to adjourn, and all members voted aye.

The meeting adjourned at 3:39 p.m.

Respectfully submitted:

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Tina DeMello
Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

Meeting Minutes

Wednesday, March 13, 2019
1:12 p.m. to 3:45 p.m.
Aging and Disability Resource Center
1055 Kinoʻole Street, Suite 101
Hilo, Hawaiʻi 96720

Committee members present:
George Hayducsko, Chair
Alan Okinaka, Vice Chair
Paul Buklarewicz
Georjean Adams *by phone*
Barbara Bell
Adam Scharf

Staff present:
Diana Mellon-Lacey, Deputy Corporation Counsel
Tina DeMello, SWD Clerk
Sanne Berrig, DEM SWD Recycling Specialist I
Katherine Seckel, Parametrix *by phone*
Dwight Miller, Parametrix *by phone*

Not present:
Steven Araujo, Member

1. CALL TO ORDER:

   Chair Hayducsko called the meeting to order at 1:12 p.m.

2. APPROVAL OF MINUTES: February 13, 2019, Meeting

   Motion and Vote: Ms. Bell moved to approve the minutes; Mr. Scharf 2nd the motion. All members preset voted aye to approve the minutes.

3. STATEMENTS FROM THE PUBLIC:

   No member of the public present

4. UNFINISHED BUSINESS:

a. Review, discuss and recommend changes to Chapters 2–10 of the Integrated Solid Waste Management Plan (ISWMP).

b. Review, discuss, and prioritize the ISWMP recommendations.
Waste Management Plan – Master Summary of Comments

Chapter 8

Motion and Vote: Ms. Bell moves to accept edits, changes, and deletions made for Chapter 8 as discussed; Mr. Scharf 2nd the motion and all members present voted aye. Motion carries.

Chapter 9

Motion and Vote: Ms. Bell moves to accept edits, changes, and deletions made for Chapter 9 as discussed; Mr. Scharf 2nd the motion and all members present voted aye. Motion carries.

c. Review the ISWMP schedule.

Discussed prioritization of programs for recommendations and ranking.

5. ANNOUNCEMENTS:

Next meeting is scheduled for April 10, 2019 at the Aging and Disability Resource Center (ADRC) Training Room at 1055 Kinoʻole Street, Ste#101 Hilo, HI 96720.

6. ADJOURNMENT:

The meeting adjourned at 3:45p.m.

Respectfully submitted:

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Tina DeMello
Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE
COUNTY OF HAWAIʻI

Meeting Minutes

Wednesday, May 8, 2019
1:00 p.m. to 3:25 p.m.
Aging and Disability Resource Center
1055 Kinoʻole Street, Suite 101
Hilo, Hawaiʻi 96720

Committee members present:

George Hayducsko, Chair
Paul Buklarewicz
Georjean Adams
Adam Scharf
Steven Araujo

Staff present:

Diana Mellon-Lacey, Deputy Corporation Counsel
Tina DeMello, SWD Clerk
Sanne Berrig, DEM SWD Recycling Specialist I
Katherine Seckel, Parametrix *by phone*
Dwight Miller, Parametrix *by phone*

Not present:

Barbara Bell, Member
Alan Okinaka, Vice Chair

Public:

Brain Moyer, Intergovernmental Support Agreements
Gregory Fleming, U.S. Army Garrison Pōhakuloa

1. CALL TO ORDER:

Chair Hayducsko called the meeting to order at 1:00 p.m.

2. APPROVAL OF MINUTES: March 13, 2019, Meeting

Motion and Vote: Ms. Adams moved to approve the minutes; Mr. Scharf 2nd the motion. All members preset voted aye to approve the minutes. Motion carries.

3. STATEMENTS FROM THE PUBLIC:

Gregory Fleming – Discussion of Recycling Programs at Pōhakuloa. Recycle, Repurpose, and Reuse @ PTA. Good stewards of the environment.

Brian Moyer – Discussion of intergovernmental support agreements and opportunities offered by the Federal Government to work with local government on managing solid waste and recyclables

4. UNFINISHED BUSINESS:

a. Review, discuss and recommend changes to Chapter 1 goals and Chapter 10 of the Integrated Solid Waste Management Plan (ISWMP).

Chapter 1 Goals:

Motion and Vote: Ms. Adams moves to accept edits, changes, and deletions for Chapter 1 goals as discussed; Mr. Buklarewicz 2nd the motion and all members present voted aye. Motion carries.

Chapter 10:

Motion and Vote: Mr. Buklarewicz moves to accept edits, changes, and deletions for Chapter 10 as discussed; Ms. Adams 2nd the motion and all members present voted aye. Motion carries.

b. Review, discuss, and prioritize the ISWMP recommendations. Power Point presentation by Sanne Berrig on Recommended Prioritization of Programs.

Chapter 8 #5.:

Motion and Vote: Ms. Adams moved to accept to delete wording of "commercial recycling" and replace business with "businesses" in Chapter 8, #5 as discussed; Mr. Scharf 2nd the motion all members present voted aye. Motion carries.

Review of ISWMP Rankings Summary – Grouped by Ranking.

Review of Each Recommended Prioritization Program Average Score.

c. Review the ISWMP schedule.

5. ANNOUNCEMENTS:

Next meeting is scheduled for June 12, 2019 at the Aging and Disability Resource Center (ADRC) Training Room at 1055 Kinoʻole Street, Ste#101 Hilo, HI 96720.

6. ADJOURNMENT:

Motion and vote: Ms. Adams moved to adjourn, Mr. Scharf 2nd and all members voted aye.

The meeting adjourned at 3:25 p.m.

Respectfully submitted:

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Tina DeMello
Solid Waste Division, Clerk III

SOLID WASTE ADVISORY COMMITTEE

COUNTY OF HAWAI'I

MEETING MINUTES

Wednesday, June 12, 2019
1:00 p.m. to 2:15 p.m.
Aging and Disability Resource Center
1055 Kino'ole Street, Suite 101
Hilo, Hawai'i 96720

Committee members present:

George Hayducsko, Chair
Paul Buklarewicz
Georjean Adams
Adam Scharf
Steven Araujo

Staff present:

Diana Mellon-Lacey, Deputy Corporation Counsel
Tina DeMello, Solid Waste Division Clerk
Sanne Berrig, Solid Waste Division Recycling Specialist I
Katherine Seckel, Parametrix (by phone)

Not present:

Barbara Bell, Member
Alan Okinaka, Vice Chair

Public:

Nancy Cook Lauer, *West Hawai'i Today*

1. CALL TO ORDER

Chair Hayducsko called the meeting to order at 1:00 p.m.

2. APPROVAL OF MINUTES OF THE MAY 8, 2019, MEETING

Motion and vote: Ms. Adams moved to approve the minutes; Mr. Buklarewicz seconded the motion. All members present voted aye to approve the minutes. Motion carried.

3. STATEMENTS FROM THE PUBLIC

None.

4. UNFINISHED BUSINESS

a. Review the ISWMP schedule.

b. Review, discuss and recommend changes to the ISWMP.

SWAC discussion on text handout: Consider recovery and treatment technology

Motion and vote: Mr. Buklarewicz moved to accept edits, changes, and deletions text for handout on consider recovery and treatment technology; Mr. Scharf 2nd the motion and all members present voted aye. Motion carries.

c. Review, discuss and prioritize the ISWMP recommended ranking.

Motion and vote: Ms. Adams moved to accept ISWMP Rankings Summary with edits and changes as discussed; Mr. Scharf seconded the motion, and all members present voted aye. Motion carried.

5. ANNOUNCEMENTS

a. No additional SWAC meetings are scheduled.

b. The following two (2) ISWMP public hearings have been scheduled:

Kona: Monday, December 9, 2019
Community Hale at the West Hawai'i Civic Center
74-5044 Ane Keohokalole Highway
5:00 p.m. – 7:00 p.m.

Hilo: Wednesday, December 11, 2019
Aupuni Center Conference Room
101 Pauahi Street, Ste#1
5:00 p.m. – 7:00 p.m.

6. ADJOURNMENT

Motion and vote: Mr. Buklarewicz moved to adjourn, Ms. Adams seconded, and all members voted aye.

The meeting adjourned at 2:15 p.m.

Respectfully submitted:

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Tina DeMello
Solid Waste Division, Clerk III

Appendix B

SWAC Recommendation Ranking Summary

ISWMP Rankings Summary – Grouped by Rankings

1. Education & Outreach

This item received priority rankings: 2-1s, 2-2s, 3-3s, and 1-4.

1	3.4–Expand public education and outreach & 4–Organics: Improve education and outreach programs that promote improved management of organics
1	Education
2	Education
2	Expand and improve public education and awareness programs
3	5.1 Education and marketing plan (rolling 3 year/update routinely to meet needs and program changes)
3	Education
3	3.1 – Organics -improve education and outreach programs that promote improved management of organics
4	Education – educate SWFAs to assist customers at R&TS

2. Renegotiate Contract with Waste Management HI

This item received priority rankings: 1-1, 1-3, and 1-4

1	Regularly review and when appropriate, renegotiate WHSL contract
3	Regularly review and when appropriate, renegotiate WHSL contract
4	Renegotiate contract with Waste Management

3. Additional HHW Collection Events

This item received priority rankings: 3-4s

4	Conduct additional HHW collection events (10 to 12 additional per year)
4	Conduct additional HHW collection events (10 to 12 additional per year)
4	Conduct additional HHW collection events (10 to 12 additional per year)

4. Change County Code to Allow Small Businesses to Drop Off Recyclables at Recycling and Transfer Stations.

This item received priority rankings: 1-1 and 1-5. Also, when this item was discussed at the May 8, 2019 SWAC meeting, all members stated they [also] had misread item 8.5. (Item reads to allow *recycling* businesses to utilize R &TS)

1	Expand commercial recycling – first step: approve small businesses using Transfer Stations (8.5)
5	Expand the opportunities for commercial recycling

5. Establish goals that are expressed and measured in terms of environmental impacts (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, in addition to tonnage-based landfill diversion or waste recovery goals.

This item received priority rankings: 1-2 and 1-4

2	Chapter 4 - #5. Establish goals that are expressed and measured in terms of environmental impacts ([e.g., greenhouse gas emissions, toxicity, energy use] and consider full life cycle impacts, as opposed to (replace with in addition to) tonnage-based landfill diversion or waste recovery goals. Add Negative Emission Technologies [NETS]).
4	Establish goals that are expressed and measured in terms of environmental impacts (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, as opposed to tonnage-based landfill diversion or waste recovery goals. (Chapter 4)

6. Develop County Policy and Ordinances Related to Source Reduction and Recycling

These 2 items received priority rankings: 1-1 and 1-3. They were listed here as they are very similar and interrelated.

1	Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills
3	Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates

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The rest of the SWAC recommendations are listed below, grouped by ranking given by SWAC member. Each of these only had a single (1) vote.

Number 1s – i.e. a SWAC member gave this items a #1 in their individual ranking

- Conduct research and coordinate with legislators and waste managers within Maui, Kauai, and Honolulu counties, to evaluate the potential for combining efforts to develop a statewide landfill diversion strategy. (Chapter 4) This would also cover the recommendation n in Chapter 9, Engage in dialog with the State/Counties about joint solutions (e.g., Discuss with City and County of Honolulu, the shipping of market-driven unrecyclable materials to their H-Power WTE plant). (Chapter 9)

Number 2s – i.e. SWAC members gave these items a #2 in their individual ranking

- 4.4 Organics Collection – management facilities and equipment.

- Thoroughly investigate mandates prior to implementation including assessment of markets (should be well-established), operational viability (solicit input from recycling and transfer station attendants, haulers, landfill operators), and implementation in other jurisdictions with an emphasis on other Hawai`i counties. (Chapter 4)
- Chapter 3 - #3 - Improve the current Reuse Facility Program.

Number 3s – i.e. a SWAC member gave this items a #3 in their individual ranking

- Chapter 9 - #2 - C&D sorting and reuse.

Number 5s –i.e. SWAC members gave these items a #5 in their individual ranking

- 3.2 PAYT – Pay As You Throw
- Conduct an operational efficiency analysis to lower costs. (Chapter 8)
- Chapter 8 - #3 - "Satellite" compaction units to cut down on full and overflowing roll-off bins.
- Chapter 10 - #1 - Prepare a Solid Waste System Financial Analysis

Comment from SWAC member –

Landfill use by infrequent residential users is currently complicated: permit, waiting period, etc. Need to make process "…easier for people who want to do the right thing"

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
Ch 3	**Source Reduction**			
1.	Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills, including:	--	2.4	--
	• Develop a County ordinance that requires a waste reduction plan be submitted to obtain a commercial or residential building permit.	--	1.8	--
	• Work with other counties to develop EPR policy statements or resolutions. As a component of EPR policy, implement a campaign to develop EPR for difficult-to-recycle products, and lobby state and federal lawmakers to advance EPR initiatives.	--	2.4	--
	• Implement a County government source reduction program policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies.	--	2.2	--
2.	Investigate a PAYT program or other funding method.	--	2.2	--
3.	Improve the current reuse facility program.	--	2.4	--
	• Work with contractor to create a list for public distribution, which describes what items are preferable donations.	--	2.2	--
	• Work with the contractor managing the reuse centers to be more selective about merchandise, emphasizing items that are lightly used, clean, and in good condition. Improve signage, organization, and display of merchandise.	--	2.2	--
	• Provide more covered space at reuse centers.	--	--	2.8
	• Collaborate with the volunteer-based Laupāhoehoe Reuse Center to increase participation of volunteers.	--	1.8	--
	• Continue public-private partnerships with organizations such as Goodwill Industries to develop reuse centers at existing outlets within the County.	--	2.4	--
	• Consider expanding the program to other recycling and transfer stations or upgrade the Laupāhoehoe Reuse Center	--	2.2	--
4.	Expand and improve public education and awareness programs.	--	--	2.6
	• Develop a business waste audit and education program to foster source reduction within the local business community.	--	2.2	--

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
	• Develop a visitor industry waste reduction education program.	--	--	2.6
	• Continue reuse education, outreach, and public awareness campaign to encourage public participation and use of the reuse centers.	--	--	2.8
Ch 4	**Recycling, Bioconversion, and Markets**			
	Recycling			
1.	Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates.	--	--	2.6
	• Thoroughly investigate mandates prior to implementation including assessment of markets (should be well-established), operational viability (solicit input from recycling and transfer station attendants, haulers, landfill operators), and implementation in other jurisdictions with an emphasis on other Hawai`i counties.	--	--	3.0
	• Establish a differential tip fee ordinance	--	2.2	--
	• Investigate the feasibility of establishing a mandatory curbside collection program for some single-family residences.	--	2.2	--
	• Establish mandatory source separation and recycling ordinance, which would require all businesses and institutions to recycle selected types of materials. This could include implementing landfill bans for select recyclables.	--	2.4	--
	• Develop legislation that requires owners and managers of multi-family dwellings and multi-tenant commercial buildings to provide recycling	--	2.4	--
	• Conduct research and coordinate with legislators and waste managers within Maui, Kauai, and Honolulu counties, to evaluate the potential for combining efforts to develop a statewide landfill diversion strategy.	--	2.4	--
	• Lobby the State to change school waste collection contracts to mandate that recycling services are included.	--	--	2.6
2.	Complete capital projects to facilitate implementation of expanded recycling programs. A common theme expressed during discussions with the SWAC is that the County needs improved facilities to manage recyclables.	--	--	2.6

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
	• Modify infrastructure at recycling and transfer stations to accommodate recycling processes.	--	--	2.8
	• Improve signage at recycling and transfer stations to provide the public with comprehensive information about recycling opportunities and procedures.	--	--	2.8
3.	Expand the opportunities for commercial recycling.	--	--	2.6
	• Allow small businesses to use the recycling and transfer stations to recycle selected materials.	--	--	2.6
	• Work with the HDOH Solid Waste Division to modify recycling and transfer station operating permits to accommodate expanded recycling services.	--	--	3.0
	• Expand education and outreach programs for both large and small businesses to foster participation in commercial recycling programs.	--	--	2.8
4.	Expand opportunities to recycle in public areas and during public events.	--	--	2.8
	• Install additional recycling bins in parks and other public areas.	--	--	2.6
	• Conduct additional recycling events within the community each year.	--	--	2.4
5.	Establish goals that are expressed and measured in terms of environmental impacts (e.g., greenhouse gas emissions, toxicity, energy use) and consider full life cycle impacts, in addition to tonnage-based landfill diversion or waste recovery goals.	--	--	2.4
5.	Annually or bi-annually assess existing local and regional markets for materials across the waste stream; study service voids for missed opportunities to recover commodities.	--	2.4	--
	Organics			
1.	Improve education and outreach programs that promote improved management of organics.	--	2.4	--
	• Ensure that the contractor responsible for administering the organics program is meeting contractual requirements.	--	--	2.8
	• Expand and further develop a master composter program (low priority).	1.4	--	--
	• Develop a training program and guidance materials for farmers and gardeners.	--	2.0	--

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
	• Implement a 'Stop Wasting Food' program that would benefit programs such as local food banks.	--	2.4	--
	• Partner to establish compost demonstration gardens at recycling and transfer stations or other visible locations in the community	--	2.0	--
2.	Onsite composting program (subsidized bins and distribution to residents and businesses)	--	2.0	--
3.	Landfill organics ban implementation study	--	1.8	--
4.	Organics management facilities and equipment	--	--	2.7
	• Add food waste drop-off bins at recycling and transfer stations that already collect green waste	--	2.2	--
	• Formulate compostable bag ASTM D6400-compliance legislation	--	2.0	--
	• Add organics/yard waste disposal to existing brochures/signage	--	--	2.8
	• Expand the number of drop-off locations for green waste and/or food waste at recycling and transfer stations	--	2.4	--
	• Continue operation of mulch facilities at WHSL and SHSL	--	--	2.7
	• Investigate organics collection programs, including a residential curbside collection program and transfer station drop-off facilities. As part of this investigation, perform pilot food waste demonstration projects with the potential for eventual expansion into full-scale food waste management programs.	--	--	2.6
Ch 5	**Education, Outreach, and Public Awareness**			
1.	Implement a 3-year education and social marketing program to educate the public and business community about landfill diversion initiatives and opportunities.	--	--	2.8
2.	Conduct a waste management attitude residential survey.	--	2.4	--
3.	Ensure County has staffing levels commensurate with the needs of the public outreach program.	--	--	2.6
Ch 6	**Household Hazardous Waste (HHW) / Electronic Waste (E-Waste)**			
1.	Ensure enough staffing to operate HHW/ e-waste programs successfully.	--	--	2.8
2.	Implement HHW/ e-waste education, outreach, and public awareness program.	--	--	2.8

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
3.	Research and evaluate elements of successful e-waste/ HHW programs implemented in other jurisdictions and integrate those successes into the County's program	--	2.2	--
4.	Explore e-waste take-back programs with State and manufacturers/sellers	--	2.2	--
	• Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of e-waste.	--	2.0	--
	• Coordinate with other counties and the State to develop and implement e-waste EPR take-back programs.	--	2.2	--
	• Coordinate with local retailers to facilitate implementation of take-back programs for e-waste.	--	2.4	--
	• Assess legislative actions that may be necessary to facilitate e-waste programs including demanufacturing, storage and handling at various types of collection locations, and funding equity.	--	2.4	--
5.	Conduct additional HHW collection events (10 to 12 additional per year)	--	--	2.6
6.	Explore legislative actions for hazardous products and packaging take-back programs.	--	2.2	--
	• Conduct research to assess what legislation may be required to mandate and manage take-back programs for specific types of hazardous waste or packaging.	--	2.2	--
	• Assess what legislative actions may be necessary to facilitate storage and handling of hazardous products and packaging at various types of collection locations, and funding equity.	--	2.2	--
7.	Explore a public-private partnership for a local e-scrap campaign (on-island demanufacturing).	--	2.6	--
Ch 7	**Special Waste**			
1.	Integrate a Do-It-Yourself Used Motor Oil program within the County's public education and information program.	--	--	2.8
2.	Increase the number of Recycling and Transfer Stations that accept white goods.	--	2.2	--
3.	Promote tire recycling best management practices within the County's public education and information program.	--	--	3.0

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
4.	Ensure that recycling facilities responsible for dismantling of white goods are trained properly for the recovery and recycling of Freon-containing appliances.	--	2.4	--
Ch 8	**Collection and Transfer**			
1.	Retain the County's system of recycling and transfer stations, but also explore alternative funding methods via a feasibility study as discussed in Chapter 3 recommendations (Recommendation #2). Until a decision is made on the best method of collection and transfer, the County will continue to maintain and upgrade Recycling and Transfer Stations to address structural deficiencies and provide expanded services to divert waste from the landfill.	--	--	2.8
2.	Reconstruct one or more recycling and transfer stations annually.	--	2.0	--
3.	Consider 'Satellite' compaction units for recyclables at select stations	--		2.6
4.	Implement full-time staffing and reduced operating hours at recycling and transfer stations and consider closing one or more stations.	--	2.0	--
5.	Change County code to allow small businesses to drop off recyclables at Recycling and Transfer Stations.	--	--	**3.0**
6.	Conduct an operational efficiency analysis to lower costs.	--	--	2.8
Ch 9	**Residuals Management**			
1.	Consider recovery and treatment technology (e.g., WTE) if: **(1)** other waste diversion approaches (e.g., proposed compost facility in Hilo, shipping of market-driven unrecyclable materials to the City and County of Honolulu) are unsuccessful or infeasible, **(2)** it can definitively be demonstrated that it is environmentally and economically feasible, and **(3)** the technology has a verifiable and viable commercial track record (successful operation $\geq$5 years) in the handling municipal solid waste.	--	1.6	--
2.	Investigate the feasibility of a landfill with a sorting and reuse area for construction and demolition materials.	--	--	2.6
3.	Update infrastructure at the WHSL and EHRS.	--	2.4	--
4.	Engage in dialog with the State/Counties about joint solutions (e.g., Discuss with City and County of Honolulu, the shipping of market-driven unrecyclable materials to their H-Power WTE plant).	--	--	2.6
Ch 10	**Administration and Funding**			
1.	Prepare a Solid Waste System Financial Analysis.	--	2.2	--

Each Recommended Prioritization Program Average Score				
	Program	**Low Priority 0-1.4**	**Medium Priority 1.5-2.4**	**High Priority 2.5-3.0**
2.	Regularly review and when appropriate, renegotiate WHSL contract.	--	--	2.8

Considerations for ranking

Diversion Potential – What is the measure's tonnage diversion potential from landfill?

Local Authority – How much control must the local government exert over the discard management system (e.g., service providers, infrastructure collection/transfer/disposal, and/or waste generators) in order to accomplish the measure?

- Implied – indirectly through culture or practice – less likely to accomplish measure
- Influenced – by policy, permit, license or ordinance – moderately likely to accomplish measure
- Explicit - directly through contracts or operations – highly likely to accomplish measure

Receptivity – What is the relative ease and level of effort to initiate and obtain local buy-in for the measure? For example, does it involve promotional activities, recognition, no requirements on waste generators, minor costs (generally easier), or does it involve setting mandatory requirements, restrictions, or higher costs (generally more difficult)?

Environmental outcome – (e.g., ecological toxicity, human heath, greenhouse gas emissions generated by raw materials extraction and product manufacturing)

Staff Knowledge – How much staff knowledge or specific expertise is needed to implement the measure? Can it be implemented by mid-level local agency staff without outside legal or contractor assistance?

Community Led Initiatives – How easy or hard is it for individuals or groups to initiate adoption or implementation of the measure without actions required by the jurisdiction? Can a local non-profit or group of interested residents carry out the activity (e.g., develop a "how-to guide") or will it require initiation by local jurisdiction staff or elected bodies (e.g., adopt a local ordinance).

Appendix C

20-Year De Facto Population Recycling, Generation, and Disposal Projections

20-Year De Facto Population Recycling, Generation, and Disposal Projections

Year	Projected De Facto Population[1]	Average Annual Growth Rate[2]	Disposal Tonnage (tons/ year) [3]	Recycling/ Diversion Tons/Year[4]	Total Generation without Increased (8%) Diversion/ Recycling Rate	Increased Recycling/ Diversion Rate	Total Disposal with Increased (8%) Diversion/ Recycling Rate
2016	222,485	1.60%	195,162	57,921	253,100	--	253,100
2017	226,045		224,196	64,309	288,500	--	288,500
2018	229,661		224,796	52,028	276,800	--	276,800
2019	233,336		212,900	55,360	268,300	--	268,300
2020	237,069	1.30%	216,300	56,240	272,500	8.0%	252,300
2021	240,151		219,100	56,980	276,100	8.0%	255,600
2022	243,273		222,000	57,720	279,700	8.0%	259,000
2023	246,436		224,900	58,470	283,400	8.0%	262,400
2024	249,640		227,800	59,230	287,000	8.0%	265,700
2025	252,885	1.20%	230,800	60,000	290,800	8.0%	269,300
2026	255,919		233,500	60,720	294,200	8.0%	272,400
2027	258,990		236,300	61,450	297,800	8.0%	275,700
2028	262,098		239,200	62,180	301,400	8.0%	279,100
2029	265,244		242,000	62,930	304,900	8.0%	282,300
2030	268,426	1.10%	244,900	63,680	308,600	8.0%	285,700
2031	271,379		247,600	64,380	312,000	8.0%	288,900
2032	274,636		250,600	65,160	315,800	8.0%	292,400
2033	277,931		253,600	65,940	319,500	8.0%	295,800
2034	281,267		256,700	66,730	323,400	8.0%	299,400
2035	284,642	1.00%	259,700	67,530	327,200	8.0%	303,000
2036	287,488		262,300	68,210	330,500	8.0%	306,000
2037	290,938		265,500	69,030	334,500	8.0%	309,700
2038	293,847		268,100	69,720	337,800	8.0%	312,800
2039	296,786		270,800	70,410	341,200	8.0%	315,900

Notes:

-- = 2016–2020 no percent increase in diversion and recycling

Projected tonnage rounded to nearest 100 tons.

[1] 2016 base year de facto population is derived from the State of Hawai`i Department of Business, Economic Development, and Tourism (2016). Table 01.09 De Facto Population, by County: 2000-2016

[2] Average annual rate is derived from the Hawai'i Department of Business, Economic Development, and Tourism (2018). Table A-3. Hawaii County Population Projection, Selected Components, 2010-2045.

[3] Disposal tonnage is based on the 2016 disposal tonnage divided by the de facto population for 2016 (6 pounds per person).

[4] Recycling/Diversion Tons/Year is based on the median diversion rate for FY 2009–2010 through FY 2016–2017: 29 percent per County of Hawai`iDEM , Solid Waste Division. 26 percent of 6 pounds is 1.7 pounds per day diversion on average.

Appendix D

2008 Waste Composition Study

Final

Waste Composition Study
County of Hawai`i

Prepared by

CH2MHILL

In Association with
Sky Valley Associates

September 2008

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SECTION 1

Introduction

The County of Hawai`i is updating its Integrated Solid Waste Management Plan. The plan will examine waste management options in the County. To aid in the evaluation of these options, CH2M HILL conducted this waste composition study to provide statistically valid data on the types and quantities of waste currently being disposed of at the West Hawai`i (Pu`uanahulu) Landfill. The field work for this study was performed by Sky Valley Associates.

This report presents the results of the waste composition study, which include composition estimates, both for the overall waste stream and for the transfer station, commercial, and self-haul wastes disposed at the landfill. The results are based on samples taken during May of 2008. A similar study was performed at the South Hilo Landfill in 2001[1]. We have used the results of that study to represent the composition of waste that enters the East Hawai`i landfill. The results are combined to provide waste composition estimates for total County disposal.

There are four major sections of this report. Section 1 briefly summarizes the project, including a description of the sources of disposed waste and the project methodology. Sections two through four provide sampling results for the overall waste stream; results for the transfer station, commercial, and self-haul substreams; and substream estimates for West Hawai`i and East Hawai`i.

Following the main body of the report are attachments that included detailed sampling results (Attachments A and B), descriptions of waste components (Attachment C), descriptions of the sampling methodology and calculations (Attachment D), and field sampling forms (Attachment E).

1.1 Sources of Disposed Waste

For analysis and planning purposes, landfill disposal quantities can be divided into substreams. A waste substream is defined according to its source of generation, its means of collection and transport to the disposal facility, or both[2]. For the purposes of this study, the waste disposed at the West Hawai`i Landfill was divided into the following three substream categories:

1. Transfer Station – This is waste hauled from one of nine transfer stations on the west side of the Island. It is transported to the West Hawai`i Landfill in transfer station compactor boxes. Transfer station loads are composed primarily of residential waste.

[1] Cascadia Consulting Group, 2001. *Waste Composition Study, South Hilo Landfill, County of Hawai`i.*

[2] It should be noted that this study estimates the composition of waste disposed, not waste generated. Waste generation is equal to the sum of both the disposed and recycled amounts.

2. Commercial – This is waste hauled by commercial hauling companies. Commercial haulers use a variety of vehicles to transport this waste to the West Hawai`i Landfill, including packer trucks (garbage trucks), roll-offs (primarily open boxes), and other vehicles (e.g. flatbeds, pickups, etc.). This waste is collected both from residences and businesses.

3. Self-Haul – This is waste that residents, contractors, businesses, and public entities haul directly to the West Hawai`i Landfill. These loads are transported either in small vehicles (e.g. autos, pick-ups, etc.) or large vehicles (e.g. dump trucks, flatbeds, etc). As with waste in the commercial substream, self-haul waste comes from both residences and businesses. Waste from public agencies (such as the County of Hawai`i Parks Department) is also included in this category.

The waste stream was broken down further in the transfer station and commercial substreams as follows:

- During field sampling, samples taken from the transfer station substream were also recorded by station so that information about the waste composition at individual stations could be recorded. Note, however, the relatively few number of samples taken at any individual station make any resulting composition estimates highly uncertain: the results should be viewed accordingly.
- Samples from the commercial substream were divided among the three main vehicle types (packers, rolloffs, and other).

Each of the three substreams contributed a portion of the approximately 128,500 total tons of waste disposed at the West Hawai`i Landfill from July 2007-June 2008 (FY 2008). About 32 percent (or about 41,700 tons) of this waste was hauled from transfer stations. Commercial hauling companies disposed of nearly 63 percent (81,000 tons), and the remaining 5,900 tons (approximately 5 percent) were transported to the landfill by self-haulers.

1.2 Methodology

This section presents a summary of the sampling and calculation procedures used in this study. The complete sampling methodology including descriptions of the main calculations can be found in Attachment C. The procedures summarized in this section were used during the recent sampling event at the West Hawai`i Landfill. Sky Valley Associates conducted both the recent sampling event at the West Hawai`i Landfill and the 2001 sampling event at the South Hilo Landfill; the same procedures were used during both events.

1.2.1 Sampling Procedures

A sampling plan was developed to produce statistically valid composition data for the three substreams described above. A total of 100 samples were captured and sorted at the West Hawai`i Landfill on May 15, 16, and 19 through 21, 2008[3]. The allocation of these samples among the three substreams was determined according to each substream's contribution to

[3] Because all sampling occurred during May of 2008, these results do not account for any seasonal variation.

the total waste stream, with one exception. There is relatively little mixed self-haul material delivered to the West Hawai`i Landfill (1,200 of 128,000 tons in FY 2008, or less than 1 percent). Therefore, it was decided that overall sampling accuracy would be improved by using self-haul sampling results from the 2001 study to represent the composition of mixed self-haul loads in West Hawai`i, and assigning samples that would have been obtained from the self-haul stream to the other two substreams. The composition profile of mixed self-haul loads from the 2001 study was used to estimate the mixed self-haul composition for the West Hawai`i Landfill.

In addition to the mixed self-haul loads delivered to the West Hawai`i Landfill, there were about 4,700 tons of pure loads i.e., loads that could be assigned to a single waste component such as confidential documents or tires (or in the case of construction and demolition debris, assigned to a subset of the waste stream). The 2001 composition profile was applied only to the mixed self-haul loads: the pure loads were added to the mixed load profile resulting in a total self-haul profile.

Finally, adjustments were made so that a sufficient number of samples were taken from each substream and vehicle type to assure that sample data are representative of composition. The commercial substream was oversampled to account for the increased variability typically encountered in that substream.

Exhibit 1-1 presents the number of samples taken per day.

EXHIBIT 1-1
Samples per Day by Substream and Vehicle Type

	Number of Samples				
	Transfer Station	**Commercial Packer**	**Commercial Rolloff**	**Commercial Other**	**Total**
May 15, 2008	6	5	6	3	20
May 16, 2008	6	8	5	1	20
May 19, 2008	6	7	6	1	20
May 20, 2008	6	4	9	1	20
May 21, 2008	6	6	4	4	20
Total	30	30	30	10	100

All loads were systematically selected for sampling[4]. From each selected load, a 200- to 300-pound representative sample was hand-sorted into 58 prescribed component material categories, which were then weighed and recorded. Evidence of explosive or hard-to-process items was noted for each load. A listing and description of the component material categories is included in Attachment C. Exhibit 1-2 summarizes the number of samples and the total and average sample weight.

[4] Systematic sampling is outlined in more detail in Attachment B. In short, this procedure assures that the correct number of samples is taken randomly and throughout the day by selecting every "nth" vehicle from each substream (i.e. every 4th commercial packer truck).

EXHIBIT 1-2
Number of Samples, Total and Average Sample Weight

	Sample Count	Sample Weights (in pounds) Total for All Samples	Average
Transfer Station	30	6,986	232.9
Commercial Packer	30	6,724	224.1
Commercial Drop Box	30	6,902	230.1
Commercial Other	10	2,376	237.6
Total	100	22,988	231.2

1.2.2 Calculations

A weighted averaging process was used to prepare the waste composition estimates in which composition percentages from substreams were multiplied by FY 2008 tons from that substream. The result is FY 2008 tons for each waste component in each substream.

Exhibit 1-3 presents a flow chart that summarizes the calculation process for the waste composition estimates. For West Hawai`i, composition estimates were calculated for the sample groups, the three substreams, and the overall waste stream using the linked procedure shown. For the transfer station substream, composition percentages were calculated for each of the nine transfer stations. Sample loads that came from each of the nine stations determined these composition percentages. The percentages were weighted according to the tons disposed by each station during FY 2008, and then pooled to produce an overall transfer station composition[5].

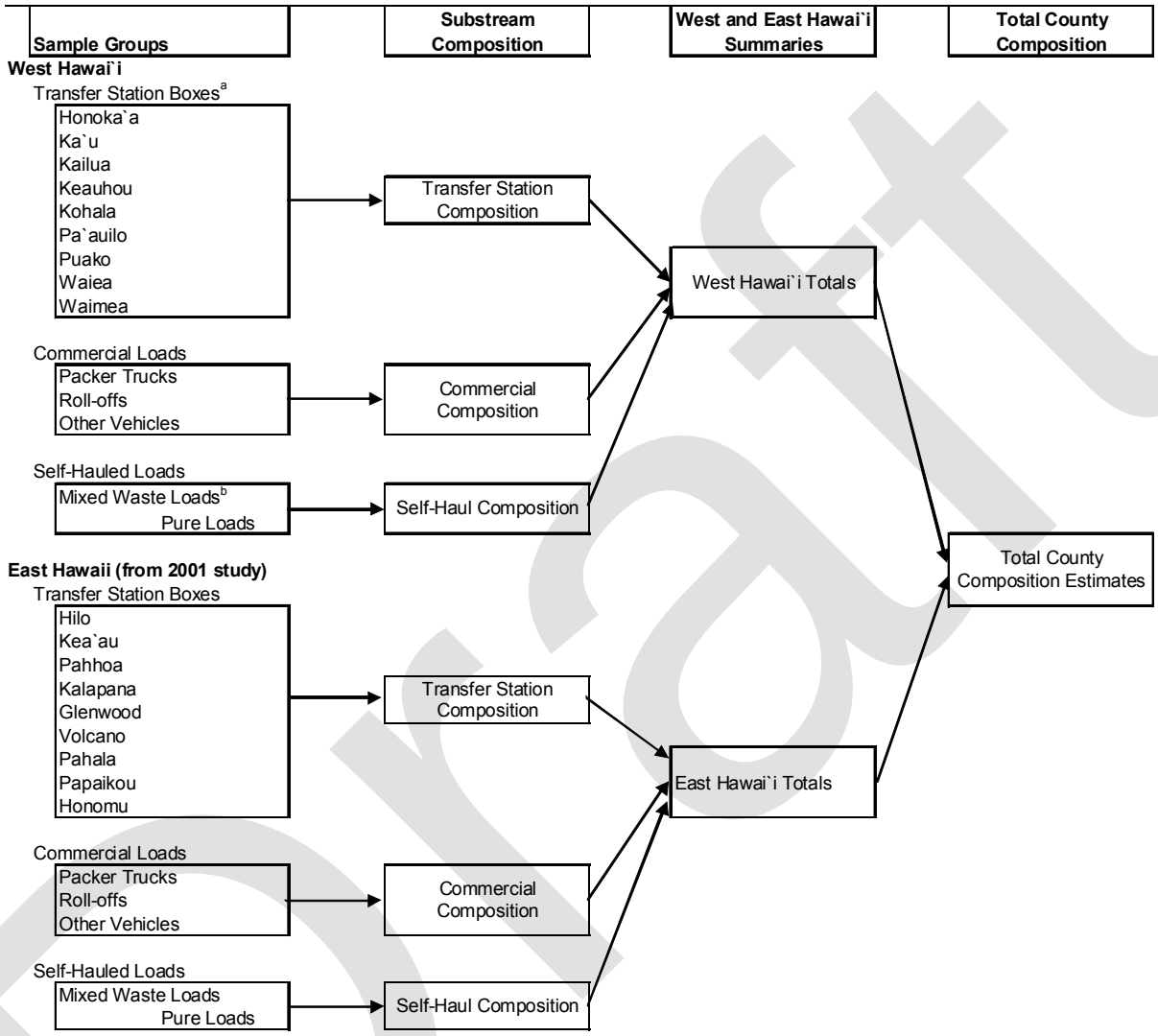
For the commercial haulers, separate composition percentages were calculated for three vehicle types: packer, roll-off, and other vehicles. These percentages were weighted according to the estimated tons disposed by each vehicle type during FY 2008. They were then combined to give composition percentages for the commercial substream.

For waste from East Hawai`i delivered to the South Hilo Landfill, the waste quantities by component were determined by multiplying the 2001 waste composition percentages by FY 2008 deliveries from each substream (transfer stations, commercial loads, and self-haul loads. As described above, pure loads delivered to the South Hilo Landfill were assigned to specific waste components.

The overall waste stream composition for West Hawai`i and East Hawai`i was calculated as an aggregate of the sample group compositions, which were weighted according to their tonnage contribution to the overall waste stream. Finally, a similar process is used to combine results from West Hawai`i and East Hawai`i into a total county waste composition profile.

[5] Tonnages from the West Hawai`i Landfill and the South Hilo Landfill provided all tonnages used to "weight" each sample group for this study. The weighting process is described in Attachment C.

EXHIBIT 1-3
Flow Diagram of Composition Calculations



[a]Not sampled because quantities were small. The 2001 composition was used for these loads.

[b]No waste was sampled from the Laupahoehoe, Miloli`i and Ke`ei stations. Tons from these stations were assigned a waste composition profile from one of the other stations.

For the West Hawai`i substreams, low and high estimates are shown that represent a 90 percent confidence level, meaning that there is a 90 percent certainty that the actual composition is within the calculated range[6]. In exhibits and charts throughout this report, the values graphed represent the mean component percentage, not the range.

[6] The low and high estimates could not be calculated for any profile that blends information from more than one East Hawai`i substream because the relative quantity of waste delivered to each substream has changed since 2001.

SECTION 2

Countywide Sampling Results

This section presents a summary of countywide composition results for the total waste stream and the three substreams (transfer stations, commercial, and self-haul), and includes data for both West and East Hawai`i. Most of this information is presented in one of the following two formats:

- A bar chart that depicts the composition by nine main waste *categories*: paper, glass, metal, plastic, organics, construction and demolition, household hazardous, special, and mixed.
- An exhibit that lists the ten largest of the 58 waste *components*, by weight.

More comprehensive exhibits that details the full composition results for the 58 component categories are presented in Attachment A (Exhibits A-1 through A-6).

2.1 Total County, West Hawai`i, and East Hawai`i Composition

Exhibits 2-1, 2-2, and 2-3 are bar charts that show the overall composition results for the nine main waste categories of waste disposed for the entire County, for West Hawai`i, and for East Hawai`i, respectively. When combined, organics and paper comprise more than half of the waste stream. Construction and demolition waste accounts for another 22% by weight. The construction and demolition category includes such components as clean lumber and gypsum scrap. The organics main waste category contains such components as food, textiles, and prunings.

The composition of waste disposed in West Hawai`i is similar to the composition of disposed waste in East Hawai`i. Two differences that merit mention include: there are more organics disposed of in West Hawai`i (35.3%) than in East Hawai`i (29.6%); and more special waste disposed of in East Hawai`i (5.2%) than in West Hawai`i (1.9%). The types of special wastes disposed most often in East Hawai`i include industrial sludge, bulky items, and tires (see Exhibit A-3 in Attachment A).

Exhibits 2-4, 2-5, and 2-6 show the ten largest waste components for the entire County, for West Hawai`i, and for East Hawai`i. In all three areas, the largest three components by weight are food, clean and treated lumber[7], and cardboard, which combined make up approximately a third of the total waste stream.

Notable differences between West Hawai`i and East Hawai`i include:

- One component in each area appears on the list in one area but not in the other: R/C metal[8] is in the top ten for West Hawai`i, and film plastic in East Hawai`i.

[7] Most of the disposed lumber in the waste stream is treated, and is not appropriate for composting.

[8] The R/C components include waste that is made mostly of one component but contains significant amounts of other components, or waste that is part of a broad waste category but cannot be put into any of its component categories. Examples of R/C organic waste includes carpet and disposable diapers, while materials such as paper towels and coated milk cartons belong to R/C paper.

- Clean and treated lumber accounts for 8.8% by weight in West Hawaii versus 14.3% in East Hawaii.
- Food accounts for 17.7% by weight in West Hawai`i versus 12.8% in East Hawai`i.

Exhibit 2-7 shows a summary comparison of composition and quantities for the nine main waste categories for West Hawai`i and East Hawai`i.

2.2 Comparison of Hawai`i County Composition to U.S. Average

Exhibit 2-8 provides an aggregated comparison of the Hawai'i County disposed waste stream with the U.S. average, as compiled by the US Environmental Protection Agency (EPA). The data are shown in aggregated form because the EPA data is grouped somewhat differently and excludes construction and demolition debris. As shown, Hawaii County's disposed waste stream includes somewhat more paper, metal, and organics and somewhat less plastic and glass than U.S. averages.

2.3 Transfer Station, Commercial, and Self-Haul Substreams

Exhibits 2-9, 2-10, and 2-11 are bar charts that show the overall composition results of waste disposed countywide in the main waste categories for the transfer station, commercial, and self-haul substreams. The composition by category for transfer station and commercial substreams are similar with organics, paper, and construction and demolition waste accounting for 70-80% of the waste disposed. Construction and demolition waste is more pronounced in the commercial substream (24.0% vs. 14.4%) and organics is more pronounced in the transfer station substream (37.6% vs. 31.5%). In comparison, the self-haul substream is quite high in construction and demolition waste (45.6%) and special waste (21.6%). As shown in Attachment A (Exhibit A-6), most of the self-haul special waste consists of industrial sludge.

Exhibits 2-12, 2-13, and 2-14 show the ten largest waste components for the transfer station, commercial, and self-haul substreams. The top ten components make up 69%, 76%, and 87% of the transfer station, commercial, and self-haul substreams, respectively. Food, clean and treated lumber, and cardboard are each in the top 5 components in the transfer station and commercial substreams. The largest self-haul substream components include clean and treated lumber (20.5%), industrial sludge (15.1%), and green waste (11.4%).

It is important to note that many of the top ten components are good candidates for re-use or are potentially recyclable. For example, the estimates indicate that there is over 15,800 tons of cardboard disposed by the transfer station and commercial substreams: cardboard represents 5.9% of the transfer station substream, and 10.0% of the commercial substream.

2.4 Explosive and Hard-to-Process Items

During the process of capturing and sorting samples, the field supervisor noted loads that contained hard-to-process or potentially explosive items. Hard-to-process items include anything that would be difficult or impossible to manually sort, automatically process, or transfer by conveyor belt due to weight or size constraints. Examples of these items are appliances, mattresses, and carpet. Of the 100 loads sampled, 9 contained hard-to-process items: three with mattresses, three with bulky furniture, and one each with large-sized demolition materials, large crates, and large plastic pipe. Five of the hard-to-process items came from the transfer station substream and four came from the commercial substream.

No potentially explosive items were identified during the 2008 and 2001 sampling events.

EXHIBIT 2-1
Composition Estimates by Waste Category: Total County

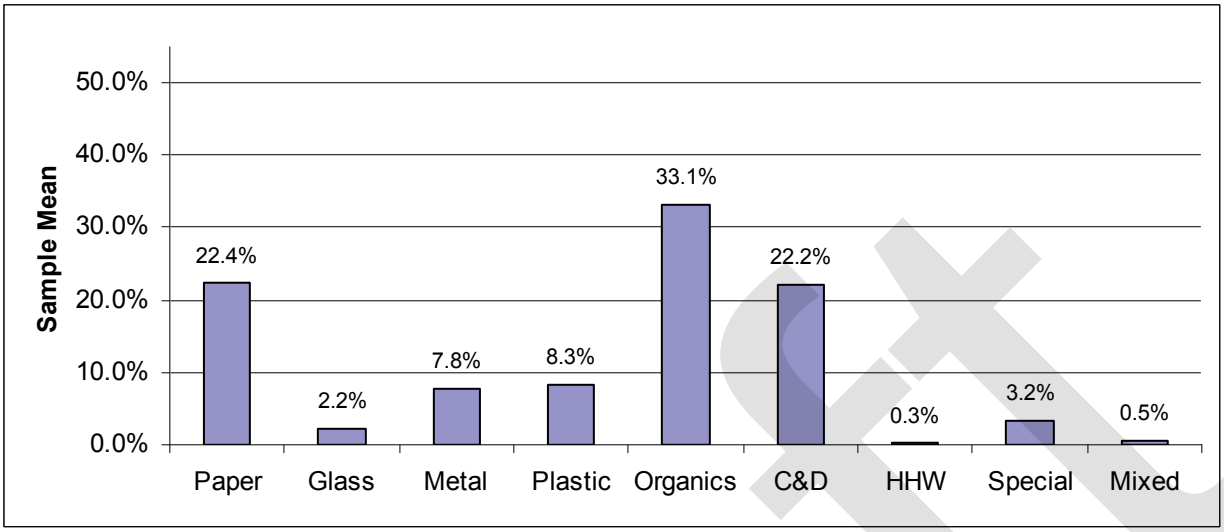


EXHIBIT 2-2
Composition Estimates by Waste Category: West Hawai`i

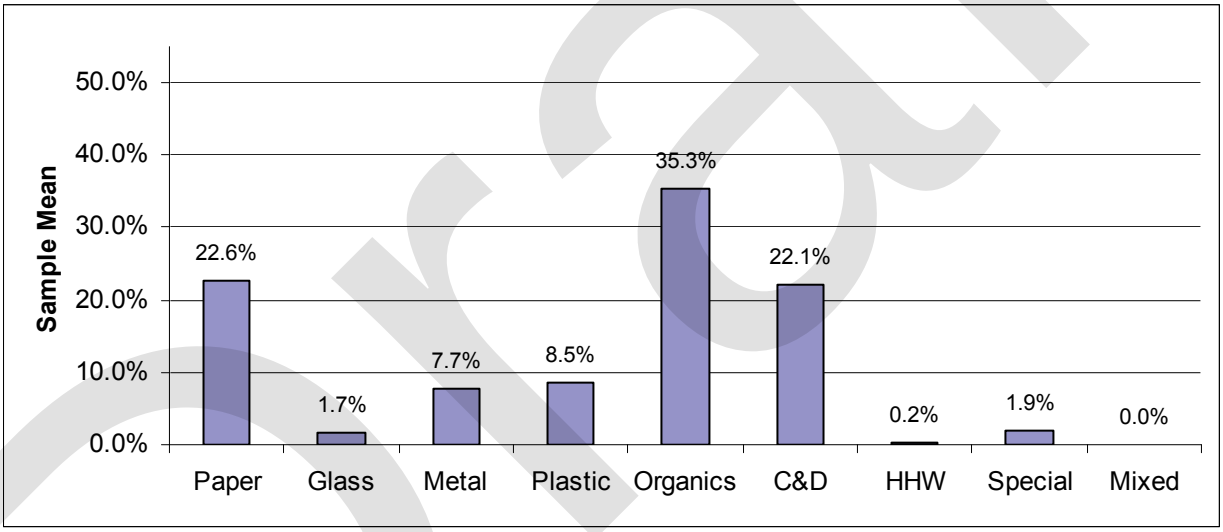


EXHIBIT 2-3
Composition Estimates by Waste Category: East Hawai`i

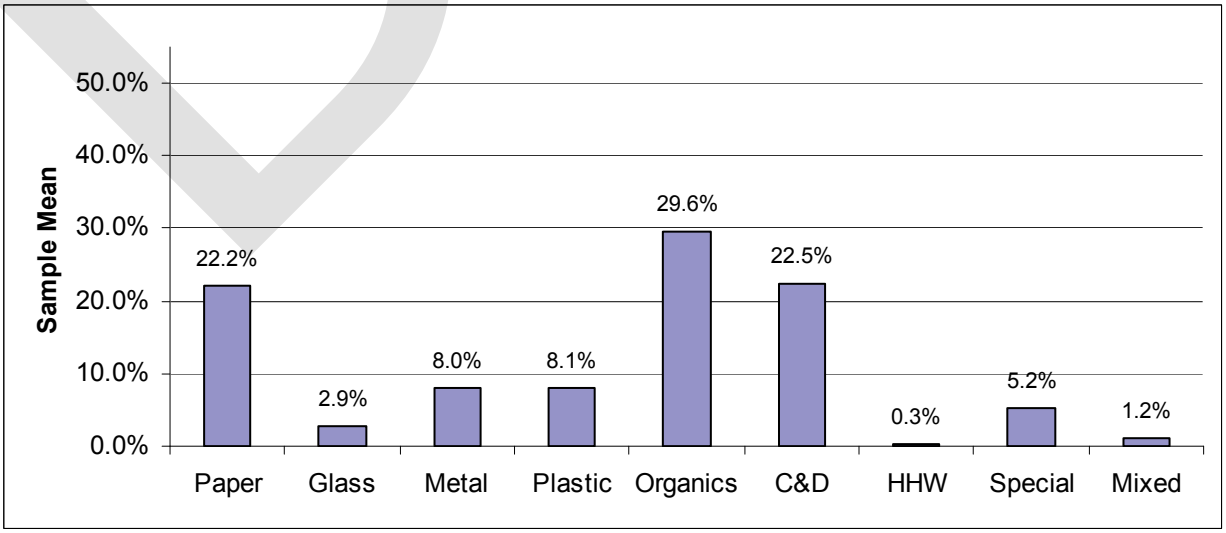


EXHIBIT 2-4
Top Ten Components: Total County

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	34,230	16.3%	16.3%
Clean and Treated Lumber	22,984	10.9%	27.2%
Cardboard	16,182	7.7%	34.9%
Green waste	15,858	7.6%	42.5%
R/C Organic	13,875	6.6%	49.1%
R/C Demolition	12,819	6.1%	55.2%
R/C Paper	11,443	5.4%	60.7%
Miscellaneous Paper	8,634	4.1%	64.8%
Ferrous Metal	7,441	3.5%	68.3%
Film Plastic	6,170	2.9%	65.4%

EXHIBIT 2-5
Top Ten Components: West Hawai`i

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	22,804	17.7%	17.7%
Clean and Treated Lumber	11,363	8.8%	26.6%
Cardboard	10,211	7.9%	34.5%
Green Waste	10,211	7.9%	42.5%
R/C Demolition	10,172	7.9%	50.4%
R/C Organic	8,573	6.7%	57.1%
R/C Paper	6,400	5.0%	62.0%
Miscellaneous Paper	6,233	4.8%	66.9%
Ferrous Metal	4,417	3.4%	70.3%
R/C Metal	4,169	3.2%	69.0%

EXHIBIT 2-6
Top Ten Components: East Hawai`i

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Clean and Treated Lumber	11,621	14.3%	14.3%
Food	11,426	12.8%	12.8%
Cardboard	5,970	6.8%	33.8%
Green Waste	5,644	6.9%	40.8%
R/C Organic	5,302	6.0%	46.7%
R/C Paper	5,043	4.6%	51.4%
Ferrous Metal	3,025	3.3%	54.7%
R/C Demolition	2,647	3.2%	57.9%
Miscellaneous Paper	2,401	2.5%	60.5%
Film Plastic	2,157	2.3%	62.7%

Note: The abbreviation “R/C” stands for Remainder/Composite. The R/C components include waste that is made mostly of one component but contains significant amounts of other components, or waste that is part of a broad waste category but cannot be put into any of its component categories. Examples of R/C organic waste includes carpet and disposable diapers, while materials such as paper towels and coated milk cartons belong to R/C paper.

Green waste includes leaves and grass, prunings, and stumps.

EXHIBIT 2-7
Composition and Quantities for West Hawai`i and East Hawai`i Main Categories

	Percent of Total		FY 07-08 Tons	
	West Hawai`i	East Hawai`i	West Hawai`i	East Hawai`i
Paper	22.6%	22.2%	29,031	18,099
Glass	1.7%	2.9%	2,234	2,359
Metal	7.7%	8.0%	9,861	6,526
Plastic	8.5%	8.1%	10,895	6,588
Organics	35.3%	29.6%	45,346	24,102
Construction and Demolition	22.1%	22.5%	28,405	18,298
Household Hazardous	0.2%	0.3%	267	260
Special	1.9%	5.2%	2,504	4,259
Mixed Residue	0.0%	1.2%	1	996
	100.0%	100.0%	128,543	81,487

EXHIBIT 2-8
Comparison of Hawai`i County Composition to U.S. Average

Material Category	Hawaii County	United States[a]	Difference HI - US
Paper	28.9%	26.3%	2.6%
Glass	2.8%	6.6%	-3.8%
Metal	10.0%	7.8%	2.2%
Plastic	10.7%	17.5%	-6.8%
Organics	42.5%	37.3%	5.2%
Other	5.1%	4.5%	0.5%

[a]U.S. Environmental Protection Agency, 2006. *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: facts and Figures for 2006.* Accessed at http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/06data.pdf

Note: Excludes construction and demolition debris.

EXHIBIT 2-9
Composition Estimates by Waste Category: Transfer Stations

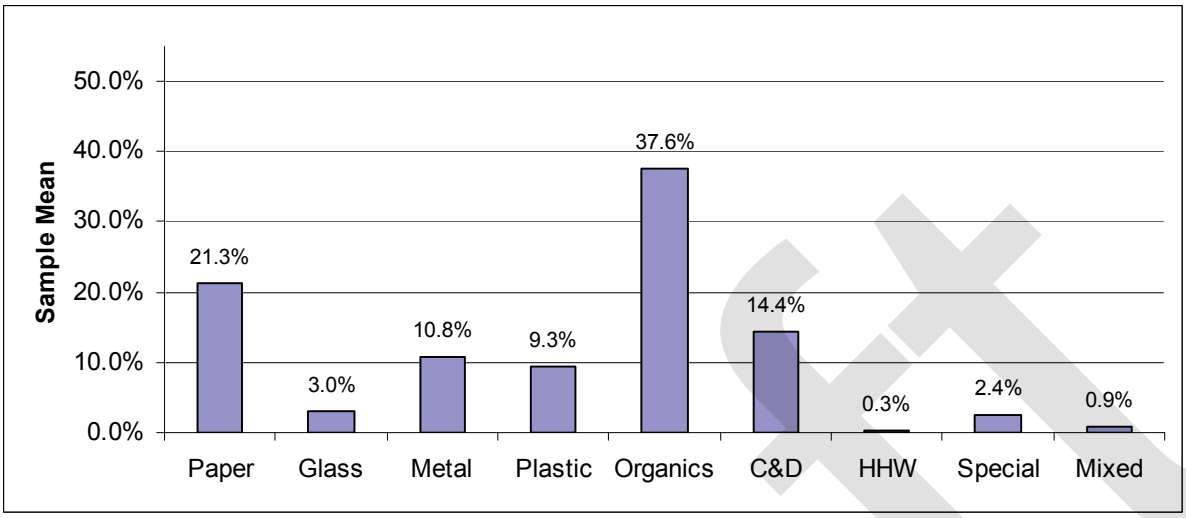


EXHIBIT 2-10
Composition Estimates by Waste Category: Commercial

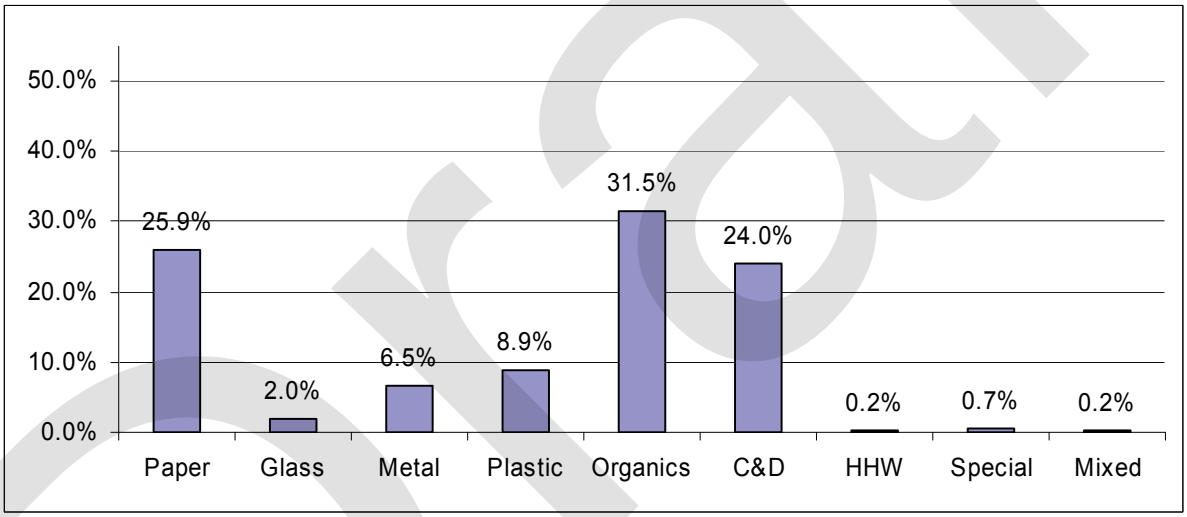


EXHIBIT 2-11
Composition Estimates by Waste Category: Self-Haul

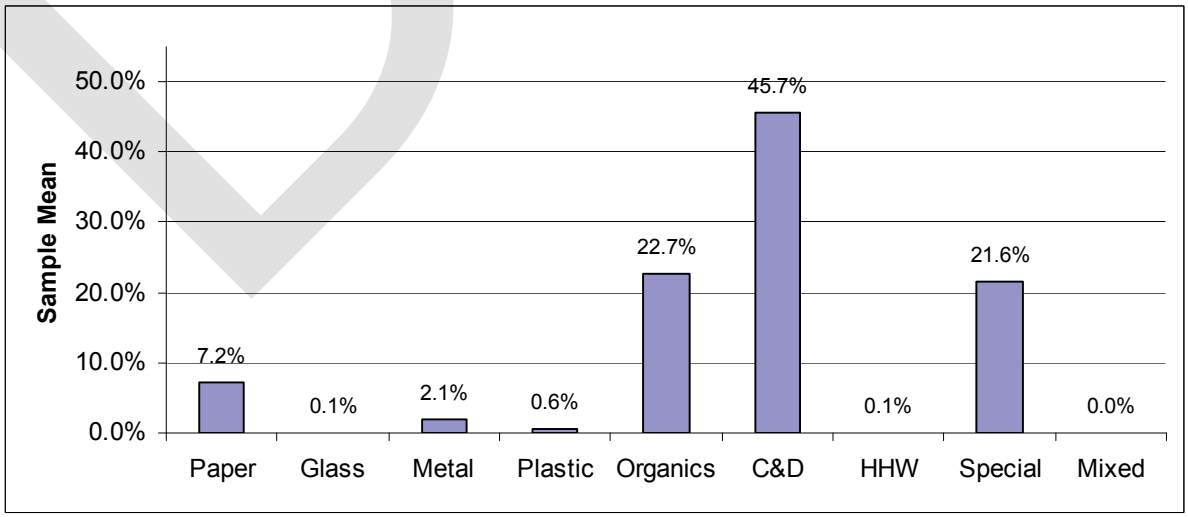


EXHIBIT 2-12
Top Ten Components: County Transfer Stations

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	10,944	13.5%	13.5%
Green Waste	9,839	12.1%	25.6%
R/C Organic	6,711	8.3%	33.8%
Clean and Treated Lumber	5,570	6.9%	40.7%
Cardboard	4,822	5.9%	46.6%
R/C Demolition	4,014	4.9%	51.6%
Miscellaneous Paper	3,834	4.7%	56.3%
R/C Paper	3,730	4.6%	60.9%
Ferrous Metal	3,574	4.4%	65.3%
R/C Metal	3,102	3.8%	69.1%

EXHIBIT 2-13
Top Ten Components: County Commercial

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	22,760	20.7%	20.7%
Clean and Treated Lumber	13,576	12.3%	33.0%
Cardboard	11,011	10.0%	43.0%
R/C Demo	7,422	6.7%	49.7%
R/C Paper	6,826	6.2%	55.9%
R/C Organic	5,586	5.1%	61.0%
Miscellaneous	4,764	4.3%	65.3%
Green Waste	3,886	3.5%	68.9%
Film	3,845	3.5%	72.4%
Concrete	3,696	3.4%	75.7%

EXHIBIT 2-14
Top Ten Components: County Self-Haul

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Clean and Treated Lumber	3,839	20.5%	20.5%
Industrial Sludge	2,826	15.1%	35.6%
Green Waste	2,129	11.4%	47.0%
R/C Organic	1,578	8.4%	55.5%
R/C Demolition	1,383	7.4%	62.9%
Concrete	923	4.9%	67.8%
Rocks and Soil	921	4.9%	72.7%
Asphalt Paving	897	4.8%	77.5%
R/C Paper	888	4.7%	82.3%
Treated Lumber	878	4.7%	87.0%

Notes: The abbreviation "R/C" stands for Remainder/Composite. The R/C components include waste that is made mostly of one component but contains significant amounts of other components, or waste that is part of a broad waste category but cannot be put into any of its component categories. Examples of R/C organic waste includes carpet and disposable diapers, while materials such as paper towels and coated milk cartons belong to R/C paper.

Green waste includes leaves and grass, prunings, and stumps.

SECTION 3

West Hawai`i Sampling Results

This section presents summary composition results for the West Hawai`i transfer station, commercial, and self-haul substreams. The information is presented using the same formats used in Section 2. More comprehensive exhibits that detail the full composition results for the 58 component categories are presented in Attachment A (Exhibits A-7, A-8, and A-9).

Exhibits 3-1, 3-2, and 3-3 show the overall composition results for waste disposed of in West Hawai`i via the three substreams. Organics, paper, and construction and demolition debris account for 77% and 83% of the transfer station and commercial substreams, respectively. More than 90% of the self-haul substream consists of three waste categories: special waste (mainly industrial sludge), construction and demolition debris, and organics.

Exhibits 3-4, 3-5, and 3-6 show the ten largest waste components in West Hawai`i for the three main substreams. Cardboard is a significant component in all three substreams: 5.1% for transfer stations, 9.8% for commercial, and 2.4% for self-haul. Other components that appear in all three substreams include food, green waste, clean and treated lumber, and R/C organic.

Green waste (14.4%) is the largest component of the West Hawai`i transfer station substream, and food (21.3%) is the largest component of the West Hawai`i commercial substream. Food, clean and treated lumber and R/C demolition are in the top 5 of both the transfer station and commercial substreams. Some components that appear in the top 10 of only one of the transfer station or commercial substreams include R/C metal, ferrous metal, and textiles, which are in the top 10 in the transfer station substream, and R/C paper, concrete, and film plastic which are in the top 10 in the commercial substream.

The self-haul substream composition differs from the transfer station and commercial substreams. The top three components of the self-haul substream are industrial sludge, clean and treated lumber, and rocks and soil.

Exhibit 3-7 shows FY 2008 tons, the number of samples taken, and composition results by category for West Hawai`i transfer stations. As discussed in Section 1, the small number of samples taken from individual stations means that there is considerable uncertainty associated with these estimates.

EXHIBIT 3-1
Composition Estimates by Waste Category: West Hawai`i Transfer Station

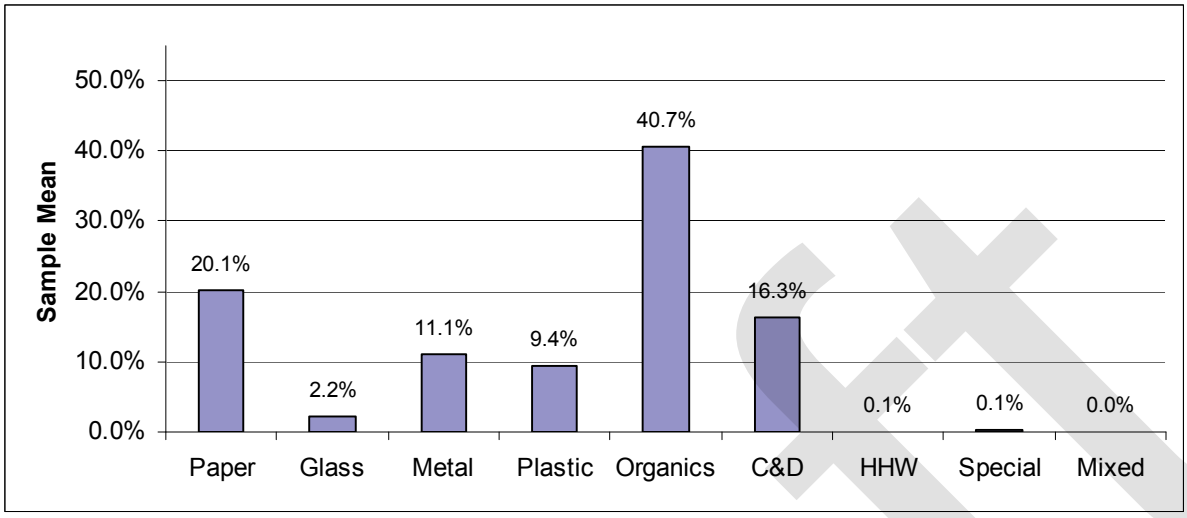


EXHIBIT 3-2
Composition Estimates by Waste Category: West Hawai`i Commercial

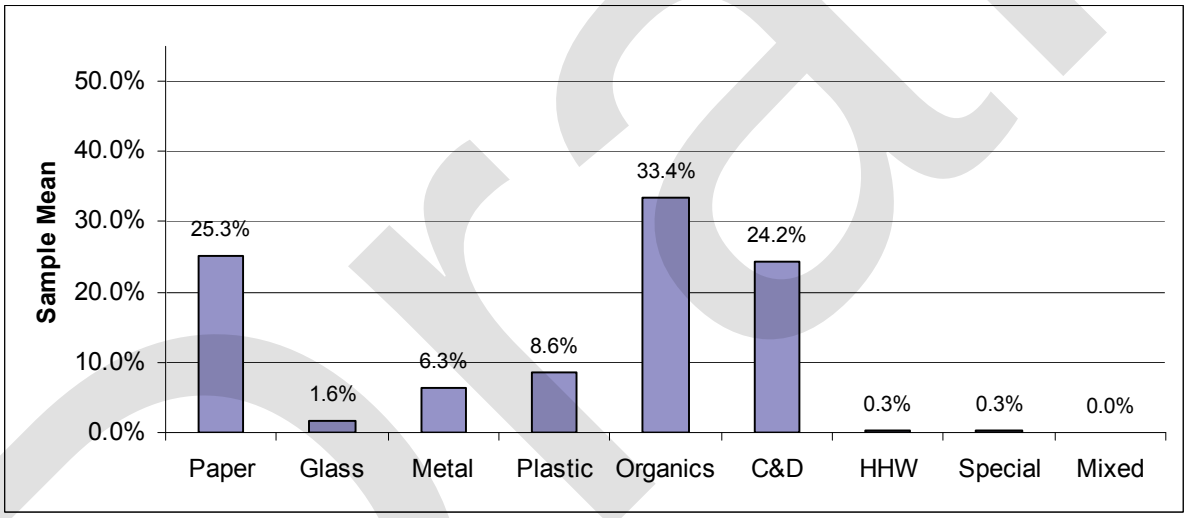


EXHIBIT 3-3
Composition Estimates by Waste Category: West Hawai`i Self-Haul

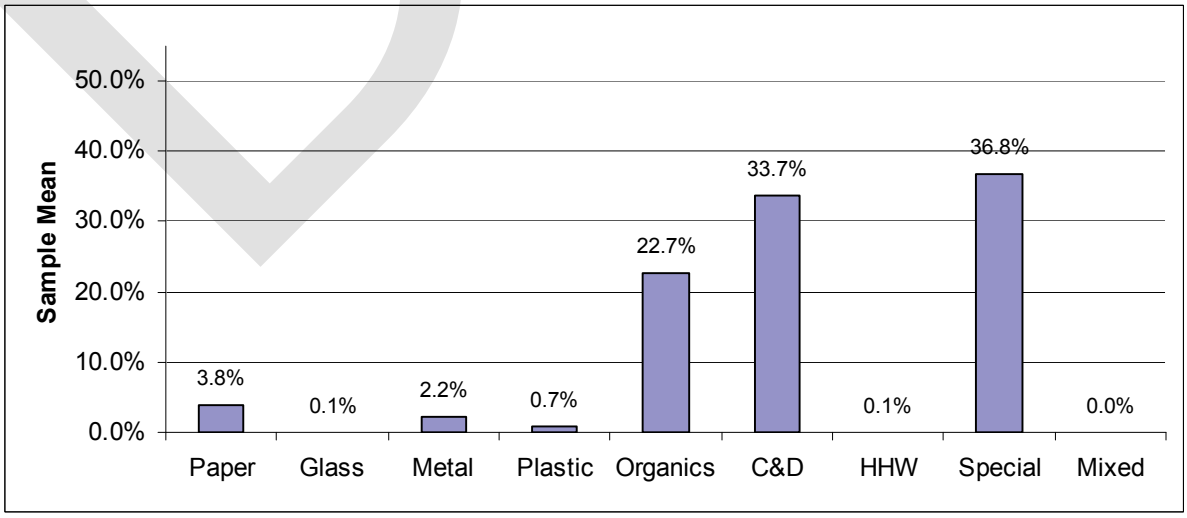


EXHIBIT 3-4
Top Ten Components: West Hawai`i Transfer Stations

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Green Waste	6,007	14.4%	14.4%
Food	5,311	12.7%	27.2%
R/C Organic	3,721	8.9%	36.1%
Clean and Treated Lumber	3,334	8.0%	44.1%
R/C Demolition	2,859	6.9%	51.0%
Miscellaneous Paper	2,333	5.6%	56.6%
R/C Metal	2,230	5.4%	61.9%
Cardboard	2,125	5.1%	67.0%
Ferrous Metal	1,911	4.6%	71.6%
Textiles	1,903	4.6%	76.2%

EXHIBIT 3-5
Top Ten Components: West Hawai`i Commercial

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	17,280	21.3%	21.3%
Cardboard	7,945	9.8%	31.1%
Clean and Treated Lumber	7,586	9.4%	40.5%
R/C Demolition	6,835	8.4%	49.0%
R/C Paper	4,936	6.1%	55.1%
R/C Organic	4,468	5.5%	60.6%
Miscellaneous	3,885	4.8%	65.4%
Concrete	3,693	4.6%	69.9%
Green Waste	3,467	4.3%	74.2%
Film Plastic	2,774	3.4%	77.6%

EXHIBIT 3-6
Top Ten Components: West Hawai`i Self-Haul

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Industrial Sludge	1,585	26.8%	26.8%
Clean and Treated Lumber	921	14.5%	41.3%
Rocks and Soil	792	13.4%	54.7%
Green Waste	737	12.5%	67.2%
R/C Demolition	478	8.1%	75.3%
R/C Organic	384	6.5%	81.8%
R/C Special Waste	299	5.1%	86.9%
Food	212	3.6%	90.5%
Cardboard	141	2.4%	92.8%
Tires	116	2.0%	94.8%

Note: The abbreviation “R/C” stands for Remainder/Composite. The R/C components include waste that is made mostly of one component but contains significant amounts of other components, or waste that is part of a broad waste category but cannot be put into any of its component categories. Examples of R/C organic waste includes carpet and disposable diapers, while materials such as paper towels and coated milk cartons belong to R/C paper.

Green waste includes leaves and grass, prunings, and stumps.

EXHIBIT 3-7
Composition Estimates: West Hawai`i Individual Transfer Stations

	Honoka`a	Ka`u	Kailua	Keauhou	Kohala	Pa`auilo	Puako	Waiea	Waimea	Laupa-hoehoe	Miloli`i	Ke`ei
Tons 06-07	3,459	3,447	7,860	5,017	4,145	1,922	2,681	2,968	6,376	1,547	207	2,025
No. of Samples	2	3	6	5	4	1	2	2	5			
Station used as a proxy when calculating total transfer station waste composition										Pa`auilo	Waiea	Kohala
Percent of Total												
Paper	21.9%	24.1%	23.6%	21.9%	17.2%	21.1%	6.3%	14.4%	20.5%	Not Sampled		
Glass	0.7%	3.3%	2.2%	4.9%	0.5%	1.7%	0.1%	2.1%	1.7%			
Metal	11.3%	14.6%	7.4%	10.2%	7.9%	23.0%	16.9%	11.4%	7.7%			
Plastic	10.3%	6.9%	15.1%	10.4%	5.2%	11.3%	4.8%	5.4%	7.6%			
Organics	33.3%	40.9%	36.5%	41.0%	42.6%	25.3%	70.8%	41.8%	43.2%			
Construction and Demolition	21.8%	10.1%	15.1%	11.5%	26.5%	17.6%	1.1%	24.8%	18.3%			
Household Hazardous	0.7%	0.2%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.1%			
Special	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%			
Mixed Residue	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

SECTION 4

East Hawai`i Sampling Results

This section presents summary composition results for the East Hawai`i transfer station, commercial, and self-haul substreams. More comprehensive exhibits that detail the full composition results for the 58 component categories are presented in Attachment A (Exhibits A-10, A-11, and A-12). As noted in Section 1, the composition percentages for the East Hawai`i substreams were taken from the results of the 2001 study. The tons for waste components were calculated by multiplying FY 2008 tons for each substream by the 2001 study's composition percentages.

Exhibits 4-1, 4-1, and 4-3 show the overall composition results of waste disposed of in East Hawai`i via the three main substreams. Organics, paper, and construction and demolition debris account for 69%, 77% and 83% of the transfer station, commercial, and self-haul substreams, respectively. Other waste types that comprise large percentages of individual substreams include metal and plastic in the transfer station substream (10.5% and 9.2%, respectively), plastic in the commercial substream (10.0%), and special waste (14.6%) in the self-haul substream.

Exhibits 4-4, 4-5, and 4-6 show the ten largest waste components in East Hawai`i for the three main substreams. Three of the top five components are the same for the transfer station and commercial substreams (food, cardboard, and R/C paper). Cardboard comprises 6.8% of the transfer stations substream and 10.5% of the commercial substream. Several waste components appear in the top 10 of only one substream, including green waste, bulky items, and R/C plastic, which are in the top 10 in the transfer station substream, and film plastic, durable plastic, and newspaper which are in the top 10 in the commercial substream.

The self-haul substream composition differs from the transfer station and commercial substreams. The top three self-haul substream components are clean and treated lumber, green waste, and industrial sludge. The only top 10 self-haul components that are also in the top 10 in one or both of the other substreams include green waste, R/C organic, R/C paper, and clean and treated lumber.

EXHIBIT 4-1
Composition Estimates by Waste Category: East Hawai`i Transfer Stations

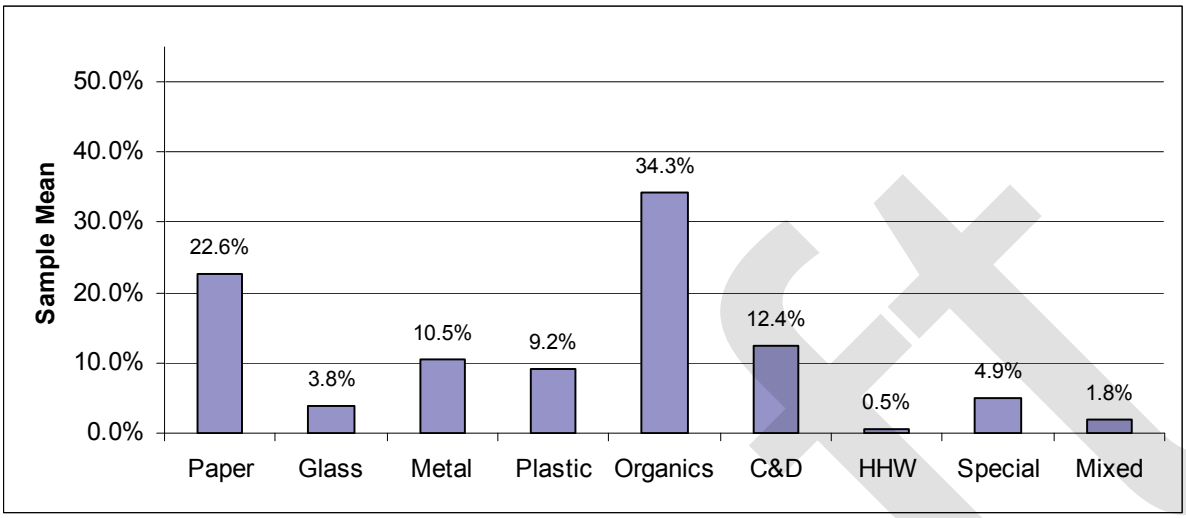


EXHIBIT 4-2
Composition Estimates by Waste Category: East Hawai`i Commercial

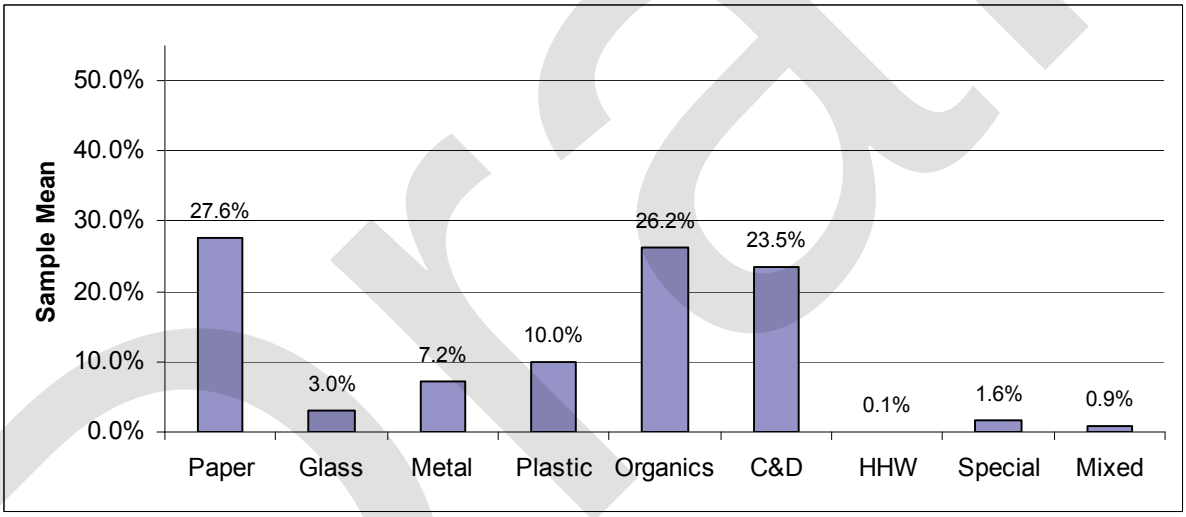


EXHIBIT 4-3
Composition Estimates by Waste Category: East Hawai`i Self-Haul

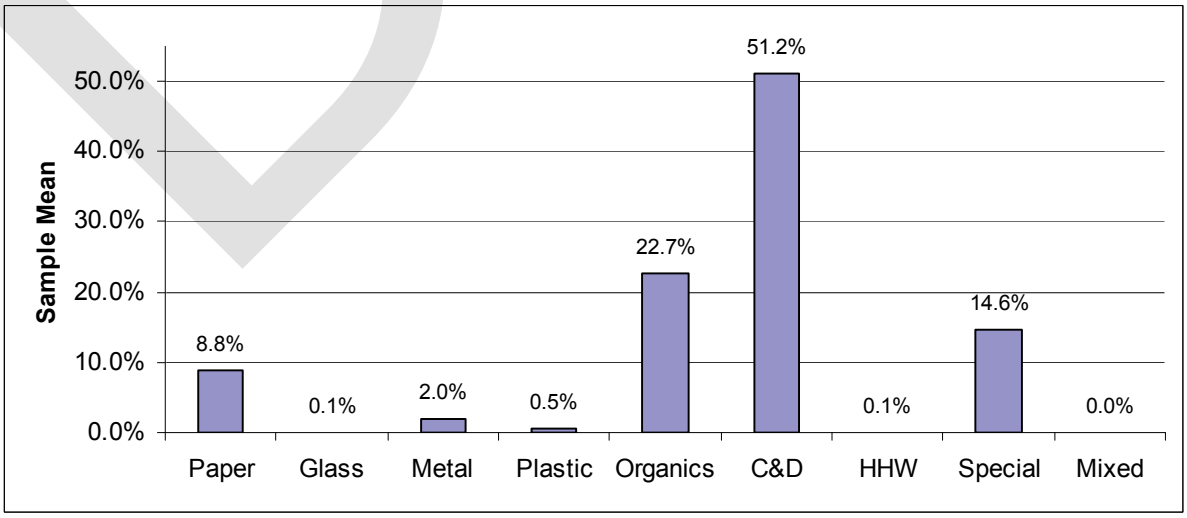


EXHIBIT 4-4
Top Ten Components: East Hawai`i Transfer Stations

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Food	5,633	14.2%	14.2%
Green Waste	3,832	9.7%	23.9%
R/C Organic	2,990	7.6%	31.5%
Cardboard	2,696	6.8%	38.3%
R/C Paper	2,303	5.8%	44.1%
Clean and Treated Lumber	2,235	5.6%	49.8%
Ferrous Metal	1,663	4.2%	54.0%
Bulky Items	1,642	4.1%	58.1%
Miscellaneous Paper	1,501	3.8%	61.9%
R/C Plastic	1,291	3.3%	65.2%

EXHIBIT 4-5
Top Ten Components: East Hawai`i Commercial

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Clean and Treated Lumber	5,990	20.6%	20.6%
Food	5,479	18.8%	39.4%
Cardboard	3,066	10.5%	49.9%
R/C Paper	1,889	6.5%	56.4%
Ferrous Metal	1,207	4.1%	60.5%
R/C Organic	1,118	3.8%	64.4%
Film Plastic	1,072	3.7%	68.1%
Miscellaneous Paper	879	3.0%	71.1%
Durable Plastic	815	2.8%	73.9%
Newspaper	734	2.5%	76.4%

EXHIBIT 4-6
Top Ten Components: East Hawai`i Self-Haul

	Tons Disposed	Percent of Total	Cumulative Percent of Total
Clean and Treated Lumber	1,194	18.8%	18.8%
Green Waste	1,392	10.9%	29.7%
Industrial Sludge	1,241	9.7%	39.4%
R/C Organic	1,194	9.3%	48.7%
R/C Demolition	905	7.1%	55.8%
R/C Paper	850	6.6%	62.4%
Concrete	816	6.4%	68.8%
Asphalt Paving	793	6.2%	75.0%
Tires	514	4.0%	79.0%
Gypsum Board	509	4.0%	83.0%

Note: The abbreviation “R/C” stands for Remainder/Composite. The R/C components include waste that is made mostly of one component but contains significant amounts of other components, or waste that is part of a broad waste category but cannot be put into any of its component categories. Examples of R/C organic waste includes carpet and disposable diapers, while materials such as paper towels and coated milk cartons belong to R/C paper.

Green waste includes leaves and grass, prunings, and stumps.

ATTACHMENT A

Detailed Sampling Results

EXHIBIT A-1
Composition Estimates: Total County

	Tons Disposed	Percent of Total
Paper	**47,130**	**22.4%**
Cardboard	16,182	7.7%
Bags	723	0.3%
Newspaper	4,193	2.0%
White Ledger	1,540	0.7%
Colored Ledger	280	0.1%
Computer	92	0.0%
Office	1,510	0.7%
Magazines	2,424	1.2%
Directories	109	0.1%
Miscellaneous	8,634	4.1%
R/C Paper	11,443	5.4%
Glass	**4,592**	**2.2%**
Clear Containers	1,476	0.7%
Green Containers	1,296	0.6%
Brown Containers	1,024	0.5%
Other Containers	307	0.1%
Flat Glass	160	0.1%
R/C Glass	329	0.2%
Metal	**16,388**	**7.8%**
Aluminum Cans	565	0.3%
Tin Cans	1,525	0.7%
Ferrous	7,441	3.5%
Nonferrous	504	0.2%
White Goods	742	0.4%
R/C Metal	5,611	2.7%
Plastic	**17,482**	**8.3%**
#1 Containers	1,067	0.5%
#2 Containers	882	0.4%
Other Containers	818	0.4%
Film	6,170	2.9%
Durable	4,002	1.9%
R/C Plastic	4,543	2.2%
Organics	**69,448**	**33.1%**
Food	34,230	16.3%
Textiles	5,485	2.6%
Leaves and Grass	6,160	2.9%
Prunings	7,057	3.4%
Stumps	2,637	1.3%
Crop Residue	3	0.0%
Manure	0	0.0%
R/C Organic	13,875	6.6%
Construction and Demolition	**46,702**	**22.2%**
Concrete	5,128	2.4%
Asphalt Paving	2,212	1.1%
Asphalt Roofing	381	0.2%
Clean and Treated Lumber	22,984	10.9%
Gypsum Board	1,471	0.7%
Rocks and Soil	1,707	0.8%
R/C Demo	12,819	6.1%
Household Hazardous	**527**	**0.3%**
Paint	171	0.1%
Vehicle Fluids	20	0.0%
Oil	54	0.0%
Batteries	117	0.1%
R/C Hazardous	165	0.1%
Special	**6,762**	**3.2%**
Ash	93	0.0%
Sewage Sludge	0	0.0%
Industrial Sludge	2,826	1.3%
Treated Medical	139	0.1%
Bulky Items	2,177	1.0%
Tires	1,124	0.5%
R/C Special	404	0.2%
Mixed	**997**	**0.5%**
Mixed Residue	997	0.5%
Total Tons	210,030	
Sample Count	100	

EXHIBIT A-2
Composition Estimates: Total West Hawai`i

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**29,031**	**22.6%**	**Construction and Demolition**	**28,405**	**22.1%**
Cardboard	10,211	7.9%	Concrete	3,800	3.0%
Bags	360	0.3%	Asphalt Paving	616	0.5%
Newspaper	2,313	1.8%	Asphalt Roofing	165	0.1%
White Ledger	726	0.6%	Clean and Treated Lumber	11,363	8.8%
Colored Ledger	190	0.1%	Gypsum Board	829	0.6%
Computer	62	0.0%	Rocks and Soil	1,460	1.1%
Office	1,090	0.8%	R/C Demo	10,172	7.9%
Magazines	1,410	1.1%	**Household Hazardous**	**267**	**0.2%**
Directories	36	0.0%	Paint	117	0.1%
Miscellaneous	6,233	4.8%	Vehicle Fluids	2	0.0%
R/C Paper	6,400	5.0%	Oil	54	0.0%
Glass	**2,234**	**1.7%**	Batteries	29	0.0%
Clear Containers	590	0.5%	R/C Hazardous	65	0.1%
Green Containers	615	0.5%	**Special**	**2,504**	**1.9%**
Brown Containers	401	0.3%	Ash	93	0.1%
Other Containers	294	0.2%	Sewage Sludge	0	0.0%
Flat Glass	98	0.1%	Industrial Sludge	1,585	1.2%
R/C Glass	236	0.2%	Treated Medical	20	0.0%
Metal	**9,861**	**7.7%**	Bulky Items	392	0.3%
Aluminum Cans	224	0.2%	Tires	116	0.1%
Tin Cans	800	0.6%	R/C Special	299	0.2%
Ferrous	4,417	3.4%	**Mixed**	**1**	**0.0%**
Nonferrous	250	0.2%	Mixed Residue	1	0.0%
White Goods	1	0.0%			
R/C Metal	4,169	3.2%			
Plastic	**10,895**	**8.5%**			
#1 Containers	580	0.5%			
#2 Containers	483	0.4%			
Other Containers	566	0.4%			
Film	4,013	3.1%			
Durable	2,632	2.0%			
R/C Plastic	2,621	2.0%			
Organics	**45,346**	**35.3%**			
Food	22,804	17.7%			
Textiles	3,755	2.9%			
Leaves and Grass	4,833	3.8%			
Prunings	4,085	3.2%			
Stumps	1,293	1.0%			
Crop Residue	3	0.0%			
Manure	0	0.0%			
R/C Organic	8,573	6.7%			
Total Tons	128,543				
Sample Count	100				

EXHIBIT A-3
Composition Estimates: Total East Hawai`i

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**18,099**	**22.2%**	**Construction and Demolition**	**18,298**	**22.5%**
Cardboard	5,970	7.3%	Concrete	1,328	1.6%
Bags	362	0.4%	Asphalt Paving	1,597	2.0%
Newspaper	1,880	2.3%	Asphalt Roofing	216	0.3%
White Ledger	814	1.0%	Clean and Treated Lumber	11,621	14.3%
Colored Ledger	90	0.1%	Gypsum Board	642	0.8%
Computer	31	0.0%	Rocks and Soil	247	0.3%
Office	420	0.5%	R/C Demo	2,647	3.2%
Magazines	1,014	1.2%	**Household Hazardous**	**260**	**0.3%**
Directories	74	0.1%	Paint	53	0.1%
Miscellaneous	2,401	2.9%	Vehicle Fluids	18	0.0%
R/C Paper	5,043	6.2%	Oil	0	0.0%
Glass	**2,359**	**2.9%**	Batteries	89	0.1%
Clear Containers	886	1.1%	R/C Hazardous	100	0.1%
Green Containers	682	0.8%	**Special**	**4,259**	**5.2%**
Brown Containers	623	0.8%	Ash	0	0.0%
Other Containers	13	0.0%	Sewage Sludge	0	0.0%
Flat Glass	62	0.1%	Industrial Sludge	1,241	1.5%
R/C Glass	92	0.1%	Treated Medical	119	0.1%
Metal	**6,526**	**8.0%**	Bulky Items	1,785	2.2%
Aluminum Cans	341	0.4%	Tires	1,008	1.2%
Tin Cans	725	0.9%	R/C Special	105	0.1%
Ferrous	3,025	3.7%	**Mixed**	**996**	**1.2%**
Nonferrous	254	0.3%	Mixed Residue	996	1.2%
White Goods	741	0.9%			
R/C Metal	1,442	1.8%			
Plastic	**6,588**	**8.1%**			
#1 Containers	487	0.6%			
#2 Containers	399	0.5%			
Other Containers	252	0.3%			
Film	2,157	2.6%			
Durable	1,370	1.7%			
R/C Plastic	1,923	2.4%			
Organics	**24,102**	**29.6%**			
Food	11,426	14.0%			
Textiles	1,730	2.1%			
Leaves and Grass	1,327	1.6%			
Prunings	2,972	3.6%			
Stumps	1,344	1.6%			
Crop Residue	0	0.0%			
Manure	0	0.0%			
R/C Organic	5,302	6.5%			
Total Tons	81,487				
Sample Count (2001 study)	100				

EXHIBIT A-4
Composition Estimates: Total County Transfer Stations

	Tons Disposed	Percent of Total
Paper	**17,309**	**21.3%**
Cardboard	4,822	5.9%
Bags	232	0.3%
Newspaper	2,109	2.6%
White Ledger	503	0.6%
Colored Ledger	69	0.1%
Computer	24	0.0%
Office	826	1.0%
Magazines	1,136	1.4%
Directories	26	0.0%
Miscellaneous	3,834	4.7%
R/C Paper	3,730	4.6%
Glass	**2,407**	**3.0%**
Clear Containers	830	1.0%
Green Containers	666	0.8%
Brown Containers	563	0.7%
Other Containers	155	0.2%
Flat Glass	43	0.1%
R/C Glass	150	0.2%
Metal	**8,802**	**10.8%**
Aluminum Cans	277	0.3%
Tin Cans	790	1.0%
Ferrous	3,574	4.4%
Nonferrous	320	0.4%
White Goods	739	0.9%
R/C Metal	3,102	3.8%
Plastic	**7,530**	**9.3%**
#1 Containers	481	0.6%
#2 Containers	472	0.6%
Other Containers	368	0.5%
Film	2,301	2.8%
Durable	1,752	2.2%
R/C Plastic	2,156	2.7%
Organics	**30,511**	**37.6%**
Food	10,944	13.5%
Textiles	3,017	3.7%
Leaves and Grass	5,133	6.3%
Prunings	4,243	5.2%
Stumps	462	0.6%
Crop Residue	0	0.0%
Manure	0	0.0%
R/C Organic	6,711	8.3%
Construction and Demolition	**11,699**	**14.4%**
Concrete	509	0.6%
Asphalt Paving	803	1.0%
Asphalt Roofing	102	0.1%
Clean and Treated Lumber	5,570	6.9%
Gypsum Board	249	0.3%
Rocks and Soil	452	0.6%
R/C Demo	4,014	4.9%
Household Hazardous	**258**	**0.3%**
Paint	46	0.1%
Vehicle Fluids	16	0.0%
Oil	19	0.0%
Batteries	84	0.1%
R/C Hazardous	94	0.1%
Special	**1,981**	**2.4%**
Ash	0	0.0%
Sewage Sludge	0	0.0%
Industrial Sludge	0	0.0%
Treated Medical	0	0.0%
Bulky Items	1,699	2.1%
Tires	221	0.3%
R/C Special	60	0.1%
Mixed	**732**	**0.9%**
Mixed Residue	732	0.9%
Total Tons	81,230	
Sample Count	70	

EXHIBIT A-5
Composition Estimates: Total County Commercial

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**28,471**	**25.9%**	**Construction and Demolition**	**26,466**	**24.0%**
Cardboard	11,011	10.0%	Concrete	3,696	3.4%
Bags	484	0.4%	Asphalt Paving	512	0.5%
Newspaper	2,019	1.8%	Asphalt Roofing	279	0.3%
White Ledger	1,034	0.9%	Clean and Treated Lumber	13,576	12.3%
Colored Ledger	210	0.2%	Gypsum Board	646	0.6%
Computer	69	0.1%	Rocks and Soil	335	0.3%
Office	684	0.6%	R/C Demo	7,422	6.7%
Magazines	1,286	1.2%	**Household Hazardous**	**253**	**0.2%**
Directories	84	0.1%	Paint	117	0.1%
Miscellaneous	4,764	4.3%	Vehicle Fluids	0	0.0%
R/C Paper	6,826	6.2%	Oil	33	0.0%
Glass	**2,173**	**2.0%**	Batteries	32	0.0%
Clear Containers	642	0.6%	R/C Hazardous	71	0.1%
Green Containers	630	0.6%	**Special**	**738**	**0.7%**
Brown Containers	459	0.4%	Ash	0	0.0%
Other Containers	152	0.1%	Sewage Sludge	0	0.0%
Flat Glass	117	0.1%	Industrial Sludge	0	0.0%
R/C Glass	173	0.2%	Treated Medical	91	0.1%
Metal	**7,202**	**6.5%**	Bulky Items	330	0.3%
Aluminum Cans	283	0.3%	Tires	273	0.2%
Tin Cans	735	0.7%	R/C Special	45	0.0%
Ferrous	3,654	3.3%	**Mixed**	**262**	**0.2%**
Nonferrous	181	0.2%	Mixed Residue	262	0.2%
White Goods	0	0.0%			
R/C Metal	2,348	2.1%			
Plastic	**9,844**	**8.9%**			
#1 Containers	583	0.5%			
#2 Containers	407	0.4%			
Other Containers	447	0.4%			
Film	3,845	3.5%			
Durable	2,242	2.0%			
R/C Plastic	2,319	2.1%			
Organics	**34,691**	**31.5%**			
Food	22,760	20.7%			
Textiles	2,460	2.2%			
Leaves and Grass	985	0.9%			
Prunings	2,790	2.5%			
Stumps	112	0.1%			
Crop Residue	0	0.0%			
Manure	0	0.0%			
R/C Organic	5,586	5.1%			
Total Tons	110,101				
Sample Count	66				

EXHBIT A-6
Composition Estimates: Total County Self-Haul

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**1,350**	**7.2%**	**Construction and Demolition**	**8,537**	**45.7%**
Cardboard	349	1.9%	Concrete	923	4.9%
Bags	6	0.0%	Asphalt Paving	897	4.8%
Newspaper	65	0.3%	Asphalt Roofing	0	0.0%
White Ledger	2	0.0%	Clean and Treated Lumber	3,839	20.5%
Colored Ledger	0	0.0%	Gypsum Board	575	3.1%
Computer	0	0.0%	Rocks and Soil	921	4.9%
Office	1	0.0%	R/C Demo	1,383	7.4%
Magazines	2	0.0%	**Household Hazardous**	**15**	**0.1%**
Directories	0	0.0%	Paint	7	0.0%
Miscellaneous	36	0.2%	Vehicle Fluids	4	0.0%
R/C Paper	888	4.7%	Oil	2	0.0%
Glass	**13**	**0.1%**	Batteries	1	0.0%
Clear Containers	5	0.0%	R/C Hazardous	0	0.0%
Green Containers	1	0.0%	**Special**	**4,043**	**21.6%**
Brown Containers	2	0.0%	Ash	93	0.5%
Other Containers	0	0.0%	Sewage Sludge	0	0.0%
Flat Glass	0	0.0%	Industrial Sludge	2,826	15.1%
R/C Glass	5	0.0%	Treated Medical	48	0.3%
Metal	**384**	**2.1%**	Bulky Items	148	0.8%
Aluminum Cans	5	0.0%	Tires	630	3.4%
Tin Cans	0	0.0%	R/C Special	299	1.6%
Ferrous	213	1.1%	**Mixed**	**3**	**0.0%**
Nonferrous	2	0.0%	Mixed Residue	3	0.0%
White Goods	3	0.0%			
R/C Metal	161	0.9%			
Plastic	**108**	**0.6%**			
#1 Containers	2	0.0%			
#2 Containers	3	0.0%			
Other Containers	2	0.0%			
Film	23	0.1%			
Durable	8	0.0%			
R/C Plastic	69	0.4%			
Organics	**4,245**	**22.7%**			
Food	526	2.8%			
Textiles	9	0.0%			
Leaves and Grass	42	0.2%			
Prunings	24	0.1%			
Stumps	2,063	11.0%			
Crop Residue	3	0.0%			
Manure	0	0.0%			
R/C Organic	1,578	8.4%			
Total Tons	18,699				
Sample Count	24				

EXHIBIT A-7
Composition Estimates: West Hawai`i Transfer Stations

	Tons Disposed	Percent of Total	Low	High
Paper	**8,359**	**20.1%**		
Cardboard	2,125	5.1%	4.1%	6.1%
Bags	47	0.1%	0.0%	0.2%
Newspaper	1,001	2.4%	1.5%	3.3%
White Ledger	195	0.5%	0.3%	0.7%
Colored Ledger	31	0.1%	0.0%	0.1%
Computer	21	0.1%	0.0%	0.1%
Office	532	1.3%	0.6%	2.0%
Magazines	632	1.5%	0.9%	2.1%
Directories	15	0.0%	0.0%	0.1%
Miscellaneous	2,333	5.6%	4.2%	7.0%
R/C Paper	1,427	3.4%	2.7%	4.1%
Glass	**918**	**2.2%**		
Clear Containers	309	0.7%	0.2%	1.2%
Green Containers	235	0.6%	0.3%	0.9%
Brown Containers	130	0.3%	0.1%	0.5%
Other Containers	142	0.3%	0.2%	0.5%
Flat Glass	14	0.0%	0.0%	0.1%
R/C Glass	87	0.2%	0.1%	0.3%
Metal	**4,630**	**11.1%**		
Aluminum Cans	75	0.2%	0.1%	0.2%
Tin Cans	268	0.6%	0.5%	0.8%
Ferrous	1,911	4.6%	3.1%	6.0%
Nonferrous	147	0.4%	0.0%	0.7%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	2,230	5.4%	3.1%	7.6%
Plastic	**3,907**	**9.4%**		
#1 Containers	173	0.4%	0.3%	0.5%
#2 Containers	222	0.5%	0.4%	0.7%
Other Containers	217	0.5%	0.4%	0.6%
Film	1,229	3.0%	2.5%	3.4%
Durable	1,202	2.9%	1.6%	4.2%
R/C Plastic	865	2.1%	1.6%	2.5%
Organics	**16,941**	**40.7%**		
Food	5,311	12.7%	10.5%	15.0%
Textiles	1,903	4.6%	2.5%	6.6%
Leaves and Grass	4,016	9.6%	5.3%	14.0%
Prunings	1,529	3.7%	1.0%	6.3%
Stumps	462	1.1%	0.0%	2.3%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	3,721	8.9%	7.2%	10.7%
Construction and Demolition	**6,794**	**16.3%**		
Concrete	0	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%
Asphalt Roofing	102	0.2%	0.0%	0.7%
Clean and Treated Lumber	3,334	8.0%	5.0%	11.0%
Gypsum Board	165	0.4%	0.0%	0.9%
Rocks and Soil	333	0.8%	0.3%	1.3%
R/C Demo	2,859	6.9%	3.5%	10.2%
Household Hazardous	**48**	**0.1%**		
Paint	0	0.0%	0.0%	0.0%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	19	0.0%	0.0%	0.1%
Batteries	15	0.0%	0.0%	0.1%
R/C Hazardous	14	0.0%	0.0%	0.1%
Special	**58**	**0.1%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	58	0.1%	0.0%	0.4%
Tires	0	0.0%	0.0%	0.0%
R/C Special	0	0.0%	0.0%	0.0%
Mixed	**0**	**0.0%**		
Mixed Residue	0	0.0%	0.0%	0.0%
Total Tons	41,655			
Sample Count	30			

Low and High are calculated at a 90% confidence interval

EXHIBIT A-8

Composition Estimates: West Hawai`i Commercial

	Tons Disposed	Percent of Total	Low	High
Paper	**20,448**	**25.3%**		
Cardboard	7,945	9.8%	6.6%	13.0%
Bags	311	0.4%	0.1%	0.7%
Newspaper	1,286	1.6%	0.6%	2.6%
White Ledger	530	0.7%	0.2%	1.1%
Colored Ledger	158	0.2%	0.0%	0.4%
Computer	40	0.0%	0.0%	0.1%
Office	558	0.7%	0.3%	1.1%
Magazines	777	1.0%	0.3%	1.6%
Directories	21	0.0%	0.0%	0.1%
Miscellaneous	3,885	4.8%	3.4%	6.2%
R/C Paper	4,936	6.1%	4.1%	8.1%
Glass	**1,311**	**1.6%**		
Clear Containers	279	0.3%	0.1%	0.6%
Green Containers	379	0.5%	0.2%	0.7%
Brown Containers	270	0.3%	0.1%	0.5%
Other Containers	152	0.2%	0.1%	0.3%
Flat Glass	84	0.1%	0.0%	0.3%
R/C Glass	147	0.2%	0.0%	0.4%
Metal	**5,103**	**6.3%**		
Aluminum Cans	147	0.2%	0.1%	0.2%
Tin Cans	533	0.7%	0.2%	1.1%
Ferrous	2,447	3.0%	0.7%	5.3%
Nonferrous	102	0.1%	0.1%	0.2%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	1,874	2.3%	0.6%	4.1%
Plastic	**6,944**	**8.6%**		
#1 Containers	406	0.5%	0.4%	0.6%
#2 Containers	261	0.3%	0.2%	0.4%
Other Containers	348	0.4%	0.3%	0.6%
Film	2,774	3.4%	2.3%	4.6%
Durable	1,427	1.8%	0.5%	3.0%
R/C Plastic	1,728	2.1%	1.2%	3.0%
Organics	**27,064**	**33.4%**		
Food	17,280	21.3%	15.1%	27.5%
Textiles	1,849	2.3%	1.3%	3.3%
Leaves and Grass	809	1.0%	0.0%	2.1%
Prunings	2,546	3.1%	0.0%	6.6%
Stumps	112	0.1%	0.0%	0.3%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	4,468	5.5%	2.6%	8.5%

	Tons Disposed	Percent of Total	Low	High
Construction and Demolition	**19,622**	**24.2%**		
Concrete	3,693	4.6%	1.4%	7.7%
Asphalt Paving	512	0.6%	0.0%	1.6%
Asphalt Roofing	63	0.1%	0.0%	0.2%
Clean and Treated Lumber	7,586	9.4%	4.8%	14.0%
Gypsum Board	598	0.7%	0.0%	1.6%
Rocks and Soil	335	0.4%	0.0%	1.0%
R/C Demo	6,835	8.4%	3.2%	13.7%
Household Hazardous	**214**	**0.3%**		
Paint	117	0.1%	0.0%	0.3%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	33	0.0%	0.0%	0.1%
Batteries	13	0.0%	0.0%	0.0%
R/C Hazardous	51	0.1%	0.0%	0.2%
Special	**274**	**0.3%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	274	0.3%	0.0%	0.9%
Tires	0	0.0%	0.0%	0.0%
R/C Special	0	0.0%	0.0%	0.0%
Mixed	**0**	**0.0%**		
Mixed Residue	0	0.0%	0.0%	0.0%

Total Tons	80,981
Sample Count	30

EXHIBIT A-9
Composition Estimates: West Hawai`i Self-Haul

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**224**	**3.8%**	**Construction and Demolition**	**1,989**	**33.7%**
Cardboard	141	2.4%	Concrete	106	1.8%
Bags	3	0.0%	Asphalt Paving	103	1.8%
Newspaper	26	0.4%	Asphalt Roofing	0	0.0%
White Ledger	1	0.0%	Clean and Treated Lumber	443	7.5%
Colored Ledger	0	0.0%	Gypsum Board	66	1.1%
Computer	0	0.0%	Rocks and Soil	792	13.4%
Office	0	0.0%	R/C Demo	478	8.1%
Magazines	1	0.0%	**Household Hazardous**	**5**	**0.1%**
Directories	0	0.0%	Paint	0	0.0%
Miscellaneous	14	0.2%	Vehicle Fluids	2	0.0%
R/C Paper	37	0.6%	Oil	2	0.0%
Glass	**5**	**0.1%**	Batteries	1	0.0%
Clear Containers	2	0.0%	R/C Hazardous	0	0.0%
Green Containers	0	0.0%	**Special**	**2,172**	**36.8%**
Brown Containers	1	0.0%	Ash	93	1.6%
Other Containers	0	0.0%	Sewage Sludge	0	0.0%
Flat Glass	0	0.0%	Industrial Sludge	1,585	26.8%
R/C Glass	2	0.0%	Treated Medical	20	0.3%
Metal	**128**	**2.2%**	Bulky Items	60	1.0%
Aluminum Cans	2	0.0%	Tires	116	2.0%
Tin Cans	0	0.0%	R/C Special	299	5.1%
Ferrous	59	1.0%	**Mixed**	**1**	**0.0%**
Nonferrous	1	0.0%	Mixed Residue	1	0.0%
White Goods	1	0.0%			
R/C Metal	65	1.1%			
Plastic	**44**	**0.7%**			
#1 Containers	1	0.0%			
#2 Containers	1	0.0%			
Other Containers	1	0.0%			
Film	9	0.2%			
Durable	3	0.1%			
R/C Plastic	28	0.5%			
Organics	**1,341**	**22.7%**			
Food	212	3.6%			
Textiles	3	0.1%			
Leaves and Grass	9	0.1%			
Prunings	10	0.2%			
Stumps	719	12.2%			
Crop Residue	3	0.1%			
Manure	0	0.0%			
R/C Organic	384	6.5%			
Total Tons	5,907				
Sample Count	0				

Notes:
Waste composition percent for mixed loads from 2001 study at South Hilo Landfill.
Pure loads at the West Hawaii Landfill added to the mixed load composition.

EXHIBIT A-10

Composition Estimates: East Hawai`i Transfer Stations

	Tons Disposed	Percent of Total	Low	High
Paper	**8,950**	**22.6%**		
Cardboard	2,696	6.8%	5.5%	8.2%
Bags	185	0.5%	0.3%	0.6%
Newspaper	1,108	2.8%	0.2%	3.6%
White Ledger	308	0.8%	0.5%	1.0%
Colored Ledger	37	0.1%	0.1%	0.1%
Computer	2	0.0%	0.0%	0.0%
Office	294	0.7%	0.1%	1.3%
Magazines	503	1.3%	0.8%	1.7%
Directories	11	0.0%	0.0%	0.1%
Miscellaneous	1,501	3.8%	3.0%	4.6%
R/C Paper	2,303	5.8%	4.5%	7.1%
Glass	**1,489**	**3.8%**		
Clear Containers	520	1.3%	0.9%	1.7%
Green Containers	431	1.1%	0.8%	1.4%
Brown Containers	433	1.1%	0.7%	1.5%
Other Containers	13	0.0%	0.0%	0.1%
Flat Glass	29	0.1%	0.0%	0.2%
R/C Glass	63	0.2%	0.1%	0.2%
Metal	**4,172**	**10.5%**		
Aluminum Cans	202	0.5%	0.4%	0.6%
Tin Cans	523	1.3%	1.0%	1.7%
Ferrous	1,663	4.2%	2.2%	6.2%
Nonferrous	173	0.4%	0.3%	0.6%
White Goods	739	1.9%	0.0%	4.7%
R/C Metal	872	2.2%	0.8%	3.6%
Plastic	**3,623**	**9.2%**		
#1 Containers	308	0.8%	0.5%	1.0%
#2 Containers	250	0.6%	0.5%	0.8%
Other Containers	151	0.4%	0.3%	0.5%
Film	1,072	2.7%	2.2%	3.2%
Durable	550	1.4%	0.9%	1.9%
R/C Plastic	1,291	3.3%	2.4%	4.2%
Organics	**13,570**	**34.3%**		
Food	5,633	14.2%	11.2%	17.3%
Textiles	1,114	2.8%	1.9%	3.8%
Leaves and Grass	1,118	2.8%	1.2%	4.4%
Prunings	2,714	6.9%	3.4%	10.3%
Stumps	0	0.0%	0.0%	0.0%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	2,990	7.6%	4.3%	10.8%
Construction and Demolition	**4,905**	**12.4%**		
Concrete	509	1.3%	0.3%	2.3%
Asphalt Paving	803	2.0%	0.0%	5.2%
Asphalt Roofing	0	0.0%	0.0%	0.0%
Clean and Treated Lumber	2,235	5.6%	3.7%	7.5%
Gypsum Board	85	0.2%	0.0%	0.4%
Rocks and Soil	119	0.3%	0.0%	0.7%
R/C Demo	1,154	2.9%	0.3%	5.6%
Household Hazardous	**210**	**0.5%**		
Paint	46	0.1%	0.0%	0.3%
Vehicle Fluids	16	0.0%	0.0%	0.1%
Oil	0	0.0%	0.0%	0.0%
Batteries	69	0.2%	0.1%	0.3%
R/C Hazardous	80	0.2%	0.0%	0.4%
Special	**1,923**	**4.9%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	1,642	4.1%	1.5%	6.8%
Tires	221	0.6%	0.0%	1.1%
R/C Special	60	0.2%	0.0%	0.4%
Mixed	**732**	**1.8%**		
Mixed Residue	732	1.8%	0.9%	2.8%
Total Tons	39,575			
Sample Count (2001 study)	40			

Low and High are calculated at a 90% confidence interval

EXHIBIT A-11
Composition Estimates: East Hawai'i Commercial

	Tons Disposed	Percent of Total	Low	High
Paper	**8,023**	**27.6%**		
Cardboard	3,066	10.5%	7.4%	13.7%
Bags	174	0.6%	0.4%	0.8%
Newspaper	734	2.5%	1.5%	3.5%
White Ledger	504	1.7%	0.9%	2.6%
Colored Ledger	52	0.2%	0.1%	0.2%
Computer	28	0.1%	0.0%	0.2%
Office	125	0.4%	0.3%	0.6%
Magazines	509	1.7%	0.8%	2.7%
Directories	63	0.2%	0.0%	0.5%
Miscellaneous	879	3.0%	2.4%	3.7%
R/C Paper	1,889	6.5%	4.5%	8.5%
Glass	**861**	**3.0%**		
Clear Containers	363	1.2%	0.8%	1.7%
Green Containers	250	0.9%	0.4%	1.3%
Brown Containers	189	0.6%	0.3%	1.0%
Other Containers	0	0.0%	0.0%	0.0%
Flat Glass	33	0.1%	0.0%	0.3%
R/C Glass	26	0.1%	0.0%	0.2%
Metal	**2,098**	**7.2%**		
Aluminum Cans	136	0.5%	0.3%	0.6%
Tin Cans	202	0.7%	0.5%	0.9%
Ferrous	1,207	4.1%	0.3%	8.0%
Nonferrous	79	0.3%	0.1%	0.4%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	474	1.6%	0.4%	2.9%
Plastic	**2,900**	**10.0%**		
#1 Containers	177	0.6%	0.3%	0.9%
#2 Containers	146	0.5%	0.3%	0.7%
Other Containers	99	0.3%	0.2%	0.4%
Film	1,072	3.7%	2.8%	4.5%
Durable	815	2.8%	0.3%	5.2%
R/C Plastic	591	2.0%	1.0%	3.0%
Organics	**7,627**	**26.2%**		
Food	5,479	18.8%	13.7%	24.0%
Textiles	611	2.1%	0.4%	3.8%
Leaves and Grass	176	0.6%	0.2%	1.1%
Prunings	243	0.8%	0.3%	1.4%
Stumps	0	0.0%	0.0%	0.0%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	1,118	3.8%	1.5%	6.1%

	Tons Disposed	Percent of Total	Low	High
Construction and Demolition	**6,844**	**23.5%**		
Concrete	2	0.0%	0.0%	0.0%
Asphalt Paving	0	0.0%	0.0%	0.0%
Asphalt Roofing	216	0.7%	0.0%	2.0%
Clean and Treated Lumber	5,990	20.6%	12.5%	28.7%
Gypsum Board	48	0.2%	0.0%	0.4%
Rocks and Soil	0	0.0%	0.0%	0.0%
R/C Demo	587	2.0%	0.0%	4.6%
Household Hazardous	**39**	**0.1%**		
Paint	0	0.0%	0.0%	0.0%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	0	0.0%	0.0%	0.0%
Batteries	19	0.1%	0.0%	0.2%
R/C Hazardous	20	0.1%	0.0%	0.2%
Special	**464**	**1.6%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	91	0.3%	0.0%	0.7%
Bulky Items	56	0.2%	0.0%	0.5%
Tires	273	0.9%	0.0%	2.1%
R/C Special	45	0.2%	0.0%	0.3%
Mixed	**262**	**0.9%**		
Mixed Residue	262	0.9%	0.5%	1.3%

Total Tons	29,119
Sample Count (2001 study)	36

Low and High are calculated at a 90% confidence interval

EXHIBIT A-12
Composition Estimates: East Hawai`i Self-Haul

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**1,126**	**8.8%**	**Construction and Demolition**	**6,549**	**51.2%**
Cardboard	208	1.6%	Concrete	816	6.4%
Bags	4	0.0%	Asphalt Paving	793	6.2%
Newspaper	39	0.3%	Asphalt Roofing	0	0.0%
White Ledger	1	0.0%	Clean and Treated Lumber	2,619	20.5%
Colored Ledger	0	0.0%	Treated Lumber	776	6.1%
Computer	0	0.0%	Gypsum Board	509	4.0%
Office	1	0.0%	Rocks and Soil	129	1.0%
Magazines	1	0.0%	R/C Demo	905	7.1%
Directories	0	0.0%	**Household Hazardous**	**11**	**0.1%**
Miscellaneous	21	0.2%	Paint	7	0.1%
R/C Paper	850	6.6%	Vehicle Fluids	3	0.0%
Glass	**8**	**0.1%**	Oil	0	0.0%
Clear Containers	3	0.0%	Batteries	1	0.0%
Green Containers	1	0.0%	R/C Hazardous	0	0.0%
Brown Containers	1	0.0%	**Special**	**1,871**	**14.6%**
Other Containers	0	0.0%	Ash	0	0.0%
Flat Glass	0	0.0%	Sewage Sludge	0	0.0%
R/C Glass	4	0.0%	Industrial Sludge	1,241	9.7%
Metal	**256**	**2.0%**	Treated Medical	28	0.2%
Aluminum Cans	3	0.0%	Bulky Items	88	0.7%
Tin Cans	0	0.0%	Tires	514	4.0%
Ferrous	154	1.2%	R/C Special	0	0.0%
Nonferrous	1	0.0%	**Mixed**	**2**	**0.0%**
White Goods	2	0.0%	Mixed Residue	2	0.0%
R/C Metal	96	0.7%			
Plastic	**65**	**0.5%**			
#1 Containers	1	0.0%			
#2 Containers	2	0.0%			
Other Containers	1	0.0%			
Film	14	0.1%			
Durable	5	0.0%			
R/C Plastic	41	0.3%			
Organics	**2,905**	**22.7%**			
Food	314	2.5%			
Textiles	5	0.0%			
Leaves and Grass	33	0.3%			
Prunings	15	0.1%			
Stumps	1,344	10.5%			
Crop Residue	0	0.0%			
Manure	0	0.0%			
R/C Organic	1,194	9.3%			
Total Tons	12,792				
Sample Count (2001 study)	24				

ATTACHMENT B

Detailed West Hawai`i Commercial Substream Results

EXHIBIT B-1
Composition Estimates: West Hawai`i Commercial Packer Trucks

bb	Tons Disposed	Percent of Total	Low	High
Paper	**12,382**	**31.5%**		
Cardboard	3,260	8.3%	6.8%	9.8%
Bags	146	0.4%	0.2%	0.6%
Newspaper	765	1.9%	1.3%	2.5%
White Ledger	466	1.2%	0.3%	2.0%
Colored Ledger	153	0.4%	0.0%	0.8%
Computer	5	0.0%	0.0%	0.0%
Office	540	1.4%	0.6%	2.2%
Magazines	605	1.5%	0.5%	2.6%
Directories	21	0.1%	0.0%	0.1%
Miscellaneous	3,148	8.0%	6.1%	9.9%
R/C Paper	3,274	8.3%	6.3%	10.4%
Glass	**712**	**1.8%**		
Clear Containers	144	0.4%	0.2%	0.5%
Green Containers	274	0.7%	0.4%	1.0%
Brown Containers	170	0.4%	0.2%	0.7%
Other Containers	111	0.3%	0.2%	0.4%
Flat Glass	0	0.0%	0.0%	0.0%
R/C Glass	12	0.0%	0.0%	0.1%
Metal	**2,400**	**6.1%**		
Aluminum Cans	114	0.3%	0.2%	0.4%
Tin Cans	253	0.6%	0.5%	0.8%
Ferrous	907	2.3%	0.3%	4.3%
Nonferrous	97	0.2%	0.2%	0.3%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	1,029	2.6%	1.3%	4.0%
Plastic	**3,941**	**10.0%**		
#1 Containers	312	0.8%	0.6%	1.0%
#2 Containers	204	0.5%	0.4%	0.7%
Other Containers	254	0.6%	0.5%	0.8%
Film	1,803	4.6%	3.8%	5.4%
Durable	372	0.9%	0.6%	1.3%
R/C Plastic	996	2.5%	2.0%	3.1%
Organics	**16,599**	**42.2%**		
Food	10,880	27.7%	22.6%	32.7%
Textiles	1,677	4.3%	2.5%	6.0%
Leaves and Grass	699	1.8%	0.0%	3.7%
Prunings	807	2.1%	0.6%	3.5%
Stumps	0	0.0%	0.0%	0.0%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	2,537	6.5%	4.3%	8.6%
Construction and Demolition	**2,904**	**7.4%**		
Concrete	0	0.0%	0.0%	0.0%
Asphalt Paving	512	1.3%	0.0%	3.4%
Asphalt Roofing	0	0.0%	0.0%	0.0%
Clean and Treated Lumber	713	1.8%	1.3%	2.3%
Gypsum Board	112	0.3%	0.0%	0.7%
Rocks and Soil	94	0.2%	0.0%	0.6%
R/C Demo	1,473	3.7%	1.2%	6.3%
Household Hazardous	**97**	**0.2%**		
Paint	0	0.0%	0.0%	0.0%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	33	0.1%	0.0%	0.2%
Batteries	13	0.0%	0.0%	0.1%
R/C Hazardous	51	0.1%	0.0%	0.3%
Special	**274**	**0.7%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	274	0.7%	0.0%	1.8%
Tires	0	0.0%	0.0%	0.0%
R/C Special	0	0.0%	0.0%	0.0%
Mixed	**0**	**0.0%**		
Mixed Residue	0	0.0%	0.0%	0.0%

Total Tons	39,309
Sample Count	30

Low and High are calculated at a 90% confidence interval

EXHIBIT B-2

Composition Estimates: West Hawai`i Commercial Drop Boxes

	Tons Disposed	Percent of Total	Low	High
Paper	**7,737**	**21.1%**		
Cardboard	4,443	12.1%	7.3%	16.9%
Bags	135	0.4%	0.0%	0.7%
Newspaper	514	1.4%	0.0%	2.9%
White Ledger	57	0.2%	0.1%	0.3%
Colored Ledger	6	0.0%	0.0%	0.0%
Computer	36	0.1%	0.0%	0.3%
Office	16	0.0%	0.0%	0.1%
Magazines	167	0.5%	0.1%	0.8%
Directories	0	0.0%	0.0%	0.0%
Miscellaneous	715	2.0%	1.0%	2.9%
R/C Paper	1,648	4.5%	2.2%	6.8%
Glass	**587**	**1.6%**		
Clear Containers	134	0.4%	0.0%	0.7%
Green Containers	98	0.3%	0.1%	0.5%
Brown Containers	100	0.3%	0.1%	0.5%
Other Containers	40	0.1%	0.0%	0.2%
Flat Glass	84	0.2%	0.0%	0.6%
R/C Glass	131	0.4%	0.0%	0.8%
Metal	**2,422**	**6.6%**		
Aluminum Cans	32	0.1%	0.0%	0.1%
Tin Cans	142	0.4%	0.2%	0.6%
Ferrous	1,495	4.1%	1.3%	6.9%
Nonferrous	4	0.0%	0.0%	0.0%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	749	2.0%	0.0%	4.3%
Plastic	**2,857**	**7.8%**		
#1 Containers	92	0.3%	0.1%	0.4%
#2 Containers	56	0.2%	0.1%	0.3%
Other Containers	94	0.3%	0.1%	0.4%
Film	886	2.4%	0.9%	3.9%
Durable	1,048	2.9%	0.5%	5.2%
R/C Plastic	681	1.9%	0.6%	3.1%
Organics	**9,389**	**25.6%**		
Food	6,380	17.4%	9.2%	25.6%
Textiles	164	0.4%	0.2%	0.7%
Leaves and Grass	29	0.1%	0.0%	0.2%
Prunings	962	2.6%	0.0%	6.5%
Stumps	0	0.0%	0.0%	0.0%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	1,854	5.1%	1.2%	8.9%

	Tons Disposed	Percent of Total	Low	High
Construction and Demolition	**13,562**	**37.0%**		
Concrete	3,652	10.0%	3.2%	16.7%
Asphalt Paving	0	0.0%	0.0%	0.0%
Asphalt Roofing	4	0.0%	0.0%	0.0%
Clean and Treated Lumber	5,818	15.9%	8.3%	23.4%
Gypsum Board	371	1.0%	0.0%	2.1%
Rocks and Soil	0	0.0%	0.0%	0.0%
R/C Demo	3,718	10.1%	3.5%	16.7%
Household Hazardous	**117**	**0.3%**		
Paint	117	0.3%	0.0%	0.7%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	0	0.0%	0.0%	0.0%
Batteries	0	0.0%	0.0%	0.0%
R/C Hazardous	0	0.0%	0.0%	0.0%
Special	**0**	**0.0%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	0	0.0%	0.0%	0.0%
Tires	0	0.0%	0.0%	0.0%
R/C Special	0	0.0%	0.0%	0.0%
Mixed	**0**	**0.0%**		
Mixed Residue	0	0.0%	0.0%	0.0%

Total Tons	36,671
Sample Count	30

Low and High are calculated at a 90% confidence interval

EXHIBIT B-3
Composition Estimates: West Hawai`i Commercial Other

	Tons Disposed	Percent of Total	Low	High
Paper	**330**	**6.6%**		
Cardboard	242	4.8%	0.6%	9.1%
Bags	29	0.6%	0.0%	1.3%
Newspaper	7	0.1%	0.0%	0.4%
White Ledger	7	0.1%	0.0%	0.3%
Colored Ledger	0	0.0%	0.0%	0.0%
Computer	0	0.0%	0.0%	0.0%
Office	2	0.0%	0.0%	0.1%
Magazines	6	0.1%	0.0%	0.3%
Directories	0	0.0%	0.0%	0.0%
Miscellaneous	22	0.4%	0.0%	1.0%
R/C Paper	15	0.3%	0.0%	0.6%
Glass	**13**	**0.3%**		
Clear Containers	0	0.0%	0.0%	0.0%
Green Containers	7	0.1%	0.0%	0.4%
Brown Containers	0	0.0%	0.0%	0.0%
Other Containers	1	0.0%	0.0%	0.0%
Flat Glass	0	0.0%	0.0%	0.0%
R/C Glass	4	0.1%	0.0%	0.2%
Metal	**281**	**5.6%**		
Aluminum Cans	2	0.0%	0.0%	0.1%
Tin Cans	138	2.8%	0.0%	6.9%
Ferrous	45	0.9%	0.2%	1.6%
Nonferrous	0	0.0%	0.0%	0.0%
White Goods	0	0.0%	0.0%	0.0%
R/C Metal	96	1.9%	0.4%	3.4%
Plastic	**145**	**2.9%**		
#1 Containers	1	0.0%	0.0%	0.1%
#2 Containers	1	0.0%	0.0%	0.0%
Other Containers	0	0.0%	0.0%	0.0%
Film	85	1.7%	0.2%	3.2%
Durable	7	0.1%	0.0%	0.3%
R/C Plastic	51	1.0%	0.0%	2.2%
Organics	**1,076**	**21.5%**		
Food	20	0.4%	0.0%	1.1%
Textiles	8	0.2%	0.0%	0.4%
Leaves and Grass	81	1.6%	0.0%	3.3%
Prunings	777	15.5%	0.0%	31.7%
Stumps	112	2.2%	0.0%	5.3%
Crop Residue	0	0.0%	0.0%	0.0%
Manure	0	0.0%	0.0%	0.0%
R/C Organic	77	1.5%	0.0%	3.9%
Construction and Demolition	**3,156**	**63.1%**		
Concrete	42	0.8%	0.0%	1.8%
Asphalt Paving	0	0.0%	0.0%	0.0%
Asphalt Roofing	59	1.2%	0.0%	3.0%
Clean and Treated Lumber	1,055	21.1%	9.2%	33.0%
Gypsum Board	115	2.3%	0.4%	4.2%
Rocks and Soil	241	4.8%	0.0%	11.7%
R/C Demo	1,644	32.9%	16.3%	49.5%
Household Hazardous	**0**	**0.0%**		
Paint	0	0.0%	0.0%	0.0%
Vehicle Fluids	0	0.0%	0.0%	0.0%
Oil	0	0.0%	0.0%	0.0%
Batteries	0	0.0%	0.0%	0.0%
R/C Hazardous	0	0.0%	0.0%	0.0%
Special	**0**	**0.0%**		
Ash	0	0.0%	0.0%	0.0%
Sewage Sludge	0	0.0%	0.0%	0.0%
Industrial Sludge	0	0.0%	0.0%	0.0%
Treated Medical	0	0.0%	0.0%	0.0%
Bulky Items	0	0.0%	0.0%	0.0%
Tires	0	0.0%	0.0%	0.0%
R/C Special	0	0.0%	0.0%	0.0%
Mixed	**0**	**0.0%**		
Mixed Residue	0	0.0%	0.0%	0.0%

Total Tons	5,000
Sample Count	10

Low and High are calculated at a 90% confidence interval

ATTACHMENT C

Waste Component Definitions

ATTACHMENT C

Waste Component Definitions

The list and definitions of the Standard Material Categories were drawn from the California Integrated Waste Management Board's Uniform Waste Disposal Characterization Method. The component category "treated lumber" was added during the design of this study. Definitions of the component materials used in this report follow.

Paper

(1) **Uncoated Corrugated Cardboard** usually has three layers. The center wavy layer is sandwiched between the two outer layers. It does not have any wax coating on the inside or outside. Examples: This component includes entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This component does not include chipboard.

(2) **Paper Bags** means bags and sheets made from kraft paper. Examples: This component includes paper grocery bags, fast food bags, department store bags, and heavyweight sheets of kraft packing paper.

(3) **Newspaper** means paper used in newspapers. Examples: This component includes newspaper and glossy inserts, and all items made from newsprint, such as free advertising guides, election guides, and tax instruction booklets.

(4) **White Ledger** means uncolored bond, rag, or stationary grade paper. It may have colored ink on it. When the paper is torn, the fibers are white. Examples: This component includes white photocopy, white laser print, and letter paper.

(5) **Colored Ledger** means colored bond, rag, or stationery grade paper. When the paper is torn, the fibers are colored throughout. Examples: This component includes colored photocopy and letter paper. This component does not include fluorescent dyed paper or deep-tone dyed paper such as goldenrod colored paper.

(6) **Computer Paper** means paper used for computer printouts. This component usually has a strip of form feed holes along two edges. If there are no holes, then the edges show tear marks. This component can be white or striped. Examples: This component includes computer paper and printouts from continuous feed printers. This component does not include "white ledger" used in laser or impact printers, nor computer paper containing groundwood.

(7) **Other Office Paper** means other kinds of paper used in offices. Examples: This component includes manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, and carbonless forms. This component does not include "white ledger," "colored ledger," or "computer paper".

(8) **Magazines and Catalogs** means items made of glossy coated paper. This paper is usually slick, smooth to the touch, and reflects light. Examples: This component includes glossy magazines, catalogs, brochures and pamphlets.

(9) **Phone Books and Directories** means thin paper between coated covers. These items are bound along the spine with glue. Examples: This component includes whole or damaged telephone books, "yellow pages," real estate listings, and some non-glossy mail order catalogs.

(10) **Other Miscellaneous Paper** means items made mostly of paper that do not fit into any of the above components. Paper may be combined with minor amounts of other materials such as wax or glues. This component includes items made of chipboard, groundwood paper, and deep-toned or fluorescent dyed paper. Examples: This component includes cereal and cracker boxes, unused paper plates and cups, goldenrod colored paper, and hardcover and softcover books.

(11) **Remainder/Composite Paper** means items made mostly of paper but combined with large amounts of other materials such as wax, plastic, glues, foil, food, and moisture. Examples: This component includes waxed corrugated cardboard, aseptic packages, wax coated milk cartons, waxed paper, tissue, paper towels, blueprints, sepia, onionskin, fast food wrappers, carbon paper, self-adhesive notes, and photographs.

Glass

(12) **Clear Glass Bottles and Containers** means clear glass beverage and food containers with or without a CRV label. Examples: This component includes whole or broken clear soda and beer bottles, fruit juice bottles, peanut butter jars, and mayonnaise jars.

(13) **Green Glass Bottles and Containers** means green-colored glass containers with or without a CRV label. Examples: This component includes whole or broken green soda and beer bottles, and whole or broken green wine bottles.

(14) **Brown Glass Bottles and Containers** means brown-colored glass containers with or without a CRV label. Examples: This component includes whole or broken brown soda and beer bottles, and whole or broken brown wine bottles.

(15) **Other Colored Glass Bottles and Containers** means colored glass containers and bottles other than green or brown with or without a CRV label. Examples: This component includes whole or broken blue or other colored bottles and containers.

(16) **Flat Glass** means clear or tinted glass that is flat. Examples: This component includes glass windowpanes, doors, and tabletops, flat automotive window glass (side windows), safety glass, and architectural glass. This component does not include windshields, laminated glass, or any curved glass.

(17) **Remainder/Composite Glass** means glass that cannot be put in any other component category. It includes items made mostly of glass but combined with other materials. Examples: This component includes Pyrex, Corningware, crystal and other glass tableware, mirrors, and auto windshields.

Metal

(18) **Tin/Steel Cans** means rigid containers made mainly of steel. These items will stick to a magnet and may be tin-coated. This component is used to store food, beverages, paint, and a variety of other household and consumer products. Examples: This component includes canned food and beverage containers, empty metal paint cans, empty spray paint and other aerosol containers, and bimetal containers with steel sides and aluminum ends.

(19) **Major Appliances** means discarded major appliances of any color. These items are often enamel-coated. Examples: This component includes washing machines, clothes dryers, hot water heaters, stoves, and refrigerators. This component does not include electronics, such as televisions and stereos.

(20) **Other Ferrous** means any iron or steel that is magnetic or any stainless steel item. This component does not include "tin/steel cans". Examples: This component includes structural steel beams, metal clothes hangers, metal pipes, stainless steel cookware, security bars, and scrap ferrous items.

(21) **Aluminum Cans** means any food or beverage container made mainly of aluminum. Examples: This component includes aluminum soda or beer cans, and some pet food cans. This component does not include bimetal containers with steel sides and aluminum ends.

(22) **Other Non-Ferrous** means any metal item, other than aluminum cans, that is not stainless steel and that is not magnetic. These items may be made of aluminum, copper, brass, bronze, lead, zinc, or other metals. Examples: This component includes aluminum window frames, aluminum siding, copper wire, shell casings, brass pipe, and aluminum foil.

(23) **Remainder/Composite Metal** means metal that cannot be put in any other component category. This component includes items made mostly of metal but combined with other materials and items made of both ferrous metals and non-ferrous metal combined. Examples: This component includes brown goods (electronics and other small appliances), computers, televisions, radios, and electronic parts.

Plastic

(24) **HDPE Containers** means natural and colored HDPE containers. This plastic is usually either cloudy white, allowing light to pass through it (natural) or a solid color, preventing light from passing through it (colored). When marked for identification, it bears the number "2" in the triangular recycling symbol. Examples: This component includes milk jugs, water jugs, detergent bottles, some haircare bottles, empty motor oil, empty antifreeze, and other empty vehicle and equipment fluid containers.

(25) **PETE Containers** means clear or colored PETE containers. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The color is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. Examples: This component includes soft drink and water bottles, some liquor bottles, cooking oil containers, and aspirin bottles.

(26) **Miscellaneous Plastic Containers** means plastic containers made of types of plastic other than HDPE or PETE. Items may be made of PVC, PP, or PS. When marked for identification, these items may bear the number "3," "4," "5," "6," or "7" in the triangular recycling symbol. Examples: This component includes food containers such as bottles for salad dressings and vegetable oils, flexible and brittle yogurt cups and lids, syrup bottles, margarine tubs, microwave food trays, and clamshell-shaped fast food containers. This component also includes some shampoo containers and vitamin bottles.

(27) **Film Plastic** means flexible plastic sheeting. It is made from a variety of plastic resins including HDPE and LDPE. It can be easily contoured around an object by hand pressure. Examples: This component includes plastic garbage bags, food bags, dry cleaning bags, grocery store bags, packaging wrap, and food wrap. This component does not include rigid bubble packaging.

(28) **Durable Plastic Items** means plastic objects other than containers and film plastic. This component also includes plastic objects other than containers or film that bear the numbers "1" through "7" in the triangular recycling symbol. These items are usually made to last for more than one use. Examples: This component includes plastic outdoor furniture, plastic toys and sporting goods, and plastic housewares, such as mop buckets, dishes, cups, and cutlery. This component also includes building materials such as house siding, window sashes and frames, housings for electronics such as computers, televisions and stereos, and plastic pipes and fittings.

(29) **Remainder and Composite Plastic** means plastic that cannot be put in any other component category. This component includes items made mostly of plastic but combined with other materials. Examples: This component includes auto parts made of plastic attached to metal, plastic bubble packaging, drinking straws, foam drinking cups, produce trays, egg cartons, foam packing blocks, packing peanuts, and cookie and muffin trays.

Other Organic

(30) **Food** means food material resulting from the processing, storage, preparation, cooking, handling or consumption of food. This component includes material from industrial, commercial or residential sources. Examples: This component includes discarded meat scraps, dairy products, eggshells, fruit or vegetable peels, and other food items from homes, stores, and restaurants. This component includes grape pomace and other processed residues or material from canneries, wineries, or other industrial sources.

(31) **Leaves and Grass** means plant material, except woody material, from any public or private landscapes. Examples: This component includes leaves, grass clippings, and plants. This component does not include woody material or material from agricultural sources.

(32) **Prunings and Trimmings** means woody plant material up to 4 inches in diameter from any public or private landscape. Examples: This component includes prunings, shrubs, and small branches with branch diameters that do not exceed 4 inches. This component does not include stumps, tree trunks, or branches exceeding 4 inches in diameter. This component does not include material from agricultural sources.

(33) **Branches and Stumps** means woody plant material, branches and stumps that exceed 4 inches in diameter from any public or private landscape.

(34) **Agricultural Crop Residues** means plant material from agricultural sources. Examples: This component includes orchard and vineyard prunings, vegetable by-products from farming, residual fruits, vegetables, and other crop remains after usable crop is harvested. This component does not include processed residues from canneries, wineries, or other industrial sources.

(35) **Manures** means manure and soiled bedding materials from domestic, farm, or ranch animals. Examples: This component includes manure and soiled bedding from animal production operations, racetracks, riding stables, animal hospitals, and other sources.

(36) **Textiles** means items made of thread, yarn, fabric, or cloth. Examples: This component includes clothes, fabric trimmings, draperies, and all natural and synthetic cloth fibers. This component does not include cloth-covered furniture, mattresses, leather shoes, leather bags, or leather belts.

(37) **Remainder/Composite Organic** means organic material that cannot be put in any other component category. This component includes items made mostly of organic materials but combined with other materials. Examples: This component includes leather items, carpets, disposable diapers, cork, hemp rope, garden hoses, rubber items, hair, and carpet padding.

Construction and Demolition

(38) **Concrete** means a hard material made from sand, gravel, aggregate, cement mix and water. Examples: This component includes pieces of building foundations, concrete paving, and cinder blocks.

(39) **Asphalt Paving** means a black or brown, tar-like material mixed with aggregate used as a paving material.

(40) **Asphalt Roofing** means composite shingles and other roofing material made with asphalt. Examples: This component includes asphalt shingles and attached roofing tar and tarpaper.

(41) **Clean Lumber** means processed wood for building, manufacturing, landscaping, packaging, and processed wood from demolition. Examples: This component includes untreated dimensional lumber, lumber cutoffs, engineered wood such as plywood and particleboard, wood scraps, pallets, wood fencing, wood shake roofing, and wood siding. Note that County of Hawai`i building codes require the use of treated lumber for home construction, thus there is relatively little clean lumber in the waste stream.

(42) **Treated Lumber** means new and used lumber that has been treated with any chemical preservative. Examples: This component includes railroad ties, marine timbers and pilings, some landscape timbers, and telephone poles.

(43) **Gypsum Board** means interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples: This component includes used or unused, broken or whole

sheets of sheetrock, drywall, gypsum board, plasterboard, gypboard, gyproc, and wallboard.

(44) **Rock, Soil and Fines** means rock pieces of any size and soil, dirt, and other matter. Examples: This component includes rock, stones, and sand, clay, soil and other fines. This component also includes non-hazardous contaminated soil.

(45) **Remainder/Composite Construction and Demolition** means construction and demolition material that cannot be put in any other component category. This component may include items from different components combined, which would be very hard to separate. Examples: This component includes brick, ceramics, tiles, toilets, sinks, and fiberglass insulation. This component may also include demolition debris that is a mixture of items such as plate glass, wood, tiles, gypsum board, and aluminum scrap.

Household Hazardous Waste

(46) **Paint** means containers with paint in them. Examples: This component includes latex paint, oil-based paint, and tubes of pigment or fine art paint. This component does not include dried paint, empty paint cans, or empty aerosol containers.

47) **Vehicle and Equipment Fluids** means containers with fluids used in vehicles or engines, except used oil. Examples: This component includes used antifreeze and brake fluid. This component does not include empty vehicle and equipment fluid containers.

(48) **Used Oil** means the same as defined in Health and Safety Code section 25250.1(a). Examples: This component includes spent lubricating oil such as crankcase and transmission oil, gear oil, and hydraulic oil.

(49) **Batteries** means any type of battery including both dry cell and lead acid. Examples: This component includes car, flashlight, small appliance, watch and hearing aid batteries.

(50) **Remainder/Composite Household Hazardous** means household hazardous material that cannot be put in the "Paint", "Automotive Fluids", "Used Oil", or "Batteries" component categories. This component also includes household hazardous material that is mixed. Examples: This component includes household hazardous waste which if improperly put in the solid waste stream may present handling problems or other hazards.

Special Waste

(51) **Ash** means a residue from the combustion of any solid or liquid material. Examples: This component includes ash from fireplaces, incinerators, biomass facilities, waste-to-energy facilities, and barbecues. This component also includes ash and burned debris from structure fires.

(52) **Sewage Solids** means residual solids and semi-solids from the treatment of domestic wastewater or sewage. Examples: This component includes biosolids, sludge, grit, screenings, and septage. This component does not include sewage or waste water discharged from the sewage treatment process.

(53) **Industrial Sludge** means sludge from factories, manufacturing facilities, and refineries. Examples: This component includes paper pulp sludge, and water treatment filter cake sludge.

(54) **Treated Medical Waste** has the same meaning as treated medical waste in Section 25023.5 of the Health and Safety Code.

(55) **Bulky Items** means large, hard-to-handle items that are not defined separately, including furniture, mattresses, and other large items. Examples: This component includes all sizes and types of furniture, mattresses, box springs, and base components.

(56) **Tires** means vehicle tires. Examples: This component includes tires from trucks, automobiles, motorcycles, heavy equipments, and bicycles.

(57) **Remainder/Composite Special Waste** means special waste that cannot be put in any other component category. Examples: This component includes asbestos-containing materials, such as certain types of pipe insulation and floor tiles, auto fluff, auto-bodies, trucks, trailers, truck cabs, and artificial fireplace logs.

Mixed Residue

(58) **Mixed Residue** means material that cannot be put in any other component categories. This component includes mixed residue that cannot be further sorted. Examples: This component includes residual material from a materials recovery facility or other sorting process that cannot be put in any of the previous remainder/composite component categories.

ATTACHMENT D

Sampling Methodology and Calculations

ATTACHMENT D

Sampling Methodology and Calculations

Sampling Methodology

Objective

This study was intended to produce statistically valid data on the types and quantities of waste disposed at the West Hawai`i Landfill during FY 2008. The results of this study were combined with the results of the 2001 study conducted at the South Hilo Landfill resulting in a waste composition profile for the entire County.

Substream Definition

The waste hauled to the West Hawai`i Landfill can be divided into the following three categories (called **substreams**):

1. **Transfer Station –** is composed of waste hauled from nine transfer stations on the west side of the island. It is transported to the West Hawai`i Landfill in transfer station compactor boxes. Transfer station loads are made up primarily of residential waste.

2. **Commercial –** is composed of waste hauled by commercial hauling companies. Commercial haulers use a variety of vehicles to transport this waste to the West Hawai`i Landfill, including: packer trucks (garbage trucks), roll-offs (primarily open boxes), and other vehicles (e.g. flatbeds, pickups, etc.). This waste is collected from both residences and businesses. Commercial samples were allocated to each of these three vehicle types.

3. **Self-Haul –** is composed of waste that residents, contractors, businesses, and public entities haul directly to the West Hawai`i Landfill. These loads are transported either in small vehicles (e.g. autos, pick-ups, etc.) or large vehicles (e.g. dump trucks, flatbeds, etc). As with waste in the commercial substream, self-haul waste comes from both residences and businesses.

Sample Allocation

The total number of samples allocated to each substream and sampled on each day of the study is provided in Exhibit D-1. Note that no samples were allocated to the self-haul substream. There is relatively little mixed self-haul material delivered to the West Hawai`i Landfill (1,200 of 128,000 tons in FY 2008, or less than 1 percent). Therefore, it was decided that overall sampling accuracy would be improved by using self-haul sampling results from the 2001 study to represent the composition of mixed self-haul loads in West Hawai`i, and assigning samples that would have been obtained from the self-haul stream to the other two substreams. The composition profile of mixed self-haul loads from the 2001 study was used to estimate the mixed self-haul composition for the West Hawai`i Landfill.

The project budget allowed for a total of 100 total loads to be sampled. The allocation of samples between the substreams was determined according to each substream's

EXHIBIT D-1
Samples per Day by Substream

	Number of Samples				
	Transfer Station	**Commercial Packer**	**Commercial Rolloff**	**Commercial Other**	**Total**
May 15, 2008	6	5	6	3	20
May 16, 2008	6	8	5	1	20
May 19, 2008	6	7	6	1	20
May 20, 2008	6	4	9	1	20
May 21, 2008	6	6	4	4	20
Total	30	30	30	10	100

contribution to the total waste stream. Adjustments were made so that a sufficient number of samples were taken from each substream to ensure a representative composition. Thus, the commercial substream was slightly over sampled, and the transfer station substream was slightly under sampled.

Vehicle Selection

Sampling intervals for each substream and vehicle type were determined by dividing the day's expected number of arriving loads by the number of samples needed on that day. For example, if 20 commercial packer trucks were expected to arrive at the West Hawai`i Landfill on a sampling day, and a total of 5 samples were needed, every 4th commercial packer truck would be selected for sampling. Prior to each sampling day, the Field Supervisor was given a sheet outlining specific sampling intervals per substream and vehicle type. Attachment E contains an example of the vehicle selection sheet used in this study.

Field Procedures

On each sampling day, the Field Supervisor identified sample loads as they arrived at the West Hawai`i Landfill. The Supervisor assigned each selected load a unique sample identification number. Then, the Supervisor surveyed the driver of each vehicle to obtain "header information" which was recorded on that sample's waste sort sheet. The following information was collected for each sample load:

1. Load type

a. Commercially hauled loads only - the hauler name

b. Transfer station loads only - name of transfer station the load came from

2. Generator type

a. Commercially hauled loads only

i. Loads that were 80% or more residential waste were recorded as "residential"

ii. Loads that were 80% or more commercial waste were recorded as "commercial"

iii. Otherwise, the generator type was recorded as "mixed"

b. Transfer station loads only - always marked as "mixed"

3. Vehicle type

a. Commercially hauled loads only - recorded as "packer," "roll-off," or "other vehicle" (e.g. flatbeds, dump trucks, pickups).

b. Transfer station loads only - were always recorded as "transfer station box."

As the load was emptied at the West Hawai`i Landfill, the Field Supervisor observed the load for evidence of hard-to-process or potentially explosive items. Details regarding these items were noted on the sample's waste sort sheet. Hard-to-process items included anything that would be difficult or impossible to manually sort, automatically process, or transfer by conveyor belt due to weight or size, such as: appliances, mattresses, cabinets, carpet, asphalt or concrete, and large pieces of scrap metal or lumber.

Next, the selected load was visually divided into an imaginary 16-cell grid. The supervisor then identified the randomly selected cell and approximately 200 to 300 pounds of waste was removed from that cell with a loader and placed on a tarpaulin. Samples were then tagged with a sample identifier labeled with their unique sample number and the date.

Once the total weight of a sample was recorded, the material was sorted by hand into the 58 prescribed components, placed in plastic laundry baskets, weighed, and recorded. (See Attachment C for a list and definitions of the components.)

Each sample was sorted by hand to the greatest reasonable level of detail, until no more than a small amount of homogeneous fines (less than 1 square inch) remained. The goal was to sort each sample completely into component categories. However, if fines did remain after sorting, they were weighed and the Supervisor classified them as "mixed residue."

As the final step in collecting field data, the Supervisor reviewed, completed and organized the forms from each day's sampling activity. The Supervisor also prepared data summary sheets and sampling checklists at the end of each day. Completed data forms were then transmitted to the Project Manager at CH2M HILL for review and quality control prior to data entry.

Waste Composition Calculations

The composition estimates represent the **ratio of the components' weight to the total waste** for each noted substream. They are derived by summing each component's weight across all of the selected records and dividing by the sum of the total weight of waste, as shown in the following equation:

$$r_j = \frac{\sum_i c_{ij}}{\sum_i w_i}$$

where:

c = weight of particular component

w = sum of all component weights

for i 1 to n

where n = number of selected samples

for j 1 to m

where m = number of components

The low and high, or confidence interval, for this estimate is derived from a nonparametric statistical technique called the Bootstrap (Efron, B. 1982. *The Jackknife, the Bootstrap, and other Resampling Plans*. Society for Industrial and Applied Mathematics). Standard methods of calculating sample statistics are generally not applicable to waste composition results because each substream consists of multiple waste components that must sum to one for each substream. The distribution of these components is a multinomial with unknown properties. As such, sample statistics other than the sample mean proportions cannot be calculated using standard parametric techniques without making unappealing assumptions that would invalidate the results.

The Bootstrap method is a simulation technique that allows the calculation of the variance and other statistics of a parameter with unknown distributional properties. In this study, the Bootstrap method was used to calculate the square root of the Bootstrap variance estimates of each sample mean (henceforth referred to as the standard error). The mean and standard error were then used to calculate confidence intervals about sample mean estimates.

The upper and lower confidence limits provide the boundaries of an interval within which we are 90 percent confident that the true mean proportion of a waste type will lie. They represent the high and low estimates shown in this study.

Upper and lower confidence limits were calculated as follows:

$$CI_u = \overline{SM_g} + (1.645 * SE_g)$$

$$CI_l = \overline{SM_g} - (1.645 * SE_g)$$

where: CI_u = upper confidence limit

CI_l = lower confidence limit

$\overline{SM_g}$ = sample mean proportion for waste component g

1.645 = standard normal deviate (two-tailed) at a 0.05 level

SE_g = standard error for waste component g

The overall waste composition estimates were calculated by performing a weighted average across the relevant sampling groups. For the transfer station substream, the estimates were calculated by performing a weighted average based on the tonnage disposed by each transfer station. For the commercial substream, the estimates were calculated by performing a weighted average based on the tonnage hauled by each vehicle type. For the self-haul substream, the estimates were calculated by multiplying total self-haul mixed loads by the waste component percentages from mixed loads from the 2001 sampling study. To that was added the tonnages disposed by 18 pure loads. Component percentages were then calculated based on the tons of mixed material and pure loads for each component.

The weighting percentages that were used to perform the composition calculations are listed in Exhibit D-2. This information was obtained from scale records at the West Hawai`i Landfill for FY 2008. The composition estimates for both the overall waste stream and each substream were applied to the relevant tonnages to estimate the amount of waste disposed for each component category.

The **weighted average for an overall composition estimate** is performed as follows:

$$O_j = \left(p_1 * r_{j1}\right) + \left(p_2 * r_{j2}\right) + \left(p_3 * r_{j3}\right) +$$

where:

Oj = overall composition estimate for component j

p = the production of tonnage contributed by the noted sample group

r = ratio of component weight to total waste weight in the noted sample group

for j = 1 to m

where m = number of components

EXHIBIT D-2
Weighting Percentages

Transfer Stations	Tons Disposed	Percent of Total
Kailua	7,860	6.1%
Keauhou	5,017	3.9%
Keei / Napoopoo	2,025	1.6%
Waiea	2,968	2.3%
Milolii	207	0.2%
Waiohinu / Ka'u	3,447	2.7%
Waimea	6,376	5.0%
Puako	2,681	2.1%
Kohala	4,145	3.2%
Honoka'a	3,459	2.7%
Pa'auilo	1,922	1.5%
Laupahoehoe	1,547	1.2%
Commercial		
Packers	39,309	30.6%
Rolloff	36,671	28.5%
Other Commercial	5,000	3.9%
Self-Haul		
Ash	93	0.1%
Crop residue	3	0.0%
Industrial Sludge	1,585	1.2%
Oil	2	0.0%
R/C Demo	765	0.6%
R/C Organic	294	0.2%
R/C Paper	2	0.0%
R/C Special	299	0.2%
Rocks and Soil	786	0.6%
Stumps	719	0.6%
Tires	116	0.1%
Treated Medical	20	0.0%
Mixed waste Loads	1,224	1.0%
Total	128,543	100.0%

Waste was not sampled from the Laupahoehoe, Miloli`i, and Ke`ei transfer stations. When calculating composite results for the transfer station substream, the tons from those stations were assumed to have the composition profile of the following stations: Pa`auilo, Waiea, and Kohala, respectively.

ATTACHMENT E

Field Sampling Forms

ATTACHMENT E

Field Sampling Forms

Two sampling forms were used in the field during the sampling event:

- Vehicle Selection Sheet
- Waste Sort Sheet

Examples of those forms follow.

COUNTY OF HAWAI`I WASTE CHARACTERIZATION STUDY

Vehicle Selection Form

Site: Pu`uanahulu Landfill

Date: **Thursday, May 15, 2008**

Cross off one number for each type of vehicle entering the landfill.

Continue for each block, beginning at #1, on the next line until the required number of vehicles is sampled.

TRANSFER STATION BOXES:	**NEED 6 TOTAL – SAMPLE EVERY 2nd VEHICLE**
1	2
1	2
1	2
1	2
1	2
1	2

COMMERCIAL PACKERS:		**NEED 5 TOTAL – SAMPLE EVERY 3rd VEHICLE**
1	2	3
1	2	3
1	2	3
1	2	3
1	2	3

COMMERCIAL ROLL-OFFS:				**NEED 6 TOTAL – SAMPLE EVERY 5th VEHICLE**
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5

NEED 3 TOTAL – SAMPLE FIRST VEHICLE AFTER TIME INDICATED
After 9:00 am
After 11:00 am
After 2:00 pm

Pu`uanahulu Landfill Sampling Form

Sample ID: _____ **Load Type:** ☐ TS ☐ Com

Date: _____

Generator: ☐ Res ☐ Com ☐ Mix R/C ☐ Const ☐ GW

Vehicle Type: ☐ Packer ☐ Roll Off ☐ Other Com ☐ TS Box

(Commercial Loads Only)
Hauler: _____
Route: _____

(TS Boxes Only)
Site/Origin: _____

PAPER	Cardboard			
	Bags			
	Newspaper			
	White Ledger			
	Colored Ledger			
	Computer			
	Office			
	Magazines			
	Directories			
	Miscellaneous			
	R/C Paper			

GLASS	Clear Containers			
	Green Containers			
	Brown Containers			
	Other Containers			
	Flat Glass			
	R/C Glass			

METAL	Aluminum Cans			
	Tin Cans			
	Ferrous			
	Nonferrous			
	White Goods			
	R/C Metal			

SPECIAL	Ash			
	Sewage Sludge			
	Industrial Sludge			
	Treated Medical			
	Bulky Items			
	Tires			
	R/C Special			

	Mixed Residue			

ORGANIC	Food			
	Textiles			
	Leaves and Grass			
	Prunings			
	Stumps			
	Crop Residue			
	Manure			
	R/C Organic			

PLASTIC	#1 Containers			
	#2 Containers			
	Other Containers			
	Film			
	Durable			
	R/C Plastic			

C & D	Concrete			
	Asphalt Paving			
	Asphalt Roofing			
	Clean Lumber			
	Treated Lumber			
	Gypsum Board			
	Rocks and Soil			
	R/C Demo			

HHW	Paint			
	Vehicle Fluids			
	Oil			
	Batteries			
	R/C Hazardous			

Evidence of Explosive/Hard –to-Process Items in Load:

Yes ☐` No ☐

Explosives:
(e.g., propane tanks) _____

Hard-to-Process Items: _____

_____

Appendix E

Chronology for Waste Reduction Technology for Hawai‘i County

Chronology for Waste Reduction Technology for Hawai`i County

Date	Event/Document
1995	
3/19/1995	Notice to Proposers for RFP S-3227 (RFP #1)
1996	
12/16/1996	Letters notifying RFP S-3227 proposers of non-selection
12/16/1996	Letter to Norton Environmental notifying them of selection
2000	
8/6/2000	Notice to Proposers for Solid Waste RFP (RFP #2)
11/30/2000	Administration Recommendation to Council
2001	
1/1/2001	Department of Environmental Management established
1/2/2001	Administration Recommendation Withdrawal to Council
5/15/2001	Contracted with Harding ESE, Inc. to update the County's Integrated Resources and Solid Waste Management Plan (IRSWMP)
5/23/2001	Environmental Management Commission first meeting; meetings held monthly until May 2004, bi-monthly thereafter.
7/3/2001	First Solid Waste Advisory Committee (SWAC) meeting; meetings were held monthly through February 27, 2002
2002	
1/23/2002	East Hawai`i Regional Transfer Station drawings submitted to Council
4/30/2002	Regional Transfer Station update provided to Council Parks and Environmental Management Committee
5/20/2002	Draft of IRSWMP submitted to Council
8/19/2002	Public Meeting held in Kona regarding IRSWMP
8/20/2002	Public Meeting held in Waimea regarding IRSWMP
8/20/2002	Public Meeting held in Hilo regarding IRSWMP
10/15/2002	Two-day waste technology Vendor presentations to Council at Parks and Environmental Management Committee
11/6/2002	Final Draft of the Integrated Resources and Solid Waste Management Plan submitted to Council
11/20/2002	Council Resolution 238-02 to adopt Update to IRSWMP
11/29/2002	State released $1M CIP For East Hawai'i Regional Sort Station and waste diversion planning
12/30/2002	Tipping Fee Increase request submitted to Council
2003	
1/8/2003	Two-day Comprehensive Planning & Visioning meeting for Solid Waste Division (1/8/2003-1/10/2003)
1/22/2003	Council Resolution 28-03. Setting landfill diversion goals with low-tech & high tech
3/3/2003	Two-day planning meeting Discussion: identifying major issues and articulating possible solution; decision made to procure Sort station independent of waste reduction technology.
3/19/2003	2003 GO Bonds authorizes $4M for Sort Station construction
4/15/2003	Executed Contract for design and EIS for Sort Station
4/23/2003	EIS Preparation Notice
6/30/2003	Design Forum for Recycling Services at EHRSS
9/22/2003	Sort Station Draft EIS published
10/9/2003	EMC and public tour of Oahu Solid Waste facilities, including Hpower
6/4/2003-12/17/2003	Public meetings held regarding Sort Station EIS

Date	Event/Document
2004	
1/22/2004	Two-day Solid Waste Vision meeting (1/22/2004-23/2004)
2/23/2004	Final Environmental Impact Statement (EIS) for the East Hawai`i Regional Sort Station published by OEQC
5/2/2004	Notice of Request for Information for Solid Waste Reduction Technology
5/5/2004	Council Resolution 180-04 adopted
6/30/2004	RFI responses received
8/4/2004	Council approves Resolution that supports solid waste landfill diversion through waste reduction technology (WRT) with procurement criteria that matches Hawai'i County policies, needs and waste stream, and delineates next actions.
8/4/2004	Award of CDBG Grant to upgrade certain transfer stations
10/13/2004	EMC and public tour of Oahu Solid Waste facilities, including Hpower
10/28/2004	First RFP evaluation committee meeting
10/29/2004	Notice to Offerors published for RFP 2146 (RFP #3)
12/7/2004	RFP for Waste Reduction Technology Hilo Landfill Site Tour & pre-proposal conference
12/10/2004	RFP 2146, Addendum No. 1
12/30/2004	RFP 2146, Addendum No. 2
2005	
1/21/2005	Response deadline for RFP 2146; Received Pacific Waste Proposal
1/26/2005	RFP evaluation committee meeting
2/4/2005	RFP evaluation committee meeting
2/16/2005	Additional questions and comments sent to proposers
3/10/2005	Pacific Waste response received to 2/16/05 questions
4/1/2005	RFP evaluation committee meeting
4/12/2005	RFP evaluation committee meeting
4/20/2005	County Council Executive Session
4/22/2005	Evaluation committee request to Purchasing Agent to cancel RFP and notify responders
4/28/2005	RFP 2146 solicitation cancelled by Purchasing Agent
4/29/2005	Letter from DEM to Council Chair requesting Executive Session
4/29/2005	Letter from Council Chair Higa to Council members transmitting 4/28/05, 4/7/05 and 4/26/05 communications from County and Barlow relating to RFP No. 2146.
5/3/2005	Letter from DEM to Isbell submitting requested C&C of Honolulu's RFP dated 2/14/03.
5/5/2005	Letter from Council member Jacobson to Stacy Higa, Council Chair, regarding open discussion of RFP process for Waste Reduction Technology, and Resolution 218-04.
5/9/2005	Council member Jacobson submitted a press release regarding the Waste Reduction Technology RFP
5/11/2005	Article regarding Solid Waste Reduction, West Hawai'i Today
5/16/2005	Letter from Mayor to Council relating to RFP cancellation and legal restrictions in the Procurement Code
12/28/2005	Issuance of Stage 1 Proposals - RFP#2210 (RFP #4)
2006	
3/20/2006	Received responses & transmitted to Evaluation Committee
5/1/2006	Issuance of Short List to receive Stage 2 RFP
5/8/2006	EISPN published in State OEQC Bulletin
6/7/2006	End of EISPN Public Comment Period
10/6/2006	Issuance of Stage 2 Proposals - RFP#2210

Date	Event/Document
2007	
4/16/2007	Received responses & transmitted to Evaluation Committee
2008	
2/25/2008	Received and reviewed Wheelabrator's BAFO
3/4/2008	Awarded Contract to Wheelabrator Technologies
4/21/2008	Finance Committee forwarded Resolution 551-08 (authorizing payment for a multi-year contract for a WTE Facility) to Council with negative recommendation
3/25/2008-4/15/2008	Public hearings held around the island
5/7/2008	Council votes 5-3 not to approve Resolution 551-08
2014- 2020	
Year 2014	County issues third RFP issued for WTE facility proposals, withdrawn
Year 2017	Two organics management sites constructed in lieu of advanced technologies
Year 2018	County issues RFP for construction of a compost and green waste processing facility, a compost facility is slated for operation in 2020

Appendix F

Ordinance 185 – Solid Waste Fees

COUNTY OF HAWAI'I STATE OF HAWAI'I

BILL NO. 82
(DRAFT 2)

ORDINANCE NO. 18 5

AN ORDINANCE AMENDING CHAPTER 20, ARTICLE 4, OF THE HAWAI'I COUNTY CODE 1983 (2016 EDITION, AS AMENDED), RELATING TO SOLID WASTE FEES.

BE IT ORDAINED BY THE COUNCIL OF THE COUNTY OF HAWAI'I:

SECTION 1. Purpose. The purpose of this ordinance is to increase disposal fees to cover costs incurred by the Solid Waste Division of the Department of Environmental Management for services it provides to the residents of and visitors to Hawai'i County. The County of Hawai'i's Integrated Resources and Solid Waste Management Plan complies with state mandates of waste reduction and provides a path to provide solid waste disposal services for all, including the operation of all transfer stations and recycling operations. The current plan requires capital improvements, new equipment, maintenance of existing equipment, as well as improved service.

The County seeks a healthy economy that requires intelligent and efficient solid waste management and disposal. Presently, the General Fund subsidy is substantial. Adoption of these changes will reduce the Solid Waste Division's dependence on the General Fund as well as provide the groundwork for implementation of the updated plan.

SECTION 2. Chapter 20, article 4, of the Hawai'i County Code 1983 (2016 edition, as amended) is amended to read as follows:

"Article 4. Solid Waste Fees.

Section 20-46. Disposal fees.

(a) Any refuse, except for prohibited materials, delivered by a business, Federal or State agency, religious entity, nonprofit organization or private citizen to the working face of a County landfill or the East Hawai'i Regional Sort Station shall be charged by the ton or fraction thereof at rates as set forth herein.

(b) In addition to the per ton charge or volume charge, items which cannot be disposed in the working face of the landfill or the East Hawai'i Regional Sort Station in accordance with usual disposal practices or which require special handling and/or arrangements by landfill or East Hawai'i Regional Sort Station personnel shall be assessed a special handling charge at rates as set forth herein. Such items shall include but may not be limited to asbestos and confidential document destruction or other disposal requiring a witness. Tires, whether whole, cut, sliced, chipped or

shredded, will not be accepted at any County landfill[.], the East Hawai'i Regional Sort Station, or transfer station. All wire or cable must be cut to four-foot lengths prior to disposal at any County landfill, the East Hawai'i Regional Sort Station, or transfer station.

(c) Administrative rules shall provide partial credit to commercial haulers for residential waste. The amount of the credit shall be no less than $2 per month for each single-family household from which the hauler collects refuse, provided the hauler's account is current. The annual credit shall be equal to the landfill disposal fee multiplied by one and one-half tons per year per single-family household. The residential credit shall not exceed the total landfill tipping fees charged to the residential hauler for the month for which the credit is being claimed.

Commercial haulers who claim this credit shall provide documentation to the solid waste division including customer name, mailing address, and service address for each credit claimed. Claims for the residential credit must be submitted on or before the last day of the month following the month for which the credit is being claimed and the hauler's account must be current for the credit to be applied.

Names, mailing addresses, and service addresses of customers of residential haulers are subject to the disclosure limitations in section 92F, Hawai'i Revised Statutes as disclosure would cause substantial harm to the competitive position of the person from whom the information was obtained.

(d) The mayor, with the approval of the council, may temporarily rescind the solid waste disposal fees for a specified period.

(e) The mayor may waive solid waste disposal fees when it is in the best interest of the County. Fees may be waived for one-time events for community organizations, nonprofit organizations, or private property owners who are remediating illegal dump sites which were not of their creation. The mayor will give notice to the council when tip [~~fee is~~] fees are waived.

[~~(f) On or before January 1, 2004, there shall be an analysis of past and projected expenses in the solid waste division. Factors to consider include, but are not limited to, capital improvement projects and any debt service for those projects, labor rates and any contractual obligations, equipment replacement and depreciation, and diversion programs. Estimates shall also be considered for total disposal expenses for businesses, Federal or State agencies, religious entities, nonprofit organizations or private citizens as compared to expenses for single-family household disposal at the island-wide solid waste transfer stations. The analysis will be done on an annual basis through January 1, 2007.~~]

Section 20-47. Collection of fees.

(a) All charges shall be collected by the solid waste division of the department. Billings shall be made monthly. Payments are due before the end of the month following the month in which charges are incurred. A finance charge of one [~~and one-half~~] percent monthly (annual rate of [~~eighteen~~] twelve percent) shall be charged on all balances which are [~~sixty or more days overdue.~~] past due. In addition to this, access to County solid waste facilities may be denied until the account is current.

Section 20-48. Solid waste fund designation.

(a) There is hereby created and established a special fund to be known as the "solid waste fund."

(b) All funds received from the collection of fees authorized by this chapter shall be deposited with the director of finance and shall be accounted for and be known as the "Solid Waste Fund" and shall be expended for the purpose of operating, maintaining, and administering the County's solid waste management, collection, and disposal systems.

Section 20-49. Fee schedule.

(a) Charge rates shall be established as follows:

(1) Landfill disposal.

(A) Rate by weight: Dollars per ton prorated accordingly.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$45~~] $108	[~~$55~~] $110	[~~$65~~] $112	[~~$75~~] $114	[~~$85~~] $116

(B) When and if it is impossible or impractical due to power outage, [~~disaster related issues~~] disaster, or other emergency to determine an accurate weight, rates by vehicle size and volume shall be used:

TYPE I: Light trucks or other vehicles with a gross vehicle weight of less than 10,000 pounds with no more than three cubic yards of refuse charged as dollars per truck.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$27~~] $65	[~~$33~~] $66	[~~$39~~] $67	[~~$45~~] $68	[~~$51~~] $70

TYPE II: Medium trucks or other vehicles with a gross vehicle weight from 10,000 pounds to 19,999 pounds with no more than six cubic yards of refuse charged as dollars per truck.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$56~~] $109	[~~$66~~] $111	[~~$76~~] $113	[~~$86~~] $115	[~~$96~~] $117

TYPE III: Large trucks or other vehicles with a gross vehicle weight from 20,000 pounds to 25,999 pounds with no more than nine cubic yards of refuse charged as dollars per truck.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$81~~] $194	[~~$99~~] $198	[~~$117~~] $202	[~~$135~~] $205	[~~$153~~] $209

TYPE IV: All other trucks or vehicles with a gross vehicle weight of 26,000 pounds including commercial refuse hauling trucks or all other vehicles not qualifying as a Type I, II, or III:

1. Compacted. Dollars per cubic yard.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$15~~] $36	[~~$18~~] $36	[~~$21~~] $37	[~~$24~~] $38	[~~$27~~] $38

2. Not compacted. Dollars per cubic yard.

Year beginning on July 1 of each calendar year.				
[~~2003~~] 2018	[~~2004~~] 2019	[~~2005~~] 2020	[~~2006~~] 2021	[~~2007~~] 2022
[~~$9~~] $22	[~~$11~~] $22	[~~$13~~] $22	[~~$15~~] $23	[~~$17~~] $23

(C) Special Handling: [~~$85~~] Dollars per truck load or fraction thereof.

Year beginning on July 1 of each calendar year.				
2018	2019	2020	2021	2022
$108	$110	$112	$114	$116

(2) Greenwaste and Organics Diversion.

(A) All clean greenwaste and acceptable organics must be delivered to a permitted County greenwaste and organics collection facility.

(B) The greenwaste and organics disposal fee is set at 25% of the landfill disposal fee as described in section 20-49(a)(1)(A).

(C) The greenwaste and organics disposal fee is set at 65% of the landfill disposal fee as described in section 20-49(a)(1)(B) at a County greenwaste and organics collection facility without scales. These facilities are able to accept Type I and Type II trucks only.

(D) Greenwaste and organics must be separated from other solid waste in order to qualify for the reduced greenwaste and organics disposal fee.

(E) The greenwaste and organics disposal fee may be suspended by the director if the greenwate and organics facilities are not operating."

SECTION 3. Material to be repealed is bracketed and stricken. New material is underscored. In printing this ordinance, the brackets, bracketed and stricken material, and underscoring need not be included.

SECTION 4. Severability. If any provision of this ordinance, or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or applications of the ordinance which can be given effect without the invalid provision or application, and to this end, the provisions of this ordinance are declared to be severable.

SECTION 5. This ordinance shall take effect July 1, 2018.

INTRODUCED BY:

COUNCIL MEMBER, COUNTY OF HAWAI'I

Hilo, Hawai'i
Date of Introduction: December 20, 2017
Date of 1st Reading: December 20, 2017
Date of 2nd Reading: January 4, 2018
Effective Date: July 1, 2018

REFERENCE Comm. 606.5

OFFICE OF THE COUNTY CLERK
County of Hawai'i
Hilo, Hawai'i

COUNTY CLERK
COUNTY OF HAWAII
2018 JAN 17 AM 9:38

Introduced By: Maile David (B/R)
Date Introduced: December 20, 2017
First Reading: December 20, 2017
Published: December 30, 2017

REMARKS:

ROLL CALL VOTE				
	AYES	NOES	ABS	EX
Chung	X			
David	X			
Eoff	X			
Kanuha	X			
Lee Loy	X			
O'Hara	X			
Poindexter	X			
Richards	X			
Ruggles	X			
	9	0	0	0

Second Reading: January 4, 2018
To Mayor: January 12, 2018
Returned: January 17, 2018
Effective: July 1, 2018
Published: January 27, 2018

REMARKS:

ROLL CALL VOTE				
	AYES	NOES	ABS	EX
Chung			X	
David	X			
Eoff	X			
Kanuha	X			
Lee Loy	X			
O'Hara			X	
Poindexter	X			
Richards			X	
Ruggles	X			
	6	0	3	0

I DO HEREBY CERTIFY that the foregoing BILL was adopted by the County Council published as indicated above.

COUNCIL CHAIRPERSON

COUNTY CLERK

Approved/Disapproved this 16th *day of* January, *20* 18.

MAYOR, COUNTY OF HAWAI'I

Bill No.: 82 (Draft 2)
Reference: C-606.5/FC-70
Ord No.: 18 5

Appendix G

Draft Plan Comments and Responses

Placeholder: Comments and Responses will be included in final draft following the public comment period.