



## 2. Existing and Future Conditions

This chapter provides a background of the County of Maui with its unique natural environment, its expected population growth and waste generation, a review of its landfill activities and, finally, reviews of its collection and recycling programs. The chapter, as a whole, is meant to give a picture of how solid waste is managed on the island.

### 2.1 Natural Environment

The natural environment in Maui is a major factor in the daily lives of citizens of and visitors to Maui. But it also creates challenges unique to the County both within the State of Hawaii and the nation as a whole.

#### 2.1.1 Geography of the County of Maui

“Paradise” is the noun one hears most when referencing Maui. The waterfalls, forests, the majestic mountain of Haleakala rising 10,023 feet above sea level, and coral reefs, are all on a land mass surrounded by brilliant blue water under a canopy of tropical climate. “Paradise” appears constant even as Haleakala, the tallest mountain on Maui, frequently has temperatures dipping below freezing as year-round sunbathers lay out on the beaches below.

Many visitors do not realize that the County consists of four islands: Maui, Molokai, Lanai and Kahoolawe. Not being interconnected by land makes it different than most counties in the United States. The waters immediately encircling the islands that make up the County are known to be no more than 300 feet deep. Yet, just ten miles off of the southwest coast of Lanai depths of 14,000 feet can be found.

The four islands are actually connected as one large land mass known as Maui Nui. “Nui” means “great/large” and defines a Maui that nearly 1.2 million years ago was 50 percent larger than the present-day Island of Hawaii. Over the hundreds of thousand of years, however, the weight of the volcanoes, erosion, and the rising height of the sea water has caused much of Maui Nui to be blanketed by the sea leaving only half of the land mass visible, today.

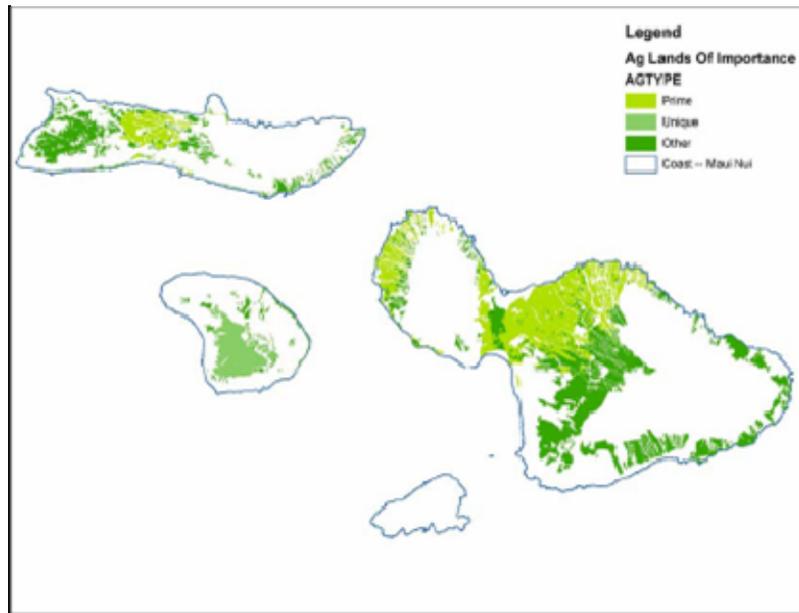
The County is the second largest of the four Hawaiian counties. It comprises a total of 1,175 square miles of land. Maui Island has 728.6 square miles, Molokai has 260.9 square miles. Lanai has 140.4 square miles, and Kahoolawe has 45 square miles.<sup>1</sup>



<sup>1</sup> Maui County Data Book, 2002.



Agricultural lands of the County have traditionally been a resource to its inhabitants. The State Department of Agriculture has a land rating system that analyzes soil productivity, water retention, erosion, chemical make-up and factors favorable for root growth. There are three land classifications that have been determined to be valuable for agricultural purposes: (1) "Prime" land that has the best physical, chemical, and climatic properties; (2) "Unique" land that is suited for high-value crops such as coffee; and (3) "Other" that may have a convenient location because of access to water but is not as productive as the other two. The map illustrates these three land categories in Maui County.



### 2.1.1.1 Island of Maui

Maui Island is the second largest island of the main Hawaiian Islands. It, along with the other islands in the County, was formed by volcanic activity. Specifically, two volcanic cones, Pua Kukui and Haleakala, flowed and united in the central valley. West Maui is geologically older than East Maui as evidenced by the lack of canyons and volcanic lava and cinders.

The trade winds blow in from the east and northeast and, consequently, those shores receive more rain than those on the west side of the islands. Thus, the rainfall varies within, as well as among, the islands that make up the County. The eastern side of Haleakala, between the 2,000 and 4,000 foot elevations, has a median annual rainfall between 200 and 300 inches. In the central Maui town of Kihei, however, only 10 inches of rain fall a year. The majority of the storms that affect Maui Island approach it from the Hana region. This area is difficult to get to during any time but especially if storms have hit the shores in the east.

### 2.1.1.2 Island of Molokai

The Island of Molokai is the fifth largest island of the main Hawaiian Islands. It consists of two volcanoes, Mauna Loa to the west and Kamakou, Molokai's highest peak at 4,970 feet, in the east, whose lava filled the Hoolehua Saddle. Toward the end of its geological development, the island's eastern volcano slid into the ocean, creating sea cliffs that are known to be the tallest in the world.

Molokai is 38 miles from the east to the west. On the east side of the island is a high plateau of 4,970 feet on Kamakou peak. In the high elevation areas, the native Ohia



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Lehua trees are the mainstay. In the east, the Nature Conservancy has two preserves, Kamakou and Pelekunu.



Flowing water from Molokai's upland gulches of Kaunakakai, Kawela, and Kamaloo deposited sand, silt, and clay on the southeastern edge of the island. This rich soil, springs, and streams, as well as the natural protection afforded the shore by the broad reef platform, made this area especially inviting to humans.

Molokai has an average temperature of 74 degrees F and fluctuates between 6 and 7 degrees on either side of that number. The average rainfall in Molokai is 20 inches in the central area, 20 inches in the western portion, and 35 inches in the east. Once or twice a year, the Kona storms drop 8 to 10 inches on the south side of the island.

### 2.1.1.3 Island of Lanai

The Island of Lanai's tall Cook Pine trees are seen on most ridge tops. They are currently about 100 feet tall and only one-third through their growth cycle. The height of the tree allows it to capture moisture from the clouds in an area that feels the effects of being in the rain shadow of Maui Island's Mount Haleakala and its West Maui Mountains. This means that Lanai is dry with miles of arid land.



Lanai is only 13 miles wide by 18 miles long but is the 42<sup>nd</sup> largest island in the U.S. Its park-like environs illustrate the ramifications of initiating a non-native species. In the 1920s, 12 Axis deer were released on Lanai where no deer had been before. With no known predators, there are, today, thousands of such deer on the island. Non-Polynesians introduced numerous species of birds to Lanai and the other islands. The Rio Grande turkeys were the first such birds. Wild chickens and peacocks roam the uplands and the area north of Lopa. Lanai is a destination for hunters.



As with Maui and Molokai, volcanic development created Lanai, but unlike its two neighbors, it had just one volcano.

### **2.1.1.4 Island of Kahoolawe**

There is a fourth, but uninhabited, island within the County called Kahoolawe. Located just seven miles off the southwest coast of Maui and southeast of Lanai, Kahoolawe is the eighth largest island in the Hawaiian chain.

The island lacked fresh water and, over time, had become a dry, grass-covered area with few trees. King Kamehameha III replaced the death penalty with the punishment of exile to Kahoolawe. As a result, a male penal colony was founded on the island circa 1830. The lack of food and water on the island caused many to starve. In 1853, the punishment of exile was terminated.

The island has seen an ever-increasing erosion of its limited natural resources. Cattle were placed on the island beginning in 1858 that denuded the island further and made it susceptible to the strong trade winds blowing the topsoil off the island, leaving behind a red hard pan. The Hawaiian territorial government attempted to restore the island's vegetation between 1910 and 1918 but with little success, so it leased the property for the next 21 years to Wyoming rancher Angus MacPhee and the Maui landowner Harry Baldwin. The two used it as a cattle ranch with varied success.

In 1941, the two lease holders subleased it to the U.S. Army where troops were trained in the art of invading an island during the cover of military shelling. The island was continually used as a military training target throughout World War II, the Korean War, and the Cold War.

A group known as Protect Kahoolawe Ohana (PKO) filed suit in 1976 to stop the military's use of the island as a location for military training. The Federal District Court for the District of Hawaii ruled, in 1977, that the military could continue its training but had to prepare an environmental impact statement and complete an inventory of historic sites on the island. On March 18, 1981, the island was added to the National Register of Historic Places. In 1990, President Bush ordered an end to the live-fire training on the island by the U.S. military.

Hawaii's Senator Daniel Inouye sponsored Title X of the 1994 Department of Defense Appropriations Act that not only transferred Kahoolawe to the State of Hawaii but called for the clearance of unexploded armaments and environmental restoration of the island. The military has spent approximately \$400 million as of 2003, but the work is still not complete.

The Island of Kahoolawe is technically under the aegis of the Kahoolawe Island Reserve Commission and not the County of Maui. This commission is currently working on a plan to control erosion, rebuild vegetation, recharge the water table, and reintroduce native species. Kahoolawe is not, however, within the scope of this ISWMP.



## 2.1.2 Conditions Unique to County of Maui

The County is alone among the State of Hawaii's counties to have multiple inhabited islands. This creates interesting issues for the Division in terms of allocating equipment and managerial oversight. Operationally, for example, woody waste would be ground at a central facility or, at the most, two facilities, as is done in the County of Hawaii, but in the County of Maui wood debris is accumulated on the islands of Lanai, Molokai, and on Maui both at the Central Maui Landfill and Hana Landfill. Purchasing a grinder for each of the facilities involves a large capital outlay. Transporting a grinder from one location to the next operationally is very expensive, as well, because of the use of private barging.

The spatial separation by water also causes problems in the allocation of human resources. On the Island of Molokai, for instance, there currently is not enough solid waste work to justify a full-time solid waste employee to handle the collection of trash. This work is done by employees of the Highways Division within the Department of Public Works, yet, they use the equipment of the Solid Waste Division. The same is true in Hana.

Many jurisdictions in the United States that have rivers or lakes within their jurisdictions will have water transports owned and operated by those jurisdictions; the County, with its three inhabited islands, does not. The cost of doing the Division's work increases because of the noncontiguous land mass and the lack of regular transportation available to the County to support its operational functions, such as solid waste collection.

## 2.2 Human Environment

### 2.2.1 Planning Period

The scope of time for the planning is 20 years. Chapter 13 of this ISWMP reviews the scenarios that the County has assembled to compare operational and capital costs of each scenario's components. However, this financial analysis is carried to the year 2042,<sup>2</sup> using FY2006 as the base year. The population projection was taken directly from the Maui County 2030 General Plan (2030 Plan).<sup>3</sup> Waste generation figures are based directly off past generation figures and advanced with the population figures from the County's 2030 Plan. Other projections included herein are carried out to the year 2030.

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<sup>2</sup> Initially, 20 years was chosen; however, in order to evaluate scenarios relative to the longest landfill life of a scenario, the year 2042 was chosen by the County.

<sup>3</sup> See the County's 2030 Plan at the following website:  
<http://www.co.maui.hi.us/departments/Planning/gp2030/index.htm>



## 2.2.2 Population Projections

The beautiful vistas and comfortable lifestyle have helped Maui County grow at a faster rate than the State of Hawaii as a whole. Between 2000 and 2004, the County's population grew at 9.2 percent compared to the State's 5.3 percent. This trend is not new. Between 1990 and 2000, Maui County's population increased by 26.2 percent compared to a statewide increase during the same period of 8.9 percent. Table 2-1 shows the historical change of population over time on the islands of Maui, Molokai, and Lanai.

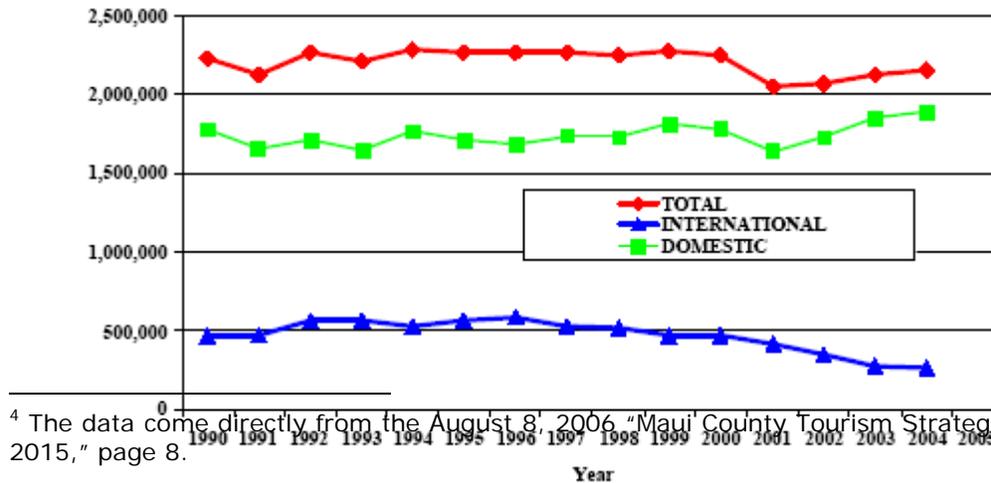
**Table 2-1 - Population History Changes**

Area	Population			Percentage Change		
	1980	1990	2000	1980-1990	1990-2000	1980-2000
Maui	70,84	100,37	128,09	42%	28%	81%
Hana	1,423	1,895	1,855	33%	10%	30%
Makawao	19,00	29,207	36,476	54%	25%	92%
Wailuku	321,1	45,685	61,346	42%	34%	91%
Lahaina	10,28	14,574	17,967	42%	23%	75%
Molokai	5,905	6,587	7,257	12%	10%	23%
Lanai	2,119	2,426	3,193	14%	32%	51%

Maui County Data Book, 2000.

Within the State of Hawaii, visitors to Maui Island are second in number only to those who visit Oahu. The chart below, Figure 2-2, shows the historical number of visitors from both within the United States and from other countries. The chart illustrates a return from a sharp downward trend after the terrorist attacks on September 11, 2001, in the U.S. Maui, as other places, is experiencing higher numbers once again as the chart below illustrates.<sup>4</sup>

**Figure 2-1 - Historical Annual Visitation to Maui**



<sup>4</sup> The data come directly from the August 8, 2006 "Maui County Tourism Strategic Plan: 2006 – 2015," page 8.



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Projecting to 2030, the County's Planning Department estimates that the population of residents in the County is projected to increase from approximately 150,000 in 2000 to 200,000 in 2030. In addition, visitors to the County are projected to increase to over 70,000. In the County's 2030 Plan, the County forecasts that the rates of growth in resident population, housing, and jobs are higher than the rate of growth for visitors. This is expected to result in an economy more diversified and less driven by tourism than in the past. The number of wage and salary jobs is expected to increase by 1.7 percent a year while per-capita income will increase very little.

Table 2-2 shows the population projections (resident inhabitants and visitors), the number of households, and number of jobs for each of the three inhabited islands in the County. The table also sums the individual islands into a County total.

**Table 2-2 - Demographic Projections 2030<sup>5</sup>**

Area	2006	2030 Forecast	Numeric Change	2006-2030 Growth (%)
<b>Population</b>				
Lanai	3,452	4,901	1,449	42%
Molokai	7,127	8,395	1,268	18%
Maui Island	129,471	186,254	56,783	44%
Maui County	140,050	199,550	59,500	42%
<b>Visitors</b>				
Lanai	1,224	1,827	603	49%
Molokai	909	1,349	440	48%
Maui Island	45,676	68,194	22,518	49%
Maui County	47,809	71,370	23,581	49%
<b>Households</b>				
Lanai	1,285	1,955	670	52%
Molokai	2,382	3,006	624	26%
Maui Island	45,474	70,058	24,584	54%
Maui County	48,141	75,018	26,878	53%
<b>Employment</b>				
Lanai	2,257	3,204	947	42%
Molokai	2,720	3,731	1,011	37%
Maui Island	81,420	109,777	28,357	35%
Maui County	88,397	118,712	30,316	36%

## 2.3 Solid Waste Stream

### 2.3.1 Sources

This section describes the waste stream in the County and forecasts future disposal levels. The County's waste disposal trends and corresponding historical population data were used to forecast solid waste needs.

<sup>5</sup> "Socio-Economic Forecast: The Economic Projections for Maui County General Plan 2030" Maui County Planning Department, June 2006, pp. I-II.



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The total waste stream is defined as tons of solid waste disposed and recycled in Maui County. Most types of solid waste are disposed in landfills, while some are recycled, used as soil amendment, or disposed in sites designated for specific wastes.

The County's largest component of the waste stream is mixed municipal solid waste (MSW). This is generally disposed at landfills. It typically consists of waste generated by residences, offices, and other businesses and institutions but excludes wastes generated from industrial facilities or construction and demolition activities that generate wood and inert wastes. It also excludes biomedical wastes, sludges, septic tank pumpings, derelict vehicles, and tires.

At times, the sources of the quantities are estimates because not each facility has scales to weigh incoming and outgoing trucks. Fortunately, the largest of the County's facilities, the Central Maui Landfill, uses scales and can therefore provide reliable figures. The landfills in Hana and Lanai, however, estimate quantities.

### 2.3.2 Quantities

Waste generation is influenced by various demographic and economic factors including changes in levels of employment and personal income, the value of recyclable materials, the price of disposal services, changes in product design and packaging, and changes in behavior affecting waste reduction and recycling levels. Some of these factors are difficult to measure over time while others are interrelated. Using them in a statistical analysis lowers the accuracy of the forecasts. For these reasons, the forecasts used are based on the number of households for residential waste and the employment for commercial waste.

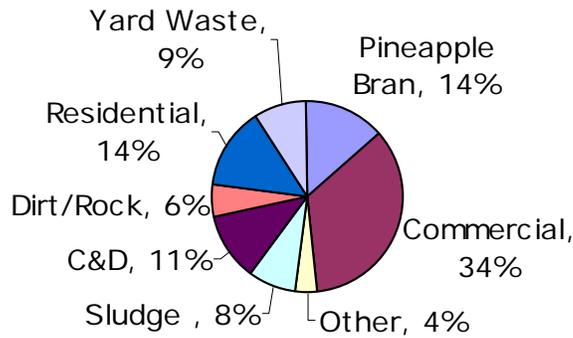
The base forecast shows that the amount of waste disposed in the County, without taking into account the projected increase in recycling, is expected to rise from the current 220,000 tons by 30 percent. These data translate to a per-capita waste disposal rate of nine pounds per person per day during the planning period. Projections of waste generation and recycling are discussed and presented in tabular form in Section 2.3.5.

### 2.3.3 Composition

The composition of the waste stream is important for determining a baseline of activity. Maui County's 1994 ISWMP looked at its 1989 waste stream composition and compared it to Kauai County's 1990 waste stream study. The 1989 waste stream composition is shown in Figure 2-2.



Figure 2-2 – Maui 1989 Waste Stream Composition

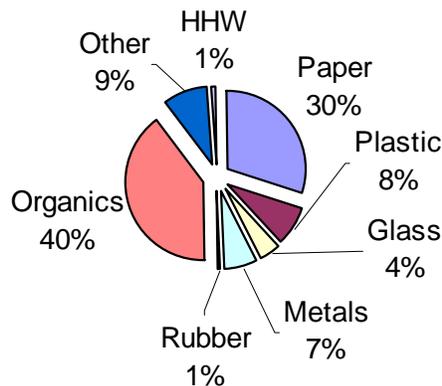


In 1994, the County conducted two waste composition audits at the Central Maui Landfill. Figure 2-3 shows the results of this audit of materials that were collected from residential and commercial customers in the County and brought into the facility by private haulers. Figure 2-4 shows the results of the analysis of waste dropped off by self-haulers, people bringing the material to the landfill directly from their homes and businesses. The two categories that show significant differences between the materials brought in by private haulers and those brought in by the self-haulers are "Other" and "Paper."

The County decided a new physical waste sort was not required at this time. The 1994 study was reviewed in conjunction with other recent sorts, such as the 2006 Kauai study and the 1999 California statewide study, and the characteristics are consistent and within the normal variability.

Construction and demolition (C&D) waste constituted 15 percent of the "Other" material that self-haulers brought in compared to just four percent by the private haulers. Since 1994, C&D waste has been banned from the Central Maui Landfill and goes to a private landfill on Maui.

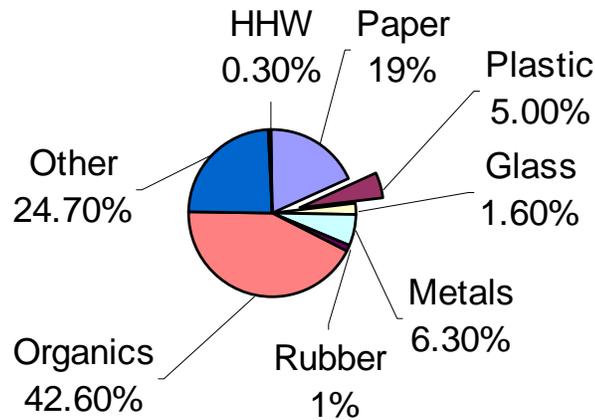
Figure 2-3 - Maui 1994 County and Commercial Hauled: Residential and Commercial (ICI)<sup>6</sup>



<sup>6</sup> ICI stands for Industrial, Commercial, and Institutional



**Figure 2-4 – Maui 1994 Waste from Self-haulers: Residential & Commercial (ICI)**



### 2.3.4 Diversion Rate

The materials diverted from landfill disposal in the County include the traditional materials collected in curbside and drop-off programs. These include newspaper, cardboard, magazines and other paper, as well as metal cans and bottles made of glass and plastic. In addition, the County currently diverts green waste and other woody organics, scrap metal, tires, batteries, used motor oil, and other fats and oils. These materials are collected and recycled by both the County and private businesses. In 2006, the County generated a total of 345,000 tons of solid waste. In addition, 21,000 tons of biosolids were generated and recycled into compost. Of these quantities, a total of 124,000 tons of material were diverted from landfilling and recycled. This resulted in a diversion rate of 30.6 percent. Table 2-3 provides a history of the diversion rate for the County.

**Table 2-3 – Diversion Rate History**

2001	2002	2003	2004	2005	2006 <sup>1</sup>	2007
33.2%	26.9%	34.3%	31.8%	30.8%	30.6%	36%

<sup>1</sup> Fiscal Year 2006 is the base year for the ISWMP.

### 2.3.5 Waste Generation Projections

Solid waste is generated by normal human activities associated with work and home life. This dichotomy corresponds to the convention used in solid waste planning that divides solid waste into two categories based on the type of generator: (1) residential and (2) commercial. This categorization is independent of what entity does the actual collection of solid waste. In Maui County, some residents have their solid waste collected by the Department of Environmental Management, some contract directly with private waste firms and some haul their own waste to the collection points. The



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businesses in the County contract with private firms or haul their own solid waste to transfer/disposal points.

Residential solid waste includes all waste generated from residences, both single-family and apartments (multi-family dwellings). Residential solid waste includes all types of waste materials that can be mixed together or separated, including food waste, paper (newspaper, magazines, junk mail, packaging, etc.), containers of plastic, glass or metal, yard trimmings, old appliances, tires and many more items and/or materials. These become solid waste when the owner no longer feels that they have utility and wants to get rid of them even though some may still have useful life.

Commercial solid waste is generated from businesses and other entities where people are employed. Commercial entities generate essentially the same materials as those discarded by residential generators, including office paper, cardboard, other papers and containers.

Industries produce specialized process wastes. An example of a process waste is sugar cane bagasse produced as a waste product from sugar making. Like many process wastes, sugar cane bagasse is managed separately from the general commercial solid waste. Bagasse generated in the County is burned for energy in the sugar factory's power plant. This analysis will evaluate the solid wastes generated by the residential and commercial generators but will not include industrial wastes such as bagasse.

The County is a popular tourist destination and, therefore, has many dwelling units that are leased to visitors for varying lengths of time. These dwelling units generate solid waste as do those occupied by permanent residents. The issue becomes how this waste should be categorized. The Maui County Planning Department makes the distinction between permanent residents and temporary ones in its 2030 Plan. This solid waste analysis will follow this convention. Solid waste characterized as Residential Solid Waste will be generated by residences or housing units occupied by permanent residents, which can include single-family dwellings, townhouses, and apartments. The solid waste generated by visitors will be included with the solid waste from other commercial generators even though they can be staying in the same types of buildings.

Solid waste generation includes all the waste produced in a residence or business, including that which is reused or recycled as well as that which is disposed in landfills. To determine the total quantity of solid waste generated in the County, the solid waste that is disposed, reused, and recycled must be identified and added together. This includes solid waste disposed in the five landfills, recycled by the recycling facilities, public and private, composted in the composting facilities and redeemed for cash by the HI-5 program. This was done for Fiscal Year<sup>7</sup> 2006, the base year, and is shown in Table 2-4, which identifies the different facilities and programs that manage the solid waste generated in the County.

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<sup>7</sup> Fiscal years are from July 1 through June 30.



Table 2-4 - FY2006 Total Solid Waste Quantities

Program or Facility	Waste Material	Quantity (Tons)
Central Maui Landfill <sup>1</sup>	MSW, recyclables, special waste	213,993
Lanai Landfill	MSW, recyclables, special waste	5,355
Molokai Landfill	MSW, recyclables, special waste	10,868
Hana Landfill	MSW, recyclables, special waste	1,618
Maui C&D Landfill	Construction & demolition wastes	50,000
County Recycling Centers	Containers, paper & plastic bags	2,267
EKO Compost Facility <sup>1</sup>	Yard waste, sludge, wood, etc.	54,253
Maui Earth Compost	Yard waste, wood, etc.	4,000
HI-5 Redemption Program	Containers	110
Aloha Glass Recycling	Glass containers	5,400
Maui Disposal Recycling	Aluminum, fibers, glass, bimetal	7,233
Kitagawa's Towing	Scrap autos, appliances, etc.	5,300
SOS Metals	Scrap autos, appliances, etc.	0 <sup>2</sup>
Other Recycling		3,300
TOTAL TONS		363,697
TOTAL POPULATION		140,050
PER CAPITA GENERATION (TPY)		2.6

<sup>1</sup>The report shows 268,246 tons which has been reduced by assigning the 54,253 tons to EKO Compost.

<sup>2</sup>SOS Metals was not operating in the base year and now has the County contract.

The total solid waste generated in the County in FY2006 as shown in Table 2-4 was approximately 366,000 tons, which includes biosolids or sewage sludge. This will be used as the base line number from which waste generation will be estimated. The per-capita generation of solid waste, including recycling and disposal, in the County in FY2006 was 2.6 tons per person per year<sup>8</sup> or 14.3 pounds per person per day. This is three times the 4.6 pounds per person per day that USEPA shows as the nationwide waste generation rate.<sup>9</sup> Of this solid waste generated in FY2006, 30.6 percent were recycled or composted and found new uses.

### 2.3.5.1 Maui Projected Summary Waste Generation

The summary projections for MSW generation for each island in the County through 2030 are shown in Table 2-5. Table 2-5 does not include recycled materials or special wastes, which will be addressed separately. These results of the solid waste projection model separately estimate the quantity of waste generated from residences and from commercial sources. The increases in waste generation are primarily a result of increases in population and employment during the planning period as is discussed in later paragraphs. As noted above, not all the solid waste generated is destined to be disposed in Maui's landfills because a large portion will be reused, recycled, composted or otherwise diverted from disposal.

<sup>8</sup> 2.6 tons per person is 365,964 tons divided by 140,050 population.

<sup>9</sup> Municipal Solid Waste in the United States: 2006 Facts and Figures, USEPA, 2007.



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**Table 2-5 - Summary of Mixed Solid Waste Projections**

	2005	2010	2015	2020	2025	2030
<b>Lanai</b>						
Residential Waste Generation	2,174	2,394	2,631	2,843	3,075	3,308
Commercial Waste Generation	2,864	3,089	3,341	3,532	3,746	3,966
Total Waste	5,038	5,484	5,972	6,375	6,821	7,275
<b>Molokai</b>						
Residential Waste Generation	3,716	3,861	4,061	4,246	4,465	4,689
Commercial Waste Generation	3,775	4,014	4,270	4,465	4,720	4,975
Total Waste	7,491	7,875	8,331	8,711	9,185	9,664
<b>Maui</b>						
Residential Waste Generation	104,394	116,537	125,720	137,163	149,058	160,887
Commercial Waste Generation	98,913	104,411	109,971	115,707	121,650	127,903
Total Waste	203,307	220,948	235,691	252,870	270,708	288,790
<b>County of Maui</b>						
Residential Waste Generation	110,285	122,793	132,412	144,252	156,598	168,885
Commercial Waste Generation	105,552	111,513	117,583	123,704	130,116	136,844
Total MSW	215,836	234,306	249,994	267,956	286,713	305,729

### 2.3.5.2 Maui Projected Growth

Generation of solid waste in the future will depend upon the number of people or families living in the County and on the level of business and other productive activity. In the 2030 Plan, the Planning Department has estimated the growth in population, households, and employment for the planning districts in the County for the years 2010, 2015, 2020, 2025 and 2030. These projections, shown in Table 2-6, will be used to project the solid waste generation for the ISWMP which is looking at essentially the same planning horizon.

**Table 2-6 - Population and Employment Projections**

	2005	2010	2015	2020	2025	2030
Population	140,050	151,301	162,599	174,450	186,850	199,548
Households	49,140	54,646	58,912	64,136	69,590	75,020
Average Family Size	2.85	2.77	2.76	2.72	2.69	2.66
Jobs/Employment	66,723	70,478	74,298	78,162	82,201	86,438

It can be seen in the table that the population and the number of households are projected to increase during the next 20 years by 32 and 37 percent, respectively. Also, the number of jobs is expected to increase over the same period by 23 percent. These projections are used to project the quantity of solid waste generated in the County over the next 20 years.

As mentioned above, the Planning Department made individual growth projections for each of the eight planning districts that make up the County. These planning districts



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are: Lahaina, Kihei-Makena, Wailuku-Kahului, Makawao-Pukalani-Kula (Upcountry), Paia-Haiku, Hana, the Island of Lanai and the Island of Molokai. These planning districts correspond reasonably well with the solid waste collection areas used by the Department of Environmental Management. Individual growth projections were therefore developed in the solid waste generation model for these planning districts.

The Planning Department broke the overall Jobs/Employment summary into nine individual job or employment categories with Services broken into two subcategories: Hotels and Other Services. The nine job categories are:

1. Agriculture
2. Manufacturing
3. Construction
4. Transportation, Communications & Utilities
5. Trade
6. Banking and Finance
7. Services
8. Government
9. Self-employed Jobs

Jobs and employment were projected for each of these categories separately by the Planning Department, and, in most planning districts, the different categories were projected to have different growth rates. The growth in commercial waste was matched to the overall growth in employment in each district with one exception. Construction employment differed from the general trend with the number of construction jobs projected to decline in several areas.

### **2.3.5.3 Residential Waste Generation Rate**

The residential waste generation rate is generally expressed on a per-capita and per-household basis. For example, waste generation can be shown as pounds per person per day or tons per household per year. For the Maui County projection model, the household generation rate was chosen and is expressed as tons of solid waste generated per household per year. A separate household generation rate was developed for four of the planning districts in the County: Lanai, Molokai, Hana and the remainder of the Island of Maui. Based on the disposal data from the base year, these districts were different enough to warrant their own rates. As previously mentioned, some residential solid waste is collected by the County and some by private collection companies. The solid waste collected by the private companies is a mixture of residential and commercial waste so the landfill records do not provide a clear quantity of residential solid waste. Therefore, the waste generation, waste disposed and recycled, for each household was estimated by dividing the waste quantity collected by the County for each district by the number of households served by County collection. This resulted in a distinct residential rate: Tons Per Year (TPY) of solid waste per household. This residential solid waste generation rate was multiplied by the total permanent households in each district to estimate the total residential solid waste for each year. The residential solid waste generation rate for each district is shown in Table 2-7.

### **2.3.5.4 Commercial Waste Generation Rate**

The residential waste generation rate was determined for the base year and applied to the future years in the planning period. A commercial solid waste generation rate was



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also estimated. These generation rates are expressed as tons of solid waste generated per employee per year. The generation rates vary depending on the nature of the business activity. For example, government employees generate less than one-half ton of solid waste per year while construction workers generate several tons of solid waste each year. This is one reason that construction and demolition wastes are treated separately in this ISWMP. Also, as mentioned earlier, construction employment is projected to decrease as well as increase as projected by the 2030 Plan. In addition, the solid waste generation varies from district to district in relation to the employment. This was particularly important in Hana, Lanai and Molokai. The commercial generation rate was estimated by subtracting the residential solid waste from the total for each district and dividing by the number of employees. The resulting commercial generation rates are shown in Table 2-7.

**Table 2-7 - Waste District Generation Rates**

Planning District	Residential Generation Rate (ton per household per year)	Commercial Generation Rate (tons per employee per year)
Lanai	1.69	1.63
Molokai	1.56	1.83
Hana	1.7	0.47
Maui (less Hana)	2.3	1.58

**2.3.5.5 Solid Waste Recycled**

Once the total solid waste generated on Maui was projected as discussed above, the next step was to project the amount of waste that would be recycled for the Status Quo. The recycling in this case is limited to the materials collected in traditional curbside and drop-off programs, i.e., paper of all kinds including cardboard and containers. Other materials, such as yard waste and special wastes, are recycled, and they are addressed separately. The traditional recyclable materials were identified and summed for all County and private programs for the base year of FY2006. These include the County recycling centers, the HI-5 program from all sites in the County both public and private, and the private recycling collected from businesses and residents. The quantities of recycled materials from the various programs in the County for FY2006 are shown in Table 2-8. Maui has a separate glass recycling program for restaurants which send glass containers to the Aloha Glass Recycling facility. In addition, glass is collected at County facilities and included in these quantities. These materials totaled approximately 19,000 tons in FY2006 or 5.5 percent of the total solid waste generated.

**Table 2-8 – Traditional Materials Recycled in FY 2006  
(Glass, Plastic, Metal Containers and Paper)**

Recycling Program	County Recycling Centers	County Landfills	HI-5 Program	Aloha Glass Recycling	Maui Disposal Recycling
Quantity in Tons	2,267	73	110	5,400	7,233



Next, this quantity of material was used to estimate the recycled quantity for FY2005 and projected forward, shown in Table 2-9, using the residential growth rates. For the Status Quo projection in Table 2-9, the projection model assumes that recycling on Maui, Lanai and Molokai is going to stay at the same rate as it was in FY2006, the base planning year. Additional scenarios will be developed based on the assumptions associated with the implementation of various alternative programs incorporated into the ISWMP.

**Table 2-9– Summary Status Quo Recycling Projections**

	2005	2010	2015	2020	2025	2030
Traditional Materials	18,398	20,465	22,064	24,024	26,069	28,106

### 2.3.5.6 Special Wastes

#### Biosolids

Included in the special wastes category is biosolids or sewage sludge. In FY2006, the Wastewater Reclamation Division produced approximately 22,000 tons of biosolids that were delivered to be composted at the Central Maui Landfill as discussed below. The County of Maui and EKO entered into a contract in 1995 where the County agreed to pay EKO on a per ton basis to receive and process the biosolids with green waste. The County provides a site for EKO at the Central Maui Landfill for co-composting. EKO is responsible for marketing the product.

#### Fats, Oil, and Grease

Fats, oil and grease (FOG) are processed into biofuel by Pacific Biodiesel. In 1995, the company entered into a contract with EKO and established a plant at the Central Maui Landfill. It has a facility to take FOG and convert approximately 5,000 tons into 200,000 gallons of fuel for diesel engines.

#### Construction and Demolition Wastes

These materials, commonly referred to as C&D wastes, or just C&D, are generated during the construction and/or destruction of buildings, bridges, and other structures. They are also generated in renovation projects. When renovation projects are small and performed by the householder, the materials can become part of the municipal waste stream. C&D waste can be composed of concrete and masonry, wood, roofing materials, gypsum wallboard, plastics, metals from reinforcing bar, cooling and other equipment, cardboard and other materials. Most of these can be recycled, and some communities are achieving 60 to 70 percent recycling of these materials.

C&D is banned from the Central Maui Landfill. Citizens and contractors take their C&D waste to a private landfill. There has been some recycling of specific projects, and the remainder has been disposed in the County’s four landfills. In FY2006, approximately 50,000 tons of C&D were disposed in the private landfill. The baseline C&D projection is shown in Table 2-10.

#### Green Waste

Most of the green waste and other woody wastes are received at the Central Maui Landfill and processed by the County’s contractor, EKO Compost Company (EKO). The



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materials are shredded and combined with the biosolids from the Wastewater Reclamation Division to make compost. The excess is available as mulch. In addition, green waste is processed into mulch and compost by private operators in the County, including Maui Earth Compost. This processing results in this material being recycled. A small quantity of the green waste in the Lanai, Molokai and Hana regions is landfilled. In FY2006, approximately 32,000 tons of green waste was recycled and disposed. The baseline green waste projection is also shown in Table 2-10.

### Scrap Metal

Scrap metal consists primarily of abandoned automobiles and appliances. These two streams are collected separately and brought together for processing. The fluids, including CFCs, are removed and the materials are crushed. The County has ongoing contracts for collection, processing and marketing of the scrap metal so that this material is recycled. In FY2006, approximately 6,700 tons of scrap metal was recycled. The baseline scrap metal projection is also shown in Table 2-10.

### Other Recyclable Materials

This category includes a variety of recyclable materials that has been combined because their quantities are small. Materials included are vehicle tires, lead acid batteries, used motor oil and others. In the Other category, the largest single material is fats that are made up of cooking oils, cooking grease and grease trap cleanings, which totaled approximately 6,000 tons in FY2006. These fats were all sent to Pacific BioDiesel in Kahului to be refined into biodiesel. In FY2006, approximately 6,200 tons of Other Recyclable Materials were recycled. The baseline projections for these are also shown in Table 2-10.

### Asbestos

Asbestos is a special waste that needs special handling to be disposed. In FY2006, approximately 1,000 tons of asbestos were disposed in the County landfills. The baseline projection for asbestos is also shown in Table 2-10.

**Table 2-10 - Summary Base Case Special Waste Projections in Tons**

	2005	2010	2015	2020	2025	2030
Boisolids (Sewage Sludge)	21,647	23,448	25,199	27,036	28,958	30,926
Construction and Demolition Wastes	51,162	52,664	53,153	53,168	53,168	53,153
Special Waste - Asbestos	1,085	1,121	1,210	1,320	1,434	1,548
Green Waste Plus Compostables	60,407	67,220	72,441	78,898	85,629	92,328
Scrap Metal - Cars, appliances, propane tanks, etc	5,400	6,005	6,474	7,048	7,648	8,244
Other Recyclable <sup>1</sup>	18,907	21,027	22,664	24,676	26,775	28,865

<sup>1</sup>Includes grease trap wastes and cooking oils converted to biodeisel.



2.3.5.7 Solid Waste Disposed

Once the total solid waste generated and the solid waste recycled in Maui County were projected as discussed above, the amount of solid waste that would require disposal is the difference. The summary values for solid waste that is projected to need disposal during the planning period are shown in Table 2-11. In addition, Table 2-11 shows the projections, for the Status Quo, of the quantities of solid waste expected to be generated and recycled through the year 2030. This projection maintains the County’s current baseline recycling rate of approximately 33 percent and disposal rate of 67 percent throughout the planning period.

Table 2-11 - Solid Waste Projections (TPY)

Table with 7 columns (Year) and multiple rows for Lanai, Molokai, Maui, and County of Maui, showing MSW Generated, Materials Recycled, and MSW Disposed values from 2005 to 2030.

2.4 Solid Waste Management System<sup>10</sup>

2.4.1 Current Organizational Structure

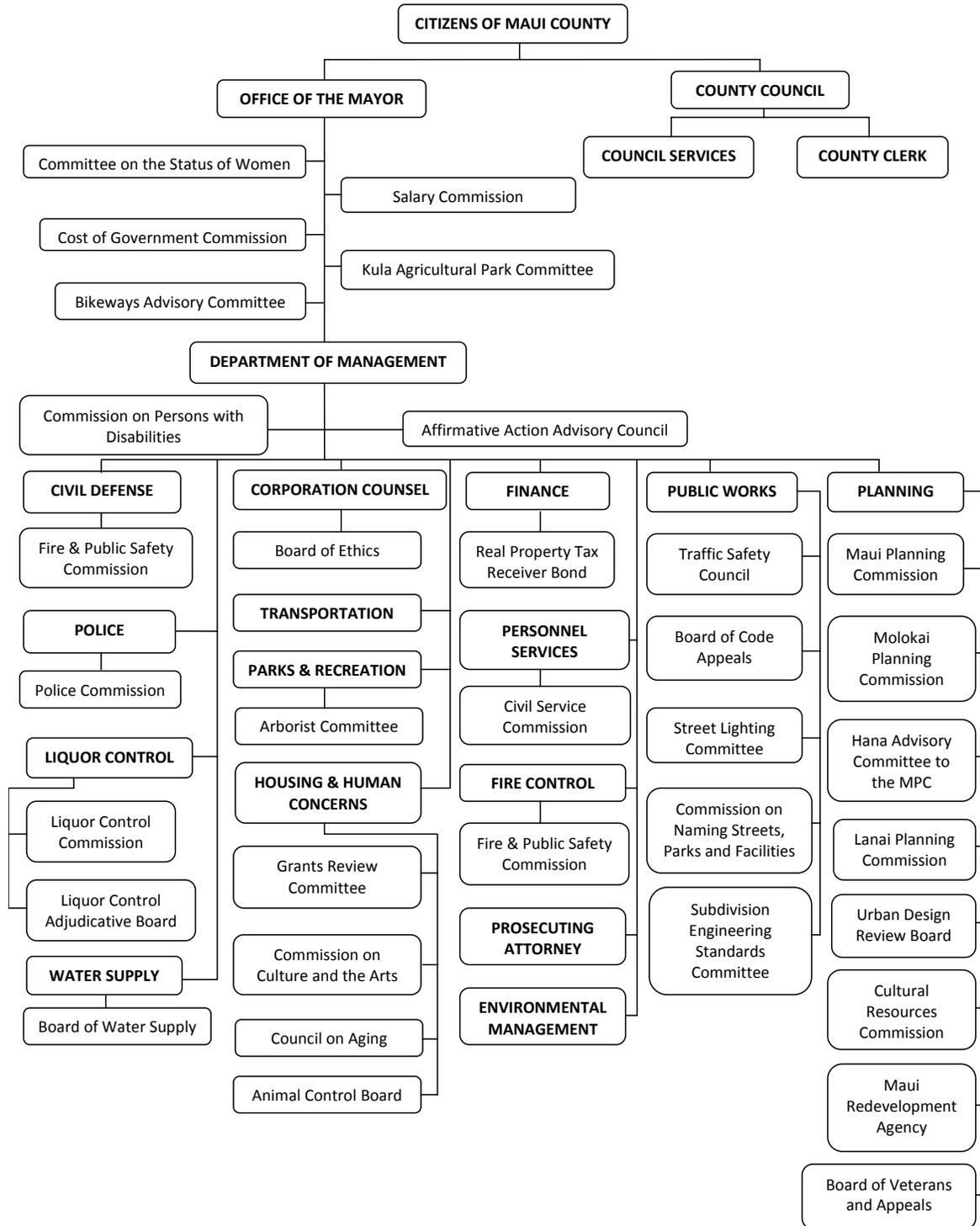
2.4.1.1 New Department

On November 7, 2006, residents in the County passed a Charter amendment, establishing the Department of Environmental Management, effective July 1, 2007. This new Department includes the Solid Waste Division and the Wastewater Reclamation Division.

<sup>10</sup> HRS Chapter 342G addresses the requirements of Integrated Solid Waste Management, Section 2.5.1 addresses the contents of the County plans.

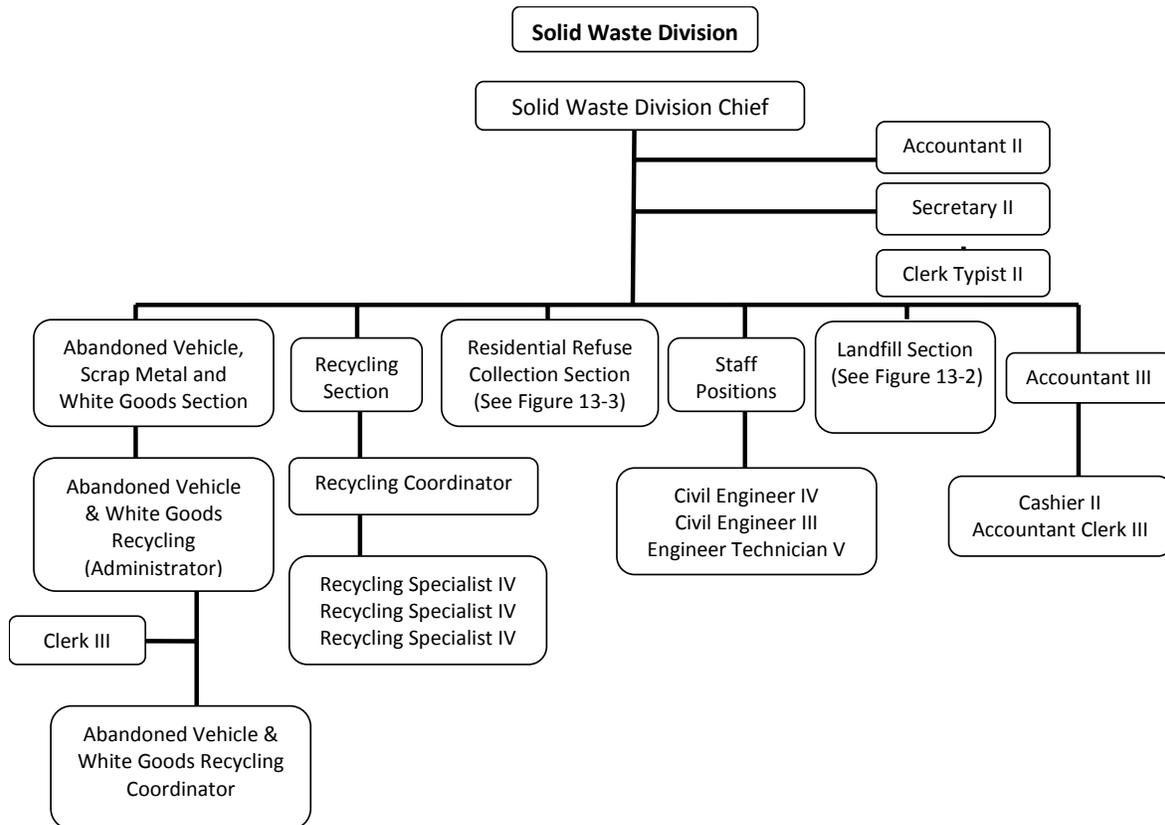


2.4.1.2 County of Maui Organizational Chart





### 2.4.1.3 Solid Waste Division Organizational Chart



## 2.4.2 Landfills

The following sections review location, number of employees, and operations at the five individual landfills in the County: Central Maui Landfill, Lana Landfill, Molokai Landfill, Lanai Landfill, and the private C&D landfill. Chapter 3 discusses the capacities at each of these landfills. Appendix F-1, Solid Waste and Recycling Facilities Technical Memorandum, provides further information on the operations of the County's landfills. The solid waste is brought to the landfills by County trucks crewed by County staff, private haulers and individual residents and businesses. These people and businesses that provide the transportation necessary to move their refuse to the landfill for disposal are referred to as "self-haul."

### 2.4.2.1 Central Maui Landfill

#### 2.4.2.1.1 Location

Central Maui Landfill is located on Pulehu Road, one mile north of Hansen Road. This is on the isthmus between western Maui and Haleakala, approximately 14,000 feet southeast of the Kahului Airport. The Tax Map Key identification for the site is TMK (2) 3-8-03:4, 19, 25.



**2.4.2.1.2 Number of Staff**

Central Maui Landfill is the largest disposal facility in the County and serves as the base for the Sanitary Landfill Section of the Solid Waste Division. There are a total of 23 funded full time employed (FTE) positions at the Central Maui Landfill. These include the landfill supervisor, who oversees all the County-operated landfills, a work site supervisor, working supervisor, one support staff, nine heavy equipment operators, six attendants, three cashiers, and two laborers.

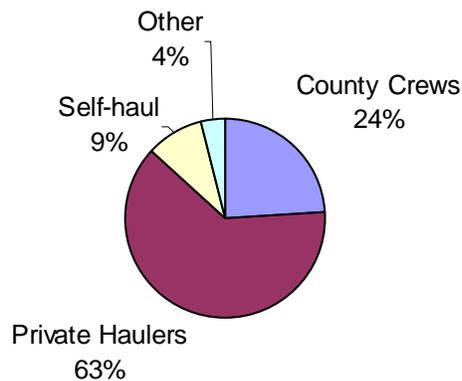
**2.4.2.1.3 Hours and Days of Operation**

The Central Maui Landfill operates and receives waste seven days per week. Its receiving hours are 6:00 am to 4:00 pm on Monday, Wednesday, and Friday, and 7:00 am to 2:30 pm on Tuesday, Thursday, Saturday and Sunday.

**2.4.2.1.4 Activities on Site**

The customer base for the landfill is made up of the County's collection crews delivering residential waste; the private haulers bringing in both residential and commercial waste; and self-haulers who are residents and individual businesses. The following chart illustrates the user base of the landfill based on the percentage of material each group brings in to the facility.

**Figure 2-4 – Customer Base of Central Maui Landfill 2006**



The Division operates the active face and scalehouse of this facility. County crews operate all activities associated with disposal of MSW and the collection of motor oil. Self-haulers take their material to a drop-off location and place their MSW into open-top roll-off boxes which landfill employees collect with a roll-off truck and take to the open face of an MSW cell. Private haulers and large self-haul loads are taken by the customer to the open face and dumped directly into the cell. There is a recycling drop-off center on site for customers to unload their post-consumer newspaper, cardboard, plastic, aluminum and glass.

Surrounding the landfill are separate private entities, such as Ameron and HC&S, and Division-associated activities where contractors for the Division perform work on its behalf. EKO entered into a contract in 1995 to accept and compost the County's biosolids and green waste. The County provides a site adjacent to the Central Maui Landfill where EKO conducts the co-composting operations. EKO is responsible for the marketing of the resulting products. Green waste loads going to the landfill are directed to the EKO operation.



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Pacific Diesel has a subcontract with EKO to receive fats, oils and grease (FOG) from restaurants and other commercial generators. Pacific Diesel converts FOG into biodiesel fuel. If a customer brings FOG to the scalehouse, the attendant instructs them to leave the landfill site and go to the adjacent facility to be recycled.

### **Observation of Activities:**

1. At one time, the County charged self-haulers to drop off their MSW at the landfill. When self-haulers had to pay, cars lined up waiting to get through the scales. These lines extended out onto the public road causing a traffic hazard. Also, space has been a problem for EKO. Recently, the County negotiated additional space for the green waste process, but if the County should increase the collection of green waste, as is discussed in Chapter 9, then more space will be needed for EKO to process the material. As the County plans for the operational growth of this facility, space should be provided for these particular operational matters.
2. The scalehouse stays open seven days a week, and there is no charge to self-haulers. On Sundays, two or less private haulers come into the facility that the scale-house attendant charges. The Division should be proactive and either work out an arrangement with the private hauler whereby these trucks either come in on another day or develop an automated accounting system so as to eliminate this labor.
3. Although the landfill employees do a good job redirecting customers with green waste, FOG, and cardboard to other locations, there appears to be little to no further education by the landfill staff to customers on recycling and environmental matters such as promoting separation of material so that less items go into the landfill.
4. Equipment at the landfill has little tracking data to assure that preventive maintenance is actually being performed. Appendix F-8, Equipment Review Technical Memorandum, examined purchase date, use, and repair data but found that the landfill data were limited if non-existent.

### **2.4.2.1.5 Tons/Volume**

For calendar year 2006 during which all disposal activity occurred in Phase IV-A, the total volume was 199,507 tons. On a 365-day/year basis, this averages to 546 TPD.

### **2.4.2.1.6 Energy Balance**

The County's operation at the Central Maui Landfill includes 17 pieces of equipment. Of these, eight are heavy equipment, such as compactors, that are fueled by diesel. The remainder are light trucks, pumps and other items fueled by gasoline. In FY2006, the fuel usage was approximately 58,000 gallons.

## **2.4.2.2 Hana Landfill**

### **2.4.2.2.1 Location**

The landfill is located on a parcel of land identified as Tax Map Key (TMK)1-3-06: 12, which is owned by the State of Hawaii and has been set aside by the State of Hawaii Board of Land and Natural Resources (Board) to the County by Executive Order No.



3304. The Board approved the County's request for a right of-entry to Parcel 12 of TMK: 1-3-06 for a garbage dump site, along with an easement for access purposes 20 feet wide over and across Parcel 7 of TMK: 1-3-06 on March 14, 1969. Although it has been used for landfill purposes by the County since 1969, for the first 15 years, the land was never formally placed under the County's control and management. In 1984, the property was set aside to the County under the current executive order (Brown & Caldwell, 1994).

The landfill has been in operation since 1969. It was constructed before the federal and state municipal solid waste regulations related to liners took effect and is therefore currently exempt from regulations 11-58.1-14 and 16. Accordingly, Hana Landfill has no liners and leachate collection and removal. Additionally, the landfill may not be expanded from the footprint established on October 9, 1993, without meeting federal and state liner design requirements.

#### 2.4.2.2.2 Number of Staff

The Hana Landfill is the smallest disposal facility in the County, and it is overseen by the landfill supervisor based out of the Central Maui Landfill. There are two staff assigned to the Hana Landfill. These include one heavy equipment operator and one attendant.

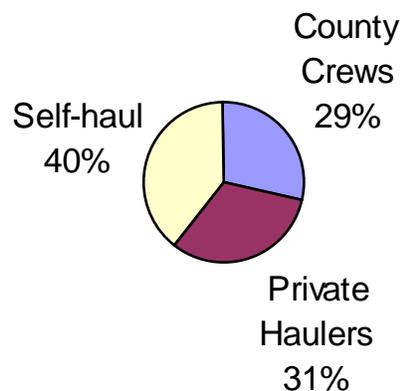
#### 2.4.2.2.3 Hours and Days of Operations

The Hana Landfill operates and receives waste six days per week. Its receiving hours are 8:00 am to 4:30 pm on Monday through Friday, and 8:00 am to noon on Saturday. The Hana Landfill is closed on Sunday.

#### 2.4.2.2.4 Activities on Site

The Hana landfill receives material from County crews who collect household garbage, self-haulers who bring material into the Hana landfill, and private haulers. These three customer groups make up the sum total of clients of this facility. The following chart illustrates the user base of the landfill based on the percentage of material each group brings in to the facility.

Figure 2-5 – Customer Base of Hana Landfill 2006



County employees perform all the work at the facility which receives green waste, motor oil and glass to be recycled. This facility has become an uncontrolled dumping area for scrap metal. The County periodically contracts out for the cleanup and



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removal of the materials. Scrap metal that is removed is recycled, and the County is currently contracting for cleanup.

### **Observation of Activities:**

1. There is little designed surface water management on the site. A flat grassy area is referred to as a "basin" and stormwater collects in it before running off to the southeast.
2. The daily cover is retrieved from an off-site cinder excavation area under no current agreement with the owner of this site.
3. Yard waste is deposited at the Hana Landfill, stored in piles and not processed.
4. There is a general sense among personnel that the facility is overlooked because of its remote location and small daily tonnage, approximately four to five tons a day.

### **2.4.2.2.5 Tons/Volume**

Because there are no scales at Hana Landfill, disposal volumes are estimated based on typical weights delivered by commercial vehicles and per-capita waste generation rates. The County has estimated the annual volume of waste received at the site to be approximately 1,620 TPY, including 1,370 tons of MSW and 250 tons of scrap metal, green waste and other recyclable materials. Based on this estimate, the volume of MSW averages approximately 4.5 tons per operating day.

### **2.4.2.2.6 Energy Balance**

The County's operation at the Hana Landfill includes three pieces of heavy equipment, such as compactors, that are fueled by diesel. No light trucks, pumps and other items are included. In FY2006, the fuel usage was approximately 4,200 gallons of diesel.

### **2.4.2.3 Molokai Landfill**

#### **2.4.2.3.1 Location**

The Molokai Integrated Solid Waste Facility (MISWF) is located in Naiwa near the southern coast of the Island of Molokai, on the dry leeward side of the island, approximately three miles northwest of Kaunakakai and approximately 1.25 miles inland, with the elevations spanning between approximately 200 to 250 feet mean sea level (MSL), and the topography gently slopes toward the south-southwest.

The project area is bounded to the north-northwest by Manawainui Gulch and to the south-southwest by a smaller unnamed gulch. Manawainui Gulch lies approximately 500 feet north-northwest of the site. Rock has been quarried from the southeast canyon wall of the gulch. The quarry is owned by Grace Pacific, Inc. and is presently being operated by Tri-L construction, Inc. The Tax Map Key identification for the site is TMK (2) 5-2-11:27 (portion).

The landfill was developed in 1993 to replace the Kalamaula Landfill which had reached capacity. It was permitted and developed under the exemption, based on receiving less than 20 TPD, for small landfills in arid areas, as provided in Hawaii Administrative Rules, Chapter 11-58.1 Section 11(f). Accordingly, it has been



developed without liners and leachate collection and removal. A liner and leachate collection system, however, was constructed in the sump area of Cell 1.

#### 2.4.2.3.2 Number of Staff

The Molokai Landfill is a small disposal facility, and it is overseen by the landfill supervisor based out of the Central Maui Landfill. The landfill working face is operated by County employees. There is a total of two County staff assigned to the Molokai Landfill. These include one heavy equipment operator and one attendant. A contractor for the County operates the scale at the entrance to the landfill and the recycling center at a cost of approximately \$214,000 per year.

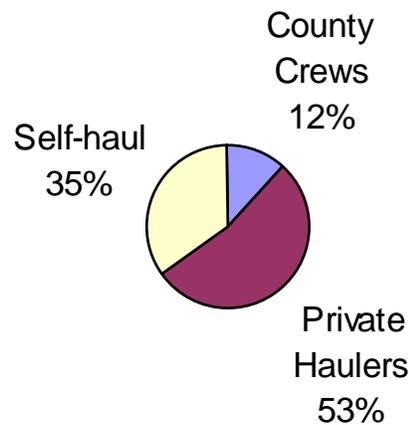
#### 2.4.2.3.3 Hours and Days of Operation

The Molokai Landfill operates and receives waste seven days per week. Its receiving hours are 8:00 am to 4:30 pm on Monday, Tuesday, Wednesday and Friday, and 8:00 am to noon on Thursday, Saturday and Sunday.

#### 2.4.2.3.4 Activities on Site

The landfill receives material from three customer groups: material brought to it by County crews, private haulers, and self-haulers. The following chart illustrates the user base of the landfill based on the percentage of material each group brings in to the facility.

Figure 2-6 – Customer Base of Molokai Landfill 2006



The Contractor operates the scales and weighs the vehicles on entry, except for some County collection vehicles that arrive before the scale operator. The contractor receives green waste and pallets which are ground up for mulch for use by residents, using the County grinder. The contractor also receives cardboard, newspaper, plastic, and aluminum, which are processed using the County-supplied equipment for shipment off island. Used motor oil is accepted and shipped off island also for recycling. The glass accepted at the facility is crushed and is currently stockpiled.

#### Observation of Activities:

1. The land slopes off to the south where there is a swale, and stormwater collects in it before running off to the southwest.



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2. The landfill has a scale, however, all trucks are not weighed. Some enter before the scale is opened, and the scale readout is not set so that weights can be taken manually.
3. The landfill does not have proper equipment, the in-place density is low which means that there could be better compaction, and the ratio of cover dirt to waste is high. This is expensive since cover dirt is purchased.
4. There was a large accumulation of scrap vehicles, appliances, batteries and other material. The County contracted for the removal of the material, and it has been removed.
5. The recycling facility equipment is in need of an upgrade, and the electrical service is not adequate.

### **2.4.2.3.5 Tons/Volume**

Based on current estimates by the County, the average daily volume during calendar year 2006 was 6,421 tons, or 17.6 TPD on a 365-day/year basis. It is important to note, however, that there is uncertainty in the estimated weights. Although scales are at the site, only commercial waste hauling vehicles (51 percent of estimated volume) are weighed. County collection vehicles and residential self-haul vehicles and bulky waste deliveries are estimated using population and estimated weights of typical deliveries.

### **2.4.2.3.6 Energy Balance**

The County's operation at the Molokai Landfill includes five pieces of equipment. Of these, three are heavy equipment, such as compactors, that are fueled by diesel. The remaining two are a light truck and a bobcat fueled by gasoline. In FY2006, the fuel usage was approximately 7,900 gallons.

## **2.4.2.4 Lanai Landfill**

### **2.4.2.4.1 Location**

Lanai Landfill is located in the southwestern portion of the Island of Lanai, approximately four miles southwest of Lanai City, between Kaunalapau Highway and the Kalamai Gulch. The elevation of the site is between 850 and 1,020 feet above MSL. The site is on and adjacent to land owned by subsidiaries of Castle & Cook, Inc. The landfill footprint occupies approximately 20 acres on a 36-acre site.

The landfill has been in operation since 1969. It was permitted and developed under the exemption, based on receiving less than 20 TPD, for small landfills in arid areas, as provided in Hawaii Administrative Rules, Chapter 11-58.1 Section 11(f). Accordingly, it has been developed without liners and leachate collection and removal.

### **2.4.2.4.2 Number of Staff**

The Lanai Landfill is a small disposal facility, and it is overseen by the landfill supervisor based at the Central Maui Landfill. There are a total of three County staff assigned to the Lanai Landfill. These include two heavy equipment operators, who also are assigned to operate the waste collection vehicles, and one attendant.

### **2.4.2.4.3 Hours and Days of Operations**

The Lanai Landfill operates and receives waste five days per week. Its receiving hours are 7:00 am to 3:30 pm on Monday through Friday. The Lanai Landfill is closed on



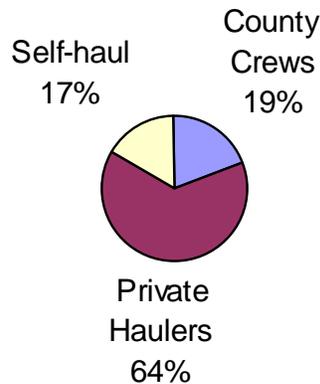
## CHAPTER 2 - EXISTING AND FUTURE CONDITIONS

Saturday and Sunday. On weekends, Lanai Waste, a private firm, sets out roll-off boxes just outside the gate for refuse drop-off by residents and businesses.

### 2.4.2.4.4 Activities on Site

The Lanai landfill receives material from County crews, private haulers, and self-haulers. The following chart illustrates the user base of the landfill based on the percentage of material each group brings in to the facility.

**Figure 2-7 – Customer Base of Lanai Landfill 2006**



The County employees divert inert material to the side but bury everything else that enters the site.

#### **Observation of Activities:**

1. The employees at the facility borrow equipment from the Lanai Company in order to do their work on site. Although there appears to be no official arrangement for this borrowing of a CAT 980 rubber tire articulating loader, County personnel will drive their personal car down to the Lanai Company and drive back the borrowed piece of equipment to use in the County's operations.
2. Landfill personnel work and charge overtime on the days they borrow the Lanai Company's equipment to move the soil that has been delivered to the active face.
3. The only equipment on site is a new D-7 CAT dozer. In addition to not having a loader, the landfill has no water truck to minimize dust on that arid landfill.
4. Cover soil is delivered on an apparently irregular basis as the table below illustrates. The delivered soil is applied one or two times a week to the active face.



**Table 2-12 - Cover Soil Deliveries, Two Months**

Date	Loads	Cubic Yards
1/10/07	16	192
1/11/07	20	240
1/17/07	5	32
1/21/07	6	120
2/5/06	9	180
2/12/07	4	48
2/13/07	6	96
2/14/07	5	100
2/15/07	5	100
2/20/07	6	120
2/21/07	13	170
2/22/07	5	100
2/23/07	6	120
2/26/07	12	184
2/27/07	16	229
2/28/07	7	140
TOTAL	141	2,171

**2.4.2.4.5 Tons/Volume**

The Lanai Landfill is not equipped with truck scales. The County estimated the total quantity of waste disposed at Lanai Landfill from July 1, 2005, through June 30, 2006, to be 5,127 tons. This is equivalent to 14.0 TPD (365 day/year basis) or 19.7 tons per operating day (the site is open five days a week).

**2.4.2.4.6 Energy Balance**

The County's operation at the Lanai Landfill includes two pieces of heavy equipment, both dozers that are fueled by diesel. No light trucks, pumps and other items are included. In FY2006, the fuel usage was approximately 4,400 gallons of diesel.

**2.4.2.5 Private Construction and Demolition Debris Landfill**

**2.4.2.5.1 Location**

The DeCoite Landfill is a privately-owned facility located near Maalaea, Maui. It is permitted to receive only C&D waste within a permitted site of 14.7 acres. Waste is placed in a pit created by previous excavation of volcanic cinders used as a building material, after lining the pit floor and walls with a geomembrane liner.

**2.4.2.5.2 Hours and Days of Operations**

The DeCoite C&D Landfill operates and receives waste six days per week. Its receiving hours are 7:00 am to 4:30 pm on Monday through Friday, and 7:00 am to 2:30 pm on Saturday.

**2.4.2.5.3 Activity**

The primary activity is the disposal of C&D material. Site personnel segregate and remove scrap metal from incoming loads for diversion to recycling facilities. Asphalt and concrete rubble are also separated to the extent possible and used within the landfill for roads and wet-weather tipping pads.



**2.4.2.5.4 Tons**

Annual disposal volumes have increased significantly at the DeCoite facility during the last five years. All incoming loads are weighed on truck scales with the following results reported for the period 2002-2006.

**Table 2-13 – C&D Tonnages**

Year	Annual C&D Waste Tonnage
2002	29,976
2003	32,211
2004	30,571
2005	41,279
2006	49,984

Assuming a nominal 10 percent diversion of incoming C&D loads, the County estimates approximately 45,000 tons of C&D material were disposed in 2006.

**2.4.3 Recycling Centers**

**2.4.3.1 Locations**

The County has nine recycling centers throughout the County to provide convenient recycling for residents and businesses, as shown in Table 2-14. Seven of these are operated by a contractor for the County.

**Table 2-14 - Recycling Center Locations**

Recycling Centers	Location
Central Maui Landfill	Pulehu Rd, 1 mile mauka off Hansen Rd
Wailuku Recycling Center	Kahekili Hwy, at Makaala Dr
Kahului Recycling Center	Wahine Pio Rd., beside MCC Campus
Makawao Recycling Center	Off Makani Road, behind Kalama Intermediate School
Haiku Recycling Center	Hana Hwy at Pauwela Rd, near Haiku Community Ctr.
Kihei Recycling Center	Corner of Welakahao Rd & Piilani Hwy, across from Hope Chapel
Olowalu Recycling Center	Honoapiilani Hwy, 3 miles south of Lahaina
Hana Landfill	Makai off Hana Hwy, just before Hana Town
Recycle Molokai at Molokai Landfill	Off Maunaloa Hwy, between mm 3 and 4

**2.4.3.2 Tons/Volume**

The quantity of material received and recycled by the County recycling centers was 2,278 tons in FY2006. This was made up of aluminum, glass containers, plastic containers with necks, plastic bags, cardboard and newspaper.

**2.4.3.3 Energy Balance**

The nine recycling centers have very little powered equipment. Olowalu has one compactor which uses electricity, and Molokai has a crusher, two balers and a skid steer. The main energy use is for transportation using diesel trucks to transport the



recovered materials to be processed. On Lanai and Molokai, the materials are shipped off island. In FY2006, the electricity and diesel usage is estimated to be 8,400 gallons of diesel or 1,210 million Btu.

## 2.4.4 Redemption Centers

### 2.4.4.1 Locations

The County and private operators have established 17 redemption centers to receive the containers included in the State of Hawaii’s HI-5 program. Nine of the HI-5 redemption centers are owned and operated by private firms or non-profit groups. The County-sponsored redemption centers are shown in Table 2-15. These are operated for the County by a contractor.

Table 2-15 – HI-5 Redemption Center Locations

HI-5 Redemption Centers	Location
Kahului Recycling Center	Wahine Pio Rd, beside MCC Campus
Kihei Recycling Center	Corner of Welakahao Rd. and Piilani Highway
Haiku Recycling Center	Hana Hwy at Pauwela Rd, near Haiku Community Ctr.
Lahaina Redemption Center	Keawe Street across from Cannery Mall
Lanai Redemption Center	Lanai City, off of 9 <sup>th</sup> street (not under contract with the County)
Makawao Recycling Center	Behind Kalama Intermediate School, off of Makani Rd
Molokai Landfill & Recycling Center	Off of Maunaloa Highway Twice/month operator takes mobile unit HI5 redemption trailer out to east and west ends of island for collection

### 2.4.4.2 Tons/Volume

The HI-5 beverage container deposit system covers beverage containers for all non-alcoholic drinks (i.e., soft drinks, soda, water, juice, tea and coffee drinks), certain alcoholic drinks (i.e., beer, malt beverages, mixed spirits (up to 15% alcohol content), wine coolers (up to 7% alcohol content) in metals, glass or #1 or #2 plastic, up to 68 fluid ounces. In FY2006, there were 110 tons of containers collected because this was the start-up and not a full year. In FY2007, there were 6,900 tons collected. About 49% of the containers redeemed is aluminum, about 28% is plastic and 23% is glass, by volume.

## 2.4.5 Reuse Centers

Reuse is identified by the USEPA as the second level in the solid waste hierarchy. Reuse is when an item that could become waste or has been set out with waste for collection is removed from the waste stream and returned to its original use.

### 2.4.5.1 Locations

There are a dozen or more private and nonprofit facilities that collect items for reuse, usually through the sale of the reuse item. The fees are used to pay for the cost of the facility. These reuse facilities include: Aloha Shares Network, Big Brothers/Big Sisters, Buyer’s Paradise, Community Work Day, Friends of the Library, Habitat for



Humanity-Restore, Kidney Clothes, Savers Thrift store, Salvation Army, and Maui Food Bank. The facilities are mainly located in the Kahului and Wailuku areas. In addition, facilities are located on Lanai and Molokai.

### 2.4.6 County Refuse Collection

The Division is responsible for collection of single-family residential properties serviced by roads or streets meeting County standards.<sup>11</sup> Currently, not all such property receives County service as subscription is voluntary. In FY2007, the Division collected from approximately 24,000 of the estimated 51,000 permanent resident households in the County. In some instances, as noted later, the Division is assisted by the Highways Division. Solid waste collection on the three islands of Maui County operates out of six separate locations or base yards that serve the population of the County. Those locations, listed in order of size, are:

1. Wailuku Base Yard
2. Makawao Base Yard
3. Lahaina Base Yard
4. Lanai Landfill
5. Molokai Base Yard
6. Hana Base Yard

Note that these locations correspond with the Community Plan areas used in the 2030 Plan except that Paia-Haiku and Kihei-Makena are served from the Wailuku Base Yard. Each of these Collection Section base yards and the operations currently conducted from these base yards are discussed in the sections that follow.

Since July 1, 2007, management of the six collections operations has been configured as shown in the organizational chart for the Maui County Solid Waste Collection Operations in Section 2.4.1.3. Most of the collection base yards are co-located with Highways Division facilities. The exception is Lanai where the landfill serves as a collection base yard.

#### 2.4.6.1 Location of Base Yards

The Wailuku Facility is located at 1827 Kaohu Street and is the home base of the Collection Section. It is responsible for curbside collection of waste and white good materials for the County. The Collection Section operations personnel at the Wailuku facility provide service for the Wailuku-Kahului, Kihei-Makena and Paia-Haiku Community Plan areas. Of the approximately 31,000 households in these Community Plan areas, 13,506 receive County refuse collection service on a twice-per-week basis.

Makawao Base Yard is located at 1295 Makawao Ave in Makawao. It is responsible for curbside collection of waste and white good materials in the "Upcountry" area that includes Makawao, Pukalani, and Kula.

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<sup>11</sup> Commercial collection of communities not meeting County road standards (often gated communities), multi-family and business establishments is not managed by the Solid Waste Division and is outside the scope of this ISWMP.



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The Lahaina solid waste collection operation works out of the Highways Division base yard located at 3310 Honoapiilani Highway in Lahaina. It is responsible for the collection of curbside waste from homes in Lahaina, Kaanapali, Kahana and Napili.

The Hana solid waste collection service operates out of the Highways Division facility located in Hana at 35 Hana Highway. The Collection Section has no personnel assigned to solid waste collection in Hana. Curbside collection and supervision are performed by Highways Division personnel.

Lanai Landfill is the base yard for curbside waste collections on the Island of Lanai. The landfill is located on the Kaunalapau Highway approximately four miles southwest of Lanai City.

Molokai collection operates out of the Highways Division's facility located off the Maunaloa Highway in Kaunakakai. The Collection Section has no personnel assigned to Molokai; curbside collection and supervision are performed by Highways Division personnel. The work is supervised by the Highways Division Supervisor for the island.

### 2.4.6.2 Number of Staff at Each Collection Base Yard

Table 2-16 presents the number of staff at each Collection base yard.

**Table 2-16 – Base Yard Employees**

Base Yard	Number of Employees
Wailuku	23
Makawao	14
Lahaina	13
Hana	3 (Highways Division)
Lanai	1
Molokai	3 (Highways Division)

### 2.4.6.3 Number and Type of Equipment

Table 2-17 lists the number and equipment type assigned to each facility during 2007. It should be noted that the Collection Section is in the process of converting refuse collection to automated side-load collection using carts as much as practical. Additional automated side-load vehicles are on order and scheduled for delivery in 2008. Please see Appendix F.8 for more detail as to the make, year, and cost of the equipment listed below. The Wailuku Facility has the largest number of collection vehicles.



Table 2-17 – Base Yard Collection Vehicles

Base Yard	Automated Side-load Trucks	Rear-load Trucks	White Goods Trucks
Wailuku	10	3	1
Makawao		6	1
Lahaina		4	
Hana		1	
Lanai	2		
Molokai		2	
TOTAL	12	16	2

**2.4.6.4 Tons/Volume**

The Division, with the assistance of the Highways Division, collected refuse from those residents electing County service and meeting the road/street access requirements of the County. Throughout the County in FY2006, County trucks and crews collected 52,448 tons of refuse. Table 2-18 shows the estimated quantity of refuse collected by the trucks and crews from each base yard.

Table 2-18 - Refuse Collected by Base Yard in FY2006

Base Yard	Wailuku	Makawao	Lahaina	Hana	Lanai	Molokai
Quantity in Tons	28,424	13,995	7,715	388	998	928

**2.4.6.5 Energy Balance**

The County operates 30 collection vehicles from the six base yards on the three islands. These are fueled by diesel fuel, and there are seven supervisor/utility vehicles (pick-up trucks) that are fueled with gasoline. In FY2006, the fuel usage was approximately 75,000 gallons.

**2.4.6.6 Private Trash Collection**

There are a number of privately-owned companies that provide waste collection services in the County. There is one company that offers only recycling collection on the Island of Maui. These companies contract directly with the residential and business entities that generate refuse and recyclables.

**2.4.6.6.1 Private Collection Service Providers by Island**

The islands that comprise the County are served by different companies. Table 2-19 shows the companies that collect refuse and recyclable materials on each Island.



**Table 2-19 - Private Collection Service Providers by Island**

Island	Private Service Provider
Maui	Aloha Waste Systems, Inc.
Maui	Maui Disposal Co., Inc.
Maui	Puaa Food Waste Services
Maui	Maui Recycling Service, Inc.
Maui	Empire Disposal, Inc.
Maui	Lahaina Curbside Recycling
Lanai	Lanai Waste Removal, Inc.
Molokai	Island Disposal

**2.4.6.6.2 Tons/Volume**

Table 2-20 shows the quantity of refuse collected by the private service providers on each island that makes up the County. These data are from the reports done annually by each of the County landfills so that the Island of Maui has quantities at Hana Landfill and at the Central Maui Landfill. In addition to collection of refuse, the private companies collect recyclable materials including green waste.

**Table 2-20 - Refuse Collected by Private Service Providers in FY2006**

Landfill	Maui	Hana	Lanai	Molokai
Quantity in Tons	130,412	420	3,265	3,972

**2.4.6.7 Market Share of Collection by Island**

For market share, the concept is to show which entities collect from the largest number of solid waste generators in the County. As mentioned in Section 2.4.6.6.1, there are a total of five private service providers in the County and four of them offer refuse collection. In addition, there are large numbers of residents and businesses that do not contract for refuse collection that need to be accounted for in the market share calculation. These people and businesses self-haul. The total quantity of refuse collected for disposal by the County, private service providers and those who self-haul is used as the measure of market share. The percentage of the refuse delivered to the County landfills by each sector is shown in Table 2-21.

**Table 2-21 - Market Share by Collector<sup>1</sup>**

Landfill	Maui (CML)	Hana	Lanai	Molokai
Private Collection	65%	31%	64%	52%
County Collection	25%	29%	19%	12%
Self Haul Collection	10%	40%	17%	35%

<sup>1</sup>Percentages may not add to 100 percent due to rounding.