### 5.1.2 Fire Protection

#### 5.1.2.1 Existing Conditions

The Honolulu Fire Department's Fourth Battalion, as shown in Exhibit 5-B, serves leeward Oahu. The Kapolei Fire Station, Station 40, also serves as the headquarters for Battalion 4. The headquarters building houses an engine and a ladder truck. Station 28, in Nanakuli, has an engine and a tanker. Station 26, the Waianae Fire Station, has an engine, a quint truck (with pump and ladder), and tanker. Also housed in this fire station are the Waianae EMS units. The Makakilo Fire Station (No. 35) has a single engine.

The Fire Department has worked successfully with WM in the past supplying equipment to help fight area brush fires outside of the landfill property (no fires have occurred from within the landfill itself).

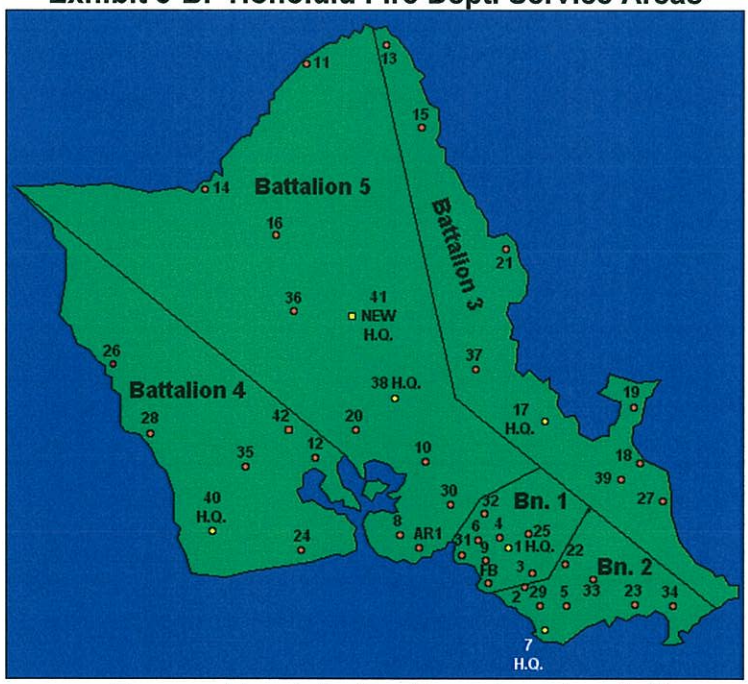
#### 5.1.2.2 Future without Proposed Action

No change in services is expected over the course of the next few years.

#### 5.1.2.3 Future with Proposed Action

The Honolulu Fire Department has asked that WM maintain adequate access for fire apparatus and indicates that WM is complying. As long as WM continues to provide adequate access, the Fire Department foresees no necessary additions as a result of the WGSL expansion.

**Exhibit 5-B: Honolulu Fire Dept. Service Areas**




Source: Honolulu Fire Department website (http://www.honolulu.gov/hfd/index.htm)

### 5.1.3 Emergency Services

#### 5.1.3.1 Existing Conditions

In Leeward Oahu there are currently three EMS locations as well as one of the island's two Rapid Response locations. EMS is found at Waianae Fire Station, in Nanakuli along Farrington Highway, and Makakilo in Kapolei. The island's first rapid response location is at St. Francis West Hospital.

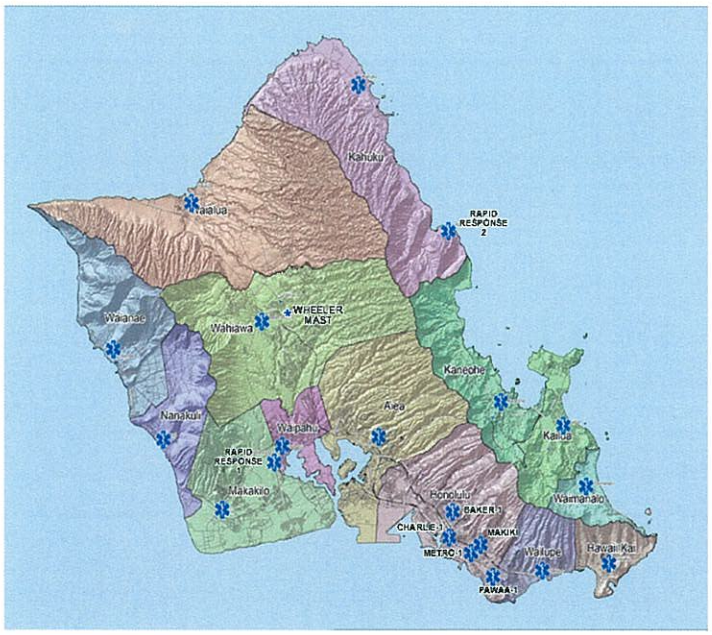
#### 5.1.3.2 Future without Proposed Action

The landfill and its surrounding communities are adequately serviced by EMS services.

#### 5.1.3.3 Future with Proposed Action

Expansion of the WGSL will not add new residents and, according to Waste Management, only 5 – 12 additional contract workers to the site. This will not significantly impact the quality of service currently available for those on the Leeward Coast.

**Exhibit 5-C: Oahu EMS Locations**




Source: Department of Emergency Services website (http://www.honolulu.gov/esd/ems/emsorg.htm)

### 5.1.4 Education

#### 5.1.4.1 Existing Conditions

Leeward Oahu has seen growth in school populations and schools in recent years, notably in Kapolei where new middle and high schools have opened. Availability of primary school space remains a problem. Two schools are located in the landfill site vicinity, Makakilo Elementary and Mauka Lani School.

Mauka Lani School having no complaints or staff concerns about WGSL nor do they report any incidences of odor or children feeling ill at school.

#### 5.1.4.2 Future without Proposed Action

Development in the Kapolei area will lead to an increase in population, eventually causing the need for additional school locations.

#### 5.1.4.3 Future with Proposed Action

Expansion of the WGSL Sanitary Landfill will not create a need for additional elementary schools, nor will it affect existing elementary schools differently than they are affected at the present time.

### 5.1.5 Library Services

#### 5.1.5.1 Existing Conditions

Hawaii's public libraries are operated by the State Department of Education. Libraries are open in Waianae, Ewa Beach and Kapolei.

#### 5.1.5.2 Future without Proposed Action

Due to limited funds, hours at libraries throughout Hawaii have been reduced in recent years. No additional libraries have been announced as planned.

#### 5.1.5.3 Future with Proposed Action

No impact on library services is anticipated.

### 5.1.6 Parks and Recreation

#### 5.1.6.1 Existing Conditions

There are parks situated in Waianae, Maili, and Nanakuli, and throughout the major residential zones of Ewa. Also, beach parks are located along the Waianae Coast at the tip of Barbers Point (in the Campbell Industrial Park) and in Ewa Beach. Odor issues and occasional airborn trash at nearby beach parks are the only reported issues caused by the current operations of the landfill. In the past, outdoor recreation at Ko Olina has been limited during occasions when odor was a problem.

Long-term WGSL may one day be used as a reclaimed recreational facility much like Ala Moana Park and Honolulu Waterfront Park.

#### 5.1.6.2 Future without Proposed Action

After the closure of Barbers Point, much of the Navy land was conveyed to the City of Honolulu for eventual redevelopment as recreation and sports facility. Funds for significant new developments have not been allocated, so major changes are not likely in the next few years.

#### 5.1.6.3 Future with Proposed Action

An expanded WGSL does not generate any additional demand on area parks. If odor issues and litter issues are adequately addressed, expansion and continued use of WGSL will have no impact on the use of nearby parks.

### 5.1.7 Medical Services

#### 5.1.7.1 Existing Conditions

Leeward Oahu is served by St. Francis West, a 100-bed hospital with 24 Emergency Service located outside Waipahu, the Waianae Coast Comprehensive Health Clinic between Nakakuli and Waianae and clinics in Kapolei maintained by other health care providers.

#### 5.1.7.2 Future without Proposed Action

SMS knows of no major changes in medical services planned for the study area.

#### 5.1.7.3 Future with Proposed Action

No impact is anticipated.

## 5.2 OTHER SOCIAL IMPACTS OF NOTE

### 5.2.1 Positive Social Impacts

#### 5.2.1.1 Reduced Impact on Other Oahu Communities

Unless a package of alternatives can feasibly process MSW and refuse currently handled by the WGSL, a landfill will still be needed. Without it, the health, sanitation and aesthetic issues associated with unprocessed waste or uncontrolled dumping will burden the entire island.

In addition, moving the current landfill operation to another Oahu location, merely shifts the adverse impacts to another community, still requiring that the issues of litter, traffic, odors, and visual pollution be addressed and managed.

### 5.2.2 Negative Social Impacts

#### 5.2.2.1 Department of Health Issues

In February 2006, the Department of Health proposed one of the largest environmental fines ever against the City: Eighteen violations were identified in DOH's six-month investigation. According to WM, all but two violations were corrected in 2006. The final two, 1) failing to measure leachate levels and to maintain these records and 2) exceeding permitted grades were deemed corrected as of September 26, 2007 and February 20, 2008 respectively. The violations included:

**Exhibit 5-D: DOH Notices & Finding of Violations**

| *Count* | *Alleged Violation* | *Dates of Last Alleged Violation* | *Compliance Status* |
|---|---|---|---|
| 1 | Exceeding Permitted Grades | 2/20/08* | In compliance |
| 2 | Failure to submit Annual Operating Reports in a Timely Manner | 2/22/2005 | In compliance |
| 3 | Failure to Place Daily Cover on the Active Face of MSW Landfill | 6/9/2005 | In compliance |
| 4 | Failure to Place Intervediate cover Material on the Ash Monofil | 6/29/2005 | In compliance |
| 5 | Exceeding Leachate Head on th4e Liner in Ash Monofill | 6/15/2005 | In compliance |
| 6 | Exceeding Leachate Head on Liner in MSW Cell E-1 Sump | 6/22/2005 | In compliance |
| 7 | Failure to Measure Leachate Levels and to Maintain Records on Leachate Levels in Cell 4B Sump | 9/26/07* | In compliance |
| 8 | Failure to Measure Leachate Levels and to Maintain Records on Leachate Levels in Ash Monofill Sump | 2/9/2005 | In compliance |
| 9 | Failure to notify DOH of Noncompliance on Equipment Blockage in MSW Cell 4B Leachate Lateral line and inability to Measure Leachate Levels | 6/22/2005 | In compliance |
| 10 | Failure to Notify DOH of Noncompliance in a Timely Manner on the Exceedances of Permitted Grades and submission of the annual Operating Reports (AOR's) | 2/22/2005 | In compliance |
| 11 | Unauthorized Storage of Material on the Ash Monofill | 3/2005 | In compliance |
| 12 | Failure to Manage and Ban the Acceptance of Special Waste | 5/19/2005 | In compliance |
| 13 | Failure to Maintain Records and Record Location of Asbestos Disposal at the Landfill | 7/2/2005 | In compliance |
| 14 | Failure to Cover a Dead Animal | 2/17/2005 | In compliance |
| 15 | Failure to Submit annual Surface Water Management Plan | 9/1/2005 | In compliance |
| 16 | Failure to Control the Generation of Dust from Vehicular Traffic | 2/17/2005 | In compliance |
| 17 | Failure to Minimize Free Litter Generation in the Landfill | 6/24/2005 | In compliance |
| 18 | Failure to Monitor Explosive Gasses and Maintain Monitoring Records | 2004 | In compliance |

* Date that DOH deemed WGSL in compliance.

#### 5.2.2.2 Property Values

The 2002 Socio-Economic Impact Assessment of WGSL Sanitary Landfill Expansion presented property value results that were not necessarily in line with what experts and the public at large would have expected.

Research found that single-family homes fit the hypothesis that property values increase with distance from the landfill up to a distance of about three miles. However, the condominium analysis shows a significant correlation of increased value and proximity to the landfill – the opposite result.

Condominium property values are higher near WGSL due to the location of the condominiums, Ko Olina. According to the Ko Olina website, "Ko Olina Resort & Marina's residential development will be Hawaii premier location for homebuyers across the word and for local residents…Ko Olina will provide a feeling of luxury in a private community…"

#### 5.2.2.3 Diminishing Community Trust

The failure to follow through on commitments from the City to close WGSL may be having an impact in eroding public trust and increasing cynicism toward City government. This is happening in the fastest growing community on the island where private-public partnerships are necessary to ensure sensible and well-managed growth.

The problem is being complicated by a "community-benefits package" proposal with which both proponents and opponents of the landfill who were interviewed expressed some hesitation. There appears to be general agreement among them that there has been insufficient community involvement in questions surrounding "who should benefit?", "what impacts are being addressed?", and "what services are appropriate?"

#### 5.2.2.4 Environmental Injustice

*"Environmental Injustice: An environmental injustice exists when members of disadvantaged, ethnic, minority or other groups suffer disproportionately at the local, regional (sub-national), or national levels from environmental risks or hazards, and/or suffer disproportionately from violations of fundamental human rights as a result of environmental factors, and/or denied access to environmental investments, benefits, and/or natural resources, and/or are denied access to information; and/or participation in decision making; and/or access to justice in environment-related matters."* [11]

A number of interviewees point out that Leeward Oahu has been and continues to remain on the receiving end of many of Oahu's burdens. They argue that within a 10-mile stretch along Farrington Highway there are two separate landfills handling hazardous[12], construction and municipal waste, as well as an two existing electrical plants, a proposed new generator unit at the Campbell plant, a deep draft harbor and a major industrial park, all of which service the entire Island of Oahu -- all of which adversely impact the environment of these communities. Further, Leeward Oahu is now the home of thousands of homeless people, many of whom were driven out of other communities only to be "welcomed" and "tolerated" on the Leeward Coast. They argue that the continued use and expansion of WGSL will only increase the imbalance of those impacts on Leeward Oahu.

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[11] Wikipedia *Environmental Justice* http://en.wikipedia.org/wiki/Environmental_justice

[12] Note: WGSL does not accept hazardous waste for disposal.

Proponents of keeping the landfill in operation point out that the siting of the landfill occurred long before the siting of the other examples noted above and had nothing to do with the demographics of the people in surrounding communities. Furthermore, the surrounding communities also accommodate one of the most beautiful resort complexes on Oahu, abutting the ever-expanding Second City of Kapolei. This is the fastest growing region on Oahu and WGSL does not appear to have stymied its growth. They believe that this is not indicative of a community suffering from environmental injustice.

Data from Exhibit 2-D would appear to support this position. Although the median household income in the Waianae DPA ($42,451) is below the island average ($51,194), the median household income in the Ewa DPA ($59,583), in which the WGSL is located, exceeds the island average. Additionally, the median household incomes for the two communities immediately surrounding the landfill all significantly exceed the island averages. These are Makakilo ($88,515) and Ko 'Olina/Honokai Hale ($74,083).

Finally, Windward Oahu residents note that for the last 40 years most of the active landfills were on the Windward side of the island. It is only recently that WGSL has been the only major landfill for MSW on Oahu.

These arguments are all worth taking into account as decision-making proceeds.

## 5.3 Economic Impact

### 5.3.1 Approach and Terminology

This economic impact section reviews the impacts that this project will contribute to the economic environment. Technical terms are used here to distinguish impacts of several sorts. First, in economic analysis, a distinction is made between impacts of the actual construction and operations of a project, and the effects of project-related spending throughout the local economy. In discussions of jobs, earnings, and taxes, three broad types are distinguished:

- *Direct* jobs/earnings/taxes are immediately involved with construction of a project or with its operations. It is important to note that direct jobs are not necessarily on-site: construction supports company personnel in offices and base yards, as well as on-site.
- *Indirect* jobs/earnings/taxes are created as businesses directly involved with a project purchase goods and services in the local economy.
- *Induced* jobs/earnings/taxes are created as workers spend their income for goods and services.

Direct, Indirect and induced economic impacts in Hawaii can be estimated using multipliers from a model of input-output relations developed and refined by State researchers.

It is also important to understand that although construction has a positive impact on the state economy, funds for this expansion will be generated from the tipping fees assessed to haulers for the use of the landfill. These tipping fees are translated to the consumers and business through maintenance fees and collection fees. As a result, financial resources for this construction will come from a reallocation of funds that are already a part of the Hawaii State economy rather than out-of-state investment. The reallocation of state monies results in a negative impact on jobs, earnings and taxes. These positive and negative impacts must be considered, in order to gain a clear picture of the economic impact of the WGSL expansion.

### 5.3.2 Employment And Earnings

#### 5.3.2.1 Construction

Expansion of WGSL is expected to take 10 years to complete. This expansion will result in an increase in the capacity of the landfill and is expected to increase the life expectancy of the landfill by 15 or more years.

Pending the receipt of final engineering figures, the construction of the expansion has been estimated at $86,000,000 over ten years, with expenditures spread consistently over those ten years. The construction estimates were determined through discussions with officials from Waste Management of Hawaii Inc., the current operator of WGSL. The expansion is planned in several stages. Each stage and year of construction will result in approximately the same level of construction spending.

#### 5.3.2.2 Employment

Construction spending will create jobs and spending in related industries. Exhibit 5-E shows that the direct jobs created as a result of this project will include some 746 person-years of employment[3] over the ten-year construction period. Direct jobs are not necessarily located on-site. As a rule of thumb, about 20% of direct construction jobs are off-site (in base yards, offices, and the like).

Indirect and induced jobs are also created throughout the state. These are likely to be concentrated in commercial and/or industrial centers, rather than near a job site. In addition, this project will support some 328 indirect and 720 induced person-years of employment. In total, approximately 1,795 person-years of employment will be created as a result of the WGSL expansion.

**Exhibit 5-E: Economic Impact – Positive Impact on Jobs**

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Infrastructure* | | | | | | | | | | | |
| Construction spending [1] | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 86.0 |
| Direct Jobs [2] | 85 | 82 | 79 | 77 | 74 | 72 | 69 | 69 | 69 | 69 | 746 |
| Indirect Jobs | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 31 | 31 | 31 | 328 |
| Induced Jobs | 82 | 79 | 77 | 74 | 72 | 69 | 67 | 67 | 67 | 67 | 720 |
| **Total Jobs** | **204** | **197** | **191** | **184** | **178** | **172** | **167** | **167** | **167** | **167** | **1,795** |

[1] In millions of 2006 constant $, [2] person-years of employment

**Source:** DBEDT: State Input – Output Study 2002

[3] Person years of employment is the number of full time equivalent positions required to complete the work defined by the estimated cost of construction during the specific period of time.

This, however, is not the net impact of this project. Remember that this project will result in a reallocation of funds that could be otherwise spent in other areas of the economy. The cost of construction is generated by revenue received from tipping fees and these fees are translated to Hawaii consumers; therefore, one must account for the negative impact associated with this project. Since tipping fees are translated to consumers, it can be inferred that this expansion will have a negative impact on personal consumer expenditures. A reduction in personal consumer expenditures results in a negative impact on jobs, earnings, and tax revenues. Exhibit 5-F shows the negative impact on jobs associated with this project.

**Exhibit 5-F: Economic Impact – Negative Impact on Jobs**

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct Jobs Lost [1] | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 72 | 721 |
| Indirect Jobs Lost | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 147 |
| Induced Jobs Lost | 31 | 30 | 29 | 28 | 27 | 27 | 26 | 26 | 26 | 26 | 275 |
| **Total Jobs Lost** | **117** | **117** | **116** | **115** | **114** | **113** | **113** | **113** | **113** | **113** | **1,143** |

[1] person-years of employment

**Source:** DBEDT: State Input – Output Study 2002

As shown in Exhibit 5-G, the WGSL expansion will result in a net positive impact. Despite the negative impact associated with the expansion some 651 direct, indirect and induced person-years of employment will be created as a result of this project.

**Exhibit 5-G: Economic Impact – Net Impact on Jobs**

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct Jobs Net | 13 | 10 | 7 | 5 | 2 | (0) | (3) | (3) | (3) | (3) | 25 |
| Indirect Jobs Net | 23 | 21 | 20 | 19 | 18 | 17 | 16 | 16 | 16 | 16 | 181 |
| Induced Jobs Net | 51 | 49 | 48 | 46 | 44 | 43 | 41 | 41 | 41 | 41 | 445 |
| **Total Jobs Net** | **87** | **81** | **75** | **70** | **64** | **59** | **54** | **54** | **54** | **54** | **651** |

**Source:** DBEDT: State Input – Output Study 2002

### 5.3.2.3 Earnings

Positive workforce earnings associated with the project's construction will amount to $59.6 million in direct earnings and $40.1 million indirect and induced earnings (as shown in Exhibit 5-H). The total positive impact on direct, indirect, and induced earnings associated with all construction will be about $99.8 million.

As with employment, this project will also have negative impacts on earnings. As shown in Exhibit 5-I a total negative impact on earnings of approximately $36.5 million can be expected.

This project will result in an overall positive impact on earnings. In total approximately $63.3 million in earnings will be generated as a result of this project. See Exhibit 5-J.

### Exhibit 5-H: Economic Impact – Positive Impact on Earnings

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Construction Earnings* [1] | | | | | | | | | | | |
| Direct earnings | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 59.6 |
| Indirect earnings | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 14.3 |
| Induced earnings | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 25.8 |
| **Total** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **10.0** | **99.8** |

[1] in millions of 2006 constant $

**Source:** DBEDT, State Input - Output Study, 2002

### Exhibit 5-I: Economic Impact – Negative Impact on Earnings

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Earnings* | | | | | | | | | | | |
| Direct earnings lost | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 19.3 |
| Indirect earnings lost | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 7.7 |
| Induced earnings lost | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 9.4 |
| **Total Lost** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **3.6** | **36.5** |

**Source:** DBEDT, State Input - Output Study, 2002

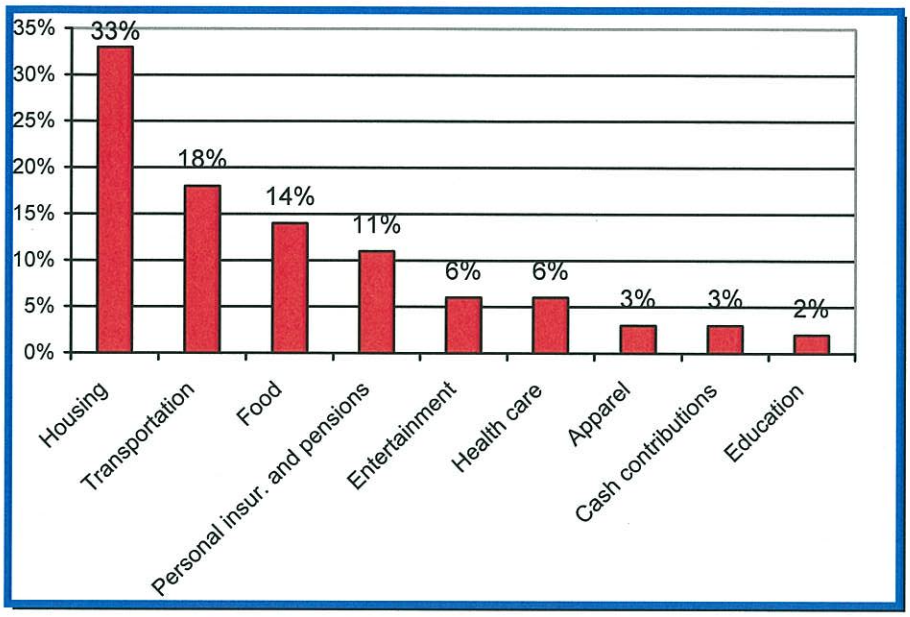
### Exhibit 5-J: Economic Impact – Net Impact on Earnings

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Earnings* | | | | | | | | | | | |
| Direct earnings - Net | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 40.3 |
| Indirect earnings - Net | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 6.6 |
| Induced earnings - Net | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 16.4 |
| **Total Net** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **6.3** | **63.3** |

These earnings will boost the local economy, as many of these dollars will be used to purchase goods and services from other industries. Exhibit 5-K shows Honolulu consumer spending patterns to illustrate how earnings may be used.

Housing costs such as shelter payments and utilities account for more than 33 percent of consumer expenditures. Food and transportation also account for a large amount of consumer spending (14 and 18 percent respectively). It can be expected that these patterns will continue in the future creating economic growth in several industries as a result of this project.

**Exhibit 5-K: Consumer Spending Patterns by Industry – 2003-2004**




**Source:** US Census 2000, State of Hawaii Data Book 2005

## 5.3.3 Fiscal Impacts

### 5.2.3.1 State Of Hawaii

Construction spending has an impact on state tax revenues. Exhibit 5-L displays estimated positive impact on state tax revenues as a result of the WGSL Expansion.

**Exhibit 5-L: Positive Impact on State Tax Revenues**

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *State Taxes* [1] | | | | | | | | | | | |
| Direct | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 3.18 |
| Indirect | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 2.34 |
| Induced | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 0.49 | 4.90 |
| **Total** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **1.04** | **10.42** |

[1] in millions of 2006 constant $

**Source:** DBEDT, State Input – Output Study, 2002

The expansion cost is estimated at $86 million and this construction will result in $3.2 million in direct state tax revenues. The indirect and induced impact of this project will result in $6.2 million in state tax revenues. In total, this project will result in an estimated positive impact of $10.4 million in state tax revenues.

As shown in Exhibits 5-M and 5-N, the total impact on state tax revenues will be positive. Approximately $6.6 million in state tax revenue will be lost as a result of this project. In total, there will be a small **positive** impact in state tax revenues of approximately $3.8 million during the 10 years of construction.

## Exhibit 5-M: Negative Impact on State Tax Revenues

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *State Taxes* [1] | | | | | | | | | | | |
| Direct lost | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 | 3.84 |
| Indirect lost | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.98 |
| Induced lost | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 1.79 |
| **Total Lost** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **0.66** | **6.61** |

[1] in millions of 2006 constant $

**Source:** DBEDT, State Input – Output Study, 2002

## Exhibit 5-N: Net Impact on State Tax Revenues

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Cumulative |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *State Taxes* [1] | | | | | | | | | | | |
| Direct Net | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.07) | (0.67) |
| Indirect Net | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 1.36 |
| Induced Net | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 3.11 |
| **Total Net** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **0.38** | **3.80** |

[1] in millions of 2006 constant $

**Source:** DBEDT, State Input – Output Study, 2002

In sum, the economic impacts of the expansion appear to be net positive with approximately $63.3 million net flowing directly and indirectly through the economy and $3.8 million of net tax revenues being raised. All of the income is a result of the 10-year construction period. Waste Management does not believe the expansion will result in the need for new hires or other increased operating costs.

This socioeconomic analysis did not take into account any indirect or induced economic effects of the landfill operation on surrounding businesses. There was insufficient, verifiable information available at the time of the compilation of the report. As noted, the residential sales program at Ko Olina has been successful. If it could have been more successful without the landfill is speculative.

# 6. MITIGATIONS

Mitigation measures are normally considered in anticipation of potential impacts. In the case of the WGSL, where there is history, as well as existing practices, one can observe the current impacts, and propose measures that go beyond mitigation measures already practiced by Waste Management, Inc. (WM) and the City.

The measures proposed below can be grouped into three areas: improving the measures currently practiced regarding irritants and safety; improving community involvement and communication; and committing to funding the necessary research and development into alternative solutions.

## 6.1 IMPROVING CURRENT PRACTICES

### 6.1.1 Views

- *WM should continue to implement the on-site landscaping plans that have already been developed and begun; especially for those areas facing south toward Ko-Olina.*

  Because of its elevation, the most obvious views of the landfill are from a distance. Berms obscure much of the operations, but the face of the berms are exposed dirt (hydro seeding has occurred, but the grass has not yet taken), and aspects of the operation are still visible. Plans have been developed to landscape the exposed areas and to shield the view of operation, and initial plantings have already begun in earnest. These should continue.

- *WM should design and implement landscape screens (e.g. pines, tall hedges) along the berm and the access road that is visible from Farrington Highway, fronting the Kahe Power Plant. As an alternative, WM might also consider entering into a partnership with HECO to plant an effective screen of trees along Farrington Highway, which would have the dual purpose of screening the landfill operations and the power plant from passing vehicles.*

  The west-facing stability berm along the upper access road shields some of the operations, but not all of it. Selected plantings, consistent with the areas natural growth (e.g. keawe) could effectively complete the visual buffer. If that is not feasible, consider plantings right along the highway that would serve the dual purpose.

### 6.1.2 Odors

- *WM and the City should continue to be vigilant in processing the sludge from the sewage treatment plants upon delivery and to take all means to reduce any odor impacts.*

  In recent months, the combined impact of immediate processing, diversion of some of the sludge to the Synagro-WTT facility, and the improved operation of the odor neutralizing mist system appear to have had a significant impact. Continued vigilance is required. In addition, any successful expansion of the composting or fertilizer conversion efforts will also reduce the amount of sludge delivered to the landfill, and reduce the possibility of odor problems.

### 6.1.3 Litter

- *WM must continue to monitor the egress and ingress of vehicles and continue to aggressively enforce the anti-littering regulations and fines.*

  WM has instituted inspection practices that monitor commercial trucks upon entering and leaving the landfill area, to ensure that their loads are secured upon entry and that the trucks are free of debris before exiting. WM policy prohibits repeat violators from entry to the landfill. These inspections are beneficial and must continue aggressively.

  The greater problem may be with ordinary citizens who are personally delivering their trash, and who are not adequately securing their loads. An aggressive education program by ENV and WM should be implemented to supplement the inspections.

- *ENV and WM should maintain a direct communication link with the HPD; in the case of littering, it will lead to faster, more effective response.*

  In a general sense, for all types of complaints, a good communication link between HPD and WM/ENV will only increase the responsiveness to the problem and reduce public anxiety with the operation. This could simply take the form of exchanging key telephone or email contacts. An important first step would be the participation of HPD on the Oversight Advisory Committee.

  On the specific problem of littering, before truck drivers enter the landfill and after they leave, WM has no control over the actions of the truck drivers. Although WM educates and informs the drivers that they will enforce the covered load policy, the issue becomes a public one once the truck is on the roadway. If complaints are received by WM or ENV and quickly reported to HPD, the offenders may be more effectively identified and prosecuted.

## 6.2 IMPROVING COMMUNITY INVOLVEMENT AND COMMUNICATIONS

### 6.2.1 Community Involvement

- *The City must find a way to effectively use the Oversight Advisory Committee.*

  The Oversight Advisory Committee allows for building relationships that are so important in addressing community concerns. But it takes time and a commitment of people to the effort. Websites and telephone communication are important complements, but face-to-face meetings build community bonds. In 2007, the Oversight Advisory Committee went through a period of having difficulty getting a quorum for its meetings. The City must find ways to stimulate attendance and participation; some ideas include rotating membership, more tours and education of the members, and so forth.

- *The City should continue to contribute to a community benefits package for as long as the landfill exists.*

  The impacts that lead to a benefit package are evident as long as the WGSL exists. The package can vary in size and content over time as the community and the City determine. The City might also consider using a variety of means to establish the priorities of the benefits package, including open communicy forums, surveys, and maintaining a suggestion link on the website.

- *Ensure that all directly affected communities are represented on the Committee that determines the benefits package.*

  There is a perception that the Committee that determines the benefits package does not include representation from all neighboring communities. If that is already the case, then this needs to be made known. Consider placing the names of the Committee members on the web site.

### 6.2.2 Web-site

- *WM/ENV should use its web sites aggressively as educational and communication tools..*

  Uncertainty is often the cause of increasing community concern; communication is usually the most effective remedy. Many of the people interviewed were unfamiliar with the Waimanalo Gulch location on the WM website and did not know that there was an avenue for electronic communication, a staple in today's world of communication. Slight improvements on what is basically a good web site and greater education as to its availability will help maximize its use as a communication tool.

## 6.3 COMMITTING TO ALTERNATIVES

### 6.3.1 Alternatives to Landfills

- *The City should continue to invest in Research and Development, and where feasible, implement alternative technologies that will result in a reduction in the City's dependency on a landfill.*

  Although the short term would appear to require a continual dependence on H-POWER and landfills, the long-term future will likely involve a mix of these elements together with transshipment, recycling and other waste processing technologies. The sooner the City brings these alternatives on line, the sooner the dependency on landfills will be reduced.

### 6.3.2 Alternative Locations

- *The City should continue to seek an alternative site to WGSL as the primary landfill location on Oahu.*

  Regardless of the technologies involved, everyone anticipates that a landfill will always be needed. Every viable process that has been proposed to reduce dependency on a landfill has excluded waste that cannot be recycled or further process; additionally, a landfill will always be required for process residue and for emergencies.

The history of landfills on Oahu teaches that landfills have worked best on the edge of urbanization. Urbanization is quickly catching up with WGSL as the second city grows and Ko' Olina expands.

Prior commitments to close WGSL will weigh heavily on the relations between the City and the communities of Ewa and the Leeward Coast. The City should make every effort to initiate the plan for selectioin of Oahu's next landfill site as soon as possible. Participation in this effort should include not only the potentially affected community in which the site is proposed, but all the communities of Oahu. In addition to safety and design issues, details on mitigation to address nuisance concerns like odor, litter, and visual aesthetics should be actively discussed and the solutions offered made a part of the record.

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# Addendum on Environmental Injustice Issues (Section 5.2.2.4. Environmental Injustice)

# SOCIO-ECONOMIC IMPACT ASSESSMENT WAIMĀNALO GULCH SANITARY LANDFILL LATERAL EXPANSION, CITY AND COUNTY OF HONOLULU

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**Prepared for:**

**Environmental Services Department, City and County of Honolulu**

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5.2.2.4 Environmental Injustice

On February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" to focus federal agencies' attention on disadvantaged communities with the goal of achieving Environmental Justice. Over the years, each federal has defined environmental justice or injustice within the context of the Executive Order and in a manner that allows its application to their particular agency's functions. The EPA defines **Environmental Justice** as "*the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies*".[1]

The US Department of Transportation, like other service agencies, goes slightly further by noting **three pro-active environmental justice principles**: *"(1) to avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations; (2) to ensure the full and fair participation by all potentially affected communities in the decision-making process'; and (3) to prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations".*[2]

A number of interviewees point out that Leeward Oahu has been and continues to remain on the receiving end of many of Oahu's burdens. They argue that within a 10-mile stretch along Farrington Highway there are two existing electrical plants, a proposed new generator unit at the Campbell electrical plant, a deep draft harbor and a major industrial park, all of which service the entire Island of Oahu – and all of which adversely impact the environment of these communities. Further, Leeward Oahu is now the home of thousands of homeless people, many of whom were driven out of other communities only to be "welcomed" and "tolerated" on the Leeward Coast. They argue that the continued use and expansion of WGSL will only increase the imbalance of those impacts on Leeward Oahu. They believe that the expansion of WGSL is a case of Environmental Injustice.

Proponents of keeping the landfill in operation point out that when the landfill was sited, the only residential communities in the area were in Makakilo. The communities of Kapolei and Ko'Olina grew up on sugar fields that once abutted the landfill, after the landfill had already been in operation. Furthermore, they note that the surrounding communities also accommodate one of the more important and successfully developing resort complexes on Oahu, Ko 'Olina, and the ever-expanding Second City of Kapolei. This is the fastest growing region of Oahu and WGSL does not appear to have stymied its growth. They believe that this is not indicative of a community suffering from environmental injustice. Finally, Windward Oahu residents note that for the last 40 years most of the

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[1] EPA goes on to define *Fair Treatment* to mean that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal environmental programs and policies. And they define *Meaningful Involvement* to mean that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decisions; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected. Toolkit for Assessing Potential Allegations of Environmental Injustice, Office of Environmental Justice, US Environmental Protection Agency, November, 2004.

[2] An Overview of Transportation and Environmental Justice, Federal Highways Administration, US Department of Transportation, May, 2000.

active landfills were on the Windward side of the island. It is only recently that WGSL has been the only major landfill for MSW on Oahu.

A closer examination of the surrounding communities against the definition of Environmental Justice provides further insight. In 2004, the Oahu Metropolitan Planning Organization and the County Department of Planning and Permitting attempted to identify areas of the island that are vulnerable to Environmental Justice concerns.[3] Using definitions and criteria established by FHWA and 2000 US Census block data, OMPO/DPP developed a systematic and comprehensive methodology to identify such communities. In their final analysis, 70 of the 435 blocks that make up Oahu were determined to be environmental justice areas based on race, and 17 blocks were identified as environmental justice areas based on income.

None of the Census blocks in the Ewa Development Plan Area were identified as environmental justice areas **based on income**. One can understand this as the overall average income in the Ewa DPA of $59,583 far exceeds the island average of $51,194. Additionally, the median household incomes for the two communities in closest proximity to the landfill all significantly exceed the island averages. These are Makakilo ($88,515) and Ko ʻOlina/Honokai Hale ($74,083).

On the other hand, two of the Census blocks in proximity to the WGSL are environmental justice areas **based on race,** one in Makakilo and Honokai Hale. Both were selected because they have a Hispanic population that slightly exceeds the average settlement pattern plus an acceptable standard deviation for Hispanics. The acceptable index for Hispanics is 14.3 percent of the population. Hispanics make up 17.3 percent and 16.5 percent of these two communities respectively. No other minority groups exceed their acceptable indices in any block in proximity to WGSL.

Having identified these two communities as EJ areas, one asks whether these two blocks are subject to disproportionately high and adverse health and environmental impacts due to the WGSL and whether they have had meaningful access to decision-making regarding the WGSL.

On the first point, the EIS findings to date would indicate that with the possible exception of views and windblown litter, no one is subject to disproportionately high and adverse health and environmental impacts based on the use of existing and future mitigation measures that have been identified in the subject DEIS document. Further, the significant mix of EJ and non-EJ communities in proximity to the WGSL would indicate that the EJ communities are not suffering disproportionately.

On the second point, it would appear that everyone has had opportunity to make their preferences known. The subject has been presented in numerous Neighborhood Board meetings, and in community meetings with the Mayor and other County officials. Additionally, the County Councilman for this district is very approachable. He is also an articulate and forceful spokesperson in opposition to the lateral expansion of the WSGL, he ably defends that position, and he is one of nine votes on the County Council to whom this question will be presented for approval. For those who support the extension, their position has been expressed by the Mayor and his Administration.

Finally, the EIS process is specifically designed to allow for review and comment by all citizens. There has been significant opportunity for any expression of concern; such expressions become part of the record for review by decision-makers.

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[3] Environmental Justice in the OMPO Planning Process: Defining Environmental Justice Populations, Oahu Metropolitan Planning Organization and the County Department of Planning and Permitting, March, 2004.

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**Impact on Property Values**

# ADDENDUM TO THE SOCIO-ECONOMIC IMPACT ASSESSMENT

## WAIMĀNALO GULCH SANITARY LANDFILL LATERAL EXPANSION, CITY AND COUNTY OF HONOLULU

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**September, 2008**

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## IMPACT ON PROPERTY VALUES

Disamenities like landfills may reduce residential property values near the site. In the present case, the proposition of interest is that the closer a residential property is to the site of the Waimānalo Gulch Sanitary Landfill, the lower will be the sales price of that unit, other factors held constant. Although much of the literature on the general topic involves unsubstantiated speculation, empirical studies have supported a negative impact on residential property values.

For this study, we adopted the often used hedonic pricing model. The model considers a single family home to be a collection of attributes including physical characteristics (size, number of bedrooms and bathrooms, age, etc.) and location (neighborhood, distance from the landfill, etc.). The sales price of the unit is considered to be a function of all of these attributes. Multiple linear regression or some other appropriate analytical method is used to estimate the impact of each attribute net of the impacts of the other attributes. The impact of distance from the landfill, therefore, can be estimated independent of the other housing unit characteristics.

The data used for the study were a set of 173 property records taken from Multiple Listing Services for properties listed between August 1, 2007 and July 10, 2008. The properties were located in West O‘ahu between ‘Ewa and Mā‘ili and within six miles of the landfill site. Data extracted for each property included physical attributes (unit type [single or multi-family], number of bedrooms, number of bathrooms, size in square feet, age in years, and date sold), and location (neighborhood name, distance from the Waimānalo Gulch Landfill site in miles). These data were analyzed using multiple linear regression with sales price as the dependent variable. Results for all communities are shown in Table 1.

**Table 1: Regression Results for All Properties, 2008**

| Property Attributes | Coefficients | | Significance Test Results | | |
|---|---|---|---|---|---|
| | Unstandardized Coefficient B | Standardized Coefficient Beta | t-value | Sig. | Std. Error |
| unit size in square feet | 435.17 | 0.755 | 9.78 | 0.000 | 44.50 |
| distance from landfill in miles | -27,602.06 | -0.287 | -6.06 | 0.000 | 4,552.41 |
| age of unit | -5,543.84 | -0.330 | -5.47 | 0.000 | 1,014.24 |
| number bedrooms | -74,253.62 | -0.279 | -4.02 | 0.000 | 18,488.33 |
| number bathrooms | -26,485.37 | -0.082 | -1.16 | 0.249 | 22,911.94 |
| multi-family | 48,240.65 | 0.046 | 1.13 | 0.262 | 42,864.92 |
| date sold | 0.00[1] | 0.021 | 0.50 | 0.620 | 0.00 |
| (Constant) | -5,754,621.47 | | -0.47 | 0.636 | |

Dependent Variable: price

[1] Dates were stored as the number of seconds since October 14, 1582, the start of the Gregorian calendar. The unstandardized regression coefficient will therefore be very small, but can be statistically significant if real differences exist in the model.

Results show that four of the eight property attributes had statistically significant[2] relationships with property value (price). Based on the unstandardized regression coefficient, the most highly related attribute was size in square feet. It was positively related to price. The age of the unit was negatively related to price. That is, as the age of the unit increased, the price decreased. The number of bedrooms was also negatively related to price, suggesting that the greater the number of bedrooms, the lower the price. And finally, the distance from the Waimānalo Gulch Landfill was negatively related to unit price. That is, the greater the distance from the landfill, the lower the price.

This analysis shows no empirical support for the proposition that the landfill results in lower residential property values for the Waimānalo Gulch Sanitary Landfill. Specifically, that distance from the landfill would be associated with lower property values.

Studies that report a negative relationship between sanitary landfills and residential property values are not unusual in the literature. Negative or statistically insignificant results have been reported by Bleich, Findlay and Philips (1991); Cartee (1989); Reichert, Small, and Mohanty (1992); Thayer, Albers and Rahamatian (1992), Zeiss and Atwater (1989). Furthermore, many reviewers have cautioned that disamenities such as landfills do not necessarily cause nearby residential property values to decrease. They note that several issues have been confounded in the discussion in the recent past. Sanitary landfills generally have much less impact on property values than hazardous materials landfills. Very large landfills have some impact on property values while smaller ones have none or even increase values (Lim and Missios, 2007). Overall, the characteristics of the residential unit (size, configuration, amenities) generally have a greater impact on market prices than distance from a landfill (Chan *et. al.,* 1993; Kung *et. al*., 1993). In this particular case, two factors are probably more important. First, the sample size for the study is small and the number of variables may be too large for reliable estimates. The adjusted R-squared value for this analysis was .728, suggesting that the model with eight property attributes explained about 73 percent of the variance in the prices measured. That is considered a reasonable level of reliability. Nevertheless, 27 percent of the variance was unexplained.

Second, the results were consistent with known property values in West Oʻahu. Koʻolina Resort properties are essentially “across the street” from the landfill site. Koʻolina properties are among the highest in West Oʻahu. As you move away from the site, you encounter communities with increasingly lower property values. We have not discovered a way to analyze this difference because the price of an individual residential property and the average property value in a community are based on the same variable – unit price. This suggests that the hedonic model may present problems when dealing with the impact of disamenities on residential property values.

In order to add some clarity to the situation, we developed a model for properties located in Koʻolina alone. It was necessary to drop the “unit type” attribute because all Koʻolina properties in our dataset were multi-family units. The results of this analysis are shown in Table 2.

[2] The significance of the t-value was less than .050.

**Table 2: Regression Results for Koʻolina Properties, 2008**

| Property Attributes | Coefficients | | Significance Test Results | | |
|---|---|---|---|---|---|
| | Unstandardized Coefficient B | Standardized Coefficient Beta | t-value | Sig. | Std. Error |
| distance from landfill in miles | 267,480.96 | 0.663 | 4.32 | 0.000 | 61,962.28 |
| age of unit | -5,300.70 | -0.116 | -1.23 | 0.227 | 4,306.57 |
| unit size in square feet | 134.12 | 0.216 | 1.09 | 0.281 | 122.49 |
| date sold | 0.00 | 0.091 | 1.00 | 0.323 | 0.00 |
| number bathrooms | 61,273.99 | 0.142 | 0.97 | 0.338 | 63,107.20 |
| number bedrooms | 39,571.27 | 0.120 | 0.90 | 0.374 | 43,906.19 |
| (Constant) | -24,096,747.51 | | -1.00 | 0.325 | |

Dependent Variable: price

Only one property attribute, distance from the landfill, had a statistically significant relationship with price. And that relationship was positive. That is, within the Koʻolina Resort, the farther from the landfill a property is sited, the higher the unit price.

The adjusted R-square coefficient was .629, somewhat less reliable than the prior analysis. The sample size was 41 property records, much smaller than we would have preferred for reliable estimates. This is particularly problematic because the price of Koʻolina properties has 3.5 times the variance of other properties and is strongly skewed to the higher end of the market. Equally important, the other property attributes in our Koʻolina dataset had only half the variance of the same attributes for other communities. Koʻolina properties were 2- and 3-bedrooms only; others were 1 to 4 bedrooms. Koʻolina unit sizes ranged from 653 to 1,834 square feet; other communities ranged from 407 to 1,766. The age of units varied from 2 to 14 in Koʻolina and from 2 to 35 in other areas. Regression models analyze covariance, the extent to which the dependent variable co-varies along with independent variables. The limited variance associated with property attributes other than price will make it difficult to identify statistically significant relationships with those attributes.

There is another issue with applying the hedonic model and regression analysis to the Koʻolina dataset. In this procedure, the correlations or covariances among the individual property attributes are analyzed to produce unidirectional relationships. The finding that distance from the landfill is related to property value (price) can be interpreted to mean that the distances exist first (in time) and result in the observed price level differences. But the landfill predates the resort development. Therefore we cannot easily eliminate the possibility that the price came before distance from the landfill. That might occur, for instance, if a developer were to locate less valuable units nearer the landfill and more valuable units at greater distances. Regression results for our second model could be produced by either process.

This analysis presents different results from the previous analysis. Once again, mixed results are not uncommon in the literature. Reichert, Small and Mohanty (1992) found all three possibilities – positive, negative and not significant -- within their landfill evaluations. Michaels and Smith found drastically different results for individual communities. Thayer, Albers and Rahamatian (1992) found that even when analysis shows a negative relationship with property value, the function may not be smooth. That is, the loss in value may not be the same for all neighborhoods.

## Summary

Given the caveats mentioned above, results for the two analyses reported here are clear. With respect to all properties located within six miles of the Waimānalo Gulch Sanitary Landfill, there is no evidence that the landfill is associated with decreasing property values. In fact, as distance from the landfill decreases, property values increase. Within the Koʻolina Resort area, distance from the landfill is associated with increasing property values.

We caution readers to consider the limitations of the data and the hedonic model. Sample sizes for both analyses were small, and the Koʻolina model is based on only 41 cases. The available data may exclude important variables used by property buyers in making their final decisions. And finally, there may be issues with applying the same hedonic model to both sets of property records.

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**Appendix K**

Alternatives Analysis and Addenda, September 2008
Waimānalo Gulch Sanitary Landfill Expansion, 2008

# *Alternatives Analysis for Disposal of Municipal Refuse*

*Submitted to the Department of Environmental Services (ENV),*
*City and County of Honolulu*


Pacific Waste
CONSULTING GROUP

*April 2008*

# Alternatives Analysis for Disposal of Municipal Refuse

## Submitted to the City and County of Honolulu
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## April 2008

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# Abbreviations & Acronyms

| | |
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| **APHIS** | US Department of Agriculture Animal and Plant Health Inspection Services |
| **BWS** | City and County Board of Water Supply |
| **C&C** | City and County of Honolulu |
| **DOH** | Department of Health |
| **EIS** | Environmental Impact Statement |
| **EISPN** | Environmental Impact Statement Preparation Notice |
| **ENV** | Department of Environmental Services |
| **HIS** | Hawaii Information Systems |
| **HI5** | Beverage containers subject to State's recycling law |
| **HWS** | Hawaii Waste Systems, LLC |
| **IDS** | Information Decision Systems |
| **LUC** | Land Use Commission |
| **MFD** | Multi–family dwelling |
| **MSL** | Mean sea level |
| **MSW** | Municipal solid waste |
| **OEQC** | Office of Environmental Quality Control |
| **OIP** | Office of Information Practices |
| **PPQ** | Local office of USDA, APHIS |
| **PRER** | Pacific Rim Environmental Resources, Inc. |
| **PWED** | Public Works & Economic Development Committee |

| | |
|---|---|
| **RCRA** | Resource Conservation and Recovery Act |
| **RDF** | Refuse Derived Fuel |
| **RFP** | Request for Proposal |
| **SUP** | Special use permit |
| **SWIMP** | Solid Waste Integrated Management Plan |
| **TCLP** | Toxicity Characteristic Leaching Procedure |
| **TMK** | Tax map key |
| **TPD** | Tons per day |
| **TPY** | Tons per year |
| **UIC** | Underground Injection Control |
| **USEPA (or EPA)** | Unites States Environmental Protection Agency |
| **WTE** | Waste-to-energy |

# Executive Summary

This analysis reviews the alternatives for replacing the Waimanalo Gulch Sanitary Landfill before November 1, 2009 when the Special Use Permit (SUP) issued by the State Land Use Commission (LUC) to operate the landfill expires. On January 16, 2008 the Planning Commission extended the date of permit expiration to May 2010 to allow time for processing the permit request supported by this *Waimanalo Gulch Sanitary Landfill Expansion Environmental Impact Statement* (EIS). A request for extension was approved by the LUC on March 7, 2008 to allow operation of the landfill until November 1, 2009.

The "Project," for EIS purposes, is to "... provide information and evaluation of the potential for environmental impacts on the natural and built environment associated with the planned 92.5-acre expansion of the Waimanalo Gulch Sanitary Landfill...."[1] when the landfill receives the expansion permit.

## 1.1 Alternatives to the Proposed Project

The alternatives evaluated were:

- No action — Landfilling at the Waimanalo Gulch Sanitary Landfill would cease on November 1, 2009, with no alternative site or technology available.
- Delayed action — The action on the permit would be delayed. Given the time needed to process the permits, the delayed and no action alternatives have the same effect.
- Transshipment — Oahu's MSW would be baled and transported to a mainland landfill for disposal.

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1 *Environmental Impact Statement Preparation Notice, Waimanalo Gulch Sanitary Landfill Expansion, Waimanalo Gulch, Oahu, Hawaii, TMKs: (1) 9-2-003: 072 and 073,* November 2006.

- Alternative technologies — Technologies other than landfilling that could reduce the amount of material requiring disposal and generate electricity or another beneficial reuse product. Alternative technologies considered here include:
    - Thermal and non-thermal technologies;
    - Enhanced recycling;
    - Addition of a third boiler to H–POWER; and
    - Alternative methods of landfilling, such as co-disposal of ash and MSW and use of a bioreactor landfill.
- Alternative sites — Alternative locations on Oahu for the landfill. The five alternative landfill sites considered in this analysis were:
    - Ameron Quarry;
    - Maili Quarry;
    - Makaiwa Gulch;
    - Nanakuli B; and
    - Waimanalo Gulch Sanitary Landfill.

An analysis is provided for each of the alternatives. With the alternative technologies, some operating examples are used to provide information describing the technologies. Much of the analysis was taken from the December 2003 report of the Mayor's Advisory Committee on Landfill Site Selection. That report provided details of the process to identify a future landfill site to disposes of the waste. Since completion of the report several factors have changed (e.g., updated estimate of the cost of two of the sites, current construction on one site) but the order of the four of the sites with respect to their suitability of the land for use as a landfill did not change. The fifth site, the Makaiwa Gulch site, is under construction for another use and, as a result, it might not be included on a future list of potential landfill site.

All of the alternatives were compared to criteria the City and County of Honolulu (C&C or City) had established for the alternative technologies, the alternative landfill sites, or transshipment. In the case of the alternative sites, the requirements were established by the Mayor's Advisory Committee report in December 2003, which was an independent panel comprised of citizens and legislators from several areas of the island. The requirements for alternative technologies were established in the City's

January 16, 2007 Notice to Bidders.[2] The transshipment alternative requirements were established in the City's January 22, 2008, Notice to Bidders.[3]

## 1.2 Preferred Alternative

The preferred alternative is the Waimanalo Gulch Sanitary Landfill. However, the City is immediately pursuing another alternative, the expansion of H–POWER, by adding another boiler. [4]

> "I have said that my administration recognizes the need to reduce the amount of opala that goes to our landfill at Waimanalo Gulch. Adding a third boiler at H-POWER is one of the best ways to help us achieve that goal and is certainly a form of energy recycling," Hannemann said.[5]

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2 City and County of Honolulu, Notice to Bidders, Project to Construct and Operate Alternative Energy Facility and/or H–POWER Facility. Competitive Sealed Proposals (CSP) NO. 037, January 16, 2007.

3 City and County of Honolulu, Notice to Bidders, Shipping of City Provided MSW. January 22, 2008.

4 Johnny Brannon, City to Expand H-POWER Capacity, Honolulu Advertiser, January 18, 1008.

5 January 18, 2008 Mayor's press release regarding the City's decision to proceed with the third boiler at H–POWER.

# 2 Introduction

This Appendix details the analysis of alternative sites and technologies that could be used in lieu of the expansion of the Waimanalo Gulch Sanitary Landfill and is part of the EIS.

This analysis reviews the alternatives for replacing the Waimanalo Gulch Sanitary Landfill before November 1, 2009, when the SUP issued by the LUC to operate the landfill expires. As such, the alternative technologies and sites considered must be in operation by November 2009. It will be difficult to get an alternative in operation in 18 months (except possibly an expansion of H–POWER) given the time needed for environmental review, permitting, contracting, and construction.

At the same time, many of the alternatives discussed in this analysis hold great potential in helping to reduce the existing need for a municipal solid waste (MSW) landfill. However, while it is possible to reduce the use of landfill space through the adoption of alternative technologies or transshipment, there are no alternatives that will completely eliminate the need for an MSW landfill on the Island of Oahu. All waste reduction technologies generate by-products that cannot be further recycled. Even with the alternative of transshipment, there is concern over the need to maintain a self-sufficient facility to protect the public welfare in the event of a shipping strike, natural disaster, or other event not in the control of the City and County of Honolulu (C&C or City).

The "Project," for EIS purposes, is to "... provide information and evaluation of the potential for environmental impacts on the natural and built environment associated with the planned 92.5-acre expansion of the Waimanalo Gulch Sanitary Landfill...."[6] when the landfill receives the expansion permit.

The alternatives evaluated were: no action, delayed action, transshipment, alternative technologies, and alternative sites.

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6 *Environmental Impact Statement Preparation Notice, Waimanalo Gulch Sanitary Landfill Expansion, Waimanalo Gulch, Oahu, Hawaii, TMKs: (1) 9-2-003: 072 and 073,* November 2006.

## 2.1 City Requirements

This section discusses the City's requirements for a disposal system to manage its MSW. The disposal system needs to meet minimum criteria to be considered before the City will direct waste to it.

Examples of the criteria include; operations at the capacity needed to dispose the amount of MSW the proponents plan to accept, a record of compliance with environmental laws and regulations, and the necessary financial strength.

### 2.1.1 Transshipment of Waste

Transshipment is the packaging of Oahu's waste for shipment to a disposal site located off-island. The transshipment alternative requirements were established in the City's January 22, 2008, bid documents[7] and the C&C has received offers from transshipment firms. These firms propose sending Oahu's waste to Washington State to be landfilled at the Roosevelt Landfill (one firm) and to a landfill in Idaho. If the C&C were to begin transshipping Oahu's waste, requirements for the handling and storage may need to be modified if the Compliance Orders established by the federal government with one of the proposers is determined to be inadequate. The C&C would also need to look at the effects of transshipment on the H-POWER facility. With the shipment of Oahu's waste off-island, waste disposed in H-POWER may be reduced and revenue from the energy sold would diminish. Also, the MSW needed to fuel the new boiler could be inadequate.

### 2.1.2 Alternative Technology

The requirements for alternative technologies are identified in the City's Invitation for Bid issued to vendors of potential technologies on October 2, 2006. The requirements are detailed in Section 5.1 of this document and are summarized below. This Alternatives Analysis also uses these requirements as these are the minimum a vendor must meet for its technology to be considered by the C&C.

- "There is at least one operational facility that has been processing 500 tons per day (TPD) of municipal solid waste (MSW) for the past two years, and the vendor has been substantially involved in its design and operations.

- The facility has been fully operational and has met all performance and environmental compliance requirements 85 percent of the time during the two years of operation.

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7 City and County of Honolulu, Notice to Bidders, Shipping of City Provided MSW. January 22, 2008.

- The facility would substantially represent the system proposed for Honolulu without major modification or equipment changes, other than those needed for the scale up or scale down.

- The product produced at the facility has been marketed and resulted in the beneficial reuse of processed materials and/or production of energy.

- The vendor must demonstrate that it has power purchase contracts ongoing to be able to claim an ability to contract for sale of electric power to a utility.

- The proposed facility shall be commercially available such that:

  (1) The design is proven and the proposed facility is not the first of its kind;

  (2) The equipment has operated successfully at a minimum of 85 percent of rated capacity for at least 85 percent of the time during the past two years;

  (3) The equipment is regarded as being reliable and is not subject to excessive maintenance or operational problems and does not require major re-designs; and

  (4) The facility has processed a minimum of 500 TPD of MSW while operating in accordance with all environmental permits.

- Certification that the ash, slag and residue by-products from the proposed facility have met all environmental requirements for either marketing or landfill disposal."

### 2.1.3 Landfill Site

The C&C has the following requirements that must be satisfied for an alternative landfill site to be acceptable:

- "The site must provide equal or better environmental protection than the Waimanalo Gulch Sanitary Landfill.

- The site must have the capacity to dispose of at least 15 years of refuse, considering the current disposal tonnage at Waimanalo Gulch Sanitary Landfill as the starting point and an assumed rate of growth in waste generation.

- The site must be convenient to the H-POWER plant to allow for cost-effective disposal of the ash, bypassed materials, and unacceptable waste.

- Development and operating costs must be reasonable when compared to other options."

These requirements were developed by the Mayor's Landfill Site Selection Committee in December 2003. The requirements were developed by the Mayor's Committee based primarily on local considerations and on federal and state criteria.

# 3 Oahu Refuse Disposal

Information about the system used by the C&C to manage waste and recyclables is needed as general background. Due to the preparation schedule for this EIS and the schedule for the C&C Solid Waste Integrated Management Plan Update (SWIMP), data from the November 2007 draft update was used for this document.

Information about the composition of the disposed waste is needed to analyze some of the programs and provide background to other discussions. The C&C studied the composition of the waste and the results are presented later. The final report was published with the November 2007 Draft SWIMP update.

## 3.1 Composition of Waste Stream

The composition of the disposed waste is based on hand-sorting randomly selected samples of the waste from garbage trucks. In 2006, the C&C studied the composition of the waste at H-POWER, the Waimanalo Gulch Sanitary Landfill, and the Keehi Transfer Station. Sampling took place at the Landfill on September 11–14, 2006, at Keehi Transfer Station on September 15–16, 2006, and at H-POWER on September 18–21, 2006.

*Table 1* shows the composition of Oahu's waste from H-POWER and the Waimanalo Gulch Sanitary Landfill combined.

## Table 1, Aggregate Overall Waste Characterization Results - 2006

| Material | Mean | +/- | Mean (tons) | +/- (tons) |
|---|---|---|---|---|
| **Total Paper** | **30.2%** | **1.8%** | **284,082** | **17,040** |
| OCC (Recyclable)/Kraft | 5.2% | 1.1% | 49,166 | 10,747 |
| Newspaper | 4.3% | 1.1% | 40,757 | 10,589 |
| High-Grade Paper | 2.6% | 0.9% | 24,420 | 7,993 |
| Low-Grade Paper | 5.1% | 0.9% | 48,151 | 8,012 |
| Other Compostable Paper | 11.7% | 1.8% | 110,142 | 16,582 |
| Other Paper | 1.2% | 0.2% | 11,446 | 1,896 |
| **Total Plastics** | **12.1%** | **1.3%** | **113,821** | **11,808** |
| PET Bottles/Containers (Deposit) | 0.3% | 0.1% | 2,843 | 578 |
| PET Bottles/Containers (Non-Deposit) | 0.3% | 0.1% | 2,449 | 646 |
| HDPE Bottles/Containers | 1.0% | 0.3% | 9,128 | 2,562 |
| Other Bottles/Containers | 1.1% | 0.2% | 10,142 | 1,818 |
| Mixed Rigid Plastics | 1.1% | 0.4% | 10,479 | 3,431 |
| Plastic Film/Wrap | 5.1% | 0.7% | 47,989 | 6,654 |
| Polystyrene | 0.8% | 0.1% | 7,056 | 1,371 |
| Other Plastics | 2.5% | 0.4% | 23,734 | 4,156 |
| **Total Metals** | **4.8%** | **0.8%** | **45,448** | **7,151** |
| Aluminum Cans (Deposit) | 0.3% | 0.1% | 2,626 | 632 |
| Aluminum Cans (Non-Deposit) | 0.3% | 0.1% | 2,630 | 1,351 |
| Tin Cans | 0.6% | 0.2% | 5,830 | 1,467 |
| Other Ferrous | 1.5% | 0.4% | 14,103 | 4,160 |
| Other Non-Ferrous | 0.4% | 0.1% | 4,148 | 1,020 |
| Mixed Metals/Other Metals | 1.7% | 0.5% | 16,111 | 4,660 |
| **Total Glass** | **1.7%** | **0.4%** | **16,089** | **4,039** |
| HI5 Glass Bottles/Containers | 0.4% | 0.2% | 4,158 | 1,589 |
| Other Glass | 1.3% | 0.3% | 11,930 | 3,102 |
| **Total Other Inorganics** | **3.1%** | **1.2%** | **29,370** | **11,020** |
| Gypsum Board | 0.3% | 0.1% | 2,760 | 1,280 |
| Asphalt Roofing | 0.5% | 0.3% | 4,261 | 2,609 |
| Asphalt Paving | 0.0% | 0.0% | 38 | 27 |
| Concrete | 0.3% | 0.2% | 3,078 | 1,535 |
| Sand/Soil/Rock/Dirt | 1.3% | 0.8% | 12,525 | 7,811 |
| Ceramics | 0.4% | 0.2% | 4,214 | 1,772 |
| Miscellaneous Inorganics | 0.3% | 0.2% | 2,496 | 1,445 |
| **Total Other Waste** | **9.8%** | **1.6%** | **91,946** | **15,278** |
| Batteries | 0.0% | 0.0% | 381 | 156 |
| Furniture | 3.4% | 1.0% | 31,555 | 9,795 |
| Appliances | 1.1% | 0.7% | 10,728 | 6,734 |
| E-Waste | 2.0% | 0.7% | 18,820 | 6,161 |
| Auto Fluff* | 3.2% | NA | 30,462 | NA |
| **Total Green Waste** | **8.7%** | **2.8%** | **82,041** | **26,182** |
| **Total Wood** | **4.5%** | **2.3%** | **42,273** | **21,884** |
| Untreated Wood | 1.4% | 0.5% | 13,017 | 5,004 |
| Treated Wood | 2.1% | 0.6% | 19,428 | 5,371 |
| Pallets | 0.3% | 0.1% | 2,644 | 1,248 |
| Stumps | 0.8% | 0.4% | 7,185 | 3,473 |
| **Total Other Organics** | **24.8%** | **2.1%** | **232,874** | **19,621** |
| Food | 12.7% | 1.9% | 119,645 | 17,575 |
| Textiles | 3.1% | 1.0% | 28,726 | 9,136 |
| Carpet | 0.7% | 0.3% | 6,650 | 2,454 |
| Tires | 0.2% | 0.1% | 1,540 | 1,090 |
| Miscellaneous Organics | 3.7% | 0.8% | 34,569 | 7,578 |
| Sludge | 4.4% | NA | 41,744 | NA |
| **Total HHW** | **0.2%** | **0.1%** | **2,234** | **1,399** |
| Pesticides/Herbicides | 0.0% | 0.0% | 0 | 0 |
| Paints/Adhesives/Solvents | 0.0% | 0.0% | 256 | 172 |
| Household Cleaners | 0.0% | 0.0% | 0 | 0 |
| Automotive Products | 0.2% | 0.1% | 1,711 | 1,221 |
| Other HHW | 0.0% | 0.0% | 277 | 147 |
| **TOTAL** | **100.00%** | | **940,187** | |

* There was no auto fluff or sludge in the samples sorted for this study. As such, the standard deviation and the lower and upper bounds of the confidence interval are not applicable. The Waimanalo Gulch Sanitary Landfill is known to accept auto fluff and sludge and therefore the average composition for these materials was obtained from sources outside this study.

*Table 2* shows the composition of waste being disposed at the Waimanalo Gulch Sanitary Landfill. The majority of the waste going into the landfill is from commercial and self-haul sources, rather than residential sources. 90 percent of the residential waste goes to H–POWER.

The results in *Table 2* are adjusted because the samples of waste for the waste characterization report were taken when H–POWER was in full operation and not diverting waste to the landfill. Waste from H–POWER is diverted to the landfill when H-POWER is unable to accept waste due to maintenance or capacity limitations. Because no waste was diverted, the composition at the landfill would have overstated the amount of some types of material. For example, if the landfill had 100 tons of material coming in and 50 tons were widgets, the waste would be 50 percent widgets. If an additional 30 tons of material were diverted from H–POWER, the total tonnage would have been 130 tons and the widgets would have been 38 percent. The annual amount of waste received at the landfill was reduced by the amount of the material diverted from H–POWER so the relative proportion of the remaining material was correct.

*Table 3* shows the composition of waste being disposed at H-POWER. About half of the waste going into H–POWER is from residential sources and about half is commercial waste. The types and amounts of material shown in this table reflect potential material for recycling programs.

## Table 2, Waimanalo Gulch Landfill Waste Characterization Results - 2006

| Material | Mean | +/- | Mean (tons) | +/- (tons) |
|---|---|---|---|---|
| **Total Paper** | **4.3%** | **1.6%** | **7,864** | **3,020** |
| OCC (Recyclable)/Kraft | 1.6% | 0.6% | 2,993 | 1,110 |
| Newspaper | 0.3% | 0.2% | 504 | 307 |
| High-Grade Paper | 0.1% | 0.1% | 161 | 96 |
| Low-Grade Paper | 1.0% | 0.5% | 1,902 | 963 |
| Other Compostable Paper | 0.7% | 0.4% | 1,347 | 817 |
| Other Paper | 0.6% | 0.3% | 1,057 | 627 |
| **Total Plastics** | **4.6%** | **1.7%** | **8,463** | **3,155** |
| PET Bottles/Containers (Deposit) | 0.1% | 0.1% | 166 | 102 |
| PET Bottles/Containers (Non-Deposit) | 0.0% | 0.0% | 87 | 55 |
| HDPE Bottles/Containers | 0.2% | 0.1% | 426 | 248 |
| Other Bottles/Containers | 0.1% | 0.0% | 154 | 89 |
| Mixed Rigid Plastics | 1.5% | 0.9% | 2,811 | 1,664 |
| Plastic Film/Wrap | 0.7% | 0.3% | 1,195 | 632 |
| Polystyrene | 0.2% | 0.1% | 326 | 197 |
| Other Plastics | 1.8% | 0.8% | 3,298 | 1,468 |
| **Total Metals** | **10.1%** | **2.8%** | **18,654** | **5,212** |
| Aluminum Cans (Deposit) | 0.0% | 0.0% | 90 | 54 |
| Aluminum Cans (Non-Deposit) | 0.0% | 0.0% | 2 | 1 |
| Tin Cans | 0.1% | 0.1% | 152 | 96 |
| Other Ferrous | 4.6% | 1.7% | 8,377 | 3,099 |
| Other Non-Ferrous | 0.3% | 0.2% | 570 | 346 |
| Mixed Metals/Other Metals | 5.1% | 2.0% | 9,463 | 3,619 |
| **Total Glass** | **0.5%** | **0.3%** | **950** | **547** |
| HI5 Glass Bottles/Containers | 0.2% | 0.1% | 413 | 261 |
| Other Glass | 0.3% | 0.2% | 537 | 329 |
| **Total Other Inorganics** | **4.9%** | **2.4%** | **8,957** | **4,452** |
| Gypsum Board | 0.8% | 0.5% | 1,477 | 933 |
| Asphalt Roofing | 2.3% | 1.4% | 4,166 | 2,585 |
| Asphalt Paving | 0.0% | 0.0% | 0 | 0 |
| Concrete | 0.5% | 0.3% | 965 | 637 |
| Sand/Soil/Rock/Dirt | 0.0% | 0.0% | 0 | 0 |
| Ceramics | 1.2% | 0.7% | 2,209 | 1,363 |
| Miscellaneous Inorganics | 0.1% | 0.1% | 141 | 100 |
| **Total Other Waste** | **33.9%** | **4.0%** | **62,267** | **7,436** |
| Batteries | 0.0% | 0.0% | 62 | 39 |
| Furniture | 12.6% | 4.4% | 23,194 | 8,054 |
| Appliances | 1.0% | 0.6% | 1,832 | 1,164 |
| E-Waste | 4.0% | 1.9% | 7,393 | 3,582 |
| Auto Fluff* | 16.2% | NA | 29,786 | NA |
| **Total Green Waste** | **3.4%** | **1.5%** | **6,270** | **2,833** |
| **Total Wood** | **10.7%** | **3.3%** | **19,589** | **6,020** |
| Untreated Wood | 2.2% | 1.2% | 4,053 | 2,148 |
| Treated Wood | 5.9% | 2.1% | 10,806 | 3,877 |
| Pallets | 0.8% | 0.5% | 1,381 | 867 |
| Stumps | 1.8% | 1.2% | 3,349 | 2,231 |
| **Total Other Organics** | **27.6%** | **1.8%** | **50,788** | **3,243** |
| Food | 1.1% | 0.7% | 2,075 | 1,206 |
| Textiles | 1.6% | 0.8% | 2,975 | 1,549 |
| Carpet | 1.6% | 0.9% | 2,908 | 1,618 |
| Tires | 0.0% | 0.0% | 33 | 23 |
| Miscellaneous Organics | 1.1% | 0.6% | 1,978 | 1,149 |
| Sludge | 22.2% | NA | 40,818 | NA |
| **Total HHW** | **0.0%** | **0.0%** | **64** | **44** |
| Pesticides/Herbicides | 0.0% | 0.0% | 0 | 0 |
| Paints/Adhesives/Solvents | 0.0% | 0.0% | 0 | 0 |
| Household Cleaners | 0.0% | 0.0% | 0 | 0 |
| Automotive Products | 0.0% | 0.0% | 0 | 0 |
| Other HHW | 0.0% | 0.0% | 64 | 44 |
| **TOTAL** | **100.00%** | | **183,866** | |

* There was no auto fluff or sludge in the samples sorted for this study. As such, standard deviation and the lower and upper bounds of the confidence interval are not applicable. The Waimanalo Gulch Sanitary Landfill is known to accept auto fluff and sludge. The average composition for these materials was obtained from sources outside this study.

## Table 3, H-POWER Waste Characterization Results - 2006

| Material | Mean | +/- | Mean (tons) | +/- (tons) |
|---|---|---|---|---|
| **Total Paper** | **36.7%** | **2.3%** | **277,570** | **17,082** |
| OCC (Recyclable)/Kraft | 6.1% | 1.4% | 46,463 | 10,889 |
| Newspaper | 5.4% | 1.4% | 40,465 | 10,784 |
| High-Grade Paper | 3.2% | 1.1% | 24,390 | 8,143 |
| Low-Grade Paper | 6.1% | 1.1% | 46,462 | 8,103 |
| Other Compostable Paper | 14.5% | 2.2% | 109,368 | 16,874 |
| Other Paper | 1.4% | 0.2% | 10,423 | 1,821 |
| **Total Plastics** | **14.0%** | **1.5%** | **150,749** | **11,585** |
| PET Bottles/Containers (Deposit) | 0.4% | 0.1% | 2,689 | 579 |
| PET Bottles/Containers (Non-Deposit) | 0.3% | 0.1% | 2,373 | 655 |
| HDPE Bottles/Containers | 1.2% | 0.3% | 8,741 | 2,598 |
| Other Bottles/Containers | 1.3% | 0.2% | 10,039 | 1,851 |
| Mixed Rigid Plastics | 1.0% | 0.4% | 7,647 | 3,048 |
| Plastic Film/Wrap | 6.2% | 0.9% | 47,026 | 6,749 |
| Polystyrene | 0.9% | 0.2% | 6,760 | 1,382 |
| Other Plastics | 2.7% | 0.5% | 20,474 | 3,956 |
| **Total Metals** | **3.5%** | **0.7%** | **26,517** | **4,936** |
| Aluminum Cans (Deposit) | 0.3% | 0.1% | 2,548 | 642 |
| Aluminum Cans (Non-Deposit) | 0.3% | 0.2% | 2,642 | 1,377 |
| Tin Cans | 0.8% | 0.2% | 5,706 | 1,491 |
| Other Ferrous | 0.7% | 0.4% | 5,566 | 2,794 |
| Other Non-Ferrous | 0.5% | 0.1% | 3,585 | 977 |
| Mixed Metals/Other Metals | 0.9% | 0.4% | 6,470 | 2,948 |
| **Total Glass** | **2.0%** | **0.5%** | **15,201** | **4,077** |
| HI5 Glass Bottles/Containers | 0.5% | 0.3% | 3,756 | 1,597 |
| Other Glass | 1.5% | 0.4% | 11,445 | 3,142 |
| **Total Other Inorganics** | **2.7%** | **1.4%** | **20,322** | **10,251** |
| Gypsum Board | 0.2% | 0.1% | 1,256 | 884 |
| Asphalt Roofing | 0.0% | 0.0% | 0 | 0 |
| Asphalt Paving | 0.0% | 0.0% | 38 | 27 |
| Concrete | 0.3% | 0.2% | 2,103 | 1,420 |
| Sand/Soil/Rock/Dirt | 1.7% | 1.1% | 12,594 | 7,959 |
| Ceramics | 0.3% | 0.2% | 1,966 | 1,138 |
| Miscellaneous Inorganics | 0.3% | 0.2% | 2,365 | 1,469 |
| **Total Other Waste** | **3.8%** | **1.8%** | **28,424** | **13,558** |
| Batteries | 0.0% | 0.0% | 319 | 154 |
| Furniture | 1.0% | 0.7% | 7,879 | 5,568 |
| Appliances | 1.2% | 0.9% | 8,904 | 6,755 |
| E-Waste | 1.5% | 0.7% | 11,322 | 5,083 |
| Auto Fluff | 0.0% | 0.0% | 0 | 0 |
| **Total Green Waste** | **10.1%** | **3.5%** | **76,048** | **26,516** |
| **Total Wood** | **3.0%** | **1.3%** | **22,363** | **9,557** |
| Untreated Wood | 1.2% | 0.6% | 8,921 | 4,594 |
| Treated Wood | 1.1% | 0.5% | 8,423 | 3,749 |
| Pallets | 0.2% | 0.1% | 1,238 | 906 |
| Stumps | 0.5% | 0.4% | 3,781 | 2,693 |
| **Total Other Organics** | **24.1%** | **2.6%** | **181,937** | **19,711** |
| Food | 15.6% | 2.4% | 118,175 | 17,863 |
| Textiles | 3.4% | 1.2% | 25,825 | 9,172 |
| Carpet | 0.5% | 0.2% | 3,696 | 1,866 |
| Tires | 0.2% | 1.0% | 1,515 | 1,111 |
| Miscellaneous Organics | 4.3% | 1.0% | 32,726 | 7,630 |
| Sludge | 0.0% | 0.0% | 0 | 0 |
| **Total HHW** | **0.3%** | **0.2%** | **2,190** | **1,425** |
| Pesticides/Herbicides | 0.0% | 0.0% | 0 | 0 |
| Paints/Adhesives/Solvents | 0.0% | 0.0% | 257 | 176 |
| Household Cleaners | 0.0% | 0.0% | 0 | 0 |
| Automotive Products | 0.2% | 0.2% | 1,720 | 1,244 |
| Other HHW | 0.0% | 0.0% | 212 | 142 |
| **TOTAL** | **100.00%** | | **756,321** | |

## 3.2 Collection

Residential waste from single-family dwellings is collected by the Refuse Division. The Refuse Division also collects from some multifamily units and small commercial accounts. Private haulers collect from a majority of the high-rise condominiums, multifamily units, and commercial facilities.

The Refuse Division uses both automated and manual trucks for single-family residential waste collection. Nearly all of the routes are collected by automated trucks. Collection areas not accessible by automated trucks (e.g., one-way, narrow streets, or steep roads) are served by manual collection vehicles.

Most City-serviced multifamily units are collected with front loader trucks.

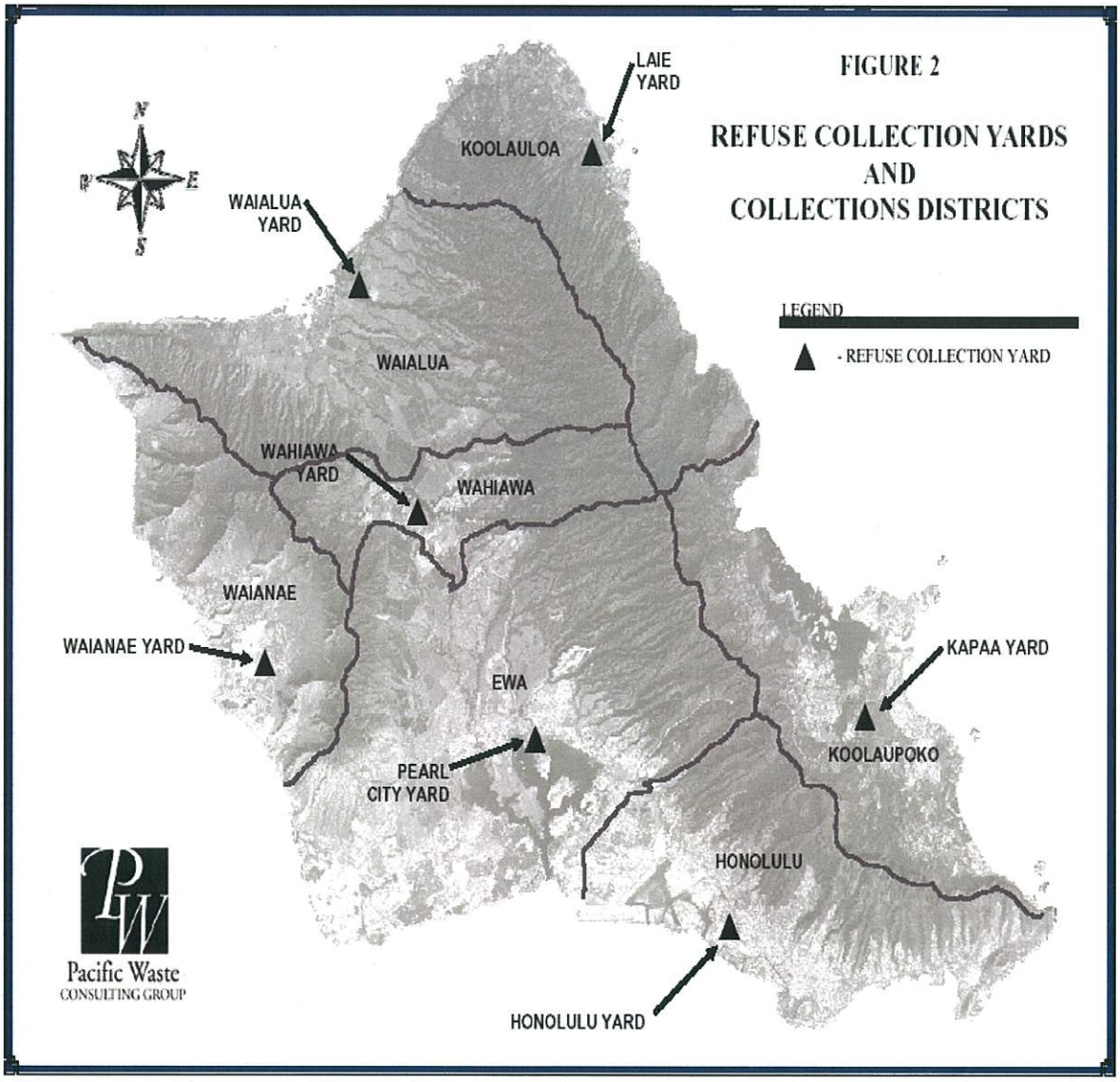
The City has seven collection districts. The dispatch yard for the collection vehicles is located in these districts near the waste generation area, which reduces the cost of collection. *Figure 1, Refuse Collection Yards and Collection Districts*, is a map showing the seven collection districts.

In districts with automated collection services, green waste is collected separately twice per month. In areas with manual collection, green waste is commingled with garbage. Residential garbage is collected twice per week. Collections are a free service to Oahu's communities. The cost of collecting Oahu's green waste and garbage is covered by property tax and tip fees at H–POWER and the landfill.

The C&C has three transfer stations for consolidating waste from small waste collection loads (six to eight tons) into large loads (20 to 22 tons) for transport to the recycling/disposal site. The use of a transfer station allows for less costly and more efficient transportation, since the contents of three collection trucks can be transported for disposal by one transfer trailer. The City owns and operates transfer stations located at Keehi, Kapaa, and Kawailoa. They service City collection vehicles and private individuals. Commercial collection vehicles; however, are restricted. There are two privately owned and operated transfer stations for commercial collection vehicles.

The City also operates six convenience centers where residents can drop-off garbage, recyclables, and green waste. Depending on the material, waste from convenience centers is recycled, composted, combusted, or disposed in a landfill. Some recyclable materials accepted at convenience centers include white goods (appliances), tires, and auto batteries.

## Figure 1, Refuse Collection Yards and Collection Districts



## 3.3 Recycling

Current recycling infrastructure consists of a pilot program to evaluate weekly MSW collection with weekly curbside recycling and green waste collection, community recycling bins, recycling support for schools, HI5 redemption sites, and curbside green waste recycling. The overall goal is to reduce the amount of waste disposed at the Waimanalo Gulch Sanitary Landfill. The community recycling bin program is supported by participating schools. The program uses a 40 cubic-yard recycling roll-off bin, divided into sections for mixed containers and paper. Students, their family members, community members, and the school employees drop-off their recyclable materials. The host school receives revenues for the recycled materials collected in their bin(s). Since the program began in 1990, more than $1,000,000 has been paid to the participating schools.

Schools are also receiving additional support through assistance programs, in which the C&C offer 96-gallon wheeled toters labeled for aluminum, glass, plastic, and newspaper. Fundraising materials, such as banners, graphics, lists of recycling companies, collection services, and redemption centers are also provided to help advertise a recycling event. The schools use these events as fundraisers. Currently, there are 75 to 80 schools and 35 non-profit organizations participating in this program. A new contract that began in March 2008 will add 40 additional sites for multi-material recycling.

The C&C also provides, through the contract, 10 HI5 event bins. These 40-cubic-yard bins are used at special school or community events for recyclables. The City's contractor removes the bin after the event and the school or community group receives the redemption value from the materials in the HI5 containers.

Another current effort is the expansion of the number of HI5 redemption sites in the C&C. The HI5 redemption sites are privately-operated for residents to drop-off their recyclable cans, plastic, aluminum, and glass HI5 containers for a 5 cent cash refund. The C&C also provides curbside green waste pick-up to its residents. The City picks up green waste twice a month on the day following garbage collection days. Approximately 10,000 tons of green waste is collected annually from residences. The collected green waste is turned into mulch and offered to residents at no cost.[8]

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8 Department of Environmental Services www.opala.org, March 11, 2008.

The City established a pilot curbside recycling/green waste collection program in the fall of 2007 to evaluate the efficacy of waste collection once per week (rather than the current twice-per-week schedule) and collect either containers and paper, or green wastes on the second collection day (that is green waste one week and containers and paper the next). That program is to be expanded island-wide starting in the fall of 2008.

Recycling alone does not replace the need for a landfill on Oahu. Recycling is just one step to reducing the amount of waste going to the Waimanalo Gulch Sanitary Landfill.

## 3.4 Disposal

The disposal facilities used by the C&C are discussed in this section. This discussion was taken from the November 2007 draft SWIMP update.[9]

### 3.4.1 Waimanalo Gulch Sanitary Landfill

"The Landfill is located in Kapolei on the leeward side of Oahu in Waimanalo Gulch, Kahe Valley. The Landfill property is 200 plus acres. About half of the property is permitted for landfilling and support operations. It is the intent of the City that the Landfill accept two types of MSW: 1) noncombustible MSW and 2) ash and residue from the H-POWER facility. In FY 2006 (July 1, 2005 to June 30, 2006), the Landfill received 337,667 tons of MSW. However, nearly half of this was combustible MSW diverted from H-POWER, as shown in Table 1-7 (Note, this table is not included in this document as the same information is presented in Section 4). Additionally, the Landfill received 88,380 tons of ash and 79,443 tons of residue from the H-POWER waste-to-energy facility. Per the permit renewal issued by the State in April 2003, the peak daily disposal rate can not exceed 3,300 tons per day of MSW and 800 tons per day of ash and residue. In FY 2006, the landfill averaged 930 tons per day of MSW and 460 tons per day of ash and residue."

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9 City and County of Honolulu Draft Integrated Solid Waste Management Plan Update, November 2007.

### 3.4.2 H-POWER

"H-POWER is a waste-to-energy (WTE) facility owned by DFO Partners, Bank of America, Inc., and the Ford Credit Corporation and operated via contract with a full service vendor since 1990. The facility, located in Campbell Industrial Park, uses combustion technology to recycle combustible solid waste materials into energy. The MSW is processed into refuse derived fuel (RDF) that is used as fuel to generate electricity. Approximately 90 percent of the volume and 70 to 75 percent of the weight of the MSW received at H-POWER is diverted from the landfill. The ash and residue from H-POWER is delivered to the Waimanalo Gulch Landfill.

The City has a waste supply contract with the facility operator to deliver 561,600 tons of solid waste per year to H-POWER. The majority of residential and commercial MSW collected on the island is delivered here. In FY 2006, 602,520 tons of waste was recycled for energy at H-POWER. An additional 153,801 tons was characterized as suitable for energy recycling at H-POWER, but was redirected from the H-POWER facility to the Landfill because the facility was closed for maintenance or because of capacity limitations. A total of 71,381 vehicles delivered waste (or would have delivered waste, if not diverted, to the Landfill at facility closure) to H-POWER in 2006. Nearly half of these were Refuse Division vehicles. The other half was private haulers delivering waste from commercial generators. The current tipping fee paid by the private haulers and other commercial vehicles at the H-POWER is $91 per ton (includes $0.35 state surcharge and 12 percent City recycling surcharge).

The City has an agreement with Hawaiian Electric Company (HECO) to purchase the electricity generated at H-POWER. Over 320 million kilowatt hours of electricity were generated in FY 2006. The sale of this electricity generated nearly $35 million in revenues.

H-POWER extracts ferrous metals from the waste using magnets and non-ferrous metals from the ash using an eddy current. Approximately 18,600 tons of ferrous metals and 2,100 tons of non-ferrous metals were recycled in FY 2006 from H-POWER per information reported by the City. The sale of ferrous and non-ferrous metal generated approximately $1.5 million per year.

As previously discussed, H-POWER is presently operating beyond its design capacity. To attempt to address this situation, the City has issued a Request for Proposals for alternative energy facility to increase overall capacity."[10]

### 3.4.3 C&D Disposal

"In addition to the Waimanalo Gulch Landfill, a private landfill (PVT) is located in Nanakuli and is permitted to accept C&D waste and petroleum contaminated soils. Information on the exact quantity of material received at this facility was not available, but is estimated at approximately 200,000 tons per year. This estimate is used for planning purposes only."

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10 Since publication of the draft Solid Waste Integrated Management Plan in November 2007, the City has announced that it will proceed with expansion of H–POWER by adding a third boiler.

# 4 Alternatives Considered

## 4.1 No Action

Under this alternative, landfilling at the Waimanalo Gulch Sanitary Landfill would cease on November 1, 2009, with no alternative site or technology available. Several actions would result:

- There would be no landfill to accept the waste currently going to the Waimanalo Gulch Sanitary Landfill, leaving about 800 TPD of MSW requiring disposal.
- Because the garbage could not be disposed, it could not be collected, requiring people to hold it at their homes and residences; resulting in health and safety problems.
- Ash disposal from H-POWER would cease as no other landfill on the island is permitted to accept that material.
- Eliminating ash disposal would stop the operation of H-POWER.
- Businesses would be closed to avoid health issues with improperly managed garbage.

Taken together, these actions can result in a health, safety, and economic catastrophe.

## 4.2 Delayed Action

The *Delayed Action* and *No Action Alternatives* would have similar results. Given the complexity of the landfill permitting process in Hawaii and the limited time until November 2009, it is possible that delaying action will prevent the C&C from receiving an updated SUP before November 2009, forcing the closure of the Waimanalo Gulch Sanitary Landfill.

Neither the *No Action* or the *Delayed Action* alternatives are changed by the City Planning Commission action on January 16, 2008, or the State LUC action on March 7, 2008, at which point the LUC extended the operation of the landfill until November 2009 to allow time to complete the documents to request an extension of the permits for 15 additional years from 2010.

## 4.3 Transshipment Off-Island

Transshipment off-island would require a landfill owner/operator on the mainland to accept Oahu's MSW for disposal. Facilities would be needed to process the MSW into shrink-wrapped bales, store the bales while awaiting shipment, and load bales onto barges. Some materials cannot be transshipped. The federal government approval to export precludes more than three percent of the bale being green or agricultural waste. In addition, there are certain materials that must be disposed either in a landfill or by incineration, such as expired food, drugs, and cigarettes. Household hazardous waste is shipped separately and white goods could not be commingled with MSW for transshipment. The lost revenue from transshipment is anticipated to reduce tipping fee revenue that currently helps support the cost of the C&C's refuse management system.

At the time this EIS was prepared, the City had issued a request for proposal to transship waste while a third boiler of H–POWER was being constructed.

## 4.4 Alternative Technologies

Alternative technologies could reduce the amount of material requiring disposal and generate electricity or another beneficial reuse product. Alternative technology is not expected to eliminate Oahu's need for a landfill as bulky, hard-to-handle items and disaster debris are expected to require landfill disposal. Any technology considered must meet the City's requirements for investing in a new approach to managing MSW.

Alternative technologies considered here include thermal and non-thermal technologies, enhanced recycling, addition of a third unit to H–POWER, and alternative methods of landfilling, such as co-disposal of ash and MSW and use of a bioreactor landfill.

At the time of this EIS, alternative technologies are not viable alternatives to eliminating Oahu's need for a landfill. Further recycling of the by-products produced from these technologies is impossible and requires a landfill for disposal. Alternative technologies do, however, hold great potential in reducing the existing need for MSW landfills in the future.

## 4.5 Alternative Sites

The five alternative landfill sites considered in this analysis are:

- Ameron Quarry
- Maili Quarry
- Makaiwa Gulch
- Nanakuli B
- Waimanalo Gulch Sanitary Landfill

The preferred alternative is the Waimanalo Gulch Sanitary Landfill.

# 5 Transshipment Off-Island

On August 23, 2006, the US Department of Agriculture (USDA) through its US Animal and Plant Health Inspection Services (APHIS) announced its decision to allow the transshipment of MSW to the continental United States from Hawaii.[11] Transshipment will be allowed only under certain circumstances. Wastes by federal regulation that would be restricted from transshipment are, hard-to-handle wastes, such as white goods, sewage sludge, auto fluff, and precluded materials such as green and agricultural wastes (more than three percent of the bale weight). The announcement is attached as Attachment A.

Three transshipment firms have shown interest in shipping Oahu's waste to the Roosevelt Landfill in Washington State. Two of the three have submitted proposals to the C&C to ship a portion of Oahu's MSW to the mainland for disposal. Both proposals would shrink-wrap the waste prior to shipping.

On January 22, 2008 the City provided a notice to bidders that it would entertain proposals for transshipping waste to the mainland for disposal. [3]

## 5.1 City Requirements for Transshipment

In the January 22, 2008 notice to bidders, the C&C established requirements for the transshipment of MSW:

(1) Permits, compliance letters, certifications, environmental assessments, and other documents, related to services needed to carry out the contract, must be current for the transshipment contractor.

(2) The proposed methods and measures to fulfill each requirement of the contract must be identified.

(3) A site plan displaying existing facilities, equipment, traffic conditions, and a description of operations must be provided.

(4) A back-up plan for equipment maintenance, failure, or other disruption, to minimize landfill disposal must be provided.

(5) A back-up plan for barge-loading obstruction or other disruptions of exporting operations to minimize landfill disposal must be provided.

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11 Federal Register volume 71, number 163, published August 23, 2006.

(6) A copy of facility agreements between the bidder and facility, barging, or disposal operators must be provided if the bidder is not the director/operator of each.

(7) The bidder must provide a property easement for the placement of a City-owned scale, scale house, and associated equipment.

## 5.2 How It Works

Two of three interested transshipment firms have submitted applications to the State for modifications to the transfer stations they currently have permitted to handle MSW. Modifications include adding the equipment needed to transship MSW to the Roosevelt Landfill in Washington State or a landfill in Idaho.

The transshipment vendors would shrink-wrap the waste to avoid shipment of pests and control nuisance impacts. The approach is described in the risk assessment prepared by APHIS for its regulatory action.[12]

The process for handling the waste in Honolulu is specified in the final Compliance Agreement between the USDA and Hawaii Waste Systems, LLC (HWS). The procedures for handling the waste and transporting it to the landfill for disposal are detailed[13] as follows:

> "...Garbage and Regulated (domestic) Garbage collected by refuse trucks shall be delivered to the HWS facility at HWS Transfer Station ...Trucks of agricultural waste shall not be accepted. Waste materials, containers, and bins associated with Foreign Garbage are strictly prohibited and shall not be accepted. The ground surface of the all areas for handling the Garbage and Regulated (domestic) Garbage should be level, solid, and impervious surface of asphalt or cement.

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12 *The Risk of Introduction of Pests to the Continental United States via Plastic-Baled Municipal Solid Waste from Hawaii,* United States Department of Agriculture, Animal and Plant Health Inspection Service, March 2006.

13 Final Compliance Agreement between Hawaiian Waste Systems, LLC, and the United States Department of Agriculture relating to the Regulated Article "Garbage and Regulated (domestic) Garbage from Honolulu, Hawaii." January 19, 2007. Pages 4-7.

The risk assessments for the movement of Garbage and Regulated (domestic) Garbage were conducted based on the specific details provided by HWS. These details included the removal of all hazardous and liquid waste prior to baling. HWS will notify PPQ (USDA, APHIS local office) if the company plans change to include such materials so that the proper risk assessments can be conducted…

The waste transfer station will receive only household and commercial waste acceptable for disposal at Roosevelt Regional Landfill. Collection trucks will deliver waste picked up from existing collection routes. After waste is tipped onto the tipping floor it will be inspected for unacceptable waste including yard waste, (other than incidental amounts not to exceed 3% of the total waste stream pursuant to 7 CFR Part 330), agricultural waste, industrial waste, infections waste, loads of predominantly of [C&D] waste and regulated hazardous waste. Any segregated unacceptable waste will be separated for further processing. Loads consisting predominately of [C&D] waste will be transferred to a C&D handling facility. Other waste will be drummed or otherwise contained and arrangements made for its proper transportation and disposal. Notwithstanding the foregoing, it is acknowledged and agreed that follow-up inspection of the route that was the source of the unacceptable waste will be conducted to try to locate the source and correct the waste handling process that allowed unacceptable waste to be collected.

Each load of waste received at the facility will be weighed and the date, time, company, driver name, truck number (i.e., company fleet number), weight (loaded), weight (empty), and origin of load, will be recorded. Records will be kept for a minimum of three years.

Step-by-step waste receiving and processing description is as follows:

1. Waste is delivered by collection truck to the HWS Transfer Station. The truck is weighed and then proceeds to the baling facility where it tips its waste onto the tipping floor. The collection truck is weighed again as it exits the site and continues on its collection routes. A weigh ticket is generated and kept on file.

2. A loader operator inspects the waste and segregates any non-household or on-commercial waste. Household and commercial waste is pushed onto the in-feed conveyor by the loader. Segregated waste is set aside and handled separately as described previously.

3. Garbage and Regulated (domestic) Garbage moves along the conveyor to the intake feed of the baler. The baler operator introduces waste into the baler where it is compressed using a compactor that produces bale densities of approximately 1000 kg per cubic meter for the most waste materials. The same force compaction will be used regardless of the material in the processing line. Companies will provide documentation of the equipment used and compactor specifications…

4. The compacted bale moves from the baler via conveyor belt to the plastic wrapper. The plastic wrapper automatically wraps the bale with a minimum of 4 layers of pre-stretched, mastic-backed polyethylene plastic, of at least 16 micrometers thickness, and extrudes it onto a roller conveyor. The baler operator or loader operator will inspect each bale for integrity of the plastic wrap. Any bale with unsatisfactory wrapping will be re-sent through the wrapper.

5. The wrapped bale moves down the roller conveyor and is removed by a loader with a special attachment that picks up the bale by squeezing it between two hydraulically operated smooth faced arms, or another piece of equipment designed to handle the bales without tearing or damaging them in any way. The smooth faced arms prevent damage to the plastic wrap.

6. The loader moves the bale onto the bale storage area – which has a solid, impervious (concrete or asphalt) surface that is kept free of soil or other contaminants – or directly onto a flat bed truck, if one is available. The loader then returns to pick up another bale from the roller conveyor.

7. Bales that are placed onto the bale storage area will be loaded onto flat bed trucks as they become available.

8. Flat bed trucks will haul the bales to Barber's Point where they will be unloaded and stacked in the Staging Area. The same type of loader attachment (or equivalent equipment) will be used for unloading to prevent damage to the plastic wrap. The loader operator will inspect each bale for damage to the plastic wrap. If damage is found it will be returned to a wrapping area for rewrapping.

9. Bales cannot be loaded onto the barge until they have been staged for at least five days. After five days, the bales are considered ready for transport and the area will be designated the Transport Area. HWS will maintain a clear separation between those bales ready for transport and those bales in the staging process.

10. Bales at the Barbers Point Harbor facility will be stored until a barge is ready to be loaded. Barge loading will occur approximately monthly. When a barge is ready for loading, the bales in the Transport Area will be transferred onto the barge, again using squeeze-arm hydraulic equipment or other comparable, appropriate lifting equipment to prevent damage to the plastic wrap. The loading supervisor will inspect each bale once the bale is loaded onto the barge. Any damaged bale will be returned to the Transfer Station for rewrapping and restaging or be rewrapped and restaged on site at Barber's Point

11. When the barge is fully loaded it will proceed to its destination at the Roosevelt Regional Landfill in Washington State.

The compression settings on the baler shall be 1,000 kg per cubic meter or more.

Records indicating the size and weigh to each bale shall be maintained.

Garbage and Regulated (domestic) Garbage which has fallen apart from an unwrapped compressed bale, or has been otherwise improperly compressed shall be set aside for a subsequent compression cycle.

The unwrapped, compressed bales shall be bound with plastic or metal clamps, netting, or strapping devices to retain its shape.

Compressed bales that do not hold together shall be rejected and set aside for a subsequent compression cycle. Records of re-compressed bales shall be maintained by HWS and available for monitoring by PPQ…"

## 5.3 Other Jurisdictions Using Transshipment

Shipment of MSW using shrink-wrap has been used in New Jersey and other areas of the US. It has been used in Europe for as long as 10 years. The Roosevelt Landfill in Washington receives MSW, not only from Washington State, but also from Oregon, Canada, Idaho, and Alaska.[14] Canada has transshipped its MSW to Michigan landfills for many years, while New York is in the process of transshipping its MSW to North Carolina. Most of these operations do not use the shrink-wrap technology.

APHIS determined, with its acceptance of transshipment of MSW stateside from Hawaii, that transshipment could occur from both Oahu and the island of Hawaii once contracts and compliance agreements have been set up in Hawaii.

## 5.4 Physical, Regulatory, and Environmental Requirements

The limitations on shipping waste from Hawaii to the mainland are established in federal regulations[15] with approval of the specific requirements promulgated in the Federal Register.[16]

Garbage subject to these regulations (Regulated Garbage) is defined as waste on—or removed from—a transport that has been in any non-U.S. or Canadian port within the past two years. The garbage is also regulated if that transport has either directly or indirectly moved in the past year between the United States and its territories and non-U.S. territories.

Any garbage commingled with regulated garbage is considered Regulated Garbage and would have to be shrink-wrapped and handled according to the Compliance Agreement.

The primary regulator of transshipment is the U.S. federal government through APHIS.

Regarding flow control of the waste, it has been determined that if the City controls the scale house, it can direct the flow of the waste to the disposal location. The January 22, 2008 Notice to Bidders requires that the successful bidder provide an easement at their site for the City's scale house and supporting equipment.

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14 Washington State Department of Ecology, Solid Waste and Financial Assistance Program, "Solid Waste in Washington State Fifteenth Annual Status Report", December 2006.

15 7CFR 330.400 and 9CFR 94.5.

16 Federal Register volume 71, number 163, published August 23, 2006.

### 5.4.1 Compliance Agreement

Before any waste can be transshipped, all parties involved with the export must enter into a Compliance Agreement with the USDA. All parties must comply with conditions within the Compliance Agreement, as well as, all provisions in 7CFR 330.400–403 and 9CFR 94.5.

### 5.4.2 Transshipment Regulations

The requirements for shipping the waste are in the Compliance Agreement and in other federal rules and regulations relating to transportation of materials by barge.

#### *5.4.2.1 Receptacles*

MSW transported from Hawaii to the mainland must be stored in specified receptacles. If the MSW is to be sent by watercraft, the receptacles must be contained within the guard rails of that watercraft. Receptacles must be tight, leak-proof, and covered while being transported.[15] Removal of receptacles must be under the direction and supervision of an inspector from APHIS and taken to an approved facility.

An approved facility is a facility certified by an appropriate government official as complying with environmental protection laws. The Administrator of APHIS must deem the equipment and procedures adequate to prevent the widespread contamination of plants and livestock.

The shrink-wrap technology used to contain the MSW before it is transshipped uses plastic film wrapping material. The wrapping material is to be impermeable and made of low density polyethylene at least 16 micrometers in thickness. It is to be coated on one side with a non-hardening mastic/adhesive. Bales are mechanically wrapped to achieve airtight seals. The film anoxiates the wrapped MSW to kill the insects and pests entrained in the bale. In a 10-month study, DEKRA Umwelt, an international service provider, determined that the filmed bale environment is made up of 1 percent oxygen and more than 50 percent methane; that within 24 hours, any insects captured during baling of the MSW died from lack of oxygen. The film contracts once it is wound around the MSW. This ensures that during transshipment and disposal no materials or insects are leaked.[12]

#### *5.4.2.2 Disposal*

Disposal of MSW must take place at an approved facility. The Roosevelt Landfill has a permit issued pursuant to the federal Subtitle D regulations and would be considered an approved facility.

## 5.5 Potential Issues

A shipping strike would create potential problems for Oahu should it occur during transshipment of MSW to the continental United States. The plastic film used to bale the MSW in preparation for transshipment is required by the USDA Compliance Order to be re-wrapped if the bale will not be in the landfill within 75 days.[13] The film has a life of at least 100 days when exposed to sunshine in tropical environments such as that found on Oahu.[12] Assuming a transit time of 14 to 21 days, even a short strike would threaten to cause the shipper to exceed the 75 day time limit from wrapping to disposal as required by the USDA. Oahu would not be able to transship its MSW during a shipping strike. This could potentially result in a health and safety catastrophe, leaving Oahu with no place to dispose of its waste.

According to the Chief Executive Officer of HWS,[17] the bales can be stacked two high. The space they have at the port facility will allow for storage of 30,000 tons of MSW. Assuming that the company handles 100,000 TPY, they can store about four months of shrink-wrapped MSW. In addition, the agreement for barge services allows management of the barge company to operate the equipment needed to transship the waste in a strike due to the health and safety aspects of transporting the waste.

Another issue with transshipment off-island is that green and agricultural wastes, as well as household hazardous wastes, are not permitted to be shipped commingled with the MSW. Incidental amounts, less than three percent of the total amount of MSW shipped, are permitted. Therefore, the source of waste that is transshipped must separate green and agricultural wastes from the MSW.

Assuming that a bale weighs 3.5 tons[17] the total weight in the bale is 7,000 pounds. The limitation of three percent or less of yard wastes[16] allows for 210 pounds of yard waste in the bale. While it is a small percentage of the bale, that amount of green waste should be observed in the inspection prior to baling.

Transshipping Honolulu's MSW makes the C&C dependent upon an outside source rather than maintaining self-sufficiency managing its own refuse. For a state that in recent months has continued to voice its desire for independence, transshipment could be a step backwards.

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17 Meeting on December 14, 2006, with Jim Hodge and Mark White held in Sacramento, California.

Transshipment would also result in the loss of high BTU value waste that would otherwise go to H–POWER. Transferring the disposal of a portion of the City's waste reduces the generating capacity at the H–POWER facility, which provides power to 45,000 homes.[18] It could also require the use of more oil and/or coal to generate power to compensate for the loss of H-POWER generation.

Relying on outside sources for the transshipment of MSW leaves Honolulu vulnerable to shipping strikes and with less negotiating power. The municipality would lose control of cost and possibly lose a source for disposal.

## 5.6 Impact on City Solid Waste Management System

From an environmental perspective, the impact of transshipment through the HWS system will be consistent with the impact of on-island disposal.

- The transfer, baling, shrink-wrap, and loading will be done at a permitted transfer station.

- The material will be contained within a system that has received approval from the federal government based on the system's ability to prevent the unexpected discharge of waste or plant pests.

From the perspective of how transshipment will impact the City's current system for financing the solid waste collection and disposal activities, the conclusion is not so clear. If transshipment removes 100,000 tons (the total could be more as there are at least three vendors seeking to transship up to 100,000 TPY each), the tip fee and energy revenues from energy production and disposal of that waste will be lost to the city. That revenue helps support the collection system, so the City will have to find other sources of funds to offset the lost revenue.

The transshipment of up to 100,000 TPY would also reduce the amount of energy produced from the H-POWER facility. Currently, H-POWER processes approximately 600,000 TPY of solid waste. With a loss of 100,000 TPY of MSW, the fuel to the H-POWER facility will be reduced, reducing the amount of homes powered by the facility if the C&C were unable to make up the tons shipped off-island. That loss would also increase the cost of power to the residents and businesses on the island because the utility would have to import more oil to generate the necessary power, assuming the utility has the excess generating capacity.

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18 H-POWER. http://www.honoluluhpower.com, March 11, 2008.

The CEO of HWS has provided a summary of their company's suggestions on how to integrate their transshipment program into the City's solid waste management system. The e-mail summarizing his suggestions is in Attachment B.

## 5.7 Consistency With City Requirements

The C&C guidelines regarding the transshipment of MSW off-island are listed in section 5.1, which were summarized from the Notice to Bidders released on January 22, 2008.

In addition, not all waste can be shipped off-island. Items such as flocked Christmas trees, sewage sludge, auto fluff, out of date medicines, and other hard-to-handle wastes cannot be shipped without special arrangements to dispose of these materials. The shipping alternative only accepts materials from a specific waste stream and does not eliminate the need for a landfill.

## 5.8 Additional Considerations

The C&C had issued an RFP seeking Alternative Technologies. On January 18, 2008 the Mayor announced that the City had decided to install the third boiler at H–POWER and not proceed with the other alternative technologies. The Mayor also stated that "... the city will invite companies to bid to ship 100,000 tons of Oahu's trash off island." [5]

## 5.9 Global Warming Considerations

In addition to these actions, the increasing concern about global warming and climate change caused an evaluation of the greenhouse gas emissions from transshipment. An analysis was conducted (See Attachment C for details) of the emissions of greenhouse gases (GHG) from transshipment compared to landfilling the same amount of waste in the Waimanalo Gulch Sanitary Landfill or burning it in H–POWER. The assumptions and general conditions in the analysis were:

- Commonly accepted emission factors used to calculate the emissions.

- Where actual data was unavailable to define the logistical details of transshipment process necessary to quantify emissions (e.g., physical considerations in port facilities, the time needed to move the wrapped waste onto and off the barge), a report prepared for the C&C to estimate the cost of transshipment was used as a resource.[19]

- Manufacturer's data was used to estimate electrical use by a baler and a shrink wrap machine as data was unavailable on the equipment that had been proposed for transshipment.

- Information on the fuel use on a tug and the time required for a load to be moved from Oahu to the mainland was obtained from shipping industry contacts.[20]

The results of the evaluation are summarized in *Table 4, Comparison of GHG Emissions from Transshipment to On-island Disposal* which shows the emissions in thousands of tons of $CO_2$ equivalent per year. The emissions at H–POWER are negative because the GHG emissions resulting from the power it generates are more than offset by the reduction in emissions from burning either coal or oil to produce that same amount of energy in other power plants on the island. The emissions from the Waimanalo Gulch Sanitary Landfill are negative because this landfill (as does Roosevelt) sequesters the carbon emissions due to the efficient landfill gas collection system. In addition, the emissions for Roosevelt also reflect the credit for offsetting the electrical generation from other sources in the Northwest. Roosevelt produces power with the gas collected and the Waimanalo Gulch Sanitary Landfill incinerates the gas using a flare.

**Table 4, Comparison of GHG Emissions from Transshipment to On-island Disposal**

| Disposal Location | Emissions ($MTCO_2e$ per year) |
|---|---|
| H–POWER | (28,711) |
| Waimanalo Gulch | (3,686) |
| Roosevelt | 3,978 |

19 RW Beck, Draft Integrated Solid Waste Management Plan Update, November 2007, Appendix C Trans-Shipment of Waste Analyses.

20 Personal communication with a representative of Young Brothers.

# 6 Alternative Technologies

This section of the Alternatives Analysis discusses the alternative technology approaches that may be able to reduce the demand for landfilling. Currently, there are no alternatives that have been proven to completely eliminate the need for a landfill. Alternative technologies reduce the demand for a landfill, but some residue will need to be disposed in a landfill.

Prior to the evaluation of alternative technologies, there are several factors that are important to the discussion.

The City encourages alternatives methods for waste disposal, such as the H–POWER facility. This facility converts about 40 percent of the MSW produced on Oahu into electricity. By-products are ash, residual, and unprocessible materials that require landfilling.

Prior to the H-POWER facility, the City operated the Waipahu, Kewalo (two plants), and Kapalama Incinerators at different times to reduce the volume of material needing disposal.

Currently, the City has contacted a private vendor to operate a sludge pelletizing facility at the Sand Island Waste Water Treatment Plant. The dryer converts sludge material previously disposed at the Waimanalo Gulch Sanitary Landfill into a fertilizer amendment product. At the current time, the fertilizer product is not being marketed.

These examples share several characteristics:

- All were operated for many years using waste material similar to that produced on Oahu and in amounts in excess of the capacity needed for Honolulu.
- The risk of operational problems was minimized because of the history of operations and the availability of firms to design, build, and operate the plants that had long term operating results.
- The environmental impacts of the technologies were well understood and all had long histories of operating in compliance with regulations.
- The total cost of the technology was well understood.
- H-POWER has resulted in a significant reduction in volume of material disposed in the landfill disposal, with the dried sludge being used as cover.
- The City has continued its search for additional alternatives. Other areas of the