

***Mayor's Advisory Committee  
on Landfill Site Selection***

***Volume 2  
Site Data Sheets***

March 2009

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## ***Appendix A*** ***Site Data Sheets***

- 1. Kalepa*
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- 5. Ma'alo*
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- 7. Kōloa*

**Tab 1**

**Appendix A – Site Data Sheets**

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Site No. 1 – Kalepa

**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 404.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** 404.2003-2011 (population density is 296 persons per square mile) (Hanamualu Homes subdivision)

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

**2. *Distance to nearest residence, school, hospital or non-compatible business***

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua‘i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Residence

**Distance from the property line to the nearest facility:** 2,000 feet to SSW

**Address of nearest facility:** 4840 Ohia Place, Lihue

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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### 3. ***Displacement of residences and/or businesses including agricultural businesses***

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** Entire parcel of land is 2,181 acres. It is unclear how many (if any) and which agricultural businesses might be displaced.

**Number of residences displaced:** 0

**Number of businesses displaced:** 6 (potentially). Parcel (TMK 3-9-002:020) is owned by the State of Hawai'i and has six agricultural lessees:

- Bunao, Aurora: 247 acres
- Butler, Lara: 156 acres
- Kapaa Banana Company: 2 acres
- Gooding, Kelly: 19 acres
- Sanchez, Alison and William: 769 acres
- Calipjo, Elesther: 432 acres

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area but sites (-746, -1826, -1827) lie between 0.25 and 0.5 miles of the alternative landfill site. (see Esh et al. 2008, Figure 57), thus yielding an assigned point value of **2**.

**Complications obtaining the data:** The Kālepa, Hanamā‘ulu Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is very low probability of their being historic properties other than post 1878 plantation infrastructure” (Esh, 2008:134).

**Complications calculating the point value:** No portion of the Kālepa, Hanamā‘ulu Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study). It is noted that sites are located in a different environmental zone (on top of the Kālepa ridge) than the project area, and their presence does not necessarily increase the likelihood of archaeological sites being found within the Kālepa project area.

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: **No**
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: **Yes**

- 
3. Closest areas of archeological and/or historical significance to site boundary:  
Approximately 0.4 miles. No sites are known within the project area.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The "site" is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** Two TMK parcels with different owners. These owners may not be willing to sell their respective properties.

### **Cost of Site Acquisition:**

1. Owner of property: Grove Farm Company, Ltd.
  2. Privately owned: Yes
  3. Site valuation: \$6,600,600 / \$5,920 per acre
- 
1. Owner of property: State of Hawai'i
  2. Privately owned: No
  3. Site valuation: \$6,939,700 / \$3,182 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 0.6 miles SE to Highway 56

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 1
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** Depending on access road (likely Ma’alo Road), trucks would pass Lihue Hongwanji Preschool

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** None but depending on access road may pass very close to Kauai Memorial Gardens (a large cemetery)

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**10. Consistency of the designation of the site for a landfill with the Kaua'i General Plan**

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other locations are not specifically identified in the GP for landfill uses or development.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kaua'i General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawai'i (ALISH) and the University of Hawai'i Land Study Bureau's Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**11. Consistency of the site with the existing County land use zoning designation**

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes (HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### **13. Location of site relative to the Underground Injection Control (UIC) Line**

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely mauka of the UIC line therefore the underlying aquifer is considered a drinking water source. Limited types of injection wells are allowed under UIC permits or permit exemptions. Permit requirements are more stringent.

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** On its way downward from various tributaries, Hanamaulu Stream branches off and feeds into a surface water body approximately 0.18 miles from the potential landfill site. This semi-permanent, palustrine (<20 acres, <6.6 ft depth) body of water supports various aquatically adapted plant forms.

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 15. *Flora and fauna habitat*

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No

- 
- a. Name of T&E flora and fauna habitat: Designated Critical Habitat (DCH), Nonou Mountain, contains several species of endangered plants.
  - b. Distance from site boundary to flora and fauna DCH: 3.9 miles

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 0.4 miles makai of 64 in. isohyet.

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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**17. *Prevailing wind direction relative to populated areas***

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

Could be argued that Hanamaulu (to SSW) would be affected

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. *Haul distance from major municipal solid waste generation areas***

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 4.2 miles from Lihue Refuse Transfer Station.

**Complications calculating the point value:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The soil association for the general area is the Lihue-Puhi land association. A soil association is an area of like soils. The Lihue-Puhi land association comprises the majority of the site and consists of agricultural land.

The site is comprised of 6 soil types, mainly silty clay:

Lihue Association (LhB, LhC, LhD, LIB, LIC)

These well-drained soils cover most of the area and differ generally in slope and mixing/composition. LIB and C are mostly gravelly soils with similar differences in slopes.

Kalepa Association (KdE)

The eastern boundary of the site borders a ridge with this soil association as the predominant soil in the area, although with generally higher percent slopes.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill at approximately 30 years.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed. Information is therefore “order of magnitude” and intended to be for comparative purposes only.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

### **Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.

6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 30 years

**Cost of site development per year of life:** \$356,687

**Group which includes the cost of development of this site:** Third group

**Basis for estimated costs in 2008 dollars:**

Acreage 77

No.	Item	Unit Cost	No. Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	7,700	lf	\$770,000
5	Off-site road	\$100	6,864	lf	\$686,400
6	Utilities	\$300	14,564	lf	\$4,369,200
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$10,700,600
9	Cost per year of life				\$356,687

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 2**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations multiplied by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
Average Cost Per Acre	\$25,510

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	77
Annual Cost of Operations (Cost per acre x Site acreage)	\$1,964,300
Group which includes the cost for this site	3
Point Value	3

**Point Value: 3**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Kekaha Mauka	(4)	\$4,489,800	1	1
Ma'alo	(5)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Pu'ū O Papai	(3)	\$3,648,000	2	2
Umi	(2)	\$3,239,800	2	2
Kōloa	(7)	\$3,239,800	2	2
Kalepa	(1)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 1**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	.19 miles	No	3

### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Lihue

**Estimated response time:** 10 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai'i GIS maps, Google Earth database, and County of Kaua'i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** The closest standard roadway is Kuhio Highway (56), which is 1.3 miles from the site boundary.

**Complications calculating the point value:** None.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**25. Proximity to parks and recreational facilities**

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai‘i GIS maps, TerraMetrics satellite maps, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 0.4 miles to N

**Name of park or recreational facility:** Wailua River State Park

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kaua'i Municipal Solid Waste Landfill Siting Study, 2001, and New Kaua'i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawai'i GIS maps were used as necessary to obtain additional data.

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The site acreage is 97 acres which is less than the horizontal surface area requirement calculated at 133 acres. An important factor offsetting the lower site acreage indicates that the depth to bedrock is deeper than reported in the USGS Soil Survey (1972). This factor accounts for the life expectancy of the site at approximately 30 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 2**

**Appendix A – Site Data Sheets**

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Site No. 2 – Umi

**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 407.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** None (all within ½ mile have population density less than 25 people per sq mi)

**Point Value:** 4

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

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## 2. *Distance to nearest residence, school, hospital or non-compatible business*

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua‘i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Residence

**Distance from the property line to the nearest facility:** Approximately 1,500 feet to the E

**Address of nearest facility:** 4322 Ai Road, Eleele

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**3. *Displacement of residences and/or businesses including agricultural businesses***

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Number of residences displaced:** 0

**Number of businesses displaced:** 0

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area or within 0.5 mile. Sites are present at just greater than 0.5 mile (see Esh et al. 2008 Figure 30), thus yielding an assigned point value of **3**.

**Complications obtaining the data:** The Umi, Wahiawa Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is a low probability of finding highly significant sites.” (Esh et al. 2008:69)

**Complications calculating the point value:** Straight-forward with the caveat that no portion of the Umi, Wahiawa Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study).

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: **No**
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: **No**
3. Closest areas of archeological and/or historical significance to site boundary: Just greater than 0.5 mile. No sites are known within the project area.

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**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The "site" is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** None. However, owner may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: McBryde Sugar Company, Ltd.
2. Privately owned: Yes
3. Site valuation: \$7,163,500 / \$4,890 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 0.6 miles N to Highway 50

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 0
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** Depends on which access road is used. May affect residence whose driveway begins at intersection Kaumakani Avenue and Kaumualii Highway

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

**10. Consistency of the designation of the site for a landfill with the Kauaʻi General Plan**

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other landfill locations are not identified.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kauaʻi General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawaiʻi (ALISH) and the University of Hawaiʻi Land Study Bureau’s Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**11. Consistency of the site with the existing County land use zoning designation**

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua'i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua'i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes(HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value: 2**

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### **13. Location of site relative to the Underground Injection Control (UIC) Line**

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely makai of the UIC Line therefore the underlying aquifer is not considered a drinking water source. A wider variety of wells is allowed, although they are still regulated by permit and exemption limitations.

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** The Umi Reservoir is a Palustrine, permanent body of surface water that lies approximately 0.16 miles from the boundary of the potential landfill site. It is impounded, likely for use in agricultural activities.

Name of Water Body: Umi Reservoir.

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**15. Flora and fauna habitat**

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No
  - a. Name of flora and fauna habitat: N/A

- 
- b. Distance from site boundary to flora and fauna Designated Critical Habitat (DCH): 5 miles to the east.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 0.6 miles mauka of 50 in. isohyet.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**17. Prevailing wind direction relative to populated areas**

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

May affect Hanapepe and Eleele approximately 2 miles away

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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**18. Haul distance from major municipal solid waste generation areas**

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 4.2 miles from Hanapepe Refuse Transfer Station.

**Complications calculating the point value:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The site is covered by the Koloa association. This association consists of silty clay textured subsoil or underlying material; located on coastal plains.

The site is comprised of 4 main soil types:

**Koloa Association (KvB, KvC)**

The Koloa land occurs on the majority of the project site and consists of well-drained, fine-textured soils that develop in material weathered from basic igneous rock and poorly drained, very fine-textured soils that developed in alluvium.

**Makaweli Association (MgB, MgC)**

This silty clay soil occurs in small pockets in various areas of the site and constitutes an insignificant percentage of the overall soil associations at the site. Other soils associated with the site in small patches include Lihue silty clay (LhB).

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value: 2**

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**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9,  
2. Physical and Socioeconomic Factors

## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill at approximately 30 years.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed. Information is therefore “order of magnitude” and intended to be for comparative purposes only.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

### **Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.

6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 28 years

**Cost of site development per year of life:** \$400,793

**Group which includes the cost of development of this site:** Second group

**Basis for estimated costs in 2008 dollars:**

Acreage 127

No.	Item	Unit Cost	No. Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	12,700	lf	\$1,270,000
5	Off-site road	\$100	3,168	lf	\$316,800
6	Utilities	\$300	15,868	lf	\$4,760,400
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$11,222,200
9	Cost per year of life				\$400,793

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 2**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000.00
Site Acreage*	98
Average Cost Per Acre	\$25,510.20

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None

**Complications calculating the point value: None**

Site Acreage	127
Annual Cost of Operations (Cost per acre x Site acreage)	\$3,239,800.00
Group which includes the cost for this site	2
Point Value	2

**Point Value: 2**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Pu'u O Papai	(3)	\$4,489,800	1	1
Kalepa	(1)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Umi	(2)	\$3,648,000	2	2
Ma'alo	(5)	\$3,239,800	2	2
Kekaha Mauka	(4)	\$3,239,800	2	2
Kōloa	(7)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line, which was along Kuhio Road. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer to the site than can be ascertained.

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**Point Value: 2**

**Comparison of Sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Kalaheo

**Estimated response time:** 5 minutes

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai'i GIS maps, Google Earth database, and County of Kaua'i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Adjacent to Halewili Road, a well-traveled standard road.

**Complications calculating the point value:** None.

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**25. Proximity to parks and recreational facilities**

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai‘i GIS maps, TerraMetrics satellite maps, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 0.5 miles to NE

**Name of park or recreational facility:** Kukuiolono Golf Club

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kauaʻi Municipal Solid Waste Landfill Siting Study, 2001, and New Kauaʻi Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawaiʻi GIS maps were used as necessary to obtain additional data. The County of Kauaʻi, Department of Public Works was also consulted

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The Umi site is 127 acres which is slightly less than the horizontal surface area requirement of 133 acres. This factor accounts in part for the life expectancy of the site at approximately 28 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 3**

**Appendix A – Site Data Sheets**

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Site No. 3 - Pu'u O Papai

**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 408.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** 408.4015 (population density is 88 persons per square mile)

**Point Value:** 0

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

## 2. *Distance to nearest residence, school, hospital or non-compatible business*

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua‘i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Residence

**Distance from the property line to the nearest facility:** Approximately 1,000 feet to the S from the southern property line.

**Address of nearest facility:** Driveway begins at intersection of Kaumakani Avenue and Kaumualii Highway.

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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### 3. *Displacement of residences and/or businesses including agricultural businesses*

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Number of residences displaced:** 0

**Number of businesses displaced:** 0

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area or within 0.5 mile. Sites are present just beyond one mile (see Esh et al. 2008 Figure 20), thus yielding an assigned point value of **3**.

**Complications obtaining the data:** The Pu‘u o Pāpa‘i, Makaweli Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is a low probability of finding highly significant sites.” (Esh et al. 2008:45)

**Complications calculating the point value:** Straight-forward with the caveat that no portion of the Pu‘u o Pāpa‘i, Makaweli Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study).

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: **No**
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: **No**
3. Closest areas of archeological and/or historical significance to site boundary: Greater than 1 mile. No sites are known within the project area.

**Point Value: 3**

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**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The “site” is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** None. However, owners may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: Gay & Robinson / Robinson Family Partners
2. Privately owned: Yes
3. Site valuation: \$5,080,400 / \$1,892 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The "site" is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 0.5 miles S to Highway 50

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 1
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 1

**School or hospital on access road:** Depends on the access road used, but some pass very close to Kamehameha Preschool-Kaumakani

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** Depends on which access road is used. May affect residence whose driveway begins at intersection Kaumakani Avenue and Kaumualii Highway

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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## 10. *Consistency of the designation of the site for a landfill with the Kauaʻi General Plan*

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other locations are not specifically identified in the GP for landfill uses or development.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kauaʻi General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawaiʻi (ALISH) and the University of Hawaiʻi Land Study Bureau’s Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### ***11. Consistency of the site with the existing County land use zoning designation***

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 12. *Consistency of the site with the existing State Land Use District designation*

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes(HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### 13. *Location of site relative to the Underground Injection Control (UIC) Line*

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of site relative the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely mauka of the UIC line therefore the underlying aquifer is considered a drinking water source. Limited types of injection wells are allowed under UIC permits or permit exemptions. Permit requirements are more stringent.

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** The closest water body to the potential landfill site is Koula Ditch, with its .18 miles west of the site boundary. It is an impounded, permanent body used likely for agricultural purposes.

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 15. *Flora and fauna habitat*

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No
  - a. Name of flora and fauna habitat: N/A

- 
- b. Distance from site boundary to flora and fauna Designated Critical Habitat (DCH): Over 6 miles north.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 1.7 miles makai of 50 in. isohyet.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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**17. *Prevailing wind direction relative to populated areas***

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua‘i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

May affect Kaumakani about 0.25 miles away to SSW

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. Haul distance from major municipal solid waste generation areas**

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 3.7 miles from Hanapepe Refuse Transfer Station

**Complications calculating the point value:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The soil association for the general area is the Makaweli land association. A soil association is an area of like soils. The Makaweli land association comprises the majority of the site and consists of agricultural land.

Makaweli Association (MgB, MgC, MgD)

This upland soil is described as a deep, gently sloping to steep, well-drained series of soils that have a dominantly moderately fine textured or fined textured subsoil and shallow, steep and very steep, well-drained soils over basalt bedrock.

A very small area of the site consists of Lihue silty clay soil (LIB).

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9,  
2. Physical and Socioeconomic Factors

## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill at approximately 30 years.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed. Information is therefore “order of magnitude” and intended to be for comparative purposes only.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

### **Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.

6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 32 years

**Cost of site development per year of life:** \$364,094

**Group which includes the cost of development of this site:** Second group

**Basis for estimated costs in 2008 dollars:**

Acreage 143

No.	Item	Unit Cost	Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100.00	14,300	lf	\$1,430,000
5	Off-site road	\$100.00	2,640	lf	\$264,000
6	Utilities	\$300.00	16,940	lf	\$5,082,000
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$11,651,000
9	Cost per year of life				\$364,094

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 2**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
Average Cost Per Acre	\$25,510

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	143
Annual Cost of Operations (Cost per acre x Site acreage)	\$3,648,000
Group which includes the cost for this site	2
Point Value	2

**Point Value: 2**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Kekaha Mauka	(4)	\$4,489,800	1	1
Ma'alo	(5)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Puʻu O Papai	(3)	\$3,648,000	2	2
Umi	(2)	\$3,239,800	2	2
Kōloa	(7)	\$3,239,800	2	2
Kalepa	(1)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

The provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability was evaluated for each site based on information provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation, and updated versions of water utilities infrastructure are not available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the reports are from 2001 siting studies. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 1**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Puʻu O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Hanapepe

**Estimated response time:** 15 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai‘i GIS maps, Google Earth database, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Site is 0.6 miles north of Kamualii Road.

**Complications calculating the point value:** None.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 25. *Proximity to parks and recreational facilities*

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai'i GIS maps, TerraMetrics satellite maps, and County of Kaua'i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 1.7 miles to SE

**Name of park or recreational facility:** Hanapepe Park

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kaua'i Municipal Solid Waste Landfill Siting Study, 2001, and New Kaua'i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawai'i GIS maps were used as necessary to obtain additional data. The County of Kaua'i, Department of Public Works was also consulted

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The site acreage is 143 acres which is greater than the area requirement calculated at 133 acres. The site would be able to sustain waste depositing for an estimated period of approximately 32 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 4**

**Appendix A – Site Data Sheets**

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Site No. 4 – Kekaha-Mauka

**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 409.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** None (all within ½ mile have population density less than 25 people per sq mi)

**Point Value:** 4

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

**2. *Distance to nearest residence, school, hospital or non-compatible business***

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua'i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Business

**Distance from the property line to the nearest facility:** Directly across Highway 50 from proposed site.

**Address of nearest facility:** ~6900 Kaumualii Highway, Kekaha

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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### 3. *Displacement of residences and/or businesses including agricultural businesses*

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Number of residences displaced:** 0

**Number of businesses displaced:** 0

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** See Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area or within 0.5 mile. Sites are present at approximately one mile (see Esh et al. 2008 Figure 12), thus yielding an assigned point value of 3.

**Complications obtaining the data:** The Kekaha-Mauka, Kekaha Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is a low probability of finding highly significant sites.” (Esh et al. 2008:27).

**Complications calculating the point value:** Straight-forward with the caveat that no portion of the Kekaha-Mauka, Kekaha Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study).

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: No
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: No
3. Closest areas of archeological and/or historical significance to site boundary: Approximately 1 mile. No sites are known within the project area.

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11, 4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The "site" is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** None. However, the State of Hawai'i may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: State of Hawai'i
2. Privately owned: No
3. Site valuation: \$3,836,100 / \$295 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 0 (This potential site is on ceded land.)**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** Directly on Highway 50

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 0
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** Directly on Highway 50

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** None (directly on Highway 50)

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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## 10. *Consistency of the designation of the site for a landfill with the Kaua'i General Plan*

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other locations are not specifically identified in the GP for landfill uses or development.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kaua'i General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawai'i (ALISH) and the University of Hawai'i Land Study Bureau's Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### ***11. Consistency of the site with the existing County land use zoning designation***

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes(HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### **13. Location of site relative to the Underground Injection Control (UIC) Line**

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of the site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely makai of the UIC Line therefore the underlying aquifer is not considered a drinking water source. A wider variety of wells is allowed, although they are still regulated by permit and exemption limitations.

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** The Waiawa Reservoir is a permanent palustrine (<20acres, >6.6 ft. depth) surface water body .4 miles northeast of the potential site.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 15. *Flora and fauna habitat*

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No
  - a. Name of flora and fauna habitat: coastal dunelands

- 
- b. Distance from site boundary to flora and fauna habitat: 0.6 miles
  - c. Name of flora and fauna habitat: Diked impoundment wetland
  - d. Distance from site boundary to flora and fauna habitat: north end of the subject parcel adjacent to the Kekaha airstrip.
3. Other: A bird habitat restoration site, known as Kawai'ele State Bird Sanctuary, is located across Kaumuali'i Highway 1.8 miles north of the site.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 1.7 miles makai of 55 in. isohyet.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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**17. *Prevailing wind direction relative to populated areas***

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

None

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. Haul distance from major municipal solid waste generation areas**

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 11.3 miles from Hanapepe Refuse Transfer Station.

**Complications calculating the point value:** None

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The soil associations for the general area are the Kekaha (KobA, KoA) and Fill (Fd) land association. The Fill land association comprises the majority of the site and consists of many kinds of material. Both soil associations together comprise the majority of the site (70 to 80 percent).

The remaining areas of the site are comprised of two soil types:

Nohili Clay (Nh)

This soil series is often associated with the Kekaha series, and consists of well-drained, medium-textured and fine-textured soils on the Mana coastal plain.

Jaucas (JfB)

This association consists of excessively drained and well-drained soils in dunes and on former beach areas on the island. It comprises approximately 25 to 40 percent of the site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9,  
2. Physical and Socioeconomic Factors

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## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

Costs identified for the Kekaha Mauka site reflect the planned use of existing facilities at the adjacent Kekaha Landfill. These existing facilities include the Office and Maintenance buildings.

**Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.

4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.
6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 40 years

**Cost of site development per year of life:** \$296,750

**Group which includes the cost of development of this site:** Third group

**Basis for estimated costs in 2008 dollars:**

Acres 176

No.	Item	Unit Cost	Units	Unit	Cost
1	Office Building*	\$75	0	sf	\$0
2	Maintenance Building*	\$60	0	sf	\$0
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	17,600	lf	\$1,760,000
5	Off-site road	\$100	0	lf	\$0
6	Utilities	\$300	17,600	lf	\$5,280,000
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$10,790,000
9	Cost per year of life				\$269,750

\*Note: Existing Office and Maintenance Buildings at Kekaha Landfill will be used for Kekaha Mauka.

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 3**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua'i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
Average Cost Per Acre	\$25,510

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	176
Annual Cost of Operations (Cost per acre x Site acreage)	\$4,489,800
Group which includes the cost for this site	1
Point Value	1

**Point Value: 2**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Kekaha Mauka	(4)	\$4,489,800	1	1
Ma'alo	(5)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Pu'u O Papai	(3)	\$3,648,000	2	2
Umi	(2)	\$3,239,800	2	2
Kōloa	(7)	\$3,239,800	2	2
Kalepa	(1)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 3**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Waimea

**Estimated response time:** 15 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai'i GIS maps, Google Earth database, and County of Kaua'i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Site is adjacent to Kamualii Highway.

**Complications calculating the point value:** None.

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 25. *Proximity to parks and recreational facilities*

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai‘i GIS maps, TerraMetrics satellite maps, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 0.5 miles to S

**Name of park or recreational facility:** Kekaha Beach Park

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kaua'i Municipal Solid Waste Landfill Siting Study, 2001, and New Kaua'i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawai'i GIS maps were used as necessary to review the calculation procedure as necessary.

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The site acreage is 176 acres which is greater than the area requirement calculated at 133 acres. The site would be able to sustain waste depositing for an estimated period of approximately 40 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 5**

**Appendix A – Site Data Sheets**

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Site No. 5 – Ma‘alo

**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 404.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** None (all within ½ mile have population density less than 25 people per sq mi)

**Point Value:** 4

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

**2. *Distance to nearest residence, school, hospital or non-compatible business***

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua'i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Business

**Distance from the property line to the nearest facility:** 1,500 feet to W

**Address of nearest facility:** Kauai Memorial Gardens, 4590 Ma'alo Road, Lihue

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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### 3. ***Displacement of residences and/or businesses including agricultural businesses***

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** Entire parcel of land is 2181 acres. It is unclear how many (if any) and which agricultural businesses might be displaced.

**Number of residences displaced:** 0

**Number of businesses displaced:** 6 (potentially). Parcel (TMK 3-9-002:020) is owned by the State of Hawai'i and has six agricultural lessees:

- Bunao, Aurora: 247 acres
- Butler, Lara: 156 acres
- Kapaa Banana Company: 2 acres
- Gooding, Kelly: 19 acres
- Sanchez, Alison and William: 769 acres
- Calipjo, Elesther: 432 acres

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area or within 0.25 mile. Sites are present at between 0.25 to 0.5 mile (see Esh et al. 2008 Figure 69), thus yielding an assigned point value of **2**.

**Complications obtaining the data:** The Ma‘alo, Wailua Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is low probability of their being historic properties in the area.” (Esh et al. 2008:167)

**Complications calculating the point value:** No portion of the Ma‘alo, Wailua Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study). While there are several historic properties within a half-mile of the project area, these are located in a different environmental zone – along the south fork of the Wailua River, rather than the flat agricultural land that comprises the Ma‘alo project area.

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: No
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: No

- 
3. Closest areas of archeological and/or historical significance to site boundary:  
Between 0.25 and 0.5 mile. No sites are known within the project area.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The "site" is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** None. However, the State of Hawai'i may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: State of Hawai'i
2. Privately owned: No
3. Site valuation: \$6,939,700 / \$3,182 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 1.7 miles SE to Highway 56

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 1
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** Depending on access road (likely Ma'alo Road), trucks would pass Lihue Hongwanji Preschool

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** None but depending on access road may pass very close to Kauai Memorial Gardens (a large cemetery)

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

**10. Consistency of the designation of the site for a landfill with the Kaua‘i General Plan**

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other locations are not specifically identified in the GP for landfill uses or development.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kaua‘i General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawai‘i (ALISH) and the University of Hawai‘i Land Study Bureau’s Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**11. Consistency of the site with the existing County land use zoning designation**

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes (HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### ***13. Location of site relative to the Underground Injection Control (UIC) Line***

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely mauka of the UIC line therefore the underlying aquifer is considered a drinking water source. Limited types of injection wells are allowed under UIC permits or permit exemptions. Permit requirements are more stringent.

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### **14. Proximity to surface water**

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArcGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** The Wailua River runs parallel to the boundaries of this potential landfill site approximately .22 miles north. Additionally, another permanent reservoir lies .08 miles southwest of the site.

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**15. Flora and fauna habitat**

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua'i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No

- 
- a. Name of flora and fauna habitat: Designated Critical Habitat (DCH), Nonou Mountain, contains several species of endangered plants.
  - b. Distance from site boundary to flora and fauna DCH: 2.6 miles

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 0.6 miles mauka of 64 in. isohyet.

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**17. *Prevailing wind direction relative to populated areas***

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

None

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. *Haul distance from major municipal solid waste generation areas***

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 4.2 miles from Lihue Refuse Transfer Station

**Complications calculating the point value:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**19. Adequacy of site drainage**

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The soil association for the general area is the Puhi-Lihue land association. This land association comprises the majority of the site and consists of well-drained, medium textured and fine-textured soils. They developed from material weathered from basic igneous rock.

A small area on the western boundary of the site is made up of the Kapaa soil association, which is a well drained and moderately drained series of soils that were also derived from basic igneous rock.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed. Information is therefore “order of magnitude” and intended to be for comparative purposes only.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

### **Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.

5. The length of utility line is equal to the length of on-site and off-site roads.
6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 36 years

**Cost of site development per year of life:** \$411,817

**Group which includes the cost of development of this site:** Second group

**Basis for estimated costs in 2008 dollars:**

Acreage 159

No.	Item	Unit Cost	No. Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	15,900	lf	\$1,590,000
5	Off-site road	\$100	8,976	lf	\$897,600
6	Utilities	\$300	24,876	lf	\$7,462,800
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$14,825,400
9	Cost per year of life				\$411,817

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 2**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
<u>Average Cost Per Acre</u>	<u>\$25,510</u>

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	159
Annual Cost of Operations (Cost per acre x Site acreage)	\$4,056,100
Group which includes the cost for this site	1
Point Value	1

**Point Value: 1**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Kekaha Mauka	(4)	\$4,489,800	1	1
Ma'alo	(5)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Pu'u O Papai	(3)	\$3,648,000	2	2
Umi	(2)	\$3,239,800	2	2
Kōloa	(7)	\$3,239,800	2	2
Kalepa	(1)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 1**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	0.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Lihue

**Estimated response time:** 10 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai'i GIS maps, Google Earth database, and County of Kaua'i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Site is 0.7 miles from Ma'alo Road, a standard well-travelled roadway.

**Complications calculating the point value:** None.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 25. *Proximity to parks and recreational facilities*

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai'i GIS maps, TerraMetrics satellite maps, and County of Kaua'i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 0.2 miles to N

**Name of park or recreational facility:** Wailua River State Park

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kaua'i Municipal Solid Waste Landfill Siting Study, 2001, and New Kaua'i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawai'i GIS maps were used as necessary to obtain additional data.

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The site acreage is 159 acres which is greater than the area requirement calculated at 133 acres. The site would be able to sustain waste depositing for an estimated period of approximately 36 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 6**  
**Appendix A – Site Data Sheets**  
Site No. 6 – Kīpū

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**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 404.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** None (all within ½ mile have population density less than 25 people per sq mi)

**Point Value:** 4

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

**2. *Distance to nearest residence, school, hospital or non-compatible business***

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua‘i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Residence

**Distance from the property line to the nearest facility:** 1,500 feet to NW

**Address of nearest facility:** 3-2122 Kaumualii Highway, Lihue

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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### 3. ***Displacement of residences and/or businesses including agricultural businesses***

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Number of residences displaced:** 0

**Number of businesses displaced:** 0

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua'i Municipal Solid Waste Landfill, Cultural Surveys Hawai'i, 2008.

**How the point value of the criterion was determined:** Site -3010 lies within 0.25 of the landfill (see Esh et al. 2008 Figure 47), thus yielding an assigned point value of **1**.

**Complications obtaining the data:** The Kīpū, Ha'ikū Ahupua'a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is a fairly low probability of there being historic properties in the area due to agricultural disturbance.” (Esh et al. 2008:111).

**Complications calculating the point value:** No portion of the Kīpū, Ha'ikū Ahupua'a project area has been previously studied (prior to the Esh et al. 2008 study). Neighboring sites are generally located in a different environmental zone (along the river) than the project area, and their presence does not necessarily increase the likelihood of archaeological sites being found within the Kīpū project area.

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: No
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: Yes
3. Closest areas of archeological and/or historical significance to site boundary: Approximately 0.25 miles. No sites are known within the project area.

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**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The “site” is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** Three TMK parcels, but all with same owner. Owner may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: Grove Farm Company, Ltd.
2. Privately owned: Yes
3. Site valuation: \$8,058,400 / \$7,378 per acre

**Life of Landfill:** Approximately 30 years

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 0.2 miles N to Highway 50

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 0
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** None (directly on Highway 50)

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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### ***10. Consistency of the designation of the site for a landfill with the Kaua'i General Plan***

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other landfill locations are not identified.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kaua'i General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawai'i (ALISH) and the University of Hawai'i Land Study Bureau's Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### ***11. Consistency of the site with the existing County land use zoning designation***

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes(HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, Hawai‘i Revised Statutes

**How the point value of the criterion was determined:** Location of proposed landfill sites were compared to Hawai‘i GIS maps identifying the State Land Use Districts of Kauai.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### 13. *Location of site relative to the Underground Injection Control (UIC) Line*

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:** The site is located completely mauka of the UIC line therefore the underlying aquifer is considered a drinking water source. Limited types of injection wells are allowed under UIC permits or permit exemptions. Permit requirements are more stringent.

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** A permanent, palustrine (<20 acres & <6.6 ft) surface water body lies .15 miles from the boundary of this site.

**Point Value: 0**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 15. *Flora and fauna habitat*

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: No

- 
- a. Name of T&E flora and fauna habitat: Haupu Ridge Designated Critical Habitat (DCH)
  - b. Distance from site boundary to flora and fauna DCH: 1.3 miles

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** 1.1 mile maikai of 48 in. isohyet.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**17. Prevailing wind direction relative to populated areas**

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

None

**Point Value: 3**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. *Haul distance from major municipal solid waste generation areas***

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 5.3 miles from Lihue Refuse Transfer Station

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The site is comprised of many soil types, mainly Puhi Silty Clay Loam:

**Puhi Association (PnB, PnC, PnD)**

Being a loamy soil, this series has high drainage and medium textured forms. This is the predominant soil association at the site, and composes more than fifty percent of the site.

**Kapaa Association (KkC, KkE)**

The Kapaa association is a well drained and moderately drained soil that has a fine textured or moderately fine textured subsoil. It occurs in small pockets throughout the site and around the area.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed. Information is therefore “order of magnitude” and intended to be for comparative purposes only.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

### **Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.

6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 33 years

**Cost of site development per year of life:** \$340,697

**Group which includes the cost of development of this site:** Second group

**Basis for estimated costs in 2008 dollars:**

Acreage 146

No.	Item	Unit Cost	Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	14,600	lf	\$1,460,000
5	Off-site road	\$100	1,320	lf	\$132,000
6	Utilities	\$300	15,920	lf	\$4,776,000
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$11,243,000
9	Cost per year of life				\$340,697

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 2**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
Average Cost Per Acre	\$25,510

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	146
Annual Cost of Operations (Cost per acre x Site acreage)	\$3,724,500
Group which includes the cost for this site	2
Point Value	2

**Point Value: 2**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Pu'u O Papai	(3)	\$4,489,800	1	1
Kalepa	(1)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Umi	(2)	\$3,648,000	2	2
Ma'alo	(5)	\$3,239,800	2	2
Kekaha Mauka	(4)	\$3,239,800	2	2
Kōloa	(7)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 1**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Lihue

**Estimated response time:** 10 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai‘i GIS maps, Google Earth database, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Site is 0.3 miles from Kamualii Highway.

**Complications calculating the point value:** None.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 25. *Proximity to parks and recreational facilities*

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai‘i GIS maps, TerraMetrics satellite maps, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** No parks or recreational facilities within several miles of site

**Name of park or recreational facility:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kaua'i Municipal Solid Waste Landfill Siting Study, 2001, and New Kaua'i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawai'i GIS maps were used as necessary to obtain additional data.

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be 133 acres.

**Complications obtaining the data:** The site acreage is 146 acres which is greater than the requirement of 133 acres. The site would be able to sustain waste depositing for an estimated period of approximately 33 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**

**Tab 7**  
**Appendix A – Site Data Sheets**  
Site No. 7 – Kōloa

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**1. *Population density near the site*<sup>1</sup>**

All other things being equal, a site located near areas with a low population density would have less potential for impacting humans.

Point Value	Measure
0	More than 50 persons per square mile living within one-half mile of the site
2	Between 25 and less than 50 persons per square mile living within one-half mile of the site
4	Less than 25 people per square mile living within one-half mile of the site

**Data Source:** US Census data from census blocks (2000). Data for the block group including the landfill site plus blocks within ½ mile of the site were used.

**How the point value of the criterion was determined:** The point value is based on the most populous block including or within ½ mile of the landfill site.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Census block group in which the potential landfill site is located:** 406.1

**Census block within ½ mile of potential landfill with more than 25 people per square mile:** None (all within ½ mile have population density less than 25 people per sq mi)

**Point Value:** 4

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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<sup>1</sup> Based on average of 94 persons per square mile in the County of Kauai. This measure is based on 50% or approximately 47 persons per square mile as the starting point. State of Hawai'i Data Book, 2007.

**2. *Distance to nearest residence, school, hospital or non-compatible business***

A better site will be further from a residence, hospital, school or business. The distance is calculated from the property line of the landfill to the residence, school, hospital, or non-compatible business.

Point Value	Measure
1	The nearest facility is located less than 0.25 miles from the proposed landfill property line
2	The nearest facility is located between 0.25 and 0.50 miles from the proposed landfill property line
3	The nearest facility is located more than 0.50 miles from the proposed landfill property line

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps. The distances between the proposed landfill site boundaries and the apparent nearest residence, school, hospital or business was calculated using County of Kaua‘i Geographic Information Service (GIS) maps.

**How the point value of the criterion was determined:** Distances were measured from nearest point on the boundary of the subject parcel and an estimate of the nearest edge of the proposed landfill site.

**Complications obtaining the data:** Exact boundaries of proposed landfill sites are unclear, thus distances to facilities are estimates and should not be considered to be exact. To assure consistency in using multiple maps, sites between which distances were measured were identified by Tax Map Key (TMK) identifiers.

**Complications calculating the point value:** None

**Type of facility that is closest:** Business

**Distance from the property line to the nearest facility:** Old Koloa Sugar Mill is within potential site boundary. Unclear if there is an active business(es) there.

**Address of nearest facility:** Old Koloa Sugar Mill, Weliweli Road, Koloa

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

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### 3. ***Displacement of residences and/or businesses including agricultural businesses***

Use of vacant land for landfilling is preferred. Also, the taking of land in whole or in part that is used by a business is to be avoided as it could adversely impact the viability of the business.

Point Value	Measure
1	A residence and/or businesses would be displaced
3	No displacement

**Data Source:** Residences, schools, hospitals, and businesses were identified using TerraMetrics satellite maps and Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Parcel information for parcels including the potential landfill site collected. Points recorded based on information on dwellings and other structures.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Number of residences displaced:** 0

**Number of businesses displaced:** 0

**Business displaced:** Old Koloa Sugar Mill is within potential site boundary. Although there is an active business(es) located nearby it would not be displaced.

**Address of displaced business:** Old Koloa Sugar Mill, Weliweli Road, Koloa

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

#### 4. *Archaeological and/or historical significance*

Sites that have archeological and/or historical significance, or are near areas of significance may be more costly to develop.

The “site” is the landfill property.

Archeological and historical significance is determined by the status of listing of the site by the State Historic Preservation Division, Department of Land and Natural Resources.

Point Value	Measure
1	Known area(s) of significant archeological and/or historical importance have been listed in areas within 0.25 miles of the site
2	Known area(s) of significant archeological and/or historical importance have been listed in areas between 0.25 and 0.5 miles of the site
3	Known area(s) of significant archeological and/or historical importance have been listed in areas greater than 0.5 miles of the site

**Data Source:** Archaeological Literature Review of Eight Possible Locations for a Kaua‘i Municipal Solid Waste Landfill, Cultural Surveys Hawai‘i, 2008.

**How the point value of the criterion was determined:** No sites are known within the proposed landfill area but one designated site (Bennett’s site 85) lies between 0.25 and 0.5 mile. (see Esh et al. 2008 Figure 38), thus yielding an assigned point value of **2**.

**Complications obtaining the data:** The Kōloa, Pā‘ā Ahupua‘a project area has not been reviewed in a prior archaeological inventory survey. Nevertheless a fairly thorough background study has concluded “there is low probability of finding sites within the project area.” (Esh et al. 2008:92)

**Complications calculating the point value:** Straight-forward with the caveat that no portion of the Kōloa, Pā‘ā Ahupua‘a project area has been previously studied (prior to the Esh et al. 2008 study).

1. Areas of known archeological and/or historical significance have been listed as being located on the site property: No
2. Areas of known archeological and/or historical significance have been listed as being located on property within a quarter mile of the site: Yes
3. Closest areas of archeological and/or historical significance to site boundary: Approximately 0.4 miles. No sites are known within the project area.

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**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 11,  
4. Archaeological and Historic Resources, Criteria No. 4

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## 5. *Cost of site acquisition*

This is the cost of acquiring the ownership of the site.

The "site" is the landfill property.

The "cost" is the annualized cost of site acquisition amortized over the life of the landfill.

Point Value	Measure
1	The site is in the group with the highest site cost
2	The site is in the group between the lowest and the highest site costs
3	The site is in the group with the lowest site cost

**Data Source:** Tax Map Key records.

**How the point value of the criterion was determined:** The 2008 assessed value of the land and buildings was tabulated and divided by the number of acres within the parcel for an approximate cost per acre. The cost of the sites will be listed in order from highest to lowest cost. The list is divided into thirds, with the highest cost in the first third, the lowest cost in the third group, and the others in the second group.

**Complications obtaining the data:** The use of tax map key records is intended to provide a relative ranking between the sites and should not be construed to represent the anticipated actual cost of site acquisition.

**Complications calculating the point value:** None. However, the owner may not be willing to sell the property.

### **Cost of Site Acquisition:**

1. Owner of property: Grove Farm Company
2. Privately owned: Yes
3. Site valuation: \$5,131,600 / \$2,164 per acre

**Life of Landfill:** Approximately 30 years

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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## 6. *Ceded or Hawaiian Homestead Land*

Land that is ceded or homestead land is considered less desirable for use based on potential for liability issues associated with the potential imposition of costs or loss of use.

The “site” is the landfill property.

Point Value	Measure
0	The site is ceded or homestead land
2	The site is considered ceded or homestead land
4	The site is not ceded or homestead land

**Data Source:** Tax Map Key records. Interview with D. Bucasas at Office of Hawaiian Affairs (OHA) on November 20, 2008.

**How the point value of the criterion was determined:** The sites were evaluated to determine the initial ceded or homestead status of the site as provided in the tax map records of the State of Hawai‘i and via input from the Office of Hawaiian Affairs (OHA)

**Complications obtaining the data:** Tax map key records are initially used to determine the status of the land. Further investigation with OHA was made to properly assess the status of the property to determine if it is ceded or homestead land.

**Complications calculating the point value:** Further assessment of the site is required to determine the ownership and title history of the property. This assessment is outside of the scope of this present investigation.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

## 7. *Site distance from major highway*

This is the distance of the site from a major highway serving as the major means of transporting refuse to the landfill site.

The “site” is the landfill property.

The definition for a major highway will be as defined by the State DOT.

The distance of the sites from the major highway will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a major highway
2	The site is in the group between the least and the highest distances from a major highway
3	The site is in the group with the least distance from a major highway

**Data Source:** TerraMetrics satellite maps for identification of sites and major highways. Estimation of distances shall be as provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the estimated distances in miles for each of the sites to a major highway.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to major highway are estimates and should not be considered to be exact.

**Distance and direction to nearest major highway:** 3.3 miles NW to Highway 50

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

**8. *Schools or hospitals along access road\****

This criterion measures the number of schools and/or hospitals located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than one school or more than one hospital
2	Access road passes one school or one hospital
3	Access road does not pass any schools or hospitals

**Data Source:** Hawai'i Department of Education. TerraMetrics satellite maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data, information about private schools, and preschool list.

**Complications obtaining the data:** Available preschool information may not be comprehensive.

**Complications calculating the point value:** None

An access road is one that may be considered a county or state street or road and provides direct access to the site. The proposed landfill site is the property boundary.

1. Number of schools depending on, but not actually on the access road: 0
2. Number of hospitals depending on, but not actually on, the access road: 0
3. Total number of schools and hospitals: 0

**School or hospital on access road:** None

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

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**9. Residential units or developments along access road\***

This criterion measures the number of residences or residential units located on the access road to the proposed landfill site.

The “site” is the landfill property.

The “access road” is one that may be considered a county or state street or road but does not have a county, state or federal numerical designation.

Point Value	Measure
1	Access road passes more than five residences
2	Access road passes more than one residence
3	Access road does not pass any residences or residential developments

**Data Source:** TerraMetrics satellite maps. Tax Map Key (TMK) maps.

**How the point value of the criterion was determined:** Identification of parcels using real property data.

**Complications obtaining the data:** None

**Complications calculating the point value:** Many potential sites have several available access roads. The access road with the most residences was used to calculate point value.

**Residential units or developments affected:** Unclear access road, but most would utilize Koloa Bypass Road which passes multiple residences.

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

\*Access Road is defined as a roadway between a Highway or a Major Collector Street/Road that directly accesses the landfill site.

**10. Consistency of the designation of the site for a landfill with the Kaua‘i General Plan**

The County General Plan is a policy document that serves as a guide to help plan and improve the physical environment and quality of life for the people of Kauai, and to address the overall development of the island. The General Plan (GP) identifies the existing Kekaha Landfill Phase II as a public facility. Other landfill locations are not identified.

Point Value	Measure
0	Land uses not consistent with General Plan
2	Land uses where a landfill may require a General Plan (Map) Amendment
4	Land uses where a landfill is consistent with the General Plan

**Data Source:** County of Kaua‘i General Plan.

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to General Plan Land Use Maps. Landfills will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** The siting of a landfill within agricultural zoned land should include further evaluation with regard to agricultural quality. A review of the Agricultural Lands of Importance to the State of Hawai‘i (ALISH) and the University of Hawai‘i Land Study Bureau’s Detailed Classification for land productivity are recommended as part of this future effort prior to or during the environmental assessment phase.

**Complications calculating the point value:** None

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### ***11. Consistency of the site with the existing County land use zoning designation***

The regulations for land development and the construction of buildings and other structures are defined in the County's Comprehensive Zoning Ordinance (CZO). The regulations and standards prescribed by the CZO promote development that is compatible with the Island's scenic beauty and environment and attempts to preclude inadequate, harmful or disruptive conditions that may prove detrimental to the social and economic well-being of the residents of Kauai.

The major County Zoning Districts include: Residential (R), Resort (RR), Commercial (C), Industrial (I), Agriculture (A), Open (O), Special Treatment (ST), and Constraint (S). The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	CZO (Zoning) Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying zoning classification	Residential (R), Resort (RR), Special Treatment (ST)	0
The siting of a landfill would require a Change of Zone and/or other land use entitlement	Commercial (C), Agriculture (A), Open (O), Constraint (S)	2
The siting of a landfill would not require a Change of Zone	Industrial (I)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying zoning classification
2	The siting of a landfill would require a Change of Zone and/or other land use entitlement
4	The siting of a landfill would not require a Change of Zone

**Data Source:** County of Kaua‘i Comprehensive Zoning Ordinance (CZO), and Planning Department, County of Kaua‘i

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to the CZO Maps. Following a zone change, a landfill will be considered as acceptable within agricultural zoned lands similar to the land use designation of the existing Kekaha Landfill. Open lands may also be considered as possible.

**Complications obtaining the data:** None. The site zoning is: Agricultural.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

**12. Consistency of the site with the existing State Land Use District designation**

The State Land Use Law (Chapter 205, Hawai‘i Revised Statutes(HRS)) provides for the classification of all land in the State of Hawaii into one of four Districts: Urban, Rural, Agricultural, and Conservation. The categories were assigned to a ranking of desirability for a landfill as follows:

Measure	State Land Use Designation	Point Value
The siting of a landfill is clearly inconsistent with the underlying land use district classification	Conservation	0
The siting of a landfill would require a Land Use District Boundary Amendment or State Special Use permit	Agricultural, Rural, Conservation (a limited portion of the site is within this district)	2
The siting of a landfill is consistent with the State Land Use District Classification	Urban (e.g., industrial use)	4

Point Value	Measure
0	The siting of a landfill is clearly inconsistent with the underlying land use district classification
2	The siting of a landfill would require a State Land Use District Boundary Amendment or State Special Use permit
4	The siting of a landfill is consistent with the State Land Use District Classification

**Data Source:** Chapter 205, HRS

**How the point value of the criterion was determined:** Location of proposed landfill sites compared to Hawai‘i GIS maps identifying the State Land Use Districts.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 2

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### **13. Location of site relative to the Underground Injection Control (UIC) Line**

This criterion measures whether a site is located over the Underground Injection Control (UIC) Line administered by the State DOH for purposes of protecting groundwater resources.

The property line is used as the boundary for comparing the site to the UIC Line.

Point Value	Measure
1	The site is located inside the UIC Line
2	The site is located coincident with the UIC Line with the line passing through the property boundary of the site
3	The site is located outside of the UIC Line

**Data Source:** Review of State of Hawai'i, DOH UIC Maps and consultation with the County of Kaua'i, Department of Water Supply

**How the point value of the criterion was determined:** Based on location of the site relative to the UIC zone in combination with DWS hydrologist confirmation for value and use of site for future water development.

**Complications obtaining the data:** None

**Complications calculating the point value:**

The site is located coincident with the UIC Line with a portion of the site makai of the line. Based on partial boundary lines located mauka of the UIC, permit regulations for mauka sites apply.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

#### 14. *Proximity to surface water*

This criterion measures the location of the site relative to surface water resources located near the site. Sites that are closest to surface water sources, i.e., shoreline, coastal, or inland streams, whichever is closer, would be less desirable.

The property line is used as the boundary for locating the distance of the site from surface water resources.

Point Value	Measure
0	The site is located 0.25 miles or less from surface water resources
2	The site is located between 0.25 and 0.50 miles from a surface water resource
4	The site is located more than 0.50 miles from surface water resources

**Data Source:** State of Hawai'i GIS maps for the identification of surface (inland or coastal) water resources and TMK map layers for the identification of the planned landfill property boundaries.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest surface water resource was determined using the distance calculation feature in the GIS program, ArchGIS, version 9.2. Relevant surface water resources were described using GIS values collected by the U.S. Fish and Wildlife Service during a State-wide inventory of wetlands in Hawai'i in 1992.

**Complications obtaining the data:** None

**Complications calculating the point value:** The Waita Reservoir is a permanent, lacustrine (>20 acres, >6.6 ft. depth) body of water with deepwater habitats. It is 0.27 miles from the potential landfill site.

**Point Value: 2**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 15. *Flora and fauna habitat*

If the site is habitat for rare, threatened, or endangered flora and fauna on or near it, it is less desirable.

The "site" is the property boundary of the landfill.

Point Value	Measure
0	Flora and fauna habitat located less than 0.25 miles from the site with rare, threatened or endangered species indicated
2	Flora and fauna habitat exist between 0.25 and 0.50 miles from the site
4	Flora and fauna habitat exist at distances greater than 0.50 miles from the site

**Data Source:** U.S. Fish & Wildlife Critical Habitat Maps for Kaua‘i, including threatened and endangered plants and *elepaio* (bird). Considered are the 48 new species recently proposed (50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Listing 48 species on Kauai as Endangered and Designating Critical Habitat. Proposed Rule. Federal Register, 73(204): 62591-62742, Tuesday, October 21, 2008). This number includes 45 plants, two birds (*akikiki* and *akekee*), and one Hawaiian picture-wing fly. Wetlands as mapped by the National Wetland Inventory can be accessed at URL: <http://www.fws.gov/wetlands/data/Mapper.html>.

**How the point value of the criterion was determined:** Using critical habitat maps and measuring distance from the habitat to the boundary of the landfill site.

**Complications obtaining the data:** Although the proposed sites tend to have wetlands on or near the property, these are in many cases artificial impoundments that are or were part of an agriculture irrigation system. In most cases, these wetlands are really ponds or small, reservoirs that provide little or no true wetland habitat.

**Complications calculating the point value:** The process of designating critical habitat areas for listed species is a complicated one, and the absence of Designated Critical Habitat is not the same as an absence of any listed species. In many cases, the distribution of a listed species exceeds the area of designated critical habitat for that species.

The site is considered the property boundary.

1. Threatened or endangered (T&E) flora and fauna habitat has been designated on the site: No
2. T&E flora and fauna habitat is located within one mile of the site boundary: Yes

- 
- a. Name of T&E flora and fauna habitat: Designated Critical Habitat (DCH):  
cave habitat
  - b. Distance from site boundary to flora and fauna habitat: 0.7 miles
  - c. Name of flora and fauna habitat: wetlands
3. Other: Biological resource value in this area is tied to underground caves that harbor the blind wolf spider (*Adelocosa anops*) and the Kauai cave amphipod (*Spelaeorchestia koloana*), both listed endangered species. The habitat for these animals is scattered, and DCH is all south and west of the site.

**Point Value: 4**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 10,  
3. Flora and Faunal Resources

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## 16. *Annual precipitation*

The less rainfall a site has, the less liquid produced that has to be managed, making that location a better site.

The “site” is the landfill property.

This criterion uses isohyets from the Atlas of Hawaii, 1998.

Point Value	Measure
1	Greater than 60 inches annual precipitation
2	20 to 60 inches annual precipitation
3	Less than 20 inches annual precipitation

**Data Source:** Atlas of Hawaii, 2nd & 3rd Editions, University of Hawaii Press, 1983 & 1998.

**How the point value of the criterion was determined:** Comparison of the midpoint of the landfill site with the location of the nearest isohyet(s).

**Complications obtaining the data:** Interpolation between isohyets is sometimes required when the site does not fall exactly on a particular isohyet.

**Complications calculating the point value:** None

**Location of site relative to isohyet:** Coincides with 48 in isohyet.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

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**17. *Prevailing wind direction relative to populated areas***

A site located so the trade winds blow away from populated areas would be superior to one where winds blow toward populated areas.

The “site” is the landfill property.

Populated areas are defined as locations with a collection of housing units comprising a subdivision; a delineated housing development; a group of homes located along a street or road; or a visitor serving facility, e.g. hotels.

Point Value	Measure
1	The prevailing wind blows from the site toward populated areas
3	The prevailing wind does not blow from the site toward populated areas

**Data Source:** National Oceanic and Atmospheric Administration

**How the point value of the criterion was determined:** Comparison of wind direction data, site maps, and GIS maps delineating population centers on the Island of Kaua'i.

**Complications obtaining the data:** No site-specific data available

**Complications calculating the point value:** No site-specific data available on the incidence over time of prevailing winds (trade or Kona winds).

**Location of populated areas immediately downwind of trade or Kona generated winds:**

Koloa, approximately 1 mile to W

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**18. *Haul distance from major municipal solid waste generation areas***

This is the distance from the closest refuse transfer station serving as the starting point for trips to the identified alternative landfill site.

The “site” is the landfill property.

The locations of the transfer stations is from the County of Kaua'i, Department of Public Works.

The distances will be listed in order from highest to lowest. The list is divided into three ranks.

Point Value	Measure
1	The site is in the group with the greatest distance from a refuse transfer station
2	The site is in the group between the least and the highest distances from a refuse transfer station
3	The site is in the group with the least distance from a refuse transfer station

**Data Source:** State of Hawai'i GIS database maps for identification of potential landfill sites and refuse transfer stations (by street address). Estimation of distances provided by the map distance measuring function.

**How the point value of the criterion was determined:** Comparing the distances in miles for each of the sites to the closest refuse transfer station.

**Complications obtaining the data:** Site is 14.1 miles from Lihue Refuse Transfer Station.

**Complications calculating the point value:** None

**Point Value: 1**

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

### 19. *Adequacy of site drainage*

The ability of the landfill to drain surface water naturally from on and off-site tributary areas reduces engineering and design associated costs. Sites with soils conducive to good drainage are preferred (based on installation of a landfill liner system that meets or exceeds federal and state standards).

Point Value	Measure
1	Fine grained soils or clays
2	Sand and/or gravel, some fine grained soils identified
3	Coarse grained soils

**Data Source:** The ability of a landfill to drain water is a function of the surface soils. Soil information was obtained from the Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (Soil Conservation Service, U.S. Department of Agriculture, 1972).

**How the point value of the criterion was determined:** The particle size of the prevalent soil types determined the point value. Coarser grained soils (sands and gravels) provide good drainage and receive a score of 3. Finer grained materials (e.g. silts and clays) restrict the movement of water and receive a score of 1. A combination of fine and coarse grained materials (allows some drainage but at a slower rate) receives a score of 2.

The soil association for the general area is the Waikomo land association. The Waikomo land association comprises the majority of the site and consists of moderately deep, medium texture and well drained upland soils or fine textured and poorly drained bottom-land soils. According to the site's elevations, the area is likely to show characteristics of the latter type of subsoils.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 20. *Cost of development*

The cost of development includes scale facilities, maintenance shops, cell preparation, drainage, bringing utilities to the site, excavation of the initial operating area, access road purchase and improvements (if needed), and other infrastructure related costs.

The “site” is the landfill property.

The “cost” is the annualized cost of site development amortized over the life of the landfill at approximately 30 years.

The cost of the sites will be listed in order from highest to lowest. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest development cost
2	The site is in the group between the lowest and the highest costs of development
3	The site is in the group with the lowest development cost

**Data Source:** Rough estimate of costs based on recent unit costs for projects on O‘ahu.

**How the point value of the criterion was determined:** Unit costs multiplied by the estimated access road length or other factor to obtain the total cost for the item.

**Complications obtaining the data:** Many unknown local conditions that make the estimating subject to large changes when detailed on-site engineering is performed.

**Complications calculating the point value:** Costs are rough estimates only based on assumptions that may not reflect actual site conditions. Unknown local conditions will significantly affect the cost estimates when on-site engineering design is performed.

**Assumptions used in the cost estimating:**

1. Roadways are 25 feet wide and designed to carry heavy trucks.
2. Preliminary costs for drainage include concrete work, excavation and grading.
3. Building costs do not include site preparation.
4. The estimates for utilities are based on experience with prior projects in open areas with no major difficulties with terrain or environmental concerns.
5. The length of utility line is equal to the length of on-site and off-site roads.

6. Development of on-site access roadways are based on an average crossing requirement of approximately 100 linear feet per acre.
7. Drainage improvement costs are based on an average of 3,500 linear feet of improvements for each of the sites.

**Life of the Landfill:** 30 years

**Cost of site development per year of life:** \$564,153

**Group which includes the cost of development of this site:** First group

**Basis for estimated costs in 2008 dollars:**

Acreage 127

No.	Item	Unit Cost	Units	Unit	Cost
1	Office Building	\$75	3,000	sf	\$225,000
2	Maintenance Building	\$60	15,000	sf	\$900,000
3	Scale	\$250,000	1	ea	\$250,000
4	On Site Road	\$100	12,700	lf	\$1,270,000
5	Off-site road	\$100	17,424	lf	\$1,742,400
6	Utilities	\$300	30,124	lf	\$9,037,200
7	Drainage improvements cost	\$1,000	3,500	lf	\$3,500,000
8	Total development cost				\$16,924,600
9	Cost per year of life				\$564,153

**Rough Estimate of Development Cost, Summary of All Sites in 2008 dollars:**

		Years	Total	Annual		
		Life	Dev Cost	Cost	Group	Point Value
Kōloa	(7)	30	\$16,924,600	\$564,153	1	1
Maalo	(5)	36	\$14,825,400	\$411,817	2	2
Umi	(2)	28	\$11,222,200	\$400,793	2	2
Pu'u O Papai	(3)	32	\$11,651,000	\$364,094	2	2
Kalepa	(1)	30	\$10,700,600	\$356,687	2	2
Kīpū	(6)	33	\$11,243,000	\$340,697	2	2
Kekaha Mauka	(4)	40	\$10,790,000	\$269,750	3	3

**Point Value: 1**

## 21. *Cost of operations*

The cost of operations includes the cost of equipment, operations, personnel, leachate and gas management, the availability and suitability of daily cover, cost of liner material, and other services needed to properly operate and maintain a landfill.

The “site” is the landfill property. The “cost” is the annual cost of site operations divided by the life of the landfill in years.

The cost of the sites is listed from highest to lowest cost. The list is divided into thirds, with the highest cost sites in the first third, the lowest cost sites in the third group, and the others in the second group.

Point Value	Measure
1	The site is in the group with the highest operations cost
2	The site is in the group between the least and the highest operations cost
3	The site is in the group with the least operations cost

**Data Source:** County of Kaua‘i, Department of Public Works, for annual operating costs at Kekaha Landfill.

**How the point value of the criterion was determined:** Estimated area of the landfill and comparative operations cost for the Kekaha Landfill (the only operational municipal solid waste disposal site on the island) to derive a unit cost per acre. The unit cost was multiplied by the total site acreage to derive a comparative annual operating cost.

### **Basis for Operating Cost Estimate:**

Annual Cost (2008 Dollars)	\$2,500,000
Site Acreage*	98
Average Cost Per Acre	\$25,510

\*Notes: Site acreage is based on both phases of the existing Kekaha Landfill (Phases I and II) to account for existing infrastructure and support facilities located on Phase I that serves the Phase II area.

**Complications obtaining the data:** None. The cost of operations is assumed to be partly offset by the generation of tip fees for the life of the landfill.

**Complications calculating the point value: None**

Site Acreage	127
Annual Cost of Operations (Cost per acre x Site acreage)	\$3,239,800
Group which includes the cost for this site	2
Point Value	2

**Point Value: 2**

**Comparison of Sites:**

Site	No.	Annual Cost	Group	Point Value
Kekaha Mauka	(4)	\$4,489,800	1	1
Ma'alo	(5)	\$4,056,100	1	1
Kīpū	(6)	\$3,724,500	2	2
Pu'ū O Papai	(3)	\$3,648,000	2	2
Umi	(2)	\$3,239,800	2	2
Kōloa	(7)	\$3,239,800	2	2
Kalepa	(1)	\$1,964,300	3	3

## 22. *Availability of utilities (water)*

Utility data for water, wastewater, power, and telephone service are not readily available for all sites under this evaluation. However, the provision of water supply is essential to the operation of a landfill. It is used for dust control, irrigation, fire fighting, and related purposes necessary in order to operate a landfill. For this reason an evaluation based on estimated water availability is provided.

Water availability is based on the evaluation of each site based on information as provided from prior reports performed by Earth Tech, Inc. The distance from the terminus of the water supply line to the site is measured to determine the length of connection (construction effort) required to provide water. The list produced for each site is ranked from highest to lowest effort and is divided into thirds. Sites that have the greatest requirement, in terms of new construction, are placed in the first third. The lowest effort sites are in the third group, and the other sites are in the second group. If a new water supply source must be developed the site is placed in the first third.

Point Value	Measure
1	The site is in the group with the highest construction cost
2	The site is in the group between the least and the highest construction cost
3	The site is in the group with the least construction cost

**Data Source:** The New Kaua‘i Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002 report by Earth Tech, Inc. State of Hawai‘i GIS maps were used to obtain additional information on the availability of water utilities to the site.

**How the point value of the criterion was determined:** Availability of water service was reviewed based on analysis performed by Earth Tech, Inc. GIS layers for the site and roadways were used to infer the nearest water utility line. Construction costs are expected to increase as a function of distance to the site, therefore sites that were farther from available sources were given a lower score.

**Complications obtaining the data:** Updated versions of water utilities infrastructure are not readily available due to security measures enacted in recent years. The likelihood of newly constructed utilities closer to some sites requires further detailed investigation.

**Complications calculating the point value:** Figures extracted from report are outdated, as the report was from a 2001 study on the potential siting of a landfill. New utilities may have been installed closer or removed from areas near the site.

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**Point Value: 3**

**Comparison of sites:**

Alternative Site	Distance From Transmission Line	New Source Required?	Rank
Kalepa	2 miles	Yes	1
Umi	1 mile	Yes	2
Pu'u O Papai	2 miles	Yes	1
Kekaha Mauka	0 miles	No	3
Maalo	2.5 miles	No	1
Kīpū	1.5 miles	Yes	1
Kōloa	0.19 miles	No	3

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### 23. *Access to fire protection*

This access to service is measured by the estimated time identified by the County of Kaua'i Fire Department in responding to a fire at the landfill site.

The "site" is the landfill property.

Point Value	Measure
1	Time for responding is greater than 6 minutes
2	Response time is between 3 and 6 minutes
3	Time for responding is less than 3 minutes

**Data Source:** Captain David Bukoski, Kauai Fire Prevention Bureau

**How the point value of the criterion was determined:** Interview with Fire Department personnel, November 20, 2008.

**Complications obtaining the data:** None

**Complications calculating the point value:** None

**Nearest fire station:** Koloa

**Estimated response time:** 10 minutes

**Point Value:** 1

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8,  
1. Physical and Socioeconomic Factors

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**24. Availability of existing access roadway from major highway or collector street/road**

Access to the site is based on one of three conditions: (1) no existing access road or trail; (2) limited site access provided but not for the entire length required to access the site; and (3) access road available but requires improvements.

The “site” is the landfill property.

Point Value	Measure
1	No access road available, construction required
2	Limited site access, the entire access does not meet county standards, construction required
3	Existing access roadway that meets county standards is available to the site from a major highway, minimal construction improvements required

**Data Source:** State of Hawai‘i GIS maps, Google Earth database, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** Based on availability of site trails or roads as identified on existing mapping sources.

**Complications obtaining the data:** Site is 0.3 miles from Koloa By-pass road, a well-travelled road.

**Complications calculating the point value:** None.

**Point Value:** 2

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 9, 2. Physical and Socioeconomic Factors

## 25. *Proximity to parks and recreational facilities*

A site located near a park or recreational facility would be less desirable as these uses are typically located in areas that are valued for their more pristine environment. The “site” is the footprint of the landfill.

Point Value	Measure
1	The site is located 0.25 miles or less from a park or recreational area
2	The site is located between 0.25 and 0.50 miles from a park of recreational area
3	The site is located more than 0.5 miles from a park or recreational area

**Data Source:** State of Hawai‘i GIS maps, TerraMetrics satellite maps, and County of Kaua‘i map information.

**How the point value of the criterion was determined:** The distance from the footprint boundary to the nearest park or recreational facility was estimated using GIS distance measuring tools.

**Complications obtaining the data:** None

**Complications calculating the point value:** Exact boundaries of proposed landfill sites are unclear, thus distances to parks and recreational facilities are estimates and should not be considered to be exact.

**Distance and direction from the site to the nearest park or recreational facility:** 1.4 mile away to SW

**Name of park or recreational facility:** Kiahuna Golf Club

**Point Value:** 3

**Notes:** For detail see Item B. Data Sheet Appendices, Tab 8, 1. Physical and Socioeconomic Factors

## 26. *Landfill Capacity or Site Life*

A longer site life is advantageous to future planning requirements and minimizes the need to site additional facilities.

Site life means the number of years the site could accept waste based on the projected volume of waste generated over the next 30 years at approximately 5,873,000 cubic yards (cy) plus the necessary volume of cover material needed at approximately 1,468,245 cy. The total volume therefore needed is estimated at 7,341,225 cy.

Point Value	Measure
1	The site has a life expectancy of less than 25 years
3	The site has a life expectancy of 25 years or more

**Data Source:** Kauaʻi Municipal Solid Waste Landfill Siting Study, 2001, and New Kauaʻi Municipal Solid Waste Landfill, Kalepa Site Evaluation, 2002, both reports by Earth Tech, Inc. State of Hawaiʻi GIS maps were used as necessary to obtain additional data.

**How the point value of the criterion was determined:** The life of the landfill was calculated to reflect current landfilling practice. The volume was calculated assuming a 100-foot buffer around the site boundary, 22 acres for infrastructure facilities, a waste depth of 47 feet, and roughly filling to the surrounding natural grade. The standard area required for a landfill site with a 30-year lifespan was calculated to be approximately 133 acres inclusive of the 22 acres for infrastructure facilities.

**Complications obtaining the data:** The Kōloa site is 127 acres which is slightly less than the horizontal surface area requirement of 133 acres. An important factor offsetting the lower site acreage indicates that the depth to bedrock is deeper than reported in the USGS Soil Survey (1972). This factor accounts for the life expectancy of the site at approximately 30 years.

**Complications calculating the point value:** None. See data source for further detail.

**Point Value: 3**