

ATTACHMENT 13B  
COUNCIL RESPONSE EM-3 (BF-1)



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October 28, 2014

County of Maui  
Department of Environmental Management  
Solid Waste Division  
2200 Main Street, Suite 225  
Wailuku, Hawaii 96793

Attention: Mr. Michael Kehano

**Subject: Phase I of Post Closure Services for the Closed Waikapu Landfill  
Waikapu, Maui, Hawaii**

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Dear Mr. Kehano:

Element Environmental, LLC (E2) is pleased to submit this letter report documenting Phase 1 of post closure services for Waikapu Landfill. E2, along with A-Mehr Inc., has been retained by the County of Maui (hereafter referred to as the County), Department of Environmental Management to facilitate post-closure planning services for the Closed Waikapu Landfill located near Waikapu on the Island of Maui, Hawaii (Figure 1).

## 1.0 INTRODUCTION

The purpose of Phase 1 of the post-closure services was to achieve the following:

- **Obtain and review available documents and information, including, but not limited to closure/post-closure plans, construction reports, monitoring plans/data, correspondences, aerial photographs, etc.** Documents were obtained through the County, Department of Environmental Management and through the State of Hawaii Department of Health (HDOH). A complete list of documents reviewed is provided in the Bibliography in Attachment A. Scanned documents are included on an attached CD for your records.
- **Interview current and former County of Maui employees with knowledge of the landfill.** Elaine Baker and Tia Stupplebeen were interviewed on August 13, 2013 and again on January 14, 2014. They were able to obtain information on site features such as groundwater monitoring wells, gas wells, provide historical documents and verify site information.
- **Conduct site investigations to locate/map and inspect the status and conditions of gas and groundwater monitoring wells, drainage systems, cover, roads, security, etc. Document existing post-closure uses.** Two site investigations were conducted; One on August 13, 2013 and another on January 15, 2014. Existing site features were documented with a GPS unit. Site photos are provided in Attachment B.
- **Provide a brief list of findings and recommendations based on completion of the above tasks.** Findings and recommendations were based on historical documents



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reviewed, site information obtained via site walks and information obtained from the County of Maui. Recommendations are provided in Section 3.

- **Identify options for interim and final post-closure uses and evaluate relative to County objectives.** Potential post-closure uses were identified based on the County's past, current and potential uses and are summarized in Section 3.
- **Identify and quantify, to extent possible, County resources and costs to implement Phases 2 and 3.** Projected cost estimates for the recommendations are summarized in Section 4.

## **2.0 SITE INFORMATION**

### **General Background Information**

The closed Waikapu Landfill is located near Waikapu on the Island of Maui, Hawaii (Figure 1). The adjacent property to the north is a light industrial park developed by Maui Lani Partners. Businesses in the light industrial park include Paradise Beverages' warehouse, a gas station, a convenience store, Oceanic Cable, and GP Roadways. Adjacent to the west of the light industrial park and northwest of the landfill is a plant nursery. East of the closed landfill is a sand quarry pit. Maui Trucking stages equipment, vehicles and containers at the adjacent property to the southwest. Vacant land is located adjacent to the Maui Trucking base yard and south of Waikapu Landfill. The closed landfill is bound by Waiale Road to the east. An affordable housing neighborhood is located on the west side of Waiale Road across from the closed landfill. Figure 2 identifies adjacent properties.

The landfill is currently used for stockpiling and storage of materials. The majority of the material stockpiled on the top of the landfill surface is stored for the County Department of Public Works (DPW). Figure 3 identifies the materials and stockpiles stored on the landfill as of April 2013. The piles were generally the same during the field investigations conducted by E2 in January 2014.

The landfill's post-closure use by the County DPW and Department of Environmental Management (DEM) Solid Waste Division has had some compliance issues with HDOH, Solid and Hazardous Waste Branch. In 2007, an inspection report by HDOH sited that there were approximately 100 waste appliances stored on the landfill property. The report also inferred that junk vehicles had been stored onsite but were removed.

Waikapu Landfill operated from 1971 to 1987. Prior to landfilling, the site was used as a borrow pit. The landfill occupies approximately 30 acres (County, 1987). The landfill accepted treated sewage sludge from 1987 to 1988. The general waste composition of Waikapu landfill is as follows (U.S. Environmental Protection Agency [EPA], 1986):



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**Table 1: Waste Composition of Closed Waikapu Landfill**

Household Wastes	33%
Commercial Wastes (Includes waste from office buildings, restaurants, other business and government offices)	58%
Construction/Demolition Wastes	8%
Other wastes	1%

The County typically used the area fill method for waste placement and compaction (USEPA, 1987). Facility operations photos show that sand was typically used for interim cover. The Post Closure Plan stated that approximately 900,000 cubic yards of refuse was placed in the landfill between 1971 and 1987. The current total volume of the landfill was calculated to be approximately 1,118,000 cubic yards. The landfill volume was calculated using the topographic survey conducted by E2 during the January 2014 site visit and compared to the historical 1954 United States Geological Survey (USGS) topographic map of the site area. The topographic survey showing site features is provided as Figure 4.

The top of the landfill is flat with side-slopes varying from 20-50%. On-site drainage systems do not direct sheet-flow to swales or ditches nor is off-site storm water directed away from the landfill by the use of ditches. The slopes are vegetated with grass. Vegetation is thicker during the rainy season (winter) and more sparsely vegetated in the dry season (summer).

The post-closure design specified that a low-permeability soil cap be placed, however; low-permeability soil could not be located (HDOH, 2005). According to County of Maui, crusher waste was used as final cover material. The material used was  $\frac{3}{4}$  inch minus and was placed over the interim cover material.

The waste edge is close to the property boundary. A chain link fence surrounds the landfill for security. HDOH stated that the service area within the landfill should be corrected to have a minimum width of 30 feet from the waste edge to the fence line. Furthermore, the impact buffer should be in the order of 100 yards to the nearest residences to allow for impacts from nuisance conditions, fires, odors, vectors and landfill subsidence (HDOH, 2005).

### **Groundwater**

There are two groundwater resources located beneath the closed Waikapu Landfill. The aquifers are part of the Wailuku aquifer sector of the Iao aquifer system. The upper aquifer is considered basal and unconfined, where fresh water is in contact with seawater (Mink and Lau, 1990). The aquifer occurs in sedimentary rock (non-volcanic lithology) and is listed as having potential use. It is also classified as ecologically important having a low salinity content (250 milligrams per liter [mg/L] to 1,000 mg/L of chloride); however the neither aquifers are fresh nor potable. The aquifer is has a high vulnerability to contamination, and considered to be irreplaceable (Mink and Lau, 1990).



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The lower aquifer is considered basal and confined, where fresh water is in contact with seawater (Mink and Lau, 1990). The aquifers occur in flank formations and is listed as having potential use as drinking water because the salinity content is low (less than 250 mg/L of chloride). The aquifer has a low vulnerability to contamination because it is confined but is considered to be irreplaceable (Mink and Lau, 1990). The aquifers are currently not being used as drinking water sources (Mink and Lau, 1990); however the upper aquifer is used for agricultural purposes.

The County closure plan states that groundwater monitoring was to be conducted quarterly for two years and semi-annually for 28 years for a total 30 years. There were two groundwater-monitoring wells (MW-1 and MW-2) installed at closure. Both wells were completed at a depth of approximately 280 feet below ground surface (Harding Lawson Associates, 1993a). Each well had 15-foot screened intervals. At the time the wells were installed, MW-1 was believed to be upgradient and MW-2 is believed to be downgradient of the landfill (Harding Lawson Associates, 1993b); however, a USGS groundwater study conducted in 2008 showed that the groundwater flow in the vicinity of the landfill flows in a northeasterly direction toward Kahului Harbor (Gingerich, 2008). Groundwater monitoring well locations and approximate groundwater flow direction are shown in Figure 4. The regional groundwater flow direction is shown in Figure 5. Based on the USGS groundwater flow direction, MW-1 is cross gradient of the landfill and MW-2 is downgradient of the southernmost part of the landfill.

MW-1 (the cross gradient well) could not be located during either site visit. The County believes that the well has been buried. MW-2, which is downgradient of the southern portion of the landfill, was encountered during both site visits and surveyed using a Trimble® GPS unit. The coordinates and elevation are as follows:

MW-2	Easting UTM 1698862.954	Northing UTM 191841.379	Top of Cover Elevation 278.35 ft msl
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One monitoring event was conducted in May of 1993. During the groundwater monitoring event, MW-1 (cross gradient well) was not sampled due to poor recovery. MW-2, the downgradient well, was purged and sampled. Results of groundwater monitoring are included in Table 2. None of the parameters analyzed exceeded the EPA Drinking water Maximum Contaminant Levels (MCLs).



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**Table 2: Groundwater Monitoring Data**

Date: Well Number:	5/3/2014 MW-2 (Downgradient)	3/4/2009 EPA Drinking Water MCLs
Dicamba	NA	No MCL
Dichlorophop	NA	No MCL
2,4-D	NA	No MCL
Silvex	NA	No MCL
2,4,5-T	NA	No MCL
Volatile Organics (EPA Method 8240)	ND	Varies
Silver	<0.01 mg/l	No MCL
Arsenic	<0.004 mg/l	0.01
Barium	0.30 mg/l	2
Beryllium	<0.005 mg/l	0.004
Cadmium	0.0034 mg/l	0.005
Cobalt	0.07 mg/l	No MCL
Chromium	0.04 mg/l	0.1
Copper	0.02 mg/l	1.3
Nickel	0.07 mg/l	No MCL
Lead	<0.002 mg/l	0.015
Antimony	<0.03 mg/l	0.006
Selenium	<0.01 mg/l	0.05
Thallium	<0.002 mg/l	0.002
Vanadium	0.14 mg/l	No MCL
Zinc	0.06 mg/l	No MCL

ND=Not Detected above reporting limit

NA=Not Analyzed

## **Landfill Gas**

Four gas wells (A through D) were installed onsite during landfill closure. Gas monitoring well locations are shown in Figure 2. Gas Well C, located near the northwestern edge of the landfill, was observed at the site during this site reconnaissance visit in August 2013; however, it was not encountered during the field survey in January 2014. None of the other wells (A, B, or D) were encountered during site reconnaissance. The County believes that the wells were inadvertently buried or destroyed.

A-Mehr, Inc. developed a conceptual model of landfill gas generation using the USEPA LandGem (Landfill Gas Emissions Model) computer program to provide an estimate of potential landfill gas emissions from the closed Waikapu Landfill. Detailed results of the LandGem are provided in Attachment C. The model computes landfill gas emissions using a time record of site-specific waste disposal volumes combined with a series of assumed waste composition, moisture and climate characteristics developed for typical landfills.

LandGem output demonstrates a typical landfill gas curve with a methane generation rate that increases annually through the end of the landfill operational life, then decreases at an exponential rate. The projected average emission rate of landfill gas for 2014 is 67 standard



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cubic feet per minute (scfm) from the 37-acre landfill. By comparison, the landfill gas collection and control system at Central Maui Landfill typically handles 600 to 800 scfm.

If emitted uniformly from the surface of the landfill, the methane volume of 34 scfm projected by the model for 2014 would be equivalent to approximately  $2.1 \times 10^{-5}$  scfm per square foot of landfill surface, or to a concentration of 21 parts per million by volume (ppmv) of methane mixed in a one cubic foot volume of air above the surface. USEPA rules for gas collection and control systems in large landfills (40 CFR 60.755) require landfill surface emissions to be less than 500 ppmv methane.

### **Maintenance Activities**

The landfill is currently visually inspected, roughly, on a quarterly basis by County of Maui Solid Waste Division staff. Cover material is used to fill areas where erosion has occurred. .

## **3.0 RECOMMENDATIONS**

The main goal of this study is to either demonstrate that the County has fulfilled their post-closure duties or to determine whether additional post-closure activities need to be conducted. The elements of demonstration are as follows:

- Post-closure use: Current uses are compatible with the closure plan and uses meet all legal requirements.
- Final cover: Intact to an acceptable depth, has low permeability, adequate drainage, and vegetation.
- Landfill Gas: No subsurface migration and minimal surface emissions;
- Leachate: Little generation and/or no evidence of groundwater impacts;
- Groundwater: No evidence of contamination;

The recommendations provided in this section will require consultation with HDOH. The recommended elements of demonstration may require modification after consultation.

### **POST-CLOSURE PLAN AND POST-CLOSURE USE**

The facilities post-closure plan will need to be updated and need to incorporate changes made to the final cover and drainage.

#### **Recommendations:**

The following will need to be conducted as part of the revised Post-Closure Plan:

- Conduct a topographic survey to evaluate current site conditions.



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- Update Post-Closure Plan with remedial design.
- Update Post-Closure Plan and present to HDOH for approval.

### **Post-Closure Use Option 1-Continue to Utilize Landfill for DOT Storage**

The landfill has been used for storage of construction materials and equipment on the top deck. HDOH required removal of such equipment several times during the period dating from 2003 to 2007.

The Closure Plan describes post-closure use as open space or park. The plan states there is a deed restriction requiring open space or park use after closure of landfill. Actual language of the 1987 quitclaim deed conveying the main 30-acre parcel of the landfill from Alexander and Baldwin, Inc. to the County states that it is conveying the property "for use as a landfill for a period of three (3) years from the date hereof and thereafter, for open space public uses as Grantee, from time to time, reasonably deems appropriate.

#### **Recommendations:**

We recommend requesting a legal opinion as to whether the quitclaim deed language can be construed to include the current use for storage of construction materials and equipment as an "open space public use". If the opinion is positive, make a policy decision regarding post-closure use such as park, open space or passive storage by County agencies. Use of the landfill space will require continuation of post-closure maintenance activities.

If the decision is to permit the current use, initiate the following concurrent activities:

- (1) Permit the proposed use through HDOH; and
- (2) Develop an agreement with the County DPW outlining acceptable operating guidelines and maintenance for the site.

### **Post-Closure Use Option 2-Dicontinue Use of Landfill**

Terminating all or most post-closure maintenance activities may be possible if the County is willing to maintain the landfill solely as secured open space.

#### **Recommendations:**

- Remove stockpiled materials and prohibit the use or any activities at the landfill.
- Construct improvements based on the recommendations provided in the discussion on final cover and storm water drainage.





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- Upgrade fencing and security to limit access to the site.
- Prepare a final report documenting conclusion of post-closure monitoring.

### **FINAL COVER AND STORM WATER DRAINAGE**

The top deck of the landfill is currently being used to store construction materials and equipment. Much of the top deck area is bare and does not have adequate vegetation to control erosion. The grass cover on the landfill slopes is adequate. The final cover material is highly permeable material spread over the interim cover material to a depth of two feet deep.

#### **Recommendations:**

We recommend the following tasks be completed to comply with post-closure responsibilities:

- Obtain a current (less than five years old) topographic survey that will identify areas where surface water could pond. If areas exist with insufficient drainage, these areas should be re-graded to improve drainage, decrease storm water ponding and infiltration.
- Correct drainage as needed. Use the topographic maps for analysis and design. Add fill were required.
- Complete test pits on the top deck of the landfill to verify the average depth of cover.
- Conduct a landscape architect study to develop a suitable post-closure vegetation plan for long-term, low maintenance plan consistent with post-closure uses.

### **LANDFILL GAS**

Based on the LandGem results, it is reasonable to conclude that the potential landfill gas emissions at the closed Waikapu Landfill are well below the threshold at which control would be feasible. It is also reasonable to conclude there is no danger of LFG migration. According to the model, the landfill does not present a threat to human health or the environment.

#### **Recommendations:**

There are no further recommendations pertaining to landfill gas.

### **LEACHATE**

There is currently no leachate collection system in place at the landfill, therefore there is no way to measure or monitor leachate collection or generation.





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Recommendations:

There are no further recommendations pertaining to landfill leachate.

**GROUNDWATER**

Two groundwater monitoring wells were installed during closure. MW-1 is cross-gradient and was never sampled and MW-2 is downgradient of the southern part of the landfill. MW-1 was not encountered during site investigation activities. MW-2 was found and surveyed. Groundwater monitoring results from MW-2 did not detect contamination above EPA Drinking Water MCLs.

Recommendations:

We do not recommend further groundwater monitoring at the site due to the following:

- The distance from the bottom of the landfill to the groundwater is about 260 feet. It is unlikely that the landfill would contaminate groundwater at that depth.
- The aquifer under the landfill is not a source of drinking water.
- Groundwater monitoring results from samples collected from MW-2 in 1993 did not indicate impacts to down gradient groundwater.
- Post-closure groundwater monitoring is not required because the landfill was closed prior to the Subtitle D operative date of October 1993.

We recommend closing the existing wells onsite upon approval from HDOH.



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#### 4.0 COST ANALYSIS

The following cost analysis was established as a starting point to estimate future post-closure expenditures for the County. The actual cost of the recommendations will depend on the final remedial design plans and acceptance by the HDOH.

Task	Approximate Quantity	Unit	Unit Price	Amount
<b>Remedial Design and Revised Closure/Post-Closure Plan</b>				
Topographic Survey	1	allow	\$15,000	\$15,000
Field Investigation to determine depth of existing cover soil	1	allow	\$50,000	\$50,000
HDOH Approved Post-Closure Plan with Remedial Design	1	allow	\$50,000	\$50,000
Remove/relocate existing material stockpiles and stored vehicles/equipment	1	allow	\$20,000	\$20,000
Repair and/or Upgrade Perimeter Fence	1	allow	\$50,000	\$50,000
<b>Final Cover and Drainage</b>				
Import and place soil to provide drainage	5,000	cubic yards	\$50	\$250,000
Regrade for drainage/erosion repairs	1	allow	\$100,000	\$100,000
Hydroseed and Maintain Nine Months	30	acres	\$13,000	\$390,000
Improve Drainage Facilities	1	allow	\$60,000	\$60,000
<b>Groundwater Monitoring</b>				
Decommission one deep groundwater monitoring well	1	allow	\$30,000	\$30,000
Contingency		base cost	20%	\$198,000
			<b>Subtotal</b>	<b>\$1,188,000</b>



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We appreciate the opportunity to prepare this letter report for you. Please call me on my mobile phone at (231) 709-5033 or at the office at (808) 488-1200, if you have any questions.

Sincerely,

Lindsay B. Mason, P.E.  
Environmental Engineer  
Element Environmental, LLC

**Figures:**     **Figure 1-Site Vicinity and Location Map**  
                  **Figure 2-Adjacent Properties**  
                  **Figure 3-Site Inventory Map Circa April 2013**  
                  **Figure 4-Surveyed Topographic Map**  
                  **Figure 5-Regional Groundwater Flow Direction**

**Attachment:**

**Attachment A: Bibliography and CD Containing Documents Reviewed**

**Attachment B: Site Photos**

**Attachment C: A-Mehr, Inc. Memorandum, Conceptual Landfill Gas Model and Emission Estimates**



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## **Figures**

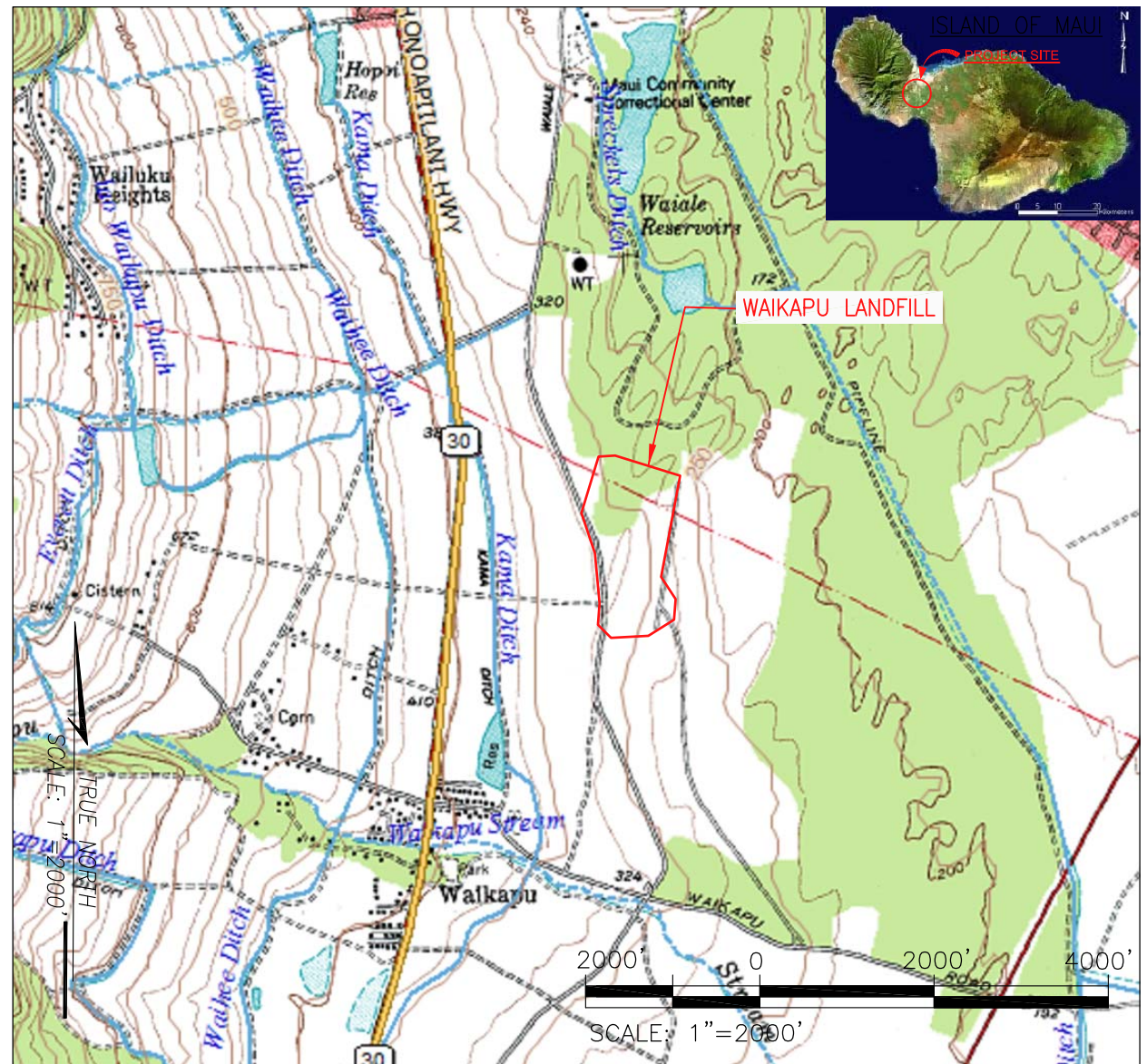
**Figure 1-Site Vicinity and Location Map**

**Figure 2-Adjacent Properties**

**Figure 3-Site Inventory Map Circa April 2013**

**Figure 4-Surveyed Topographic Map**

**Figure 5- Regional Groundwater Flow Direction**



### Legend

- Approximate Landfill Boundary

References:  
Google, 2013; [www.aaccessmaps.com](http://www.aaccessmaps.com), 2013; and DeLorme, 2005.

DATE:  OCT 2014	PROJECT TITLE: PHASE 1 OF POST CLOSURE SERVICES CLOSED WAIKAPU LANDFILL WAIKAPU, ISLAND OF MAUI, HAWAII
FIGURE TITLE:  SITE VICINITY AND LOCATION MAP	FIGURE NO.:  1





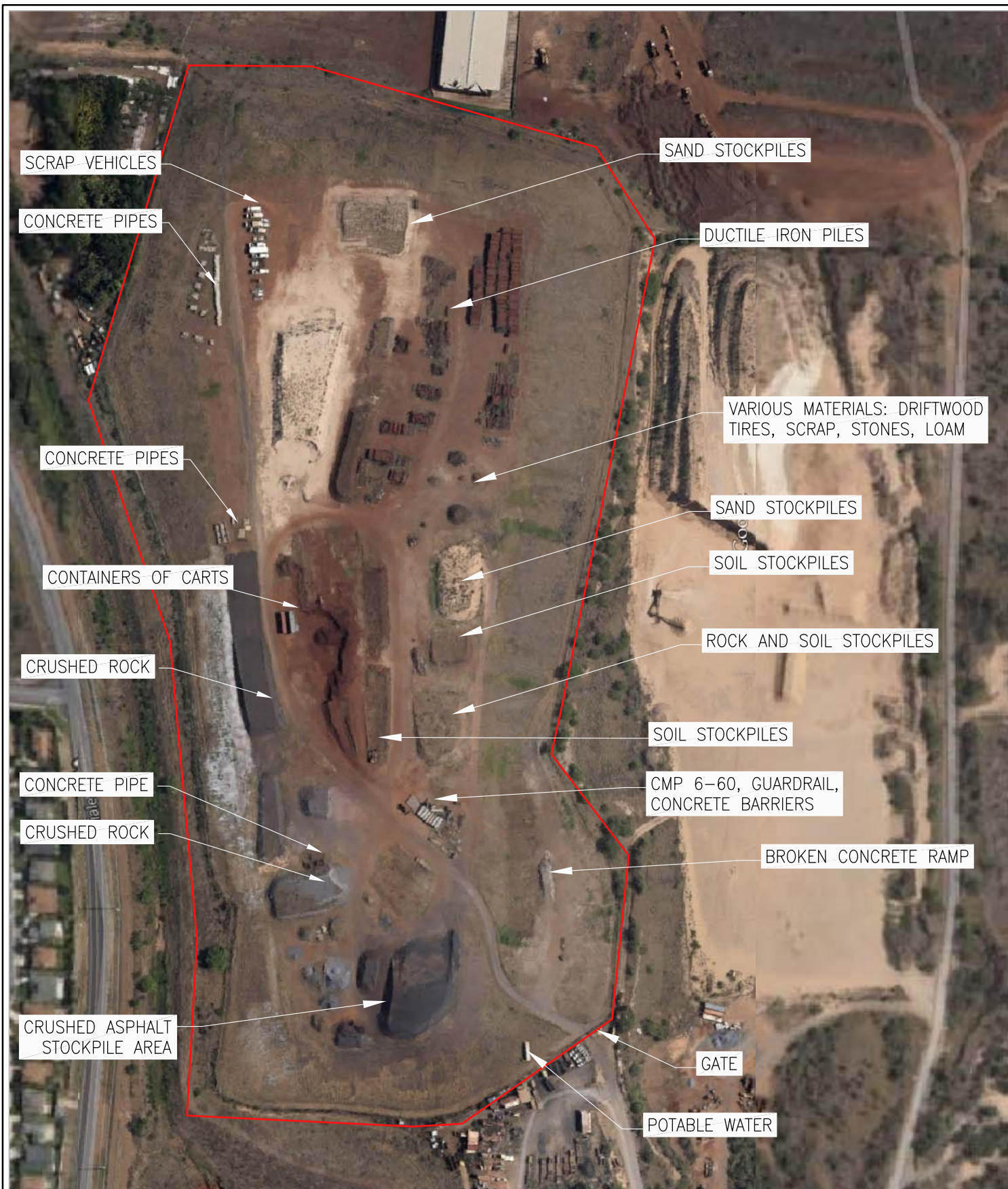
#### Legend

— Approximate Landfill Boundary

References:  
Google, 2013; [www.aaccessmaps.com](http://www.aaccessmaps.com), 2013; and DeLorme, 2005.

DATE: OCT 2014	PROJECT TITLE: PHASE 1 OF POST CLOSURE SERVICES CLOSED WAIKAPU LANDFILL WAIKAPU, ISLAND OF MAUI, HAWAII	
FIGURE TITLE: ADJACENT PROPERTIES		FIGURE NO.: 2





**Legend**

— Approximate Landfill Boundary



SCALE: 1"=500'

References: GOOGLE, 2013.

DATE: OCT 2014	PROJECT TITLE: PHASE 1 OF POST CLOSURE SERVICES CLOSED WAIKAPU LANDFILL WAIKAPU, ISLAND OF MAUI, HAWAII
FIGURE TITLE: SITE INVENTORY MAP CIRCA APRIL 2013	FIGURE NO.: 3



TRUE NORTH  
SCALE: 1"=250'

MW-1  
(Not Located)  
GAS WELL NO 2  
NOT LOCATED

GAS WELL NO 3  
LOCATED IN AUGUST  
BUT NOT SURVEYED

GAS WELL NO 4  
NOT LOCATED

MW-2  
(Located and Surveyed)

GAS WELL NO 1  
NOT LOCATED

#### Legend



Groundwater Monitoring Well




Gas Monitoring Well

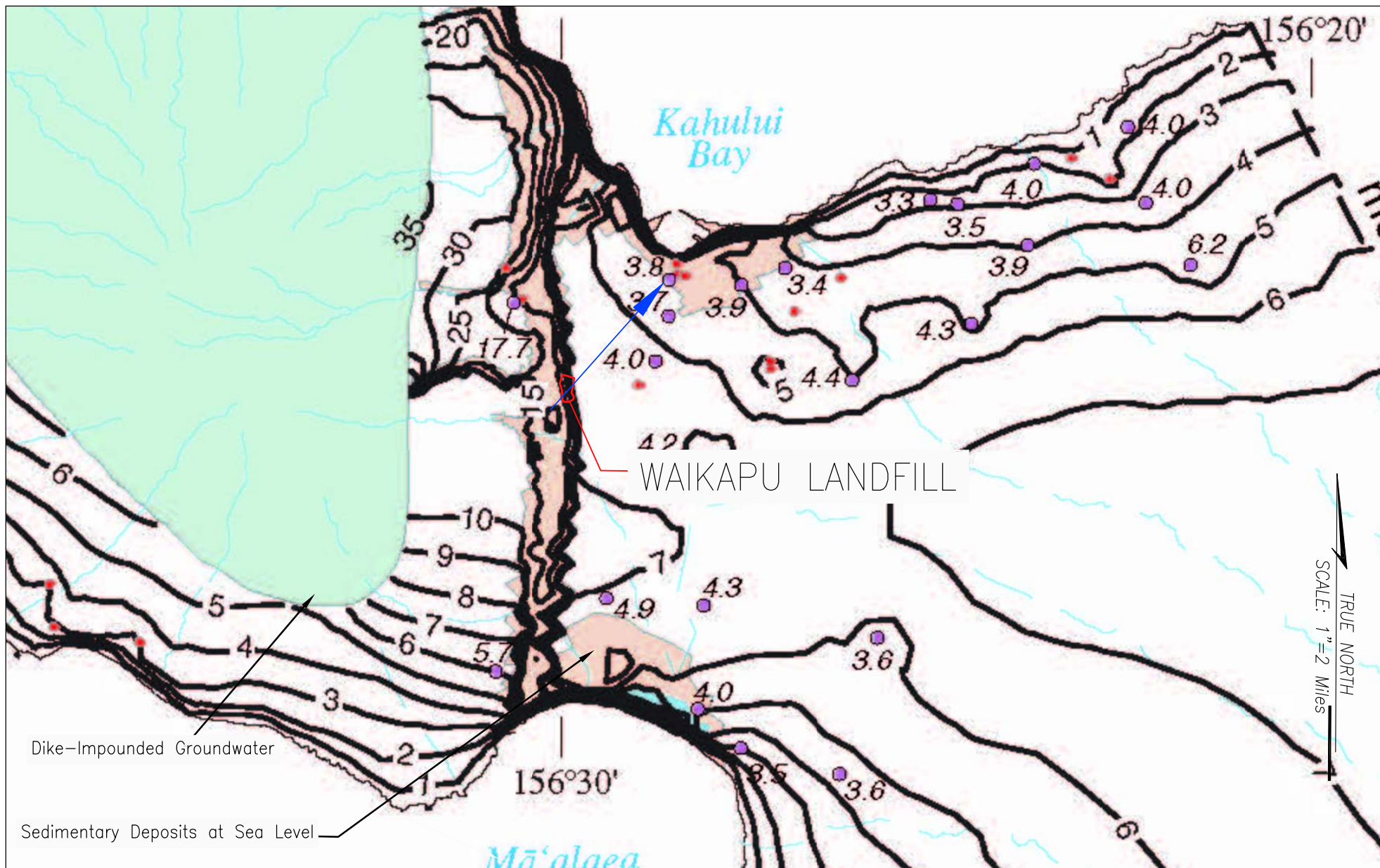


Approximate Groundwater Flow Direction



SCALE: 1"=100'

	DATE: <b>OCT 2014</b>	PROJECT TITLE: PHASE 1 OF POST CLOSURE SERVICES CLOSED WAIKAPU LANDFILL WAIKAPU, ISLAND OF MAUI, HAWAII
	FIGURE TITLE: <b>SURVEYED TOPOGRAPHIC MAP</b>	FIGURE NO.: <b>4</b>



#### Legend

- Approximate Landfill Boundary
- Approximate Groundwater Flow Direction
- Groundwater Contours in ft above mean sea level

#### Basemap Reference:

Gingerich, S.B., 2008, Ground-water availability in the Wailuku area, Maui, Hawai'i:  
U.S. Geological Survey Scientific Investigations Report 2008-5236, Figure 26.



SCALE: 1"=2 Miles

DATE:

OCT 2014

PROJECT TITLE:

PHASE 1 OF POST CLOSURE SERVICES  
CLOSED WAIKAPU LANDFILL  
WAIKAPU, ISLAND OF MAUI, HAWAII

FIGURE TITLE:

GROUNDWATER FLOW DIRECTION

FIGURE NO.:

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## **Attachment A: Bibliography and CD Containing Documents Reviewed**

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## Attachment B: Site Photos

## ATTACHMENT B



Photo 1: Groundwater Monitoring Well MW-2



Photo 2: Vegetated Side Slopes





Photo 3: Stored Equipment, Sparse Vegetation on Top Deck



Photo 4: Conduit Storage, Sparse Vegetation

## **Attachment C: A-Mehr, Inc. Memorandum, Conceptual Landfill Gas Model and Emission Estimates**

**A-MEHR, INC.**  
**Memorandum**

June 4, 2014

TO: File, Waikapu Closed Landfill  
FROM: Glen Odell  
RE: Conceptual Landfill Gas Model and Emission Estimates

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1. In order to provide an estimate of potential landfill gas emissions from the closed Waikapu Landfill we developed a conceptual model of landfill gas generation using the USEPA LandGem (Landfill Gas Emissions Model) computer program. The model computes LFG emissions using a time record of site-specific waste disposal volumes combined with a series of assumed waste composition, moisture and climate characteristics developed for typical landfills.
2. In the absence of historical records of annual waste disposal volumes, we developed a synthetic disposal record based on:
  - Total volume of waste disposed - 1,118,000 cubic yards based on topographic analysis by Element Environmental;
  - Average in-place density of waste - 1,000 lb/cubic yard, a slightly conservative estimate for low to medium tonnage sites operating in the 1970's and 1980's. This results in an estimated total waste tonnage in place of 559,000 tons.
  - Active life from 1971 to 1988 (17 years)
  - Annual volume proportional to Maui population during the active life (49,100 in 1971 to 93,000 in 1988, averaging 3.807% increase per year. Based on this assumption, annual tonnage was assumed to increase from 22,800 tons in 1971 to 41,450 tons in 1987.
3. Conventional LandGem default model parameters were used as follows:
  - Potential methane generation capacity ( $L_0$ ) - 100 m<sup>3</sup>/Mg
  - Methane generation rate (k) - 0.05 year<sup>-1</sup>
  - Methane content - 50% by volume
4. The resulting model output demonstrates a typical LFG curve with a methane generation rate that increases annually through the end of the landfill operational life, then decreases at an exponential rate. Results of the model analysis are summarized in Table 1 below. The projected average emission rate of LFG for 2014 is 67 standard cubic feet per minute (scfm) from the 37-acre landfill. By comparison, the LFG collection and control system at Central Maui Landfill typically handles 600 to 800 scfm.

5. If emitted uniformly from the surface of the landfill, the methane volume of 34 scfm projected by the model for 2014 would be equivalent to approximately  $2.1 \times 10^{-5}$  scfm per square foot of landfill surface, or to a concentration of 21 ppmv of methane mixed in a one cubic foot volume of air above the surface. USEPA rules for gas collection and control systems in large landfills (40 CFR 60.755) require landfill surface emissions to be less than 500 ppmv methane.
6. Based on these results it is reasonable to conclude that the potential landfill gas emissions at the closed Waikapu Landfill are well below the threshold at which control would be feasible, and present no threat to human health or the environment.

TABLE 1  
WAIKAPU LANDFILL  
CONCEPTUAL LANDFILL GAS GENERATION  
BY USEPA LANDGEM COMPUTER MODEL

YEAR	ANNUAL LFG (METRIC TONS / YEAR)	AVERAGE LFG (SCFM)	AVERAGE METHANE (SCFM)
1990	4,141	223	111
2000	2,512	135	68
2010	1,524	82	41
2014	1,247	67	34
2020	924	50	25
2030	560	30	15
2040	340	18	9
2050	206	11	5.5