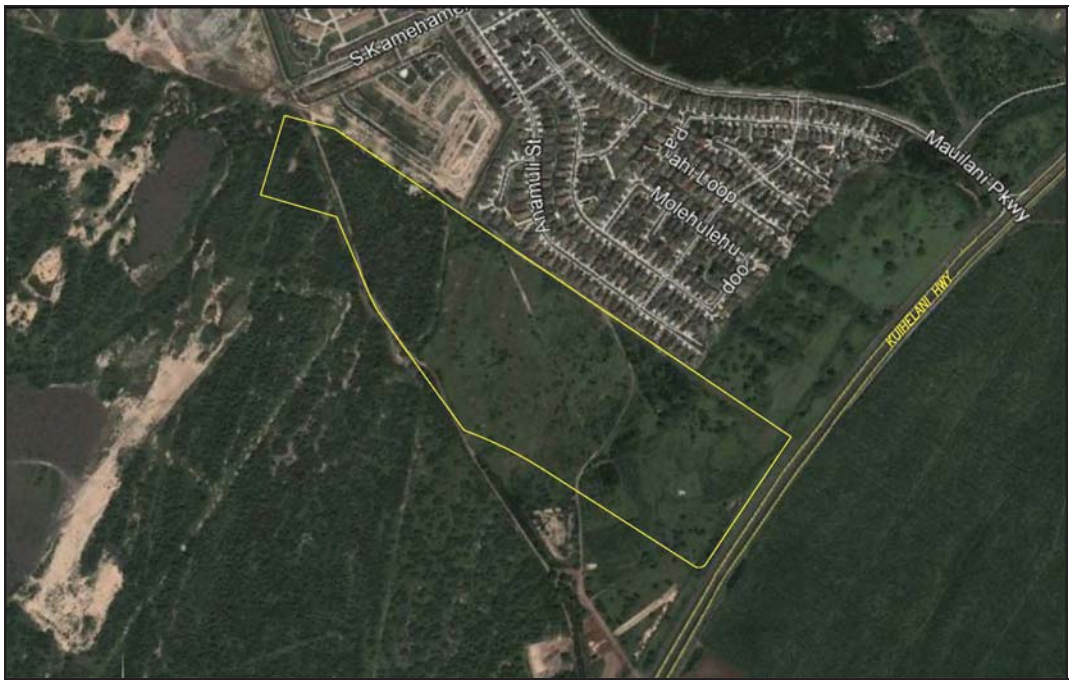
Final Report

Phase II Environmental Site Assessment
Central Maui Regional Park
Kahului, Maui, Hawaii
TMK: (2) 3-8-007:101 (portion)



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Executive Summary

Element Environmental, LLC (E2) completed a Phase II Environmental Site Assessment (ESA) of the proposed Central Maui Regional Park site located on Tax Map Key (TMK) parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA determined if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

Per the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009), the screening was completed on various sized decision units (DUs) utilizing a multi-increment (MI) sampling approach. The 65-acre site was divided into seven (7) DUs ranging in size from approximately 16,300 square feet to 8.1 acres. Two (2) MI soil samples were collected from each DU, one (1) at 0 – 6 inches below ground surface (bgs), and the other at 1 – 2 feet bgs. One of the DUs identified as the Stressed Vegetation DU was sampled in triplicate for quality assurance/quality control (QA/QC) purposes. Each multi-increment sample was analyzed for some or all of the following COPCs: total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), diesel range organics (DRO) and residual range organics (RRO), halogenated volatile organic compounds (HVOCs), polynuclear aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), Organochlorine Pesticides, Resource Conservation and Recovery Act (RCRA) 8 Metals, polychlorinated biphenyls (PCBs) and Dioxins/Furans.

The results of the multi-increment sampling analyses indicate that residual levels of COPCs are not present at significant levels in surface and subsurface soils at the site. HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected. Dioxins/Furans, the organochlorine pesticide 4,4'-DDE, PAHs, RCRA 8 metals, TPH-DRO and TPH-RRO were all detected above laboratory reporting limits in various MI samples, however none exceeded their associated Tier 1 environmental action levels (EALs) for unrestricted land use. Therefore the project site does not require any further action or restrictions on land use prior to its development into a public park.

No MEC were encountered in any of the DUs during MI soil sampling or site reconnaissance activities. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified at the project site. A total of 16 solid waste soil piles located throughout the project site were identified during the site reconnaissance. Physical descriptions were recorded in the field notebook and the footprint of each soil pile was surveyed using a differential global positioning system (GPS) unit. No MEC were observed on the surface of any of the soil piles. It is recommended that the solid waste in the soil piles be removed and properly disposed during the future re-development of the site as a public park. It is also recommended that a qualified environmental scientist be present during the solid waste removal to visually observe if any releases from the solid wastes have occurred that warrant further investigation and sampling. Although MEC was not observed during the site reconnaissance, MEC was found during excavations on adjacent properties. It is recommended that all future grading operations be completed with MEC construction support.

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FIGURES

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APPENDICES

List of Acronyms

%RSD	percent relative standard deviation
APPL	Agriculture and Priority Pollutant Laboratories, Inc.
AR	applicable requirements
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
°C	degrees Celsius
CD-ROM	Compact Disc Read Only Memory
COC	Chain-of-Custody
COPC	Contaminants of Potential Concern
DLNR	Department of Land and Natural Resources
DQO	data quality objectives
E2	Element Environmental, LLC
EAL	Environmental Action Level
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
°F	degrees Fahrenheit
GPS	global positioning system
HDOH	State of Hawaii Department of Health
HDPE	High Density Polyethylene
HEER	Office of Hazard Evaluation and Emergency Response
HVOC	halogenated volatile organic compound
LCS	laboratory control sample
LDC	Laboratory Data Consultants
MDL	method detection limit
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mph	miles per hour
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
msl	mean sea level

PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, completeness
PCB	polychlorinated biphenyl
pg/g	picogram per gram
PPE	personal protective equipment
PQL	practical quantitation limit
PZUE	Pu'uone sand
QA	quality assurance
QA/QC	quality assurance/quality control
RPD	relative percent difference
RSD	relative standard deviation
SOW	scope of work
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semi-volatile organic compound
TMK	Tax Map Key
TPH-DRO	total petroleum hydrocarbons-diesel range organics
TPH-GRO	total petroleum hydrocarbons-gasoline range organics
TPR-RRO	total petroleum hydrocarbons-residual range organics
USDA-SCS	U.S. Department of Agriculture Soil Conservation Service
USGS	U.S. Geological Survey
UXO	unexploded ordnance
VOC	volatile organic compound

Section 1 Introduction

This Phase II Environmental Site Assessment (ESA) Report presents the work procedures, methods, and results from the Phase II ESA conducted by Element Environmental, LLC (E2) for the proposed Central Maui Regional Park site located on Tax Map Key (TMK) parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA was conducted to determine if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document and survey piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

This Phase II ESA Report has been prepared for the State of Hawaii Department of Land and Natural Resources (DLNR) Division of State Parks in accordance with E2's sampling and analysis plan (SAP) dated March 2013.

1.1 Purpose and Objectives

The purpose of the Phase II ESA was to determine if historical uses at the property as identified in the Phase I ESA have impacted soils at the site with COPCs. In addition, due to the potential presence of MEC at the site, a site reconnaissance of the property was conducted in order to identify features that may suggest previous use of the site for a training range or bombing target. The results of this screening will be used to determine if additional characterization and/or remediation with regard to the planned future development is necessary to protect human health and the environment.

1.2 Report Organization

Details of the investigation are presented in the following sections of this Phase II ESA Report. The report is organized as follows:

Section 1:	Introduction
Section 2:	Site Background
Section 3:	Field Investigation and Sample Collection
Section 4:	Soil Sampling Results
Section 5:	Summary of Findings
Section 6:	References
Appendix A:	Project Photographs
Appendix B:	Laboratory Analytical Data Reports
Appendix C:	Data Validation Report
Appendix D:	Precision, Accuracy, Representativeness, Comparability, Completeness Summary Report
Appendix E:	Soil Pile Photographs
Appendix F:	Senior Unexploded Ordnance Supervisor Final Report

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Section 2 Site Background

2.1 Site Location and Description

The project site consists of one contiguous parcel of relatively undeveloped land located two (2) miles inland from Kahului, Maui along the northwestern side of Kuihelani Highway (Figure 2-1). The property consists of approximately 65 acres of land designated as TMK parcel (2) 3-8-007:101 (portion).

Kuihelani Highway runs along the southeastern boundary of the site. A dirt road off of Kuihelani Highway leads up to the southwestern perimeter of the site, which is approximately one quarter mile inland from the highway. The dirt road forks halfway to the site perimeter and the right hand segment transects the parcel and leads to the northeastern boundary. A lined irrigation basin is located adjacent to the southwestern perimeter of the project site along the dirt access road. Various concrete pads and infrastructure are located throughout the southern portion of the property. These are believed to be the remnants of a sod farm which previously occupied this portion of the property. The northern portion of the property is grassy, semi-cleared land which is believed to have been used for past agricultural practices.

The project site is currently unoccupied. The Maui Lani housing development is being constructed along the northeastern boundary of the site, and horse pastures occupy the area west of the site. The horses are contained by wire fences which run along the western edge and through the northern portion of the property. An additional entrance to the project site is located on the northern edge of the property where South Kamehameha Avenue temporarily terminates in the adjacent Maui Lani housing development. The state land use designation for the property is Agricultural (State of Hawaii, 2012).

2.2 Physiography

2.2.1 Climate

The annual average temperature at the property is 75.6 degrees Fahrenheit (ºF). The property experiences an average winter temperature of approximately 72.2ºF and an average summer temperature of approximately 78.5ºF. Annual average wind speed at the property is approximately 12.8 miles per hour (mph). Total precipitation at the property averages approximately 18.5 inches annually. Precipitation occurs mostly during winter and relatively infrequently during the summer. Precipitation averages approximately 9.1 inches during the winter, approximately 4.6 inches during the spring, approximately 3.7 inches during the fall, and less than one (1) inch during the summer (PBR, 2011).

2.2.2 Geology

The island of Maui is part of a huge volcanic massif built by at least six major and one minor volcano (Macdonald, et al., 1983). The lower saddles between the volcanoes are flooded by sea water, dividing the volcanic massif into four separate islands – Maui, Kahoolawe, Lanai, and Molokai (Macdonald, et al., 1983). The development of the island above sea level is believed to have occurred between late Pliocene and Pleistocene time (approximately one to 12 million years ago) (Macdonald, et al., 1983).

Maui as it is today consists of two major volcanoes; the older West Maui Volcanics and the younger Haleakala or East Maui Volcanics (Macdonald, et al., 1983). The volcanic rocks of West Maui are divided into three series named the Wailuku Volcanic Series (the oldest), the Honolua Volcanic Series, and the Lahaina Volcanic Series (the youngest) (Macdonald, et al., 1983). The Wailuku Volcanic Series built the major shield of the volcano and was followed by a period of weathering and erosion. The Honolua Volcanic Series consists of thin layers of flows, domes, and pyroclastic deposits. After a long period of erosion, came the eruptions that produced the flows and cones of the rejuvenated volcanism known as the Lahaina Volcanic Series. The volcanic rocks of East Maui or Haleakala are divided into two series; the Honomanu Volcanic Series (oldest), the Kula Volcanic Series, and the Hana Volcanic Series (youngest) (Macdonald, et al., 1983). The Honomanu Volcanic Series, the main mass of Haleakala, has been almost wholly buried by later lavas and is now exposed only in sea cliffs along part of the north shore. The Kula Volcanic Series forms the surface over most of the northwestern and southeastern segments of the mountain including the subject property. In some localities the Kula lavas are separated from the underlying Honomanu lavas by a layer of red soil, but at many places there is no obvious break between the two series. The Hana Volcanic series were formed after a long period of erosion and are considered the post erosional lavas. Hana lavas are absent on the entire northwestern sector of the volcano.

The subject property is located within the isthmus on the saddle between the West and East Maui Volcanics. The isthmus consists of dunes, chiefly lithified and is underlain by East Maui lavas that banked against those of West Maui (Macdonald and Abott, 1970).

2.2.3 Soils

According to the U.S. Department of Agriculture Soil Conservation Service (USDA-SCS), the soil in the area of the site is classified as Pu'uone sand (PZUE).

- The Pu'uone sand (PZUE) series (7 to 30 percent slopes) consists of somewhat excessively drained soils in uplands. These soils developed in material weathered from coral seashells. In a typical profile, the surface layer is sand about 20 inches thick and the subsoil is approximately 20 to 40 inches of cemented material. Capacity of the most limiting layer to transmit water is moderately high to high, available water capacity is very low, and the depth to water table is more than 80 inches (USDA-SCS, 2013).

2.2.4 Hydrogeology

The subject property is located within the Kahului Aquifer System of the Central Aquifer Sector (Mink and Lau, 1990). Two aquifers underlie the site. The upper aquifer has the aquifer code 60301116 (12211). This aquifer is basal, unconfined, located in sedimentary (nonvolcanic) lithology and is currently used as an ecologically important water source. The aquifer has a low salinity with a chloride content of 250 milligrams per liter (mg/l) to 1,000 mg/l. This aquifer is considered irreplaceable and is highly vulnerable to contamination (Mink and Lau, 1990).

The lower aquifer has the aquifer code 60301111 (12212). This aquifer is basal, confined, located in flank formations and is currently used as an ecologically important water source. The aquifer has a fresh salinity with a chloride content of less than 250 mg/l. This aquifer is considered irreplaceable and is moderately vulnerable to contamination (Mink and Lau, 1990).

The subject property is *makai* (below) of the underground injection control line, indicating that the underlying aquifer is not considered a drinking water source (HDOH, 1999). The average elevation of the property is approximately 171 feet above mean sea level (msl).

Groundwater is assumed to flow down gradient in an east northeast direction. The depth to and direction of groundwater flow beneath the property are not definitively known. Characterization would require subsurface exploration, installation of groundwater monitoring wells, and surveys of groundwater elevations. No municipal drinking water supply wells are located on the subject property. An irrigation water supply system consisting of two wells, an aboveground storage tank and a pumphouse is located approximately 700 feet southwest of the property. Fourteen (14) private wells are located within one (1) mile of the subject property.

2.2.5 Surface Water

The closest surface water body to the site is a water reservoir located approximately 300 feet to the west that is part of the Waihe'e Ditch system. A pipeline connects the reservoir to the larger Wai'ale Reservoir located approximately 1.7 miles east northeast of the subject property. The nearest ocean water body is Kahului Harbor, which is located approximately two (2) miles northeast of the site and is contiguous with the Pacific Ocean. The location of Kahului Harbor in relation to the project site is shown on Figure 2-1.

Storm water runoff is expected to surface flow to the east northeast of the subject property.

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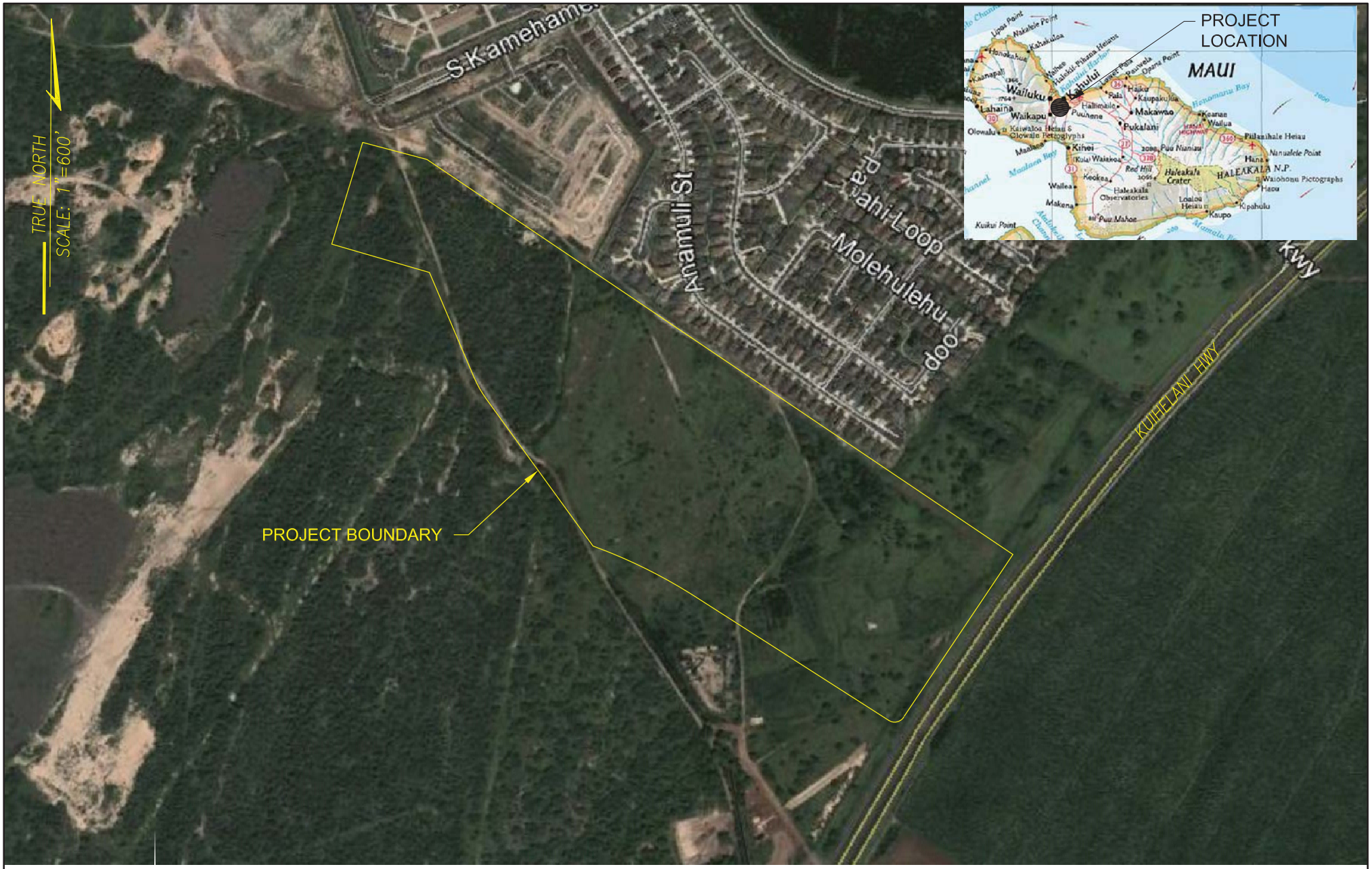

600' 0 600' 1200'

SCALE: 1"=600'

REFERENCES: GOOGLE EARTH, 2012
DELORME, 2002

	DATE: DEC 2013	PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII
	FIGURE TITLE: PROJECT LOCATION MAP	FIGURE NO.: 2-1

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2.3 Site History

A Phase I ESA was completed for the proposed Central Maui Regional Park parcel by Pacific Consulting Services Inc. in July 2012. Based on aerial photographs, the Phase I ESA identified the following historic site uses:

- A substantial portion of the Subject Property was actively farmed between 1951 and 2000, but is currently unused. The photographs do not indicate any development of the northwestern-most portion of the Subject Property. Various dirt roads are evident on the property in the aerial photographs.
- Between 1951 and 2000, the Subject Property appears to have been cultivated for a variety of plants, although it does not appear that sugar cane or pineapple were grown on the Subject Property.
- The 2000 aerial photograph shows indications of structures or vehicles in the eastern part of the Subject Property, near Kuihelani Highway. A possible structure or debris pile is evident in the same general area in the 2012 aerial photograph.

Based on the activities observed in the aerial photographs, as well as other sources of information gathered during the Phase I ESA, the following recognized environmental concerns were identified:

1. Historical use of the site for various agricultural uses;
2. Unexploded ordnance (UXO) removal from adjacent properties to the northeast and southwest that suggest the potential presence for UXO on the property;
3. Stressed vegetation in the area where 6,000 pounds of abandoned hazardous materials were discovered and removed by the property owner; and
4. Accumulation of solid waste in several areas of the parcel that include automobiles, automobile parts, construction debris and building debris. Some of the solid wastes appear to have been pushed into dirt-covered piles using heavy equipment.

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Section 3 Field Investigation and Sample Collection

3.1 Sampling Approach

The primary objective of this project was to resolve the following project Decision Statements:

- Determine whether COPC concentrations in soil exceed risk-based screening criteria.
- Determine whether COPCs in soil, if present in excess of screening criteria, pose unacceptable risk to human health and/or the environment.
- Determine whether a training range or bombing target is present at the site.

These decision statements were developed based on the principal study questions (PSQs) and alternative actions outlined in the project sampling and analysis plan (SAP) [E2, 2013].

3.1.1 Multi-Increment Sampling

In order to resolve the Decision Statements listed above, E2 determined that an appropriate amount of data would be required. Therefore, a multi-increment (MI) sampling strategy was designed to screen the entire 65 acre site. MI sampling is a method employed to obtain representative samples that exhibit average concentrations of COPCs in the material being sampled and that account for the variability of COPC concentrations within that particular material. Such a method was developed to provide accurate (closeness of the sample value to its actual value) and precise (closeness of repeated sample values, or repeatability) data.

The MI sampling approach was employed in accordance with the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009) to determine the concentrations of COPCs in soils within the areas identified as having recognized environmental concerns. Decision units (DUs) for the MI sampling are depicted in Figure 3-1 and were established as follows:

- The area historically used for agriculture was divided into four (4) regional DUs approximately 6.8 to 8.1 acres in size. Two (2) MI soil samples were collected from each DU: one (1) at the surface (0-6 inches below ground surface [bgs]) and one (1) from the subsurface (1 to 2 feet bgs). The MI samples were analyzed for pesticides, heavy metals, PCBs, and dioxins.
- One (1) DU approximately 16,300 square feet in size was established in the stressed vegetation area where the removal of 6,000 pounds of abandoned hazardous materials occurred. The extents of the DU were modified in the field in order to include an adjacent soil berm that contained suspect solid waste. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.
- One (1) DU approximately 4.4 acres in size was established within the area that is adjacent to the former Maui Sod Occupant. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the

subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.

- One (1) DU approximately 5.1 acres in size was established within the area where former structures were observed to be present onsite in an aerial photograph from 2000. This area also contains several dirt covered solid waste piles that were identified in the Phase I ESA. Two (2) MI soil samples were collected from the DU: one (1) at the surface (0 to 6 inches bgs) and one (1) from the subsurface (1 to 2 feet bgs). Samples were analyzed for petroleum related contaminants, pesticides, heavy metals, and PCBs.

For quality assurance/quality control (QA/QC) purposes, the Stressed Vegetation DU was sampled in triplicate at both sampling depths. The field sampling methodology is described in Section 3.2.

3.1.2 Multi-Increment Sample Analyses

Based on the recognized environmental concerns identified in the Phase I ESA, MI samples from the different DUs were analyzed for some or all of the following constituents:

- Total Petroleum Hydrocarbons (TPH) - Gasoline Range Organics (GRO) (Method: EPA 8260B);
- Halogenated Volatile Organic Compounds (HVOCs) (Method: EPA 8260B);
- TPH – Diesel Range Organics (DRO) and Residual Range Organics (RRO) (Method: EPA 8015M);
- Polynuclear Aromatic Hydrocarbons (PAHs) (Method: EPA 8270C);
- Semi-volatile Organic Compounds (SVOCs) (Method: EPA 8270C);
- Organochlorine Pesticides (Method: EPA 8081A);
- Resource Conservation and Recovery Act (RCRA) 8 Metals (Method: EPA 6010B and 7471);
- Polychlorinated Biphenyls (PCBs) (Method: EPA 8082); and
- Dioxins/Furans (Method: EPA 8290).

All sample preparation and analyses were conducted according to the guidance outlined in *Test Methods for Evaluating Solid Waste,* EPA SW-846 (EPA 1996), *Guidance for Obtaining Representative Laboratory Subsamples from Particulate Laboratory Samples* (EPA 2003), and the *Department of Defense, Quality Systems Manual for Environmental Laboratories* (Department of Defense, 2010).

3.2 MEC Site Reconnaissance and Solid Waste Pile Survey

A visual survey for MEC was conducted on the property in conjunction with the MI soil sampling. The soil sample locations described above were cleared of UXO by a trained UXO technician prior to sampling. In addition, because the UXO found on the adjacent properties seemed to be randomly located, a site walkthrough was conducted to try to identify shooting positions, grenade pits, small arms berms and/or other target areas.

Solid waste soil piles located throughout the project site were scanned with a metal detector and visually inspected for MEC. The soil pile extents were then surveyed using a differential global positioning system (GPS) unit. The approximate size and volume of each pile was recorded in the field notebook, as well as a physical description of the pile noting any type of debris that was visible. In the event that any UXO was discovered, plans were made for it to be promptly turned over to the Maui Police and the U.S. Army Explosive Ordnance Disposal (EOD) for removal.

3.3 Archeological Survey

A survey for artifacts of archeological significance was conducted on the property in conjunction with the MI soil sampling. The survey was performed by an archeologist from the State of Hawaii Department of Land and Natural Resources (DLNR) who was present on site during all fieldwork activities. The soil generated during excavation at each increment sample location was screened for artifacts prior to sample collection. Plans were made to alert the DLNR archeologist if any artifacts were observed during subsurface exploration. Detailed notes of the soil composition and any findings made at each increment sample location were maintained by the archeologist. No artifacts of cultural or historical significance were discovered during the project.

3.4 Sample Collection

3.4.1 Decision Unit and Sample Increment Establishment

The boundaries and increment sample locations of the seven (7) DUs were established at the site utilizing a differential GPS unit equipped with a rover pole antenna. Northing and Easting coordinates of the DU corners and increment sample locations were input into the GPS for field stakeout prior to the commencement of fieldwork. The Stressed Vegetation DU boundaries and sample increment locations were decided upon in the field in order to encompass the entire hazardous waste removal area as well as an adjacent soil pile containing solid waste. Once the respective DU corners and sample increments were located in the field, survey flags were used to mark their locations. The seven (7) DUs were labeled according to their historic site usage as well as findings from the Phase I ESA: Ag DU-1, Ag DU-2, Ag DU-3, Ag DU-4, Stressed Vegetation DU, Structure DU and Sod DU. The increment sample locations within each DU were positioned using a stratified random design per the HDOH *Technical Guidance Manual* and are depicted on Figures 3-2 and 3-3. The replicate sample locations in the Stressed Vegetation DU were also laid out using a stratified random design, but from different starting locations and different sampling directions. The locations of the 90 individual sampling increments as well as the extents of the modified Stressed Vegetation DU were surveyed with the GPS unit following MI sample collection and are shown on Figure 3-3.

3.4.2 Multi-Increment Sample Collection

Two (2) MI soil samples were collected from each DU, with the Stressed Vegetation DU sampled in triplicate at each sampling depth for QA/QC purposes. Sample increments were collected from the surface (0 - 6 inches bgs) and subsurface (1 - 2 feet bgs) at 30 individual locations within each DU (90 individual locations for the triplicate samples within the Stressed Vegetation DU).

The MI soil samples were collected from different depth ranges by digging a two (2) foot deep hole with a posthole digger, then collecting fixed mass aliquots of soil from the sidewalls of each hole at each depth range using Terra-Core soil plungers and soil caps. For each sample increment, a 5-gram aliquot of soil was collected first using a Terra Core soil plunger, and placed into a methanol preserved volatile organic analysis (VOA) vial provided by the laboratory (i.e., for those DUs that required volatile analysis). A 30-gram soil aliquot was then collected by scraping the sidewalls with a fixed volume soil cap and placing it into a Ziploc bag for the remaining analyses. Each MI sample that required volatile analysis consisted of 10 methanol preserved VOA vials containing three (3) 5-gram soil aliquots each, and approximately one (1) kilogram of soil in a Ziploc bag. The MI samples that did not require volatile analysis consisted of approximately one (1) kilogram of soil in a Ziploc bag.

The subsurface MI sample increment was collected first in each hole in order to avoid sloughing of surface soils into the hole. Following sample collection at the subsurface depth range, the surface MI sample increment was collected using the same sampling techniques described above.

Each sampling location was cleared for MEC by a trained UXO technician prior to and during digging operations. A summary of the MI samples collected during the project is presented in Table 3-1.

600' 0 600' 1200'

SCALE: 1"=600'

REFERENCE: GOOGLE EARTH IMAGE, 2012

DATE: DEC 2013

PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII

FIGURE TITLE: MULTI-INCREMENT SOIL SAMPLE DECISION UNITS ESTABLISHED WITHIN PROJECT SITE

FIGURE NO.: 3-1

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300' 0 300' 600'

SCALE: 1"=300'

REFERENCE: GOOGLE EARTH IMAGE, 2012

DATE: DEC 2013

PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII

FIGURE TITLE: INCREMENT SAMPLE LOCATIONS WITHIN DECISION UNITS

FIGURE NO.: 3-2

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30' 0 30' 60'

SCALE: 1"=30'

REFERENCE: GOOGLE EARTH IMAGE, 2013

	DATE: DEC 2013	PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII
	FIGURE TITLE: SURVEYED EXTENTS AND SAMPLE INCREMENTS OF STRESSED VEGETATION DECISION UNIT	FIGURE NO.: 3-3

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Table 3-1: Multi-Increment Soil Sample Summary

Sample Identification	Decision Unit	Sample Depth Range (inches bgs)	Number of Increments
AGDU1-A	Ag DU 1	0 – 6	30
AGDU1-B	Ag DU 1	12 – 24	30
AGDU2-A	Ag DU 2	0 – 6	30
AGDU2-B	Ag DU 2	12 – 24	30
AGDU3-A	Ag DU 3	0 – 6	30
AGDU3-B	Ag DU 3	12 – 24	30
AGDU4-A	Ag DU 4	0 – 6	30
AGDU4-B	Ag DU 4	12 – 24	30
SVDU1-A	Stressed Vegetation DU	0 – 6	30
SVDU1-B	Stressed Vegetation DU	12 – 24	30
SVDU2-A	Stressed Vegetation DU	0 – 6	30
SVDU2-B	Stressed Vegetation DU	12 – 24	30
SVDU3-A	Stressed Vegetation DU	0 – 6	30
SVDU3-B	Stressed Vegetation DU	12 – 24	30
STRUCTDU-A	Structure DU	0 – 6	30
STRUCTDU-B	Structure DU	12 – 24	30
SODDU-A	Sod DU	0 – 6	30
SODDU-B	Sod DU	12 – 24	30

3.4.3 Sample Shipment

All soil samples were labeled with a unique sample identification designation and placed into insulated coolers filled with ice for preservation immediately upon sample collection. The samples were chilled and maintained at a temperature of 4 degrees Celsius (ºC) ± 2 ºC and managed under chain of custody protocol and documentation during transport to the analytical laboratory. The samples were shipped overnight via FedEx to the analytical laboratory, APPL, Inc. (APPL), in Clovis, California. APPL processed the samples and completed all of the analyses. Level IV data packages of the analytical results were then sent to Laboratory Data Consultants (LDC) in Carlsbad, California for complete data validation.

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Section 4 Soil Sampling Results

4.1 Data Evaluation Criteria

The primary objective of this Phase II ESA is to determine if residual levels of COPCs related to the recognized environmental concerns identified in the Phase I ESA are present in site soils, and if present, whether the levels warrant further characterization and/or remediation when considering the planned future development of the site into a community park. Therefore, the soil sample analytical results for this Phase II ESA are compared to the current HDOH Tier 1 Environmental Action Levels (EALs) for sites with unrestricted land use, groundwater is a current or potential source of drinking water and a surface water body is located greater than 150 meters from the site (HDOH, 2012). In addition, dioxin levels are compared to the soil action levels presented in the HDOH HEER technical memorandum entitled "Update to Soil Action Levels for TEQ Dioxins and Recommended Soil Management Practices" dated June 2010 (HDOH, 2010).

4.2 Sample Results

4.2.1 Multi-increment Sample Results

A total of 18 MI samples (14 primary and four (4) replicate) were collected during this investigation: two (2) from each of the seven (7) DUs (surface and subsurface), with the Stressed Vegetation DU sampled in triplicate at each depth for QA/QC purposes. The laboratory analytical results are presented in Table 4-1. Some analytical results within the table are reported as "ND", which indicates that a specific analyte was "not detected" at or above the method detection limit as shown on the laboratory reports. Concentrations above the detection limit but below the quantitation limit are shown in the table but are marked with a "J" qualifier indicating that it is an estimated value. Detected concentrations that are above the quantitation limit, but below the respective HDOH Tier 1 EAL are shown on the table as normal values. Detected concentrations that exceed the corresponding HDOH Tier 1 EAL are bolded and highlighted in orange. Several analytes do not have established EALs and are identified on the table by "NS", which indicates that "no standard" has been established. If a MI sample was not analyzed for a certain contaminant, it is shown in the table with "NA" indicating that it was "not analyzed" for that respective analyte. The complete laboratory analytical data reports are provided in Appendix B.

The analytical results indicate that HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected from the site. Dioxins/Furans were only analyzed for in the MI samples collected from the four (4) Ag DUs. Subsequently, they were detected in all eight (8) Ag DU MI samples at toxicity equivalent (TEQ) concentrations ranging from 0.43 picograms per gram (pg/g) to 11 pg/g. These results are all well below the TEQ dioxin soil action level of 240 pg/g for unrestricted land use.

The organochlorine pesticide 4,4'-DDE was detected in three (3) of the 18 MI samples at estimated concentrations ranging from 0.0023 milligrams per kilogram (mg/kg) to 0.0032 mg/kg. These concentrations are all well below the corresponding HDOH Tier 1 EAL of 1.4 mg/kg.

PAHs were analyzed for in the MI soil samples collected from the Structure DU, Sod DU and Stressed Vegetation DU (sampled in triplicate). Of the ten (10) MI samples collected from these DU's (including the QA/QC triplicate MI samples), all ten (10) contained detected concentrations or estimated concentrations of various PAH compounds. However, none of the PAH detections in any of the MI samples exceeded its respective HDOH Tier 1 EAL.

The eight (8) RCRA metals were analyzed for in all 18 MI samples collected from the site. All 18 MI samples contained detected or estimated concentrations of various metals (with the exception of selenium and silver which were non-detect in all samples), however none exceeded their respective HDOH Tier 1 EALs. Arsenic was detected at concentrations ranging from an estimated 0.35 mg/kg to 5.7 mg/kg, which are below the Tier 1 EAL of 24 mg/kg. Barium was detected at concentrations ranging from 4.5 mg/kg to 65.5 mg/kg, which are below the Tier 1 EAL of 1,000 mg/kg. Cadmium was detected at concentrations ranging from an estimated 0.072 mg/kg to 1.2 mg/kg, which are below the Tier 1 EAL of 14 mg/kg. Chromium was detected at concentrations ranging from 10.1 mg/kg to 24.5 mg/kg, which are below the Tier 1 EAL of 1,100 mg/kg. Lead was detected at concentrations ranging from an estimated 0.19 mg/kg to 4.3 mg/kg, which are below the Tier 1 EAL of 200 mg/kg. Mercury was detected at concentrations ranging from an estimated 0.01 mg/kg to an estimated 0.031 mg/kg, which are well below the Tier 1 EAL of 4.7 mg/kg.

TPH-DRO and RRO were analyzed for in the MI soil samples collected from the Structure DU, Sod DU and Stressed Vegetation DU (sampled in triplicate). Of the ten (10) MI samples collected from these DU's (including the QA/QC triplicate MI samples), only the six (6) MI samples from the stressed vegetation DU contained detected or estimated concentrations of these TPH compounds. None of the TPH-DRO or RRO detections in any of the MI samples exceeded its respective HDOH Tier 1 EAL. TPH-DRO was detected at concentrations ranging from an estimated 1.6 mg/kg to an estimated 2.8 mg/kg, which are below the Tier 1 EAL of 100 mg/kg. TPH-RRO was detected at concentrations ranging from an estimated 8.1 mg/kg to 18 mg/kg, which are below the Tier 1 EAL of 500 mg/kg.

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	AGDU1-A		AGDU1-B		AGDU2-A		AGDU2-B	
			Laboratory ID	AY79373		AY79374		AY79386		AY79387	
			Sample Location	Ag DU1 0-6" bgs		Ag DU1 12-24" bgs		Ag DU2 0-6" bgs		Ag DU2 12-24" bgs	
Method	**Analyte**	**Units**	**PAL[1]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	ND		ND		ND		0.14	J
	1,2,3,7,8-PECDD	pg/g	NS	ND		0.1	J	ND		1.4	J
	1,2,3,4,7,8-HXCDD	pg/g	NS	ND		ND		ND		1.9	J
	1,2,3,6,7,8-HXCDD	pg/g	NS	0.79	J	0.56	J	3.4	J	6.5	J
	1,2,3,7,8,9-HXCDD	pg/g	NS	ND		ND		2.4	J	4.1	J
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	15		9.4	J	64		130	
	OCDD	pg/g	NS	130		82		580		1200	
	2,3,7,8-TCDF	pg/g	NS	ND		ND		0.14	J	0.21	J
	1,2,3,7,8-PECDF	pg/g	NS	ND		ND		0.43	J	ND	
	2,3,4,7,8-PECDF	pg/g	NS	ND		ND		0.55	J	0.88	J
	1,2,3,4,7,8-HXCDF	pg/g	NS	ND		0.27	J	ND		ND	
	1,2,3,6,7,8-HXCDF	pg/g	NS	ND		ND		0.83	J	ND	
	2,3,4,6,7,8-HXCDF	pg/g	NS	ND		ND		0.97	J	1.9	J
	1,2,3,7,8,9-HXCDF	pg/g	NS	ND		ND		ND		0.63	J
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	ND		ND		ND		17	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	ND		ND		1.1	J	2	J
	OCDF	pg/g	NS	6.8	J	2.1	J	10	J	26	
	TEQ[2]	pg/g	240	0.64		0.43		2.9		5.9	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	NA		NA		NA		NA	
	2-Methyl-naphthalene	mg/kg	4.1	NA		NA		NA		NA	
	Benzo(a) Anthracene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(a)Pyrene	mg/kg	0.15	NA		NA		NA		NA	
	Benzo(b) Fluoranthene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(g,h,i) Perylene	mg/kg	35	NA		NA		NA		NA	
	Benzo(k) Fluoranthene	mg/kg	15	NA		NA		NA		NA	
	Chrysene	mg/kg	30	NA		NA		NA		NA	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	NA		NA		NA		NA	
	Fluoranthene	mg/kg	460	NA		NA		NA		NA	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	NA		NA		NA		NA	
	Naphthalene	mg/kg	4.4	NA		NA		NA		NA	
	Phenanthrene	mg/kg	440	NA		NA		NA		NA	
	Pyrene	mg/kg	44	NA		NA		NA		NA	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	3.2	J	2.6	J	5.7	J	2.4	J
	Barium (Ba)	mg/kg	1000	8.8	J	4.5	J	8.1	J	5.5	J
	Cadmium (Cd)	mg/kg	14	0.29	J	0.12	J	0.28	J	0.11	J
	Chromium (Cr)	mg/kg	1100	13.7	J	11.1	J	14.8	J	10.5	J
	Lead (Pb)	mg/kg	200	ND		ND		ND		ND	
	Mercury (Hg)	mg/kg	4.7	ND		ND		ND		ND	
TPH (8015C)	TPH-GRO	mg/kg	100	NA		NA		NA		NA	
	TPH-DRO	mg/kg	100	NA		NA		NA		NA	
	TPH-RRO	mg/kg	500	NA		NA		NA		NA	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	AGDU3-A		AGDU3-B		AGDU4-A		AGDU4-B	
			Laboratory ID	AY79476		AY79477		AY79474		AY79475	
			Sample Location	Ag DU3 0-6" bgs		Ag DU3 12-24" bgs		Ag DU4 0-6" bgs		Ag DU4 12-24" bgs	
Method	**Analyte**	**Units**	**PAL[1]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	ND		ND		0.25	J	ND	
	1,2,3,7,8-PECDD	pg/g	NS	ND		ND		2.5	J	ND	
	1,2,3,4,7,8-HXCDD	pg/g	NS	1.6	J	ND		3.2	J	ND	
	1,2,3,6,7,8-HXCDD	pg/g	NS	5.3	J	1.2	J	12	J	ND	
	1,2,3,7,8,9-HXCDD	pg/g	NS	3.5	J	1.1	J	8.7	J	ND	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	100		23		270		15	
	OCDD	pg/g	NS	890		200		2900		110	
	2,3,7,8-TCDF	pg/g	NS	ND		ND		ND		ND	
	1,2,3,7,8-PECDF	pg/g	NS	0.49	J	ND		0.95	J	ND	
	2,3,4,7,8-PECDF	pg/g	NS	ND		ND		1.9	J	ND	
	1,2,3,4,7,8-HXCDF	pg/g	NS	2.4	J	ND		6.3	J	ND	
	1,2,3,6,7,8-HXCDF	pg/g	NS	ND		ND		ND		ND	
	2,3,4,6,7,8-HXCDF	pg/g	NS	1.5	J	ND		3.8	J	ND	
	1,2,3,7,8,9-HXCDF	pg/g	NS	ND		ND		1.5	J	ND	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	10	J	ND		43		ND	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	1.7	J	0.46	J	4.1	J	0.25	J
	OCDF	pg/g	NS	19	J	4	J	76		3.3	J
	TEQ[2]	pg/g	240	4.4		1.5		11		0.79	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	NA		NA		NA		NA	
	2-Methyl-naphthalene	mg/kg	4.1	NA		NA		NA		NA	
	Benzo(a) Anthracene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(a)Pyrene	mg/kg	0.15	NA		NA		NA		NA	
	Benzo(b) Fluoranthene	mg/kg	1.5	NA		NA		NA		NA	
	Benzo(g,h,i) Perylene	mg/kg	35	NA		NA		NA		NA	
	Benzo(k) Fluoranthene	mg/kg	15	NA		NA		NA		NA	
	Chrysene	mg/kg	30	NA		NA		NA		NA	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	NA		NA		NA		NA	
	Fluoranthene	mg/kg	460	NA		NA		NA		NA	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	NA		NA		NA		NA	
	Naphthalene	mg/kg	4.4	NA		NA		NA		NA	
	Phenanthrene	mg/kg	440	NA		NA		NA		NA	
	Pyrene	mg/kg	44	NA		NA		NA		NA	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	3.6	J	2.9	J	2.4	J	0.68	J
	Barium (Ba)	mg/kg	1000	4.7	J	5.1	J	8.8	J	10.3	J
	Cadmium (Cd)	mg/kg	14	0.095	J	0.072	J	0.19	J	0.24	J
	Chromium (Cr)	mg/kg	1100	10.2	J	10.1	J	12.3	J	16.6	J
	Lead (Pb)	mg/kg	200	ND		ND		0.19	J	ND	
	Mercury (Hg)	mg/kg	4.7	ND		ND		ND		ND	
TPH (8015C)	TPH-GRO	mg/kg	100	NA		NA		NA		NA	
	TPH-DRO	mg/kg	100	NA		NA		NA		NA	
	TPH-RRO	mg/kg	500	NA		NA		NA		NA	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	SVDU1-A		SVDU1-B		SVDU2-A		SVDU2-B	
			Laboratory ID	AY79375		AY79376		AY79377		AY79378	
			Sample Location	Stress Veg. DU1 0-6" bgs		Stress Veg. DU1 12-24" bgs		Stress Veg. DU2 0-6" bgs (Surface Replicate 1)		Stress Veg. DU2 12-24" bgs (Sub-surface Replicate 1)	
Method	**Analyte**	**Units**	**PAL[1]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	0.0026	J	ND		ND		0.0032	J
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	0.0012	J	ND		ND		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.0018	J	0.0012	J	0.00097	J	ND	
	Benzo(a) Anthracene	mg/kg	1.5	0.0045	J	0.0018	J	0.0042	J	ND	
	Benzo(a)Pyrene	mg/kg	0.15	0.0058		0.0016	J	0.0043	J	ND	
	Benzo(b) Fluoranthene	mg/kg	1.5	0.014	J	0.0038	J	0.008		0.0017	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.009		0.0024	J	0.0054		0.0014	J
	Benzo(k) Fluoranthene	mg/kg	15	0.013	J	0.0036	J	0.0026	J	0.0016	J
	Chrysene	mg/kg	30	0.0051		0.0021	J	0.0041	J	0.00089	J
	Dibenzo(a,h) Anthracene	mg/kg	0.15	0.0029	J	ND		0.0018	J	ND	
	Fluoranthene	mg/kg	460	0.0052		0.003	J	0.0041	J	ND	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0065		0.0018	J	0.0043	J	ND	
	Naphthalene	mg/kg	4.4	0.002	J	0.0013	J	0.0021	J	ND	
	Phenanthrene	mg/kg	440	0.0023	J	0.0023	J	0.002	J	ND	
	Pyrene	mg/kg	44	0.0043	J	0.0025	J	0.0036	J	ND	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		0.35	J	ND		ND	
	Barium (Ba)	mg/kg	1000	44.3	J	11.6	J	40.5	J	10.7	J
	Cadmium (Cd)	mg/kg	14	0.74	J	0.18	J	0.67	J	0.2	J
	Chromium (Cr)	mg/kg	1100	19.4	J	13.3	J	19.4	J	14.4	J
	Lead (Pb)	mg/kg	200	3.6	J	0.19	J	2.8	J	1.6	J
	Mercury (Hg)	mg/kg	4.7	0.031	J	ND		0.03	J	ND	
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND		ND	
	TPH-DRO	mg/kg	100	2.5	J	2.2	J	2.3	J	2.8	J
	TPH-RRO	mg/kg	500	18		12		13		8.1	J

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	SVDU3-A		SVDU3-B		TRIP BLANK		STRUCTDU-A	
			Laboratory ID	AY79379		AY79380		AY79381/AY79388		AY79384	
			Sample Location	Stress Veg. DU3 0-6" bgs (Surface Replicate 2)		Stress Veg. DU3 12-24" bgs (Sub-surface Replicate 2)		NONE		Structure DU 0-6" bgs	
Method	**Analyte**	**Units**	**PAL[1]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		NA		0.0023	J
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	ND		ND		NA		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.0024	J	0.0018	J	NA		0.0015	J
	Benzo(a) Anthracene	mg/kg	1.5	0.0048	J	0.0012	J	NA		0.0065	
	Benzo(a)Pyrene	mg/kg	0.15	0.0052		0.0012	J	NA		0.03	J
	Benzo(b) Fluoranthene	mg/kg	1.5	0.012	J	0.0028	J	NA		0.069	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.0061		0.0021	J	NA		0.09	J
	Benzo(k) Fluoranthene	mg/kg	15	0.011	J	0.0026	J	NA		0.064	J
	Chrysene	mg/kg	30	0.0048	J	0.0013	J	NA		0.0094	
	Dibenzo(a,h) Anthracene	mg/kg	0.15	ND		ND		NA		0.019	
	Fluoranthene	mg/kg	460	0.0045	J	0.0018	J	NA		0.0066	
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0044	J	0.0014	J	NA		0.058	J
	Naphthalene	mg/kg	4.4	0.0024	J	0.0013	J	NA		0.0014	J
	Phenanthrene	mg/kg	440	0.002	J	ND		NA		0.0018	J
	Pyrene	mg/kg	44	0.0041	J	0.0016	J	NA		0.0054	
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		ND		NA		ND	
	Barium (Ba)	mg/kg	1000	41.8	J	14.5	J	NA		65.5	J
	Cadmium (Cd)	mg/kg	14	0.66	J	0.28	J	NA		1.2	J
	Chromium (Cr)	mg/kg	1100	18.9	J	15.5	J	NA		24.5	J
	Lead (Pb)	mg/kg	200	1.5	J	0.19	J	NA		2	J
	Mercury (Hg)	mg/kg	4.7	0.031	J	ND		NA		0.03	J
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND		ND	
	TPH-DRO	mg/kg	100	2.2	J	1.6	J	NA		ND	
	TPH-RRO	mg/kg	500	13		9	J	NA		ND	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

pg/g - picogram per gram

PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

Table 4-1: Multi-Increment Soil Sample Analytical Detections

			Sample ID	STRUCTDU-B		SODDU-A		SODDU-B	
			Laboratory ID	AY79385		AY79382		AY79383	
			Sample Location	Structure DU 12-24" bgs		Sod Farm DU 0-6" bgs		Sod Farm DU 12-24" bgs	
Method	**Analyte**	**Units**	**PAL[1]**	**Result**	**Qualifier**	**Result**	**Qualifier**	**Result**	**Qualifier**
Dioxins/ Furans (8290)	2,3,7,8-TCDD	pg/g	NS	NA		NA		NA	
	1,2,3,7,8-PECDD	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,6,7,8-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,7,8,9-HXCDD	pg/g	NS	NA		NA		NA	
	1,2,3,4,6,7,8-HPCDD	pg/g	NS	NA		NA		NA	
	OCDD	pg/g	NS	NA		NA		NA	
	2,3,7,8-TCDF	pg/g	NS	NA		NA		NA	
	1,2,3,7,8-PECDF	pg/g	NS	NA		NA		NA	
	2,3,4,7,8-PECDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,6,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	2,3,4,6,7,8-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,7,8,9-HXCDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,6,7,8-HPCDF	pg/g	NS	NA		NA		NA	
	1,2,3,4,7,8,9-HPCDF	pg/g	NS	NA		NA		NA	
	OCDF	pg/g	NS	NA		NA		NA	
	TEQ[2]	pg/g	240	NA		NA		NA	
Organo-chlorine Pesticides (8081A/ 8082A)	4,4'-DDE	mg/kg	1.4	ND		ND		ND	
PAHs (8270C, SIM)	1-Methyl-naphthalene	mg/kg	1.8	ND		ND		ND	
	2-Methyl-naphthalene	mg/kg	4.1	0.00097	J	0.0014	J	ND	
	Benzo(a) Anthracene	mg/kg	1.5	0.0012	J	0.015		0.0015	J
	Benzo(a)Pyrene	mg/kg	0.15	0.0014	J	0.023		0.0032	J
	Benzo(b) Fluoranthene	mg/kg	1.5	0.0034	J	0.066	J	0.01	J
	Benzo(g,h,i) Perylene	mg/kg	35	0.0026	J	0.05		0.0072	
	Benzo(k) Fluoranthene	mg/kg	15	0.0032	J	0.061	J	0.0094	J
	Chrysene	mg/kg	30	0.0019	J	0.016		0.0024	J
	Dibenzo(a,h) Anthracene	mg/kg	0.15	ND		0.013		0.002	J
	Fluoranthene	mg/kg	460	0.0018	J	0.013		0.002	J
	Indeno(1,2,3-cd) Pyrene	mg/kg	1.5	0.0019	J	0.036		0.0052	
	Naphthalene	mg/kg	4.4	0.0011	J	0.0012	J	0.00094	J
	Phenanthrene	mg/kg	440	ND		0.0025	J	0.0011	J
	Pyrene	mg/kg	44	0.0013	J	0.011		0.0016	J
Metals (6010B/ 7471B)	Arsenic (As)	mg/kg	24	ND		ND		ND	
	Barium (Ba)	mg/kg	1000	29	J	40	J	15.8	J
	Cadmium (Cd)	mg/kg	14	0.62	J	0.81	J	0.39	J
	Chromium (Cr)	mg/kg	1100	20.6	J	22.2	J	19.6	J
	Lead (Pb)	mg/kg	200	0.46	J	4.3	J	ND	
	Mercury (Hg)	mg/kg	4.7	ND		0.024	J	ND	
TPH (8015C)	TPH-GRO	mg/kg	100	ND		ND		ND	
	TPH-DRO	mg/kg	100	ND		ND		ND	
	TPH-RRO	mg/kg	500	ND		ND		ND	

Notes:

J – Indicates an estimated value.

ND – not detected above the detection limit

NA - contaminant not analyzed for in respective sample

NS - No standard available for respective contaminant

mg/kg – milligram per kilogram

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PAL - Project Action Limit

[1]State of Hawaii Department of Health Tier 1 Environmental Action Levels, Environmental Management Division, 2012. Screening for Environmental Concerns at sites with unrestricted use, drinking water resource IS threatened, and a surface water body is NOT located within 150 meters. Interim Final. rev. January 2012.

[2]TEQ - Toxicity Equivalent of Dioxins

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4.2.2 Quality Control Samples

The Stressed Vegetation DU was sampled in triplicate at both depth ranges for quality assurance/quality control (QA/QC) purposes. PAHs, the pesticide 4,4'-DDE, RCRA 8 Metals, TPH-DRO and TPH-RRO were the only analytes detected in these six (6) MI samples. None of the detections exceeded their respective Tier 1 EAL. The percent relative standard deviation (%RSD) was calculated for the results of each analytical detection within each group of triplicate MI soil samples. If one (1) of the MI samples within a triplicate group contained a result below the laboratory detection limit, the relative percent difference (RPD) was calculated for the analytical results of the remaining two (2) MI samples. If only one (1) MI sample within a triplicate group contained a detection of a certain analyte, the %RSD and RPD were both not calculable.

The %RSD and RPD of the analytical results for the surface triplicate MI samples exceeded their respective limits three (3) times [two (2) PAH compounds and one (1) RCRA 8 metal]. The %RSD and RPD limits were exceeded four (4) times in the subsurface triplicate MI samples [three (3) PAH compounds and one (1) RCRA 8 metal]. The detected concentrations of all the triplicate sample results that exceeded their %RSD and RPD limits are well below their associated Tier 1 EALs. These limit exceedances likely reflect the heterogeneity of the surface and subsurface soil in the Stressed Vegetation DU, rather than the precision in the field sampling methodology and laboratory analyses. Detected concentrations well below the associated Tier 1 EALs were reproduced in each triplicate sample regardless of the %RSD and RPD limit exceedances; therefore, the analytical results are confirmed and the objective of screening for COPCs at the project site has been met.

Laboratory QA/QC procedures employed for this project were standard laboratory QA/QC procedures which included using standard EPA test methods and analyzing one or more of the following: method blanks, laboratory control spikes, matrix spikes, matrix spike duplicates, laboratory control samples and sample duplicates. QA/QC results and QA/QC case narratives are provided in the attached laboratory analytical data reports from APPL (Appendix B). According to APPL, the laboratory QA/QC analysis met quality assurance objectives with the exceptions noted in the case narratives.

All laboratory analytical results were validated by a third party validator (LDC) under EPA Level IV data validation guidelines in order to evaluate the data according to precision, accuracy, representativeness, comparability and completeness (PARCC) relative to the project data quality objectives (DQOs). A total of 18 MI soil samples were analyzed for COPCs during the project. All data was assessed to be valid with the exception of 18 of the 144 total RCRA 8 metals results, which were rejected based on matrix spike/matrix spike duplicate percent recoveries. With respect to the completeness of the overall project data, 18 sample results of the 1,594 total analytes reported were rejected; for a completeness percentage of 98.8. This completeness percentage based on rejected data meets the DQO goal of 90 percent. The complete LDC data validation report is provided in Appendix C, and the PARCC summary report is included in Appendix D.

4.3 MEC Site Reconnaissance and Solid Waste Pile Findings

A visual survey for MEC was conducted on the property in conjunction with the MI soil sampling. No MEC were encountered in any of the DUs during MI soil sampling activities at the site. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified during fieldwork activities. The Senior UXO Supervisor (SUXOS) Final Report detailing the MEC reconnaissance activities performed during the project is provided in Appendix F.

A total of 16 solid waste soil piles were identified, measured and surveyed throughout the project site following MI soil sampling. The dimensions and volume of each pile were measured and recorded in the field notebook, as well as a physical description of the pile and any debris that was visible. The footprint of each soil pile was surveyed using a differential GPS unit. No MEC were observed on the surface of any of the soil piles. Photographic documentation of each solid waste soil pile is included in Appendix E on the attached CD-ROM. Approximate dimensions, volumes, and physical descriptions of the 16 soil piles are summarized in Table 4-2. The surveyed locations and footprints of each soil pile within the project site are depicted in Figure 4-1.

Table 4-2: Summary of Solid Waste Soil Piles Observed within Project Site

Soil Pile Identification	Soil Pile Dimensions [L x W x H] (ft)	Soil Pile Volume (yd^3)	Description of Soil Pile and its Visible Contents
Pile 1	375 x 45 x 4.5	2,813	Pile height ranges from 6 ft at the NE end to 3 ft at the SW end. Pile consists mostly of clayey fine sand with silt; no significant metallic debris or rubbish (300 lbs.); aluminum cans, foil and window frames observed.
Pile 2	510 x 8 x 3	453	Pile height ranges from 2 ft to 4 ft. Small pile (1 yd^3) of Monier tile observed within pile; pile is mostly soil with some metallic debris (700 lbs.); fence posts and car rims observed. Car parts and cans observed between Piles 1 and 2.
Pile 3	68 x 9 x 3	68	Pile is mostly soil with minor amounts of metallic debris; one block of concrete and several fence posts observed.
Pile 4	426 x 25 x 7	2,761	Pile height ranges from 6 ft to 8 ft. Pile is mostly soil with some boulders; contains one large piece of rusted metal (possibly an old water heater), two 2'x2' pieces of ¼" steel plating, and other minor metallic debris such as rebar.
Pile 5	520 x 30 x 8	4,622	Pile is mostly soil; no significant metallic debris detected; only one aluminum can observed.
Pile 6	40 x 12 x 4	71	Pile contains soil with a pile of concrete (1 – 1.5 tons); no other metallic debris.
Pile 7	54 x 15 x 5	150	Pile is mostly fine sand with some clay and silt; small amount of trash, wire (250 lbs.), and a metal rack observed in pile.
Pile 8	190 x 18 x 5	633	Some carpet observed along sides of pile; truck axle observed (500 lbs.); southern 2/3 length of pile contains: another truck axle and bumper; lot of metal debris in one area of the pile; one computer monitor and one pile of rocks.
Pile 9	180 x 36 x 4	960	Pile height ranges from 3 ft to 5 ft. Scrap metal, car parts, wire, steel and PVC pipe, car hood and car seats observed in pile.
Pile 10	50 x 36 x 3	200	Pile contains car tires and rims, PVC pipe, corrugated metal and wire.
Pile 11	370 x 30 x 3.5	1,439	Pile height ranges from 3 ft to 4 ft. Pile contains concrete debris, scrap metal, vegetative waste, car tires, wood debris, an appliance (stove?), and steel fence posts.
Pile 12	Pile stretches along entire eastern boundary of the site	~9,000	The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development. Pile contains scrap metal, PVC pipe, irrigation lines, wood debris, car tires and rims. The most concentrated debris areas are adjacent to the housing area.
Pile 13	100 ft diameter x 6	1,745	The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development.
Pile 14	600 x 50 x 8	8,889	Pile height ranges from 4 ft to 11 ft. The pile is primarily a push-up pile created during the clearing of the land for the adjacent housing development, located on the NE property boundary. Pile contains plastic and construction debris (lumber, nails, bands, etc.)
Pile 15	60 x 20 x 6	267	Pile contains wooden fence posts and wooden debris.
Pile 16	12 ft diameter x 3	13	Pile contains concrete rubble, CMU blocks, rebar, piping and traffic bollards.

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500' 0 500' 1000'

SCALE: 1"=500'

REFERENCE: GOOGLE EARTH IMAGE, 2012

	DATE: DEC 2013	PROJECT TITLE: CENTRAL MAUI REGIONAL PARK PHASE II ENVIRONMENTAL SITE ASSESSMENT KAHULUI, MAUI, HAWAII
	FIGURE TITLE: SURVEYED LOCATIONS OF SOLID WASTE SOIL PILES WITHIN PROJECT SITE	FIGURE NO.: 4-1

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Section 5 Summary of Findings

E2 completed a Phase II ESA of the proposed Central Maui Regional Park site located on TMK parcel (2) 3-8-007:101 (portion) in Kahului, Maui, Hawaii. A Phase I ESA prepared for the property in July 2012 identified recognized environmental concerns as well as potential munitions and explosives of concern (MEC) at the site. This Phase II ESA determined if contaminants of potential concern (COPCs) are present in site soils. In addition, a site reconnaissance of the property was conducted in order to document piles of solid waste as well as identify features that may suggest previous use of the site for a training range or bombing target.

Per the State of Hawaii Department of Health (HDOH) *Technical Guidance Manual* (HDOH, 2009), the screening was completed on various sized decision units utilizing a multi-increment sampling approach. The 65-acre site was divided into seven (7) decision units ranging in size from approximately 16,300 square feet to 8.1 acres. Two (2) multi-increment soil samples were collected from each decision unit, one (1) at 0 – 6 inches bgs, and the other at 1 – 2 feet bgs. The Stressed Vegetation DU was sampled in triplicate for QA/QC purposes. Each multi-increment sample was analyzed for some or all of the following COPCs: TPH-GRO, DRO and RRO, HVOCs, PAHs, SVOCs, Organochlorine Pesticides, RCRA 8 Metals, PCBs, and Dioxins/Furans.

The results of the multi-increment sampling analyses indicate that residual levels of COPCs are not present at significant levels in surface and subsurface soils at the site. HVOCs, SVOCs, TPH-GRO and PCBs were not detected above laboratory detection limits in any of the MI samples collected. Dioxins/Furans, the organochlorine pesticide 4,4'-DDE, PAHs, RCRA 8 metals, TPH-DRO and TPH-RRO were all detected above laboratory reporting limits in various MI samples, however none exceeded their associated Tier 1 EALs for unrestricted land use. Therefore the project site does not require any further action or restrictions on land use prior to its development into a public park.

No MEC were encountered in any of the DUs during MI soil sampling or site reconnaissance activities. Shooting positions, grenade pits, small arms berms and/or other target areas were not identified at the project site. A total of 16 solid waste soil piles located throughout the project site were identified during the site reconnaissance. Physical descriptions were recorded in the field notebook and the footprint of each soil pile was surveyed using a differential GPS unit. No MEC were observed on the surface of any of the soil piles. It is recommended that the solid waste in the soil piles be removed and properly disposed during the future re-development of the site as a public park. It is also recommended that a qualified environmental scientist be present during the solid waste removal to visually observe if any releases from the solid wastes have occurred that warrant further investigation and sampling. Although MEC was not observed during the site reconnaissance, MEC was found during excavations on adjacent properties. It is recommended that all future grading operations be completed with MEC construction support.

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Appendix A

Project Photographs

Appendix A

Photo 1: Entrance to proposed Central Maui Regional Park project site off of Kuihelani Highway

Photo 2: Typical landscape and vegetative growth within project site

Photo 3: Concrete pad and solid waste debris within Stressed Vegetation decision unit

Photo 4: Orange flags marking increment soil sample locations within decision unit

Photo 5: Excavating to 24" bgs using posthole digger in order to collect subsurface soil sample increment; UXO technician performing MEC clearance at various depths of excavation

Photo 6: Collecting soil sample increment using dedicated fixed-volume soil scoop

Photo 7: Completed multi-increment soil samples ready for shipment to the analytical laboratory

Photo 8: State of Hawaii Department of Land and Natural Resources archeologist performing archeological monitoring at increment sample location

Photo 9: Documenting and surveying solid waste soil pile; concrete debris present in foreground

Photo 10: UXO technician screening the surface of solid waste soil pile for MEC using metal detector

Photo 11: Automobile parts observed in solid waste soil pile

Photo 12: Various solid waste debris observed in soil pile adjacent to new Maui Lani housing development

Photo 13: Example of large metal debris observed in solid waste soil pile

Photo 14: Large soil pile extending along northern boundary of project site created during clearing/grading of parcels for adjacent Maui Lani housing development