



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

Areawide Environmental Hazard Management Plan for the Waikoloa Maneuver Area Island of Hawaii

Explosives Safety Guidance to Help Protect You from Munitions



Prepared by the Hawaii Department of Health
Hazard Evaluation and Emergency Response Office
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Disclaimer

The Areawide Environmental Hazard Management Plan (AEHMP) is intended for use as a guidance document. The guidance it contains cannot guarantee your safety from hazards associated with unexploded military ordnance (UXO). However, the information can help greatly to reduce the risk of injury should you encounter an object you suspect of being UXO. The Hawaii Department of Health (HDOH) has prepared this AEHMP to:

- Inform the public that unexploded military ordnance (UXO) are present in the former Waikoloa Maneuver Area (WMA) on the Island of Hawaii.
- Alert the public and property owners to hazards associated with UXO.
- Help identify UXO should you encounter suspicious objects.
- Recommend actions to take if suspected UXO are encountered.
- Recommend actions to take prior to starting construction work on property where UXO may be present.

Under no circumstances should an untrained person touch or disturb an object suspected of being UXO.

If you discover a possible UXO, it is very important that you immediately observe the “3Rs of Explosive Safety.”

- **Recognize** the potential danger.
- **Retreat** from the area.
- **Report** your findings to the police (911).

Observe the “3Rs” of
UXO Safety and Reporting:
Recognize...Retreat...Report!

- It is important to react responsibly in the presence of Unexploded Ordnance (UXO).
- If you encounter an object you suspect may be UXO:
 - STOP! Do not move closer.
(**Recognize the hazard**)
 - DO NOT touch, move or disturb the UXO.
 - Clearly mark the area around the UXO.
 - Complete the ‘UXO Report Form’ in the Appendix.
- Back away at least 100 feet from the UXO following the same path as your approach.
(**Retreat**)
- Call 911 to report the location of the UXO and forward the completed UXO Report Form to the *U.S. Army Corps of Engineers* and the *Hawaii Department of Health, Hazard Evaluation and Emergency Response Office (HEER Office)* at the addresses listed on the form. (**Report!**)

Prologue

The Hawaii Department of Health (HDOH) prepared this guidance document to reduce the risks associated with Unexploded Ordnance (UXO) and allow for safer and more cost-effective development in the former Waikoloa Maneuver Area (WMA).

The initial version of the guidance was presented at a November 30, 2016 conference entitled, "*Solving the UXO Conundrum*." The conference, held in Waikoloa, was well attended by property owners, resort owners/managers, munitions contractors, Federal, State and County officials, and the interested public. The conference program featured senior government officials along with interactive panels designed to answer questions and discuss issues.

The initial document was distributed for public comment from May 2016 through February 2017. The document was then revised based on the comments received.

It is very important to keep in mind the guidance offered in this Areawide Environmental Hazard Management Plan (AEHMP) is specifically designed to reduce risks related to UXO in the WMA. The guidance does not address other sources of contamination.

If historical property use indicates the possible presence of other hazardous substances, pollutants, or contaminants regulated under the Hawaii Environmental Response Law (HERL), or if other contaminants are discovered during a UXO investigation or in the course of redeveloping a property, those contaminants must be addressed separately as required by Hawaii Revised Statute (HRS), Chapter 128D.

IMPORTANT NOTICE

HDOH recommends following the guidance presented in this document for any development within the WMA, whether or not the Department of Defense has completed its clearance activities.

Interested parties should consider the guidance information in this document when planning soil-disturbing activities within the WMA. The information presented is designed to provide a fast and structured way to reduce risks of accidental injury related to UXO.

All developments, whether conducted under this AEHMP or a HDOH-approved SSEHMP, or not, will be at the landowner's own risk and HDOH will not be held liable for any damages or injuries that may occur in the WMA.

Use of this AEHMP and/or an associated SSEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH.

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List of Acronyms

| | |
|--------------------|--|
| AEHMP | Areawide Environmental Hazard Management Plan |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| DDESB | Department of Defense Explosives Safety Board |
| DoD | U.S. Department of Defense |
| EHE | Environmental Hazard Evaluation |
| EHMP | Environmental Hazard Management Plan |
| EOD | Explosives Ordnance Disposal |
| FUDS | Formerly Used Defense Site(s) |
| HDOH | Hawaii Department of Health |
| HE | High Explosive |
| HEER Office | Hazard Evaluation and Emergency Response Office |
| HERL | Hawaii Environmental Response Law |
| HRS | Hawaii Revised Statute(s) |
| ICs | Institutional Controls |
| ROE | Right of Entry |
| SSEHMP | Site-Specific Environmental Hazard Management Plan |
| USACE | United States Army Corps of Engineers |
| UXO | Unexploded Ordnance |

Executive Summary

The United States Marines used the Waikoloa Maneuver Area (WMA) from 1943 to 1946 for “live fire” training. Approximately 10% of the explosive ordnance failed to detonate, leaving a potential explosive hazard across at least 120,000 acres of land.

Since 1946, the Department of Defense (DoD) conducted several investigations and cleanup activities in various locations throughout the WMA. Today, the United States Army Corp of Engineers (USACE) and the U.S. Army Garrison-Hawaii continue to investigate and remove UXO from the WMA.

Completing this work in the entire WMA will cost approximately \$720,000,000. With the current annual budget of \$10,000,000, the cleanup process will take decades to complete. The USACE prioritizes its cleanup efforts based on areas that pose the greatest risk to local communities and those sites with the highest potential to contain UXO.

In addition to these fiscal constraints, there are technological limitations in the detection and removal of UXO. Even after a cleanup is completed, today’s investigation and cleanup process cannot guarantee that UXO are no longer present. Consequently, despite the government’s best efforts to remove all the UXO, a continuing level of ‘residual risk’ related to UXO will remain in the WMA.

What’s more, due to population growth and the high demand for housing and vacation resorts, significant development is expected in the WMA. Proposed development projects include: additions to existing dwellings, development of vacant lots, new large-scale subdivisions, retail/commercial facilities, and other tourism-related projects.

Recognizing the ‘residual risk’ posed by UXO, lenders may be reluctant to fund large and small development projects within the WMA. The guidance offered in this Areawide Environmental Hazard Management Plan (AEHMP) will help reduce the ‘residual risk’ of UXO by raising awareness, educating the public, and explaining how best to go about developing land in the WMA.

Section 1 Introduction

The U.S. Navy and Marines used the original 91,000 acre Waikoloa Maneuver Area (WMA) from 1943 to 1946 as a practice area for troop maneuvers and the live firing of artillery and other weapons. The U.S. Department of Defense (DoD) later expanded the area to include over 123,000 acres (Figure 1). DoD's efforts to define the full extent of the WMA continue.

Since an estimated 10% of the military munitions used during live-fire training may have failed to detonate, potential hazards from unexploded ordnance (UXO) and other munitions remain in the WMA. Several deaths and injuries caused by accidentally detonating UXO that have occurred in the WMA over the years since World War II confirm that serious risks from UXO are present.

Since the WMA was closed in 1946, DoD has undertaken five cleanup activities and continues to investigate and remove munitions to this day. **It is very important to understand that despite extensive efforts to detect and remove munitions, due to technological limitations it is still possible that munitions have gone undetected. As such, 'residual risk' related to munitions remains present in the WMA...even in areas previously cleared.** 'Residual risk' refers to the risk that unexploded munitions remain present **even in previously-cleared areas** due to limitations of current detection technology and the challenging topography and geology of the WMA.

The potential of encountering a munition increases significantly with the degree of development and excavation occurring within the WMA. To protect workers and the public during development activities, Section 8 of this AEHMP contains directions for using 'UXO Construction Support' during ground disturbing activities and procedures for properly managing soils.

Munitions are referred to by many names, including: UXO, duds, discarded military munitions, munitions debris, shells, rounds, or munitions and explosives of concern. Additionally, munitions may also be referred to by the type of weapons system in which they were used, such as artillery, shells, mortars, grenades, rockets, or tank rounds. **In this document, 'UXO' refers to all types of munitions that may pose a risk to human health or the environment, primarily because it is the term most familiar to the community.**

Section 2 Summary of HDOH Activity

The Hawaii Department of Health (HDOH) has been involved in remediation activities at the WMA since the mid-2000's. The Department's primary role in the WMA is to oversee work performed by the United States Army Corps of Engineers (USACE) and the U.S. Army Garrison and ensure that the work complies with the Hawaii Environmental Response Law (HERL), Chapter 128D, Hawaii Revised Statutes (HRS).

State law authorizes HDOH to respond whenever there is a release or a substantial threat of a release of any hazardous substance, pollutant or contaminant that may present a substantial danger to public health, welfare, or the environment. DoD provides funding to the HDOH Hazard Evaluation and Emergency Response (HEER) Office to oversee DoD remediation activities. The HEER Office also reviews DoD activities to make sure they comply with "all applicable or relevant and appropriate requirements," as required by State and Federal laws.

To assist in mitigating risks related to UXO, the HEER Office:

- Works with DoD Munitions Site Response Program personnel to:
 - 1.) Review and approve investigation planning documents, findings, and final reports;
 - 2.) Participate in Restoration Advisory Board meetings;
 - 3.) Assist with voluntary evacuations; and
 - 4.) Offer general guidance and support to help protect human health and the environment.
- Participates in USACE public awareness and educational outreach programs.
- Prepares and updates this Areawide Environmental Hazard Management Plan (AEHMP) to help property owners and contractors develop land within the WMA as safely as possible.
- Provides guidance for preparing Site-Specific Environmental Hazard Management Plans (SSEHMP) that developers of large-scale construction projects within the WMA must submit to the HEER Office.

Section 3 Background Information

3.1 Site History and Location

In December 1943, the U.S. Navy acquired approximately 91,000 acres in Waikoloa. The land was acquired through a licensing agreement with Richard Smart of Parker Ranch. At that time, the area was known as Camp Tarawa and it is now referred to as the WMA. Additional acreage was acquired between 1943 and 1945, and the WMA expanded to 123,000 acres. Portions were used as an artillery firing range on which live ammunition and other explosives were employed. The remaining area was devoted to troop maneuvers and the largest encampment on the Island of Hawaii.

In September 1946, the original 91,000 acres were transferred back to Parker Ranch. Most of the remaining acreage was transferred back at later dates. Some land remained in use until 1953. Approximately 13,500 acres, in the northeastern region of the former WMA, was leased to the U.S. Army through the 1990's. This area was identified as the Pu'u Pa'a Local Training Area until 1998. It is currently identified as the Pu'u Pa'a Munitions Response Area.

Since 1946, much of the land in the former WMA has been subdivided and redeveloped. After World War II, the town of Waimea expanded greatly, and the Waikoloa Village community was developed. Parker Ranch currently owns only a portion of the former ranchland. Numerous resorts have been developed along the coastline in areas that were former artillery targets and maneuver areas. While large portions of the former WMA remain agricultural or undeveloped, much of the land has changed ownership. Numerous subdivisions have been developed and portions of the properties have been subdivided for homestead lots.

Since 1945, at least three deaths, and several injuries, have been attributed to UXO from the former WMA. In 1945, a civilian highway worker was killed when a UXO exploded three miles south of Waimea.

In 1954, two Parker Ranch workers installing a fence were killed, and three others were injured when a mortar round exploded. This incident prompted additional cleanup efforts by DoD as described in Section 3.4. In 1983, two Schofield Barracks soldiers were injured by UXO on Parker Ranch land about four miles outside of Waimea.

The current boundaries of the WMA are shown in Figure 1. For the purposes of this AEHMP, the WMA boundary includes the WMA Formerly Used Defense Site (FUDS) Munitions Response Area managed by the USACE as well as the Pu'u Pa'a Munitions Response Area managed by the U.S. Army Garrison – Hawaii.

3.2 Geology and Hydrology

The land surface in the WMA is sloping and generally varies from smooth to rocky. It is marked by numerous cinder cones and cut by widely spaced erosion gullies. The WMA is surrounded by three of the five volcanoes found on the Island of Hawaii. There are no permanent watercourses in the WMA due to the low level of precipitation. Appendix E contains additional information on the geology and hydrology of the WMA.

3.3 Types of UXO and Their Hazards

DoD estimates approximately 10 percent of all munitions fail to detonate, resulting in a substantial number of unexploded ordnances. UXO are considered extremely dangerous because they are most likely fully armed and ready to explode.

The explosive hazard associated with UXO and the sensitivity of their armed fuzing does not decrease with time. As a result, even decades later, UXO still have the potential to detonate. In fact, some types of explosives become more sensitive over time. Moving, disturbing, or handling UXO may cause them to detonate. Depending on the type of ordnance, the potential blast radius from an accidental explosion may reach 450 feet from the UXO.

The primary hazard from UXO in the WMA is the risk of injury, death, and/or property damage caused by their accidental detonation. The hazard includes not only the initial blast and flying shrapnel, but the shock wave associated with the detonation, which can cause damage to internal organs, as well as building components. In general, UXO in the WMA are not considered hazardous unless they are disturbed. Based on soil and groundwater investigations conducted by USACE between 2009 and 2012, it does not appear that chemical constituents of UXO pose a risk to human health or the environment in the WMA.

Many different types of UXO are still present in the WMA. These dangerous and potentially “live” munitions fall into four broad categories: (a) large bombs, (b) artillery projectiles, (c) rocket warheads, and (d) other munitions. The fourth category is quite large and varied. At the time of impact, munitions may have broken into sections or partially detonated, leaving only part of the explosive payload behind. These partially detonated munitions are referred to as “UXO remnants.” It takes highly trained and experienced individuals to properly identify and assess UXO. As such, every suspicious metal object encountered in the WMA should be treated as if it is UXO.

DoD used all shapes, sizes, and types of munitions for weapons testing and troop training. The appearance of these munitions may change dramatically due to impact, deterioration, rust, dirt, mud, and vegetation.

In addition to intact munitions, munition components (e.g., fuzes and exposed explosives) may continue to pose a hazard. Also, the presence of apparently harmless debris, such as metal fragments, may indicate that UXO are present in the vicinity. Do not pick up or handle munitions debris. Remember, only well-trained specialists can accurately identify UXO and determine if they have the potential to detonate.

To protect yourself, please observe this most important safety guideline related to UXO and munitions debris:

"If You Did Not Drop It...Do Not Pick It Up!"

The following table lists the munitions most likely to be encountered in the WMA. The list is based on historical records, newspaper accounts, previous investigations and recovered UXO. Appendix I contains photos of various munitions used at the WMA.

Table 3-1
Types of UXO Found at the Waikoloa Maneuver Area

| | |
|--|---|
| <ul style="list-style-type: none"> • 155mm High Explosive (HE) shells • 105mm HE shells • 81mm HE mortars • 75mm HE shells • 60mm HE shells • 60mm illumination rounds • 37mm anti-tank cannon • 4.2-inch mortar shell • 4.5-inch barrage rockets • 3.5-inch rockets • 2.75-inch rocket | <ul style="list-style-type: none"> • 2.36-inch rockets • 50-caliber small arms • Rifle and hand grenades • MK II hand grenades • Practice land mines • Japanese hand grenades • Japanese Mortars • Japanese 25mm anti-aircraft/tank round • 47mm Japanese anti-tank projectile |
|--|---|

Note: Table 3-1 illustrates representative UXO located within the WMA.

3.4 Limitations of Technology

A variety of geophysical detection technologies (e.g., electromagnetic detectors or magnetometers) are being used to investigate UXO at the WMA. The technologies fall into two general categories referred to as analog and digital.

Analog equipment is generally smaller and more maneuverable, allowing the investigator to probe areas where the terrain is too rugged to use larger and more delicate equipment. However, analog equipment relies more heavily upon the technician's ability to analyze data in real time. When using analog equipment, it is also more difficult to create an accurate record that can be analyzed later.

Digital equipment is generally larger and more delicate. It is able to create a digitized record that can be analyzed later for anomalies. The digitized record also allows for better quality control and documentation. Unfortunately, the use of digital equipment is extremely limited in parts of the WMA due to the terrain and other logistical limitations. In some areas, the terrain is so dangerous that it is unsafe to use any type of detection equipment. In these areas, UXO investigations are limited to a visual assessment of the surface.

In addition to limits posed by the terrain, geology at the WMA affects the depths of detection for all types of geophysical detection equipment. The high iron content in the soil (see Appendix E) creates troubling background noise and false-positive signals. The depth of detection is the depth at which a buried metal item can be detected by the electromagnetic sensors on the

equipment. The higher the background noise, the shallower the depth of detection. The depth of detection also varies with the size and density of the object. In general, smaller UXO items, such as grenades, can only be detected to depths of about 10 to 12 inches, whereas larger 105 and 155 millimeter projectiles can be detected at depths up to 36 inches.

Technology available for detecting and removing munitions has improved significantly over the years. Nonetheless, investigations for munitions remains a tedious, painstaking, and costly process that will never be 100% effective. Also, because munitions may be present for a variety of reasons (e.g. live-fire training, lost or discarded during training or by veterans who incorrectly and dangerously kept munitions as souvenirs, or disposed of at sea) munitions may be encountered almost anywhere. As a result, there is always a ‘residual risk’ of encountering UXO.

To minimize hazards associated with the residual risk, ‘UXO Construction Support’ should be conducted during all development projects and other activities that involve excavation of soil within the WMA. This is true even in areas that have been previously cleared by USACE. Construction Support and proper soil management are described further in Section 8 of this AEHMP.

3.5 History of Response Actions in the Waikoloa Maneuver Area

Training activities in most of the WMA ended in 1946. However, limited training activities continued in the former Pu’u Pa’a Local Training Area through the 1990’s. This portion of the WMA is currently referred to as the Pu’u Pa’a Munitions Response Area and its cleanup is being managed separately by the U.S. Army Garrison - Hawaii. Cleanup in the rest of the WMA is currently being managed by the USACE under the DoD Environmental Response Program. Over the years since training activities ended, DoD has undertaken five separate cleanup programs in the WMA. These programs are described further in Appendix C.

The USACE and U.S. Army Garrison-Hawaii are conducting the current cleanup program with oversight from HDOH. All work is being done in accordance with the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). In total, the current DoD cleanup program has investigated and removed munitions from approximately 29,000 acres of the WMA’s estimated 123,000 acres (approximately 25%).

To increase awareness of dangers associated with UXO and help the public recognize munitions, USACE and HDOH conduct public outreach events and distribute useful information.

Section 4 USACE Cleanup Priorities in the Waikoloa Maneuver Area

Currently, USACE continues its work to find and remove UXO. USACE conduct its response actions using a method based on the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process which is overseen by HDOH. Congress allocates funds annually for the cleanup of formerly used defense sites (FUDS) nationwide. Estimates to complete work in the entire WMA are in the range of \$720 million dollars. With an annual budget in the range of \$10 million dollars per year, this project is expected to be ongoing for decades. Funding for the Pu'u Pa'a Munitions Response Site is separate from the FUDS program and is managed by the U.S. Army Garrison – Hawaii.

Each year, USACE creates a priority list for UXO cleanup based on the degree of estimated risk. Property owners can request that USACE adjust its priorities for a variety of reasons such as: community needs and benefits, changes in land use, and funding constraints. Appendix G contains more information about how USACE prioritizes its cleanup activities.

4.1 Right of Entry Considerations

The burden of cleaning up FUDS property rests with DoD. However, since DoD no longer owns or controls these properties, USACE must first obtain a signed "Right of Entry (ROE)" agreement from property owners before cleanup activities can begin. A sample ROE agreement is included in Appendix D. The ROE agreement allows USACE and its contractors to access and investigate the property.

Occasionally, a property owner is hesitant to sign an ROE based on one or more of the conditions or requirements it contains that the property owner finds unacceptable. Examples of troubling provisions include:

- UXO investigations and removal actions may require that work crews have full access to the property and leave equipment onsite for up to 12 months, and possibly longer in some cases.
- Cleanup work may require that property owners vacate the property for periods of time with little advanced notification.
- The legalistic language in the ROE can be difficult to understand, disconcerting and open to misinterpretation.

Questions landowners frequently asked about the ROE agreement include:

- Who is liable for damage to my property or home caused by USACE cleanup?
- Who is liable for damage to neighboring properties?
- What liability does a property owner have for USACE managed activities?

- How does the USACE handle discovery of cultural artifacts on the property? Will this information be made public? Will the landowner be required to allow cultural and environmental groups access under the ROE?
- If the property owner declines to sign an ROE, will the federal or state government pursue legal actions against the property owner?

It is quite reasonable for a property owner to request clarification regarding any concerns the property owner has prior to signing an ROE. Currently, the federal and state governments do not initiate legal action against property owners who refuse to grant an ROE. However, if evacuation of an adjacent property is required to safely remove UXO, the USACE may ask the adjacent property owner to evacuate their property. This may occur even if the adjacent property owner has not granted an ROE.

It is important that property owners know they may receive significant benefits by cooperating with a UXO investigation. USACE does not charge the property owner to conduct the UXO investigation or for the removal of suspected UXO and munitions debris from the property. Without an ROE from the property owner, USACE is prohibited from entering the property to perform this vital task which may significantly reduce the residual risk from UXO at the property.

If a property owner does not grant an ROE when requested, USACE will designate the parcel as an "Exception Area – No ROE." In such a case, the property may be placed at the bottom of the priority list for any future cleanup, or the site may be closed without any future investigation and the parcel will remain an Exception Area in the final documentation.

Section 5 Present and Future Land Use in the Waikoloa Maneuver Area

Present land use across the WMA is quite diverse and consists of residential, commercial, industrial, institutional, resort, pastoral and agricultural areas. There are also significant areas, such as the former lava flows, that are not currently in use. Figure 2 shows the general land use in the WMA.

Property in Hawaii County is in high demand. Future land use will likely consist of expanding residential and commercial activities. Further resort development may occur along the coastline while residential and other forms of commercial expansion are expected in Waimea, Waikoloa Village, and elsewhere.

Varying levels of ‘residual risk’ will remain on individual properties in the WMA, even after DoD UXO removal activities are completed. As a result, lenders may be reluctant to fund property loans and developments in the area and may seek reassurance that safety measures will be in place during construction and use of the property. Following this AEHMP can significantly reduce risks from UXO associated with construction activities, which may improve financing options.

Section 6 Responsibilities of Government Agencies and Landowners

Everyone, including federal, state, and local governments, landowners and individuals, shares responsibility for understanding and mitigating risks associated with UXO. This section describes the general responsibilities of each group and how they interact with one another.

DoD: At the Federal level, DoD is responsible for investigating and removing UXO, as well as, addressing related contaminants in the WMA.

Army Corps of Engineers: DoD has delegated USACE responsibility for addressing UXO issues on Formerly Used Defense (FUDS) in the WMA.

U.S. Army Garrison – Hawaii: Manages investigation and cleanup of the Pu'u Pa'a Munitions Response Site. This work is separate from the work being done by USACE on the FUDS portion of the WMA.

HDOH/HEER Office: In general, HDOH ensures that remediation of hazardous substances, pollutants, or contaminants are done in accordance with the Hawaii Environmental Response Law (HERL). The HEER Office also oversees DoD's UXO remediation activities under a Cooperative Agreement with DoD.

Counties and Municipalities: At the local level, counties and municipalities act as the "first responders." Once notified, police officials contact DoD Explosive Ordnance Disposal (EOD) specialists and assure that the public keeps a safe distance.

WMA Property Owners: Landowners should inform all users of their property that UXO may be present and clearly communicate the "3Rs" safety message to them. USACE has pamphlets and signage available upon request. During any construction activities, property owners should adhere to this AEHMP and any Site-Specific Environmental Hazard Management Plan (SSEHMP) approved by HDOH. 'UXO Construction Support' should be provided, even on properties previously cleared by the DoD.

Residents and Visitors: Individuals who encounter munitions should observe the following "3Rs" of Explosive Safety:

- 1) **RECOGNIZE** a potential munition and be aware of its dangers;
- 2) **RETREAT** and do not approach, touch, move or disturb the object. Carefully leave the area along the same path they walked in on and warn others to do the same; and
- 3) **REPORT** the object by calling 911 and advising police of what you saw and where you saw it.

In addition to calling 911, the individual who discovered the UXO and the first responder should complete the **UXO Report Form** (see **Form 1** in Appendix). Once completed, they should send copies to both the HEER Office and USACE at the addresses are listed on the form.

See Appendix H for additional information on government agency and landowners' responsibilities.

Section 7 General Use of AEHMP's and SSEHMP's by HDOH

HDOH has successfully used Areawide Environmental Hazard Management Plan's (AEHMP) to help ensure the safe development of properties located within larger areas known to be contaminated by similar chemical contaminants.

An AEHMP describes known "contaminants of potential concern" in a particular area and provides general guidance for safely handling and managing soil and groundwater for all properties within the AEHMP boundary. The AEHMP is generally designed to be used for small-scale projects such as utility excavations, landscaping, and minor renovation activities. HDOH typically prepares the AEHMP which applies to multiple properties within a given area and usually provides only an overview of the contaminants that may be present and general guidance for safely managing them.

Some properties within the AEHMP boundary may also have individual plans to manage specific contaminants identified on those properties. These *Site-Specific Environmental Hazard Management Plans* (SSEHMP's) are generally prepared by an environmental consultant working for the property owner. SSEHMP's include specific details regarding known contaminant concentrations and how they affect the site. SSEHMP's must be reviewed and approved by HDOH.

While property owners may use an AEHMP for minor activities, HDOH may request that property owners prepare an SSEHMP when considering major development projects within the AEHMP boundary. For example, the AEHMP may be used for replacement of a broken sewer line, but an SSEHMP will likely be required if the owner is planning to construct a new shopping center.

Typically, an AEHMP or SSEHMP contains the following:

- 1) A Health and Safety Plan;
- 2) An Environmental Hazard Evaluation (EHE);
- 3) Precautionary measures to be followed during construction;
- 4) Soil management plan; and
- 5) Post-construction institutional controls (ICs); post-construction ICs are included when residual contamination is left on the property.

Institutional Controls may include:

- 1) Restrictions on certain activities at a site (e.g., "no digging");
- 2) Safety and training requirements for site users; and
- 3) Engineering controls to reduce exposure (e.g., soil caps, fencing, or signage).

If residual contamination is managed onsite, there will also be institutional controls that must be followed: 1) in the event that additional contamination is discovered, or 2) when further subsurface excavations are to occur at the site. At the end of a construction activity, it is often appropriate to update the SSEHMP and the AEHMP. All updates and revisions must be reviewed and approved by HDOH.

An important benefit of the AEHMP is that its component parts can be used for other development activities within the AEHMP area boundary. In this way, the AEHMP may save the time and expense of preparing separate documents (Health and Safety Plan, EHE, etc.). If an SSEHMP is

required for a project, then components of the AEHMP may often be inserted into the SSEHMP with little modification. Details on when an SSEHMP is required are found in Appendix F.

Section 8 Use of AEHMP's and SSEHMP's in the Waikoloa Maneuver Area

8.1 Introduction

The HEER Office has developed this AEHMP to enhance public safety by:

- 1) Alerting the public to the presence and risks related to UXO in the WMA;
- 2) Suggesting measures to reduce the risks should you encounter a potential UXO; and
- 3) Providing safety guidelines for developing land in the WMA.

More specifically, this AEHMP:

- **Provides useful information about the WMA** (Sections 3 and 5; Appendix E)
- **Discusses the nature and potential hazards associated with munitions** (Section 3 and Appendix G)
- **Provides information about current cleanup activities and regulatory oversight** (Sections 2, 4, and 6; Appendices C, G, and H)
- **Identifies safety measures people should take if they encounter potential UXO** (Section 6 and Section 8)
- **Discusses the process used to mitigate risks associated with munitions that may be present** (Section 8)
- **Identifies precautions parties should take when planning construction work in the WMA** (Section 8 and Appendix F)

HDOH recommends following the guidance presented in this document for any development within the WMA, regardless of whether DoD has completed its clearance activities. The safety information presented is designed to reduce the risk of injury should you encounter a potential UXO. Use of this AEHMP and/or an associated SSEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH.

In the WMA, the common contaminant across the area is UXO, with varying degrees of risk at different sites. The degree of risk depends on the types and quantities of munitions originally used and the level of cleanup activity conducted to date. Even in areas that have been completely cleared by the DoD, some 'residual risk' remains due to the technological limitations discussed in Section 4. Based on this information, the AEHMP approach described in Section 7 can easily be applied to the entire WMA, regardless of the extent of cleanup activities that have occurred in any specific area.

The basic assumption underlying the Environmental Hazard Evaluation discussed below is that all property within the WMA presents a potential UXO hazard. To mitigate this potential hazard, the landowner must communicate the possibility that UXO is present to all users of the land. It is particularly important to alert workers who may disturb or remove soil from the property (e.g., construction workers, landscapers, etc.). HDOH suggests landowners use this document to help them communicate the risks associated with UXO.

In addition, the subsections below describe:

- 1) Recommended actions to take if UXO is encountered;
- 2) Proper use of UXO Construction Support and soil management procedures to reduce risk associated with UXO when developing the property; and
- 3) The need to prepare an SSEHMP for large-scale development projects.

Section 8.2 Environmental Hazard Evaluation

A critical component of an Environmental Hazard Management Plan (AEHMP or SSEHMP) is an Environmental Hazard Evaluation (EHE), which describes the specific environmental hazards the plan is designed to address.

USACE has found that no specific chemical contaminants were used in the WMA. This was the conclusion of a 2004 Phase III Engineering Evaluation/Cost Analysis Report. In addition, between 2009 and 2012, USACE conducted multi-increment soil and groundwater sampling. No contaminants of concern were found that exceeded HDOH Tier 1 Environmental Action Levels (see Appendix C). USACE presented the sampling results to HDOH in 2013, which included chemical residues associated standard munition constituents, such as metals and explosives. Based on these investigations, this EHE also assumes that contamination from chemical warfare materials is not present in the WMA.

The primary risk associated with UXO in the WMA appears to be the potential injury, death, or property damage from accidental explosion. It is very difficult to assess the likelihood an individual will encounter a munition that may explode. It is likewise very difficult, if not impossible, for a regulatory agency to establish an objective standard by which to judge the acceptable risk of such a catastrophic, life-threatening event occurring. Furthermore, no matter what level of cleanup DoD or others perform, some 'residual risk' related to UXO will always remain.

Importantly, it is commonly accepted that UXO present in the WMA are not likely to explode if left undisturbed. HDOH believes only mishandling UXO or disturbing the ground pose an explosive hazard. While munitions debris does not generally pose a risk, explosive residues may be present. Such residues could ignite and cause a burn or similar injury. Munitions debris may also indicate a greater likelihood that UXO are present in the area.

UXO hazards increase significantly during subsurface construction activities such as installing footings, driveways, roads, fence posts, street lighting, and swimming pools. Handling excavated soil containing undetected UXO may also present a hazard. Soil containing UXO that is moved, can pose a risk to offsite receptors, as well.

In general, larger items of UXO present a hazard over a greater distance than smaller items. A 155 millimeter shell, for example, poses a hazard at a greater distance than a hand grenade. Of course, the risk of serious injury or death for a person in direct contact with either item of UXO is likely the same. Unlike chemical contamination that may cause illness or death after years of exposure, explosive hazards such as UXO can seriously injure or kill in an instant.

In those areas where DoD has completed its investigation and clearance, the risks associated with UXO will have undoubtedly been reduced significantly. Nonetheless, regardless of DoD's best efforts to detect and remove UXO, some level of 'residual risk' will always remain.

Section 8.3 Required Action If You Encounter a Munition

In the event a landowner, munitions contractor, construction contractor, or any other on-site visitor encounters a munition, they should immediately call the Waimea Police Department by dialing 911. Do not approach or attempt to pick up the item. **Remember to always observe the "3Rs" of Explosive Safety. The "3Rs" stand for:**

Recognize...Retreat...Report. Anyone who suspects they have encountered a UXO must:

- **RECOGNIZE** the munition and understand the potential dangers.
- **RETREAT** and do not approach, touch, move or disturb the item. Leave the area along the same path and warn others to do likewise.
- **REPORT** by calling 911 and advise the police of what you saw and where.

Remember, only trained personnel can accurately assess the dangers posed by suspected UXO. Under no circumstances should you approach, move, disturb or handle a suspected munition or munitions debris. Once you contact the police, they will contact the military authorities to request DoD support.

Section 8.4 Requirements for Reporting UXO

If a munition is discovered during site investigation, ground disturbing or intrusive activities or at any other time, in addition to calling Waimea Police Department, the **UXO Report Form (Form 1** in the Appendix) should be completed and mailed within seven (7) days to the:

State Agency

Hawaii Department of Health
Hazard Evaluation and Emergency
Response Office
2385 Waimano Home Road #100
Pearl City, Hawaii 96782

Federal Agency

U.S. Army Corps of Engineers
Pacific Division, Honolulu District
Building 230
Fort Shafter, Hawai'i 96858-5440

Section 8.5 Pre-construction Planning and UXO Construction Support

HDOH strongly recommends using 'UXO Construction Support' for all actions taken within the WMA that involve ground disturbing or intrusive activities. These activities include, but are not limited to: landscaping, renovation activities, new construction, installing fence posts, grubbing and grading, etc.

'UXO Construction Support' is an industry term that describes procedures for site screening and steps to avoid suspicious objects referred to as 'anomalies.' The support is conducted in consultation with a qualified munitions contractor. The use of UXO Construction Support is especially important on properties that have not yet been 'cleared' by the DoD. However, due to

the ‘residual risk’ of UXO, HDOH recommends UXO Construction Support for all ground disturbing activities.

HDOH recommends that the guidance in this AEHMP be followed during all construction activities in the WMA.

Following these guidelines for all ground disturbing activities will decrease the risk to workers, property users, and neighbors of an accidental UXO explosion. The process includes the following:

- a) Notify all workers that UXO may be present and that UXO are dangerous.
- b) Inform HDOH if you are planning a large-scale construction project.
- c) HDOH may require that you prepare and submit a Site-Specific Environmental Hazard Management Plan (SSEHMP) for approval prior to beginning any excavation or soil boring activities (see Appendix F and Section 8.6 below).
- d) Hire a qualified UXO Contractor to prepare an ‘Anomaly Avoidance Plan’ and conduct UXO Construction Support during all soil disturbing activities.
- e) Communicate the Anomaly Avoidance Plan and the Site Health and Safety Plan to all site workers.
- f) Both large and small scale developments should follow the Soil Management Plan guidelines described in Section 8.9 below to prevent the spread of potentially UXO-contaminated soil to other areas.
- g) Follow the “3Rs” of explosive safety and complete the attached **UXO Report Form** (Form 1) if UXO are encountered.
- h) Complete the attached **Soil Management Plan Reporting Form (Form 2)** in the Appendix) for all excavated soil. This form should be maintained by the property owner, except when requested by HDOH.
- i) Notify HDOH prior to, and at the completion of, any ground disturbing activities.

There are two methods currently used for detecting munitions: 1) a visual surface survey and 2) geophysical detection equipment to detect buried munitions. Both surveys should be performed by a UXO Contractor that has been certified by the Department of Defense Explosives Safety Board (DDESB) to perform such work (Appendix J).

The DDESB-certified UXO Contractor should also prepare an Anomaly Avoidance Plan. The Plan should be used to convey the potential UXO hazard to site workers as part of their general Health and Safety Training and during on-site tailgate safety meetings. Appendix B contains a sample outline for a typical Anomaly Avoidance Plan.

The property owner should provide the UXO Contractor with construction plans that clearly indicate areas where soil may be disturbed and the depths of all excavations (e.g. locations of

structure footings, driveways, swimming pools, subdivisions, utility corridors, grading and grubbing plans, laydown areas for construction equipment, etc.). For smaller projects, such as landscaping and fence-post installation, the property owner may just show the areas to the UXO Contractor and/or clearly mark the areas to be disturbed. The UXO Contractor must then screen all the surface areas where soil will be disturbed both visually and with a magnetometer.

The UXO Contractor should be on-site during all excavation activities. Where soil excavation or grading will penetrate greater than 12 inches below the ground surface, the soil should be removed in 12-inch layers and the UXO Contractor should perform additional scans after each layer. This process also applies when boring holes for posts or wells, and when collecting soil samples. The UXO Contractor should re-scan with a magnetometer at every 12 inches of depth until desired depth or bedrock is reached. If the excavation does not reach bedrock, the UXO Contractor should perform a final scan at the completion of the excavation to ensure that a clearance has been achieved to 12 inches below the final excavation. All soil excavated from the site should be managed in accordance with the Soil Management Plan described in Section 8.9.

If an anomaly is detected, the UXO Contractor should mark the location and instruct the property owner and workers not to dig in that location. The property owner and construction contractor(s) should perform construction activities only in areas that have been cleared by the UXO Contractor. This may require revisions to the construction plans.

If the construction plans cannot be altered to avoid the anomaly and the UXO Contractor determines the anomaly may be a UXO, the property owner or the contractor should call 911 to report the suspected UXO and complete the **UXO Report Form (Form 1)** in the Appendix. The DoD Explosives Ordnance Disposal (EOD) specialists who respond to the report will assess and dispose of the anomaly. **Under no circumstances, should the privately hired UXO Contractor attempt to remove or otherwise dispose of any UXO.**

Section 8.6 Using a Site-Specific Environmental Hazard Management Plan

When planning a large-scale development in the WMA, HDOH requests that property owners submit a Site-Specific Environmental Hazard Management Plan (SSEHMP) for prior approval. Examples of small- and large-scale development projects are described below. If you are unsure whether your project warrants an SSEHMP, please call the HDOH HEER Office at 808-586-4249 for clarification.

Small-Scale Projects

Small-scale developments are defined as single lot construction projects that include: building a single-family home or garage, home renovation, installing a swimming pool, animal shelter, driveway, fence post, mailboxes, lamp posts and minor alterations to structures that requires subsurface excavations.

Since lots may range up to 100 acres or more, for developments with footprints larger than 3,000 square feet, please contact the HDOH/HEER Office to determine if an SSEHMP is needed. HDOH may ask to review the construction plans to decide whether following the AEHMP alone is acceptable, or whether the landowner needs to submit an SSEHMP.

Large-Scale Projects

Large-scale projects are defined as subdivisions, schools, and shopping centers, etc., that may include roadways, utility corridors and major modifications to complex existing structures. All large-scale construction projects in the WMA should follow an SSEHMP reviewed and approved by the HDOH.

The SSEHMP provides considerably more detailed site-specific guidance than the AEHMP. Maps included in the SSEHMP provide more detail regarding the planned construction, including features such as roads, subsurface utilities, location of structures, depths of excavations and grading activities. The SSEHMP also includes a detailed soil management plan.

The SSEHMP should include the intended location of all subsurface construction activities. Typical projects might include: installing building footers with a two-foot deep excavation; installing subsurface utility lines, grading large areas for parking; and excavating 10-feet to construct a swimming pool. It should also locate storage ‘lay-down’ areas for vehicles, heavy equipment, and materials to be used during construction. The SSEHMP should direct the UXO Contractor to conduct UXO Construction Support and anomaly screening in all these areas.

Appendix F contains additional information on the preparation and use of an SSEHMP.

Section 8.7 Qualifications for Conducting UXO Activities

It is very important that landowners avoid disturbing munitions. Detecting and disposing of munitions requires special training. As a precaution, landowners should hire a UXO contractor to provide UXO Construction Support and prepare an Anomaly Avoidance Plan. The UXO contractor should be certified by the Department of Defense Explosives Safety Board (DDESB). Appendix J includes Tables from DDESB Technical Paper 18, which describe the minimum qualifications for a UXO Contractor. The complete paper (TP-18) may also be found at:

<https://www.denix.osd.mil/ddes/ddes-technical-papers/>

CAUTION

Disposing of UXO requires expertise beyond that needed to detect anomalies. A privately hired UXO Contractor should NEVER attempt to dispose of UXO.

If a potential UXO is identified, contact 911 immediately. The local police department will arrange for a DoD Explosives Ordnance Disposal Specialist to help.

Section 8.8 Subsurface Munitions Clearance Depths

The construction plan should provide for detecting munitions at least 12 inches deeper than the planned depth of excavation, or to bedrock. Although UXO in the WMA do not typically penetrate soil deeper than three feet, investigators have found larger shells as deep as five feet. In general, UXO have been encountered below three feet only in areas where the soil has been otherwise disturbed (e.g., fissures in the soil or landslide areas, etc.). Except for swimming pools and utility poles, subsurface activities in the WMA, are not expected to disturb soil below four feet.

Section 8.9 Soil Management Plan

A critical part of this AEHMP and an SSEHMP is the Soil Management Plan which details how soil is excavated, reused, or disposed of during construction activities. Excavated soil may contain UXO that were not detected during the surface and subsurface surveys. Therefore, each truckload of soil taken off site should be screened again by geophysical detection equipment and/or soil sieving with a 2-inch mesh sieve. If possible, to avoid unintentionally transporting UXO off-site, it is better to reuse all excavated soil on-site for landscaping purposes.

If soil removed from the site is contaminated with UXO, the landowner may be in violation of the Hawaii Solid Waste Pollution Law (HRS 342 H).

At a minimum, the Soil Management Plan should contain the following requirements:

- a) Excavate soil slowly by removing layers of 12 inches or less at a time (referred to as “lifts”). Similarly, soil boring cores should be removed every 12 inches to allow for screening by the UXO Contractor. This includes geotechnical borings used to assess soil conditions.
- b) Use geophysical detection equipment to scan before each 12-inch lift or soil core that is removed. After the final lift or core is removed, scan at least 12 inches below the final depth of the excavation or to bedrock, whichever occurs first.
- c) Stockpile and reuse excavated soil on-site to avoid transporting soil to another location that might contain UXO.
- d) When moving soil off-site, re-screen each truckload using geophysical detection equipment or a 2-inch soil sieve to ensure UXO are not transported off-site. This secondary survey of the soil stockpile should also be done in 12-inch lifts prior to loading for transport and disposal.
- e) If possible, soil removed from the site should only be used for landfill cover. Permission from the landfill operator is required prior to removing the soil for off-site disposal.
- f) If the soil is to be placed other than in a landfill, the off-site disposal location should be recorded on the attached **Soil Management Plan Reporting Form (Form 2** in the Appendix) and the landowner should request approval from the HDOH.
- g) Whenever possible, soil re-used on-site should be placed under foundations or roadways, or in other areas that minimize exposure.

- h) The **Soil Management Plan Reporting Form (Form 2)** in the Appendix), should be completed by the landowner or construction contractor and maintained by the landowner. The forms should be made available to HDOH upon request. If soil is transported to an off-site location other than a landfill, copies should be sent to USACE and HDOH at the addresses listed on the form.
- i) If UXO are encountered during soil excavation, follow the instructions in Section 8.3 and 8.4, and complete the **UXO Reporting Form (Form 1)** in the Appendix). The form should be completed by a UXO Contractor.

Section 9 Summary

1. 'Residual risk' from UXO is present throughout the WMA, even in areas that have been previously cleared by DoD.
2. Risk of death or injury from accidental explosion is the only hazard associated with UXO at the WMA. Chemical constituents from UXO have not been found to exceed acceptable regulatory levels. In addition, there is no documentation indicating that chemical warfare munitions were used in the WMA.
3. This AEHMP provides guidelines to owners and users of properties in the WMA to reduce the risk of exposure to UXO hazards. If you see a suspect UXO, follow the "3Rs of Explosives Safety" (*Recognize, Retreat, and Report!*) and call 911 immediately to report the location.
4. For all ground-disturbing activities in the WMA, landowners should use UXO Construction Support. The support should be provided only by a UXO Contractor that has been certified by the Department of Defense Explosives Safety Board (DDESB).
5. This AEHMP does not address sources of chemical contaminants other than UXO that may be found in the WMA. If a chemical release is detected or suspected, the property owner should contact the HEER Office to report it in compliance with the Hawaii Environmental Response Law (HERL) (HRS, Chapter 128D).
6. Use of this AEHMP and/or an associated SSEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH.
7. Following this AEHMP can provide a fast and economical way to minimize risks associated with UXO when developing both small- and large-scale projects in the WMA.

APPENDIX

Form 1: UXO Report Form

Please complete this form and submit copies to the following:

HEER Office
2385 Waimano Home Road #100
Pearl City, HI 96782
ATTN: SDAR - DSMOA

USACE, Pacific Division, Honolulu District
Building 230
Fort Shafter, HI 96858-5440
ATTN: FUDS - Waikoloa Maneuver Area

| | | |
|---|--------|----------------------------|
| Initial / Final Report (<i>circle one</i>) | | |
| 1. Report Prepared By: | | |
| Name: | | Date: |
| Email Address: | | Phone Number: |
| 2. Location of Suspected Item: | | |
| Address/ GPS: | | |
| City: | State: | Zip Code: |
| Nearest Road/ Cross Street: | | |
| Additional Comments: | | |
| 3. Specific Information: <i>Do Not Approach, Move, or Disturb Item.</i> | | |
| <i>View item from a safe distance</i> | | |
| Date of Discovery: | | Approx. Time of Discovery: |
| Keeping your distance describe the item: (<i>size, shape, color, markings</i>): | | |

Form 1: UXO Report Form (page 2)

Description of Surrounding Area (*circle only one*):

Located on the Surface of the Soil / Partially Buried / Subsurface /
In the Water / Located in another Piece of Equipment

If other, please
specify:

Additional Comments:

4. Immediate Munitions Response Action Taken:

Evacuation of the Area: Yes / No

Marked Item Location: Yes / No

Photographed Item: (attached) Yes / No

GPS Location of Item (provided): Yes / No

Notified Waimea Police Department: Yes / No

Reported Suspect Item to:

Entity Responding:

Time and Date of Response:

Additional Information:

Form 1: UXO Report Form (page 3)

5. Regulatory Notification:

| | | |
|---------------|--|---------------------|
| Date: | | Time: |
| Name: | | Agency: |
| Phone Number: | | Purpose / Comments: |
| | | |
| Date: | | Time: |
| Name | | Agency: |
| Phone Number: | | Purpose / Comments: |

Additional Information:

Form 2: Soil Management Plan Reporting Form

*To be Completed by Property Owner or Construction Contractor
When performing Subsurface Excavations in the WMA*

Please complete this form and submit copies to the following:

*HEER Office
2385 Waimano Home Road #100
Pearl City, HI 96782
ATTN: SDAR - DSMOA*

*USACE, Pacific Division, Honolulu District
Building 230
Fort Shafter, HI 96858-5440
ATTN: FUDS - Waikoloa Maneuver Area*

| | |
|--|---|
| Owners Name: _____ Address: _____ _____ Date: _____ Telephone # _____ Signature: _____ | Name Munitions Contractor Contractors: Telephone #: |
| | Name of Building Contractor if Other Than Self Telephone # |
| | Comments |
| | |

Number and Depth of Each Excavation:

Total Volume of Soil Excavated:

Use of Soil:

Circle One Reused on Site Offsite/Landfill cover Other Explain

Number of UXO Located:

Number of Munitions Debris Located

If Exported Offsite, Means of Screening:

Circle One: Geophysical Detection Equipment Sieving

Form 2: Soil Management Plan Reporting Form (page 2)

Implement this Plan by:

1. Making sure on-site workers are aware of the AEHMP and the potential hazards of subsurface excavation on the property associated with UXO.
2. Making sure a copy of the completed plan is present at the construction site.
3. Accessing additional guidance for completing this form in Section 8 of the AEHMP for the WMA.
4. Keeping a copy for your records and send a copy to the HEER Office and the USACE at the addresses listed above.
5. Attach a sketch of the location and depth of excavation.

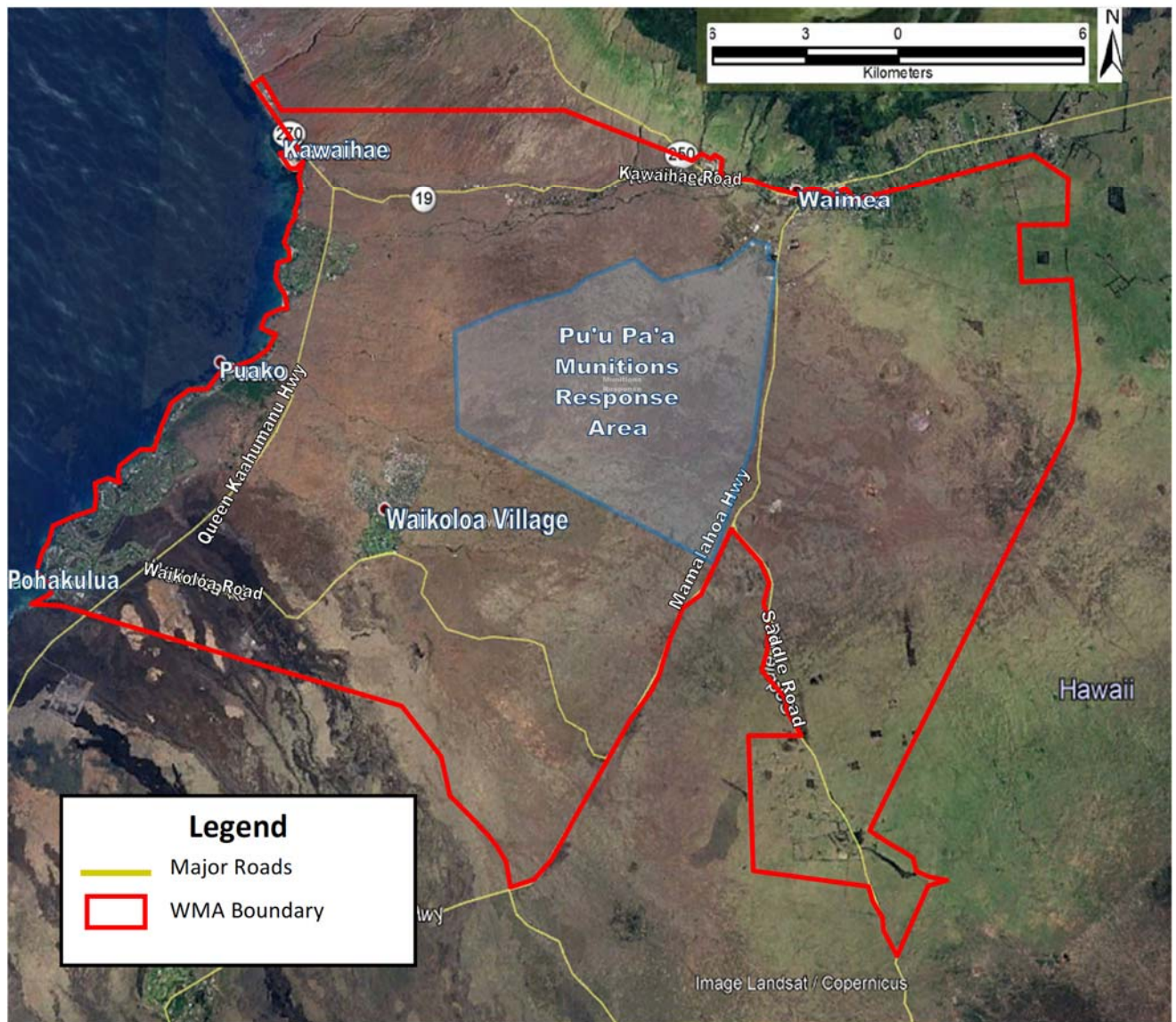


Figure 1:
Waikoloa Maneuver Area Location Map
(including WMA Formerly Used Defense Site and Pu'u Pa'a Munitions Response Area)
Hawaii County, Hawaii

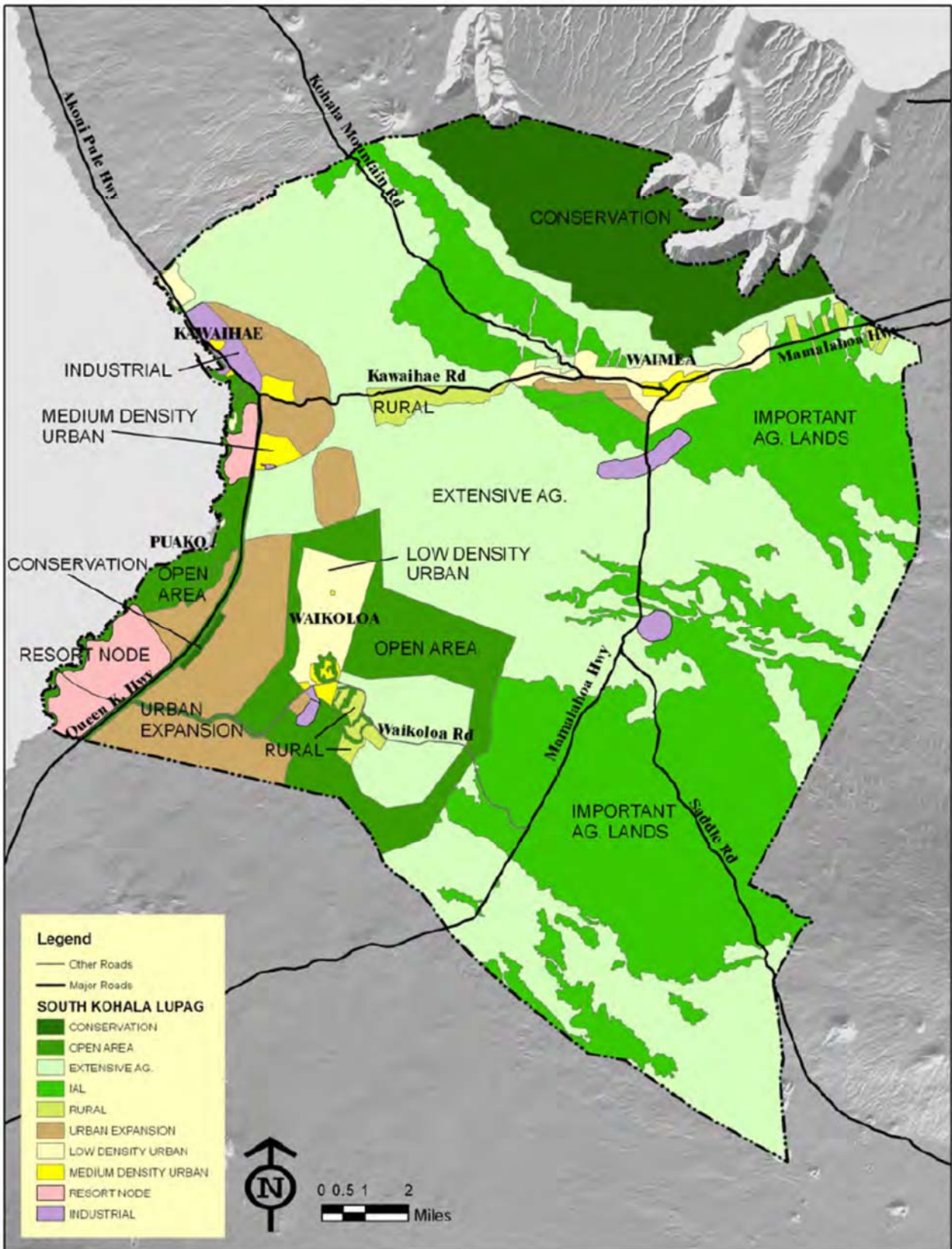


Figure 2:

Land Use in the Waikoloa Maneuver Area

Source: South Kohala Community Development Plan. FINAL. November 2008
<http://www.hcrc.info/community-planning/community-development-plans/>

Appendix A

Useful References

1. Department of the Army Pamphlet 385-64, “Ammunition and Explosive Safety Standards.”
2. Department of Defense Directive 6055.9, “DoD Explosives Safety Board (DDESB) and DoD Component Explosives Safety Responsibilities.”
3. Department of Defense Explosives Safety Board, Technical Paper 18, “Minimum Qualifications for Personnel Conducting Munitions and Explosives of Concerned-Related Activities,” September 1, 2015. http://64.78.11.86/uxofiles/enclosures/DDESB_TP_18_July2015.pdf
4. State of Hawaii Department of Health (HDOH), “Guidance for Soil Stockpile Characterization and Evaluation of Imported and Exported Fill Material,” October 2017. <http://www.hawaiidoh.org/references/HDOH%202017d.pdf>
5. HDOH, “Technical Guidance Manual” published by the HDOH Hazard Evaluation and Emergency Response (HEER) Office.
6. South Kohala Community Development Plan. FINAL. November, 2008
<http://www.hcrc.info/community-planning/community-development-plans>, Adopted: November 20, 2008. Prepared For: The County of Hawai’i, Prepared By: The South Kohala Community with the Assistance of: The County of Hawaii Planning Department and Townscape, Inc.
7. U.S. Army Corps of Engineers (USACE), Engineering Manual 385-1-97, Explosives Health and Safety Manual
8. USACE, “UXO Safety Former Waikoloa Maneuver Area” pamphlet,
<https://www.poh.usace.army.mil/Portals/10/docs/fuds/WMA%20UXO%20Safety4.pdf>
9. USACE “April 2013 Fact Sheet, Formerly Used Defense Site (FUDS), Waikoloa Maneuver Area, South Kohala, Hawaii,”
<https://www.poh.usace.army.mil/Portals/10/docs/factsheets/Fact%20Sheet%20-Waikoloa%20April%202013.pdf>
10. U.S. Army, “FY2016, Pohakuloa Training Area, Army Defense Environmental Restoration Installation Action Plan,” December 2016,
<https://www.aec.army.mil/application/files/8715/0007/9015/HI-PTA.pdf>

Appendix B

Sample Outline of an Anomaly Avoidance Plan

UNEXPLODED ORDNANCE AVOIDANCE PLAN

- 1.0 CHAPTER 1 – INTRODUCTION**
 - 1.1 Project Authorization**
 - 1.2 Purpose and Scope**
 - 1.3 Site Description and History**
 - Figure 1-1 Site Location Map**
- 2.0 CHAPTER 2 - TECHNICAL MANAGEMENT PLAN**
 - 2.1 General Procedures**
 - Personnel**
 - Areas to Be Inspected**
 - Inspection Procedures**
 - Procedures to be used in the event UXO is located**
 - 2.2 Project Execution**
 - 2.2.1 Phase I – Mobilization**
 - 2.2.2 Phase II - UXO Avoidance for Construction Support**
 - 2.2.3 Demobilization**
 - 2.2.4 OE Personnel and Qualifications**
 - 2.3 Public Affairs**
- 3.0 CHAPTER 3 - EXPLOSIVES MANAGEMENT PLAN**
- 4.0 CHAPTER 4 - EXPLOSIVES SITING PLAN**
- 5.0 CHAPTER 5 - GEOPHYSICAL PROVE-OUT PLAN AND REPORT**
- 6.0 CHAPTER 6 - GEOPHYSICAL INVESTIGATION PLAN**
- 7.0 CHAPTER 7 - LOCATION SURVEYS AND MAPPING PLAN**
- 8.0 CHAPTER 8 – WORK, DATA, AND COST MANAGEMENT PLAN**
- 9.0 CHAPTER 9 - PROPERTY MANAGEMENT PLAN**
- 10.0 CHAPTER 10 - QUALITY CONTROL PLAN**
- 11.0 CHAPTER 11 - ENVIRONMENTAL PROTECTION PLAN**
- 12.0 CHAPTER 12 - INVESTIGATION-DERIVED WASTE PLAN**
- 13.0 CHAPTER 13 - GEOGRAPHICAL INFORMATION SYSTEM (GIS) PLAN**
- 14.0 CHAPTER 14 - REFERENCES**

Appendix C

History of Response Actions in the Waikoloa Maneuver Area

Training activities in the Waikoloa Maneuver Area (WMA) ended in 1946. The Navy acquired the Waikoloa Maneuver Area (WMA) in 1943 through a licensing agreement to use as a military training camp and artillery range. The area served 50,000 troops from 1943 to 1945. However, limited training activities continued in the former Pu'u Pa'a Local Training Area portion of the WMA through the 1990s).

Two surface clean-up activities were conducted in 1946 and 1954. The 1946 clean-up was done after the departure of the military. The 1954 clean-up followed an accidental detonation of a dud fuse or shell killing two civilians and seriously injuring three others. Munitions and explosives continue to be discovered at the Former Waikoloa Maneuver Area. Investigation and clearance continue in areas planned for development and where risk assessments rate the areas as moderate to high.

To date over 100 different types of munitions have been found at the Former Waikoloa Maneuver Area to include mortars, projectiles, hand grenades, rockets, land mines and Japanese ordnances. Since activities at the WMA ended, DoD has undertaken five separate cleanup activities in the WMA. In total, to date, DoD has investigated and removed munitions from approximately 25% (29,000 acres) of the WMA's, currently estimated, 123,000-plus acres.

The current estimated cost to complete investigation, clean-up and long-term monitoring is \$723 million. In accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Remedial Investigation/ Feasibility Studies have started that will characterize and assess the nature and extent of the contamination at the WMA.

DoD conducted the first visual surface clearance prior to the 5th Marine Division's departure in 1946. The second surface clearance effort occurred in 1954 after an accidental UXO detonation killed two civilians and injured three others. The extent of these two clearance efforts is unclear, although records imply they covered approximately 91,000 acres. During these two clearances, technicians discovered numerous live munitions.

Following the two investigations in 1946 and 1954, and the establishment of the DoD's Defense Environmental Restoration Program in the 1980s, the WMA (except for the Pu'u Pa'a Local Training Area portion) was designated as a Formerly Used Defense Site (FUDS) to be managed by USACE. In the 1990s and early 2000s, the USACE performed several preliminary Engineering Evaluation/Cost Analysis site investigations, followed by a series of Time-Critical and Non-Time-Critical Removal Actions across the FUDS portion of the former WMA.

In 1997 and 2001 the third and fourth clearance for munitions was conducted in the WMA which included a Phase I and Phase II Evaluation/Cost Analysis. The clearance conducted resulting in the removal of numerous munitions and other non-hazardous debris. In 2004, a fifth clearance was conducted and a Phase III Evaluation/Cost Analysis on the outskirts of the WMA. The investigation discovered and removed several UXO and a variety of other debris.

Beginning in 2012, this evolved into the current cleanup activities. In 2012, the USACE changed the removal process to a process like that used to address hazardous substance releases under CERCLA, also known as the 'Superfund.'

This process, overseen by the HDOH, involves conducting an initial Remedial Investigation/ Feasibility Study on areas identified as potentially contaminated in the preliminary assessment. Alternatives are then presented to the various stakeholders (e.g., property owners, HDOH, and the public) and a Decision Document is prepared that may include additional Removal or Remedial Action.

Investigations in 2009 and 2012 included collecting soil and groundwater samples in representative areas of the WMA. Samples were analyzed for munitions constituents including metals and explosives and compared to HDOH Tier 1 Environmental Action Levels. No contaminants of potential concern were detected at concentrations exceeding the Environmental Action Levels. Based on these studies, USACE concluded that munitions constituents are not a concern at the WMA.

Because the cleanup process is expected to continue well into the future, USACE currently devotes a significant amount of time into conducting a community awareness outreach program. They visit elementary schools and community events across Hawaii county, particularly around Waikoloa and Waimea, to share the “3Rs of Explosives Safety” message. HDOH works together with USACE at these events because we recognize the importance of spreading this message out to the community in order to reduce the risk of exposure to UXO in the WMA.

The Pu’u Pa’a Munitions Response Area is managed separately by the U.S. Army Garrison – Hawaii. This is because the Pu’u Pa’a Local Training Area continued to be used by the Army and the Army National Guard through the 1990s before the property was returned to private ownership, which made the property ineligible for the FUDS program (FUDS properties must have been returned before October 1987). The U.S. Army Garrison – Hawaii also follows a CERCLA-like process at the Pu’u Pa’a Munitions Response Area portion of the former WMA and is currently preparing its Final Remedial Investigation/ Feasibility Study document for that site.

Appendix D

Sample Right of Entry Letter and Agreement

Dear Landowner:

The U.S. Army Corps of Engineers (Corps), under the Defense Environmental Restoration Program (DERP), has been assigned responsibility by the Department of Defense (DoD) to identify, investigate, and respond to environmental hazards that are a direct result of DoD activities at former military properties. Established by Congress in the mid-1980s, the Formerly Used Defense Sites (FUDS) Program cleans up properties formerly owned, leased, possessed, or used by the military services (Army, Navy, Air Force, or other Defense agencies). The Army is the DoD Executive Agent for FUDS and the Corps is responsible for carrying out the program.

The former Waikoloa Maneuver Area, South Kohala, Island of Hawaii, Hawaii, has been determined to be an eligible DERP FUDS site. We are required to inform you that your property may potentially have munitions and explosives of concerns and munitions debris that may be a hazard to the landowner, the public, and the environment. For your information, enclosed is a pamphlet on Questions and Answers on Property Surveys for Munitions and Explosives of Concern.

Also, enclosed are three Rights-of-Entry (ROE) which will allow the Corps and its contractor onto your property to perform surveys, demolish and/or remove identified MEC (Munitions and Explosives of Concern) items, and perform any other such work which may be necessary to safely get rid of said MEC. We are asking for a 12-month ROE. Our contractors are scheduled to in your area within the next couple of months to do the actual work. We apologize for the short suspense, but we are requesting your cooperation in signing two copies of the attached ROE and returning them to us in the enclosed self-addressed stamped envelope by . Once we receive your signed ROE, we will sign it and return to you a fully executed copy. Approximately 7-14 days prior to the actual work, our contractor will contact you by phone, email and/or letter explaining that they will be entering your property on a specific day(s) and provide you a window of time. Hand-held metal detectors will be used to sweep your property to locate surface and subsurface metallic objects. Each object discovered will be thoroughly inspected to determine what it is and if special handling is required. Road closures and traffic diversions may also be required depending upon the exact location and what types of MEC items are found on your property.

If you choose not to participate in this project and deny access, please notify us in writing. If access is denied, our regulations require us to indefinitely suspend our actions with your property. In addition, we are required to notify appropriate authorities such as the Environmental Protection Agency and State Environmental Regulatory Agency. This is a serious matter as there may be risks associated with the use of this property. Thus, we urge you to sign the ROE to allow us to conduct our work.

If you have any questions on the ROE document, please contact Ms. Zandra Smith at (808)835-4053 or by email at zandra.a.smith@usace.army.mil. If you have any questions on this Waikoloa project, please contact Mr. Loren Zulick, Project Manager, at (808)835-4005 or by email at Loren.A.Zulick@usace.army.mil.

Should you find any suspected MEC item, notify local law enforcement officials immediately. Please remember the 3Rs of Unexploded Ordnance Safety: **Recognize** that any suspicious objects found in the area should not be touched under any circumstances; **Retreat**, or carefully leave the area and; **Report** immediately what is found and its approximate location to the police, call 911.

Thank you in advance for your cooperation and support.

Sincerely,

US Army Corps Chief
Chief, Real Estate Branch

Enclosures

DEPARTMENT OF THE ARMY
RIGHT-OF-ENTRY FOR
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) REMOVAL

Formerly Used Defense Site (FUDS) Waikoloa Maneuver Area; TMK Number(s): _____

The undersigned, hereinafter called the “Owner”, in consideration for the mutual benefit of the work described below, hereby grants the UNITED STATES OF AMERICA, hereinafter called the “Government”, a right-of-entry upon the following terms and conditions.

1. The Owner hereby grants to the Government an irrevocable and assignable right to enter in, on, over, and across the land as depicted in Exhibit A, for a period not to exceed twelve (12) months, beginning with the date of the signing of this instrument, and terminating with the earlier of the expiration of the right-of-entry or the completion of the remediation by the representative of the United States in charge of the FUDS Waikoloa Maneuver Area Project, for use by the United States, its representatives, agents, and contractors, and assigns, as a work area for environmental investigation and removal; including the right to store, move, and remove equipment and supplies; erect and remove temporary structures on the land; investigate and collect samples; excavate and remove MEC, pollutants, hazardous substances, contaminated soils, containerized waste, and replace with uncontaminated soil; dispose of MEC (ordnance and explosives) by detonation; and perform any other such work which may be necessary and incident to the Government’s use for the investigation and removal of MEC, pollutants, hazardous substances, contaminated soils, and containerized waste on said lands, subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowner(s), their heirs, executors, administrators, successors and assigns, all such right, title, interest, and privilege as may be used and enjoyed without interfering with or abridging the rights and right-of-entry hereby acquired.

2. The Owner also grants the right to enter and exit over and across any other lands of the Owner as necessary to use the described lands for the purpose listed above.

3. All tools, equipment, and other property taken upon or placed upon the land by the Government will remain the property of the Government and shall be removed by the Government at any time within a reasonable period after the expiration of this right-of-entry.

4. Upon expiration or termination of this right-of-entry, the Government will ensure restoration of the ground contour, replace any pavement or other cover which was removed or damaged for this work, establish a groundcover of grass on areas not otherwise covered, and reconnect any operating utility lines that were required to be disconnected or otherwise disrupted.

DEPARTMENT OF THE ARMY
RIGHT-OF-ENTRY FOR
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) REMOVAL

Formerly Used Defense Site (FUDS) Waikoloa Maneuver Area; TMK Nos: _____

5. The land affected by this right-of-entry is located in the County of Hawaii, State of Hawaii and as depicted in Exhibit A.

WITNESS MY HAND AND SEAL this _____ of _____, 2012.

UNITED STATES OF AMERICA

By _____

Real Estate Contracting Officer
U.S. Army Corps of Engineers,
Honolulu District

Owner's Signature

Owner name (print)

Mailing Address

City, State, Zip Code

Phone number / Cell phone number

Email address

Appendix E

Geology and Hydrology

The current boundaries of the Waikoloa Maneuver Area (WMA) start in the south and extend from Anaehoomalu Bay along the Pacific shoreline to Kawaihai in the west and upland to the upper reaches of Waimea in the north. The northern boundary extends eastward to Waikii in the east, then back through the Waikoloa Village area to Anaehoomalu Bay.

The former maneuver area is characterized by a generally smooth to rocky, sloping land surface of consistent grade, marked by numerous cinder cones along the volcanic rift zones that are now covered with grassland vegetation and cut by widely spaced erosional gullies. The WMA is surrounded by three of the five volcanoes that comprise the Island of Hawaii. On the north are the Kohala Mountains, the oldest volcanic feature on the island; on the east is Mauna Kea; and on the southwest are the Hualalai Cone and Crater. Coastal land bounds the former maneuver area from the south onto the west.

Most of the former maneuver area lies within the Waimea Plains. The plains were formed by Mauna Kea lava flows that ponded against the older Kohala Mountains and are now covered with volcanic ash-type soils. The interior plains at Pohakuloa are covered with more recent lava flows from Mauna Loa that banked against Mauna Kea. The lava is predominantly basalt flows and scoria of the Hamakua Volcanics, a sequence of basaltic lavas, erupted between about 65,000 and 200,000 years ago, which was then followed by an eruption of Laupahoehoe Volcanics (which were cooler and had thicker flows) between 4,500 and 65,000 years ago. These lavas are intermingled with glacial deposits from the Pleistocene age (Macdonald, Abbott, and Peterson, 1983).

These rocks, like all Hawaiian basalts, are extremely iron rich (Wolfe and Morris, 1996). The composition of some basalt rocks exceeds 40 percent iron minerals. This high iron content can cause geophysical "false alarms" in the detection of subsurface ordnance. Not only will the geophysical equipment detect ferrous ordnance, it will also detect iron rich basalt cobbles, sub-crops, or changes in the iron composition from one lava flow to the next, depending on its iron content. Basalt, because of its iron rich composition, will oxidize and weather like that of oxidized ordnance. Consequently, there can be difficulty in visually discriminating ordnance from oxidized basalt lava flows.

Soil types within the project area are largely shallow, dry, and/or stony, and are subject to aeolian (wind-blown) conditions leaving a thin veneer of silt loam as a top soil. These soil conditions, along with the semiarid climate, lend itself to large expanses of grassland along with sparse stands of vegetation, including cactus and eucalyptus trees. According to the Natural Resources Conservation Service, the soils within the former maneuver area can be classified into one of three soil associations: the Kawaihae Association, the Puu Pa-Pakini-Waiaha Association, and the Waimea-Kikoni-Naalehu Association.

The Kawaihae Association consists of moderately deep, gently sloping to moderately steep, somewhat excessively drained soils that have medium textured subsoil that form in volcanic ash. These soils are found in the west one-third of the former maneuver area (the coastal plains) and extend inland from near sea level to approximately 1,500 feet above mean sea level. Kawaihae soils have a surface layer of dark reddish-brown and dusky-red silt loam. Bedrock is at a depth of approximately 10 to 40 inches below ground surface (U.S. Department of Agriculture, 1973).

Puu Pa-Pakini-Waiaha Association soils make up the central one-third of the former maneuver area and consist of shallow to deep, nearly level to steep, well drained to somewhat excessively drained soils that have a medium-textured subsoil or underlying material. These upland soils occur at elevations up to 4,000 feet above mean sea level and have a concentration of calcium carbonate that occurs as a soil layer or as coatings on rock fragments. Also formed of volcanic ash, these soils have a very dark brown, extremely stony, very fine sandy loam surface layer. Their subsoil is dark brown and dark yellowish-brown, very stony, very fine sandy loam, and can range from 20 to 55 inches below ground surface (U.S. Department of Agriculture, 1973).

The easternmost one-third of the former maneuver area is characterized by Waimea-Kikoni-Naalehu Association soils. These volcanic ash soils are very deep, nearly level to steep, well drained, and have a medium-textured to moderately fine-textured subsoil. The soils have a dark surface layer that is high in content of organic matter; they occur at elevations ranging from 750 feet to 6,000 feet above mean sea level (U.S. Department of Agriculture, 1973). Depending upon the location and amount of rainfall, the soil types within the former maneuver area are able to support pastureland and farming of various crops. The remaining areas support habitat for wildlife.

The WMA is in the West Mauna Kea Aquifer sector which includes the Waimea Aquifer system and the Northwest Mauna Loa Aquifer sector which includes the Anaehoomalu Aquifer System. Groundwater occurs as a freshwater lens, floating on denser saltwater within permeable lava flows near the coast. The fresh groundwater flows from the inland area west to the Pacific Ocean. Because the volcanic rocks are highly permeable, freshwater can readily discharge to the ocean and therefore groundwater levels are relatively low (less than 10 feet above sea level).

The WMA extends inland from near sea level to approximately 6,000 feet above mean sea level. Bedrock is at a depth approximately 10 to 40 inches below ground in most locations but deeper in the upper reaches of the maneuver area. The annual rainfall ranges from 20 to 50 inches, with most of the rainfall occurring October through April. In areas where volcanic flows have not recently occurred, the terrain is eroded by seasonal rivers and streams. In other areas, the terrain is undissected and quite barren, revealing a large area of exposed lava (U.S. Department of Agriculture, 1973).

There are no permanent watercourses in the WMA due to the low level of annual precipitation. Waikoloa Stream and other minor watercourses are seasonal, flowing only during the rainy season and subject to occasional flash floods. When flooding does occur, it may have the energy to move soil and rock, potentially exposing UXO that lie close to the surface. In the WMA, fresh groundwater tends to move from the mountainous areas of the island toward the coast. Given the presence of "cap rock" and the substantial depth to groundwater, a release of munitions constituents (e.g. explosive fill material) from munitions do not threaten to contaminate groundwater in the WMA.

Appendix F

Site-Specific Environmental Hazard Management Plan Guidance

Introduction

The use of Environmental Hazard Management Plans (EHMPs) has grown significantly in recent years due primarily to the increased complexity and the enormous costs associated with removing all contamination. At times, it is simply not feasible to remove all risk at a site with a feasible approach or realistic cost.

Risk assessment and risk management are the two key elements used to deal with the presence of munitions and help ensure safety. In the Waikoloa Maneuver Area (WMA), the common contaminant across the area is Unexploded Ordnance (UXO), with varying degrees of risk at different sites dependent on the types and quantity of munitions originally used at a site, and the level of cleanup activity conducted to date. Even in areas that have been completely cleared by the DoD, there is some ‘residual risk’ due to technological limitations.

The Areawide Environmental Hazard Management Plan (AEHMP) for the WMA was developed to educate the public about the ‘residual risk’ related to UXO within the WMA and to help minimize the risk when developing properties. The degree of guidance needed to address the ‘residual risk’ will depend upon the nature and size of the planned development project. The AEHMP guidance includes:

- 1) Educating workers about the ‘residual risk’ from UXO;
- 2) Using UXO Construction Support; and
- 3) Properly managing soil when conducting ‘small-scale’ development projects.

For small-scale projects, the AEHMP guidance alone may be sufficient. However, for ‘large-scale’ development projects, the Hawaii Department of Health (HDOH) recommends preparing an additional Site-Specific Environmental Hazard Management Plan (SSEHMP), which should be reviewed and approved by HDOH prior to initiating any ground disturbing activities. Small-scale developments are generally defined as single lot construction projects with footprints less than 3,000 square feet.

Large-scale developments include, but are not limited to:

- 1) Residential subdivisions;
- 2) Residential apartment buildings;
- 3) Schools;
- 4) Shopping centers;
- 5) New roads;
- 6) Alternative energy projects such as solar and wind farms;
- 7) Utilities corridors and roadways;
- 8) Commercial structures; and
- 9) Major modifications to complex existing structures.

If you are not sure whether your planned development is a large- or small-scale project, please contact the HEER Office, Site Discovery, Assessment, and Remediation Section at 808-586-4249.

Please Note the Following Regarding Site-Specific Contaminants:

The AEHMP prepared by the HDOH only addresses ‘residual risk’ associated with UXO at the Waikoloa Maneuver Area (WMA). Individual properties within the WMA may also contain other hazardous substances, pollutants or contaminants regulated by the State of Hawaii Environmental Response Law (HERL; Hawaii Revised Statutes [HRS] 128D).

If contaminants regulated under HERL are identified, their presence should be reported to HDOH Hazard Evaluation and Emergency Response (HEER) Office. In addition, an assessment should be made to determine whether remediation is required prior to development. If HDOH determines that the contaminants may be managed in place, the SSEHMP should address both the UXO ‘residual risk’ and any risks associated with the other contaminants.

Preparing Your Site-Specific Environmental Hazard Management Plan (SSEHMP)

The purpose of an SSEHMP is to further reduce risks large-scale development projects. HDOH accomplishes this by first requiring that risks be removed to the extent practicable through various remediation strategies. An SSEHMP specifies additional actions that parties must take under various circumstances to properly protect the public, the landowner, construction workers, and the environment from the ‘residual risks.’ The SSEHMP helps to further reduce risk by employing various ‘control measures’ designed to address the specific type of ‘residual risks’ present. Collectively, these additional control measures are referred to as ‘engineering controls (ECs)’ and ‘institutional controls (ICs).’

Use of this AEHMP and/or an associated SSEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH. Typically, HDOH approval of an SSEHMP is required prior to approval of large-scale development projects. While HDOH approval may not be required in some cases, preparation of an SSEHMP may still be advisable. Please contact the HEER Office to clarify the requirements.

A key component of the AEHMP and any SSEHMP to address ‘residual risk’ from UXO is utilizing UXO Construction Support. This requires the landowner to contract a Department of Defense Explosives Safety Board (DDESB) certified UXO Contractor to conduct the following activities:

- Prepare an Anomaly Avoidance Plan.
- Provide on-site training to workers prior to excavation activities.
- Screen all areas where soil disturbing activities will take place to 12-inches beyond the depth of excavation, or to bedrock.
- Be on-site during excavation activities to monitor for UXO hazards.
- Screen soil prior to off-site disposal in accordance with the Soil Management Plan.

The SSEHMP provides guidelines for worker safety and proper soil management like those presented in the AEHMP. The SSEHMP also includes more site-specific information such as:

- A description of the development and potential users of the site.

- A conceptual site model that conveys the ‘residual risk’ of UXO to all receptors (e.g., workers, visitors, residents, etc.) during the development.
- Detailed plans for mitigating ‘residual risk’ before and after construction. This could include: Health and Safety Plan, Anomaly Avoidance Plan, UXO Construction Support, hazard communication plan for site workers, and warning signage, etc.
- A detailed Soil Management Plan, including: guidelines for the stockpiling of soil on site, screening requirements for soil that will be taken off-site, and detailed instructions for the final disposition of excavated soil.
- If other chemicals of potential concern regulated by the HERL have been identified at the site, they should be addressed in the SSEHMP.
- Detailed maps of various features of the construction, including:
 - Location of roads, subsurface utilities, structures, etc.
 - Depths and locations of planned excavations
 - Depths and locations of planned soil borings
 - Locations of planned grading and grubbing activities
 - Locations of planned laydown areas
 - Location of soil stockpiles

Section 18.5.16 of the HDOH Technical Guidance Manual (TGM) provides a suggested format for the SSEHMP. The Technical Guidance Manual is available on-line at:

<http://www.hawaiidoh.org>. As described in Section 19.6 of the TGM, the SSEHMP, at a minimum, should include the following:

- A summary of the site background and history of contaminant releases. This should include a description of the ‘residual risk’ associated with UXO hazards, the UXO clearance previously conducted at the site, and other Chemicals of Potential Concern that have been identified at the site.
- Maps that clearly indicate the extent and magnitude of contamination remaining in soil, groundwater and/or soil gas.
- Identification and discussion of all potential environmental hazards.
- Requirements for long-term monitoring of contaminants in soil, groundwater, and/or soil gas.
- Discussion of engineering and/or institutional controls needed to eliminate exposure pathways for identified environmental hazards.
- Guidance on proper handling, reuse and disposal of contaminated soil and groundwater that is encountered during future site activities.
- Description of notifications to help protect construction workers.
- Use restrictions to protect occupants, residents, guests, and others.

- Measures for repair or replacement of engineering controls disturbed or breached during future site activities.
- Additional information required to adequately mitigate and manage remaining environmental concerns at the site.

| Outline for a Site-Specific Environmental Hazard Management Plan | |
|---|--|
| 1.0 | Introduction and Purpose |
| 2.0 | Background |
| 2.1 | Summary of Site Background and History of Contaminant Releases |
| 2.2 | Chemicals of Potential Concern |
| 2.3 | Conceptual Site Model |
| 3.0 | Clear Map Descriptions of Extent and Magnitude of Remaining Contamination (to scale, with north arrow, and including footprints of any on-site buildings nearby contaminated areas) |
| 4.0 | Summary of Potential Environmental Hazards |
| 5.0 | Long-Term Monitoring Requirements |
| 6.0 | Engineering Controls Requirements |
| 7.0 | Institutional Controls Requirements |
| 8.0 | Implementation |
| 9.0 | Soil and Groundwater Management for Future Site Activities Affecting On-Site Contamination |
| 9.1 | Consultation with HEER Office |
| 9.2 | Pre-Excavation Evaluation of Soils and Groundwater |
| 9.3 | Soil Excavation and Handling |
| 9.4 | Soil Stockpiling/Storage |
| 9.5 | Soil Disposal |
| 9.6 | Groundwater Handling |
| 9.7 | Groundwater Disposal |
| 10.0 | Exposure Management |
| 10.1 | Awareness/Training for Contamination Managed On-Site |
| 10.2 | Construction Worker Notifications and Protections |
| 10.3 | Use Restrictions to Protect Site Workers, Guests |
| 10.4 | Emergency Response for Chemical Exposure |
| 10.4.1 | Eye and Skin Exposure to Chemicals |
| 10.4.2 | Internal Exposure to Chemicals |
| 10.4.3 | Inhalation Exposure to Chemicals |
| 11.0 | References |

Along with the SSEHMP, where significant public review is anticipated, a brief Fact Sheet should be prepared that summarizes the SSEHMP in simple, non-technical terms. Additional guidance may be found in the HDOH publication *A Landowner's Guide to Environmental Hazard Management Plans (EHMP)* available at:

<http://eha-web.doh.hawaii.gov/eha-cma/Leaders/HEER/technical-guidance-and-fact-sheets>

At the completion of the development project, documentation should be submitted to HDOH showing that the AEHMP and/or SSEHMP requirements have been followed. Following the completion of the development, the landowner should continue to do the following:

- 1) Continue to comply with guidance in the AEHMP and SSEHMP;
- 2) Follow the AEHMP and HDOH-approved SSEHMP for any future development; and
- 3) Approve future DoD requests for a Right of Entry (ROE) to complete their investigation of the parcel.

Appendix G

Assessing Risks from Munitions

Risk assessment and risk management are the two key elements used to help minimize the risk related to UXO. **Risk assessment** refers to a process of identifying and evaluating the risks posed by the presence of munitions. It requires a thorough characterization and understanding of the risk factors at the site. **Risk management**, *on the other hand*, involves developing alternative actions to remove or reduce the identified risks. To do so, requires a careful evaluation of the alternative(s), a process to select the most appropriate alternative(s), and plan to successfully implementing the actions selected.

Below is a description of the general approach used by the Department of Defense (DoD) to "assess" the risks associated with munitions. Section 8 of the Waikoloa Maneuver Area Areawide Environmental Hazard Management Plan (AEHMP) presents the measures proposed by the State of Hawaii Department of Health to "manage" and mitigate those risks. The U.S. Army Corps of Engineers (USACE) conducts additional risk management activities, including educational outreach and Remedial Actions that are described in **Appendix C** of the AEHMP.

There are numerous risks associated with munitions. Assessing these risks involves a complex process. In 2001, the DoD established the Military Munitions Response Program (MMRP) to address sites known to, or suspected of, containing unexploded ordnance, discarded military munitions, or munitions constituents. When implementing the MMRP, DoD complies with federal and state environmental cleanup laws, such as the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; aka Superfund), and State "applicable or relevant and appropriate requirements" including those contained in the Hawaii Environmental Response Law (Chapter 128D, Hawaii Revised Standards).

To prioritize funding and cleanup of "Munitions Response Sites" DoD developed the Munitions Response Site Prioritization Protocol. This protocol consists of three separate modules that specify the process for evaluating the potential risks associated with: explosives; chemical warfare material; and other environmental contaminants. Applying the Munitions Response Site Prioritization Protocol helps DoD establish the "relative priority" for each Munitions Response Site. DoD uses the relative priority to help sequence its response actions. In addition to assessing the technical risk factors, DoD also evaluates other criteria such as economic impact, local redevelopment plans, and stakeholder concerns.

At the WMA, the 123,000-acre Formerly Used Defense Site (FUDS) portion has been divided in 23 separate Munitions Response Sites areas by USACE. These sites have been designated as "Area A" through "Area T" and "Sectors 15, 16, and 17". In addition to these 23 Munitions Response "Areas" and "Sectors," there are a few subdivisions that have been created, including "BOQJ-Cleared" and "BOQJ-Remnants" around Waimea town, and "Sector 17-A,B,C,E,F" and "Sector 17-D" along the coast between Kawaihae Harbor and Waikoloa Beach Resort. These Munitions Response Sites have been individually prioritized by USACE based on the factors below.

The Pu'u Pa'a Munitions Response Site portion of the WMA is currently being assessed by the U.S. Army Garrison – Hawaii who has the responsibility of managing this area. A draft Remedial Investigation /Feasibility Study for the entire 13,500-acre site is currently under review. The U.S. Army Garrison – Hawaii has not yet subdivided the Pu'u Pa'a Munitions Response Site.

USACE and U.S. Army Garrison – Hawaii assess potential risks posed at Munitions Response Sites by completing the following three hazard evaluation modules:

1. ***Explosive Hazard Evaluation (EHE) Module:***

Evaluates the relative risk and priority of sites where hazards from munitions and explosives of concern (MEC) are known or suspected to be present. A sample of the ***Explosive Hazard Evaluation Module*** from the Pu'u Pa'a munitions response site appears at the end of this appendix.

2. ***Chemical Warfare Material Hazard Evaluation (CHE) Module:***

Evaluates the relative risk and priority of sites where chemical warfare materiel (CWM) hazards are known or suspected to be present.
(Note: there is no documented use of CWM in the State of Hawaii).

3. ***Health Hazard Evaluation (HHE) Module:***

Evaluates the relative risk to human health and the environment where Munitions Constituents and other contaminants are known or suspected to be present.
(Note: this module assesses health hazards associated with munitions constituents, which, as discussed in **Appendix C** of the AEHMP, have not been identified in the WMA at concentrations above regulatory levels).

DoD determines the relative priority of a munitions response site using the results of these three hazard evaluation modules. As a matter of DoD policy, munitions response sites with higher relative risks are addressed before those with lower relative risks. However, DoD may also consider factors such as: environmental justice, economic development, and stakeholder concerns.

DoD believes strongly that involving stakeholders early and often promotes better understanding of the assessment and cleanup process. Receiving feedback directly from stakeholders is an effective way to identify and address their concerns about environmental and safety issues. Involving stakeholders raises awareness of the dangers and educates them as to how they can best protect themselves and the environment.

In 2008 the U.S. Environmental Protection Agency developed a tool to help site managers and regulators evaluate explosive safety hazards at munitions response sites. This “Munitions of Explosive Concern Hazard Assessment Methodology” is generally incorporated into the Remedial Investigation/Feasibility Study and used by the DoD.

To learn more about the Munitions Response Site Prioritization Protocol and the Munitions of Explosive Concern Hazard Assessment Methodology, please visit the following websites:

- 1) <http://www.denix.osd.mil/mmrp/mrspp/home/>
- 2) <https://www.epa.gov/fedfac/munitions-and-explosives-concern-hazard-assessment-mec-ha-methodology-technical-work-group>

Example

Munitions Response Site Prioritization Protocol for the Pu'u Pa'a Munitions Response Site

MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

| | | | |
|---------------------------|-------------------------------------|--------------------------|---|
| Installation Name: | Pohakuloa Training Area | EHE Score: | A |
| Site Name: | Pu'u Pa'a MRS (PTA-003-R-01) | CHE Score: | No Known or Suspected CWM Hazard |
| Completed By: | Contractor | HHE Evaluation: | No Known or Suspected MC Hazard |
| Date Completed: | October 14, 2013 | Overall Priority: | 2 |

Background

The Munitions Response Site Prioritization Protocol reflects the statement in 10 U.S.C. § 2710(b)(2) that the priority assigned should be based on the overall conditions at each location, taking into consideration various factors relating to safety and environmental hazard potential. As required under 10 U.S.C. § 2710(b)(1), the priority assigned to each munitions response site will be included with the inventory information made publicly available. The requirement for an inventory of munitions response sites known or suspected of containing unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC) is found at 10 U.S.C. § 2710(a). The assigned priority will be updated annually to reflect new information that becomes available.

Description

The Munitions Response Site Prioritization Protocol evaluates the following potential explosive safety and environmental hazards:

- Explosive hazards posed by unexploded ordnance (UXO) and discarded military munitions (DMM)
- Hazards associated with the effects of chemical warfare materiel (CWM)
- The chronic health and environmental hazards posed by munitions constituents (MC) or other chemical constituents.

DoD recognizes the different hazards inherent to each class of materials. To address these differences, the Protocol has three hazard evaluation modules, each of which is specific to one type of hazard, specifically:

- Explosive hazards are evaluated using the Explosives Hazard Evaluation (EHE) module
- CWM-related hazards are evaluated using the Chemical Warfare Materiel Hazard Evaluation (CHE) module
- Health and environmental hazards posed by MC are evaluated using the Health Hazard Evaluation module.

DoD recognized that sufficient data to apply all three of the hazard evaluation modules may not be immediately available for some munitions response sites. In such cases where data are available for only one or two of the modules, the priority will be assigned based on the modules for which sufficient data are available. This initial priority may change when additional data are collected and all three modules are evaluated. Modules for which there are insufficient data will be assigned a status of "evaluation pending".

Upon completion of all necessary munitions responses at a munitions response site, the status "prioritization no longer required" will be assigned. The sequencing of munitions response sites for environmental restoration activities will be based primarily on the priority assigned using this Protocol, but may also reflect other relevant information, such as stakeholder concerns, economic issues, and program management considerations.

Appendix H

Responsibilities for Federal, State, County Governments, and Land Owners

All levels of government share the responsibility of alerting the public to the dangers of UXO and the importance of observing the “3Rs.”

In turn, the public must do its part by not approaching, disturbing, moving or handling a suspected munition and calling 911.

Observing the “3Rs” is the single most important thing people can do to protect themselves from the potential explosive hazards associated with UXO.

The federal government through the Department of Defense (DoD) has the lead role to investigate, remove and dispose of unexploded ordnance (UXO) in the Waikoloa Maneuver Area (WMA). The U.S. Army Corps of Engineers manages the Formerly Used Defense Site portion of the WMA for DoD. The U.S. Army Garrison – Hawaii manages work within the Pu’u Pa’a Munitions Response Area portion of the WMA. The State of Hawaii through the Hawaii Department of Health Hazard Evaluation and Emergency Response Office ensures that DoD actions are consistent with the Hawaii Environmental Response Law (HERL), Hawaii Revised Statutes (HRS) 128D.

Everyone, including federal, state, and local governments, landowners and individual, shares responsibility for understanding and taking actions to mitigate risks associated with munitions. This section describes the general responsibilities of each group and how they interact with one another.

Federal

First, at the Federal level, DoD is responsible for carrying out the Defense Environmental Restoration Program which promotes environmental restoration at facilities under the jurisdiction of DoD. The Army is the lead agent charged with meeting applicable environmental restoration requirements at Formerly Used Defense Sites (FUDS), regardless of which DoD component had jurisdiction of the property. More specifically, the U.S. Army Corps of Engineers (USACE) is responsible for FUDS and for coordinating with State government, local agencies and the public. USACE follows a detailed methodology based on the process described in the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). All areas of the WMA, except for the Pu’u Pa’a Munitions Response Area, are designated as FUDS. The U.S. Army Garrison – Hawaii is responsible for managing the Pu’u Pa’a Munitions Response Area portion of the WMA directly. The U.S. Army Garrison – Hawaii also uses a CERCLA-like process.

In addition to site cleanup activities, USACE is engaged in public education and outreach activities in the WMA. Since the cleanup process will likely require ongoing public awareness education, USACE initiated the “3Rs of UXO Safety” message: **Recognize, Retreat, Report**. For the past several years, USACE has been sharing this safety message at elementary and middle schools, community events, and public meetings throughout the WMA and other parts of Hawaii county.

State

Since the Hawaii Environmental Response Law (HERL), Hawaii Revised Statutes (HRS), Chapter 128D) authorizes the Hawaii Department of Health (HDOH) to respond whenever there is a release or a substantial threat of a release of any hazardous substance, pollutant or contaminant that may present a substantial danger to public health, welfare, or the environment. However, the HERL does not explicitly address the explosive hazard associated with UXO and the State has not developed an independent process for UXO investigations or removal activities. Therefore, HDOH defers to DoD as the lead agency responsible for UXO remediation.

However, HDOH maintains regulatory authority over DoD clean-up activities in the state through a DoD-State Memorandum of Agreement (DSMOA). DoD provides funds for this regulatory oversight through a cooperative agreement with the Hazard Evaluation and Emergency Response (HEER) Office. The HEER Office ensures that all work performed by DoD complies with the HERL and the Remedial Action Objectives defined in their work plan documents.

Under DSMOA, DoD uses a CERCLA-like process to conduct munitions response actions which requires DoD to meet each of Hawaii's "applicable or relevant and appropriate requirements." To do this, DoD submits its investigative reports, recommendations and decision documents to the Site Discovery, Assessment, and Remediation Section of the HEER Office for its comments and/or concurrence.

In addition, the HEER Office supports USACE in its outreach efforts at public schools and community events throughout the WMA and Hawaii county. The HEER Office also works with other stakeholders, such as the Department of Hawaiian Homelands, the Hawaii Public Housing Authority, the U.S. Department of Housing and Urban Development, and private landowners to address their concerns about the impact of UXO on development in the WMA. The HEER Office developed this AEHMP as part of its work with various stakeholders.

Local

At the local level, counties and municipalities share responsibility primarily as “first responders.” Police and fire officials are responsible for managing the local situation. Once notified, the police officials contact DoD Explosive Ordnance Disposal (EOD) specialists who are trained to assess potential dangers and dispose of munitions reported by the public. In the meantime, first responders assure the public keeps a safe distance and does not disturb munitions.

Landowners

At the landowner level, any construction activities in the WMA should adhere to this Areawide Environmental Hazard Management Plan (AEHMP) and, if recommended by HDOH, should also adhere to an HDOH-approved Site-Specific EHMP (SSEHMP). However, use of this AEHMP and/or an associated SSEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH.

At a minimum, landowners should provide ‘UXO Construction Support’ during any activities that involve disturbing or excavating soil. Construction Support and soil management guidelines are described in **Section 8** of the AEHMP. Even properties that have been previously cleared by USACE should be screened. Also, potentially contaminated soil should be screened before being moved from the site or to another area of the property. Construction Support should include preparation of an Anomaly Avoidance Plan and communication of the plan to all site workers.

Additionally, landowners should inform all users of their property, including guests, property managers, employees, and contractors, of the potential UXO hazard at the property. The landowner should clearly communicate the “3Rs” safety message to all users. The USACE has pamphlets and signage available to all property owners within the WMA upon request.

Individual

At the personal level, individuals who encounter munitions are strongly encouraged to observe the “3Rs” of Explosive Safety. The “3Rs” stand for: **Recognize...Retreat... *REPORT***.

Anyone who suspects they have encountered a UXO must:

- First **RECOGNIZE** when they may have encountered a munition and that munitions are dangerous.
- They must next **RETREAT**; do not approach, touch, move or disturb it, but carefully leave the area along the same path they walked in on, warning others to do the same.
- Finally, they must **REPORT**; **call 911** and advise the police of what you saw and where you saw it.

Additionally, the **UXO Report Form** (see **Form 1** in the Appendix) should be filled out by both the individual who discovered the UXO and the first responder, with copies sent to both the HEER Office and the USACE (addresses listed on form).

Appendix I

Photos of UXO, Munitions Debris, and Warning Signs



UXO Warning Sign at Hapuna Beach



4.5" Barrage Rocket



4.5-inch Barrage Rocket



60mm Mortars and Mortar Fuze



155mm Projectile





Fuze from a 75mm Projectile



MK II Hand Grenade Fragmentation





Munitions Debris

Appendix J

DDESB Technical Paper 18: Minimum Qualifications for Personnel Conducting Activities Related to Munitions and Explosives of Concern Tables

The following tables (4.1 to 4.3) describe the minimum qualifications for Unexploded Ordnance (UXO) Contractors to perform work in accordance with this Areawide Environmental Hazard Management Plan (AEHMP) for the former Waikoloa Maneuver Area (WMA), as described in the Department of Defense Explosive Safety Board (DDESB) Technical Paper 18 (TP-18). The complete most recent version of DDESB TP-18 may also be downloaded at:

<https://www.denix.osd.mil/ddes/ddes-technical-papers/>

Technical Paper 18

1 September 2016

DDESB

Minimum Qualifications for Personnel Conducting Munitions and Explosives of Concern-Related Activities



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Table 4.1. Minimum Qualifications for UXOQP^{1, 2, 3, 4}

| Position Description | Training Required | Minimum MEC-related Experience | Minimum MEC-Supervisory Experience | Minimum Total EOD/MEC Experience |
|----------------------|------------------------------|--|------------------------------------|----------------------------------|
| SUXOS | Notes 5, 7, 8, 9, 10, and 11 | 2 years | 1 year | 10 years |
| | Notes 6, 7, 8, 9, 10, and 11 | 10 years | 5 years | 13 years |
| UXOSO | Notes 5, 7, 8, and 9 | 1 year | 0.5 year | 8 years |
| | Notes 6, 7, 8, and 9 | 8 years | 2 years | 10 years |
| UXOQCS | Notes 5, 7, 8, 10, and 11 | 1 year | 0.5 year | 8 years |
| | Notes 6, 7, 8, 10, and 11 | 8 years | 2 years | 10 years |
| Dive Qualified | Note 12 | As indicated above for the position description. | | |

Notes:

1. By definition, UXO-TII and UXO-TIII are UXOQP (minimum qualifications for UXO-T are provided on Table 4.2.
2. Graduate of an Occupational Safety and Health Administration (OSHA)-compliant (29 CFR 1910.120) 40-hour HAZWOPER course.
3. Limited to performance of MEC-related activities as a UXOT or UXOQP or similar civilian government service (e.g., Ordnance and Explosives Safety Specialist (OESS)). Conduct of activities performed as an SP or SW are not considered MEC-related experience and are not counted toward the experiential requirements for UXOQP.
4. Limited to experience in UXO supervisory positions (i.e., UXO-TIII, UXOQCS, UXOSO, OESS).
5. Graduate of a military EOD School of the United States, Canada, Great Britain, Germany, or Australia. (See Paragraph 4.8) for EOD personnel who were terminated for gross negligence in the performance of assigned duties, a flagrant violation of EOD safety procedure or regulation or who are not discharged under honorable conditions will not be considered EOD qualified and will not be considered a military EOD School graduate. To obtain employment, such personnel must complete the training required for a UXO-TI.
6. Graduate of a UXO-TI Course (see Chapter 3), the EOD assistant's course or pass a comprehensive assessment.
7. Graduate of an OSHA-compliant (29 CFR 1910.120(e)(4)) 8-hour Management and Supervisor Training course, if supervising other personnel.
8. Possesses an understanding of applicable explosives safety criteria and experience in the various phases of a munitions response to MEC or the conduct of range clearance activities, as appropriate for the operations to be performed.
9. Must have completed a 10-hour OSHA Construction Safety and Health Training and earned a Department of Labor Construction Safety Course Completion Card.
10. UXOQCS must have either:
 - a. Successfully completed training as a quality professional (i.e., International Standards Organization 9001 internal auditor, American Society of Quality Certified quality auditor);
 - b. Possess a quality-professional certification by a recognized organization (e.g., U.S. Army the Corps of Engineers and Naval Facility Engineering Command Training Course Construction Quality Management for Contractors; or
 - c. Receive company- and project-specific QC training and work under the supervision of a certified quality professional.
11. UXOQCS must demonstrate an understanding of QC and QA practices associated with MEC-related activities and managing and processing MPPEH, including documentation of its explosives safety status.
12. Divers who are independently performing the duties of a UXOT or UXOQP must:
 - a. Meet this TP's criteria for the duties performed and the requirements of 29 CFR 1910, Subpart T.
 - b. Possess the dive-related certifications required for the tasks they are to perform or supervise. (Note: Certifications (dive or training) must be from an accredited school and meet the requirements contained in ANSI/ACDE Standard-01; be documented as valid by an ADC Commercial Diver Certification Card for the appropriate training level; and/or have documentation of successful completion of an appropriate level of training from an ACDE accredited school or have completed the underwater portion of NAVSCOLEOD (or foreign equivalent) training.)

Table 4.2. Minimum Qualifications for UXOT^{1, 2, 3}

| Position Description | Training Required | Minimum MEC-related Experience | Minimum Total EOD/MEC Experience |
|--|-------------------|--|----------------------------------|
| UXO-TIII | Notes 4, 6, and 7 | 1 years | 8 years |
| | Notes 5, 6, and 7 | 8 years | 8 years |
| UXO-TII | Notes 4 and 7 | 0 years | 1.5years |
| | Notes 5 and 7 | 3 years | 3 years |
| UXO-TI | Notes 4 and 7 | 0 years | 0 years |
| | Notes 5 and 7 | 0 years | 0 years |
| Dive Qualified | Note 8 | As indicated above for the position description. | |
| Notes: <div>1. By definition, UXO-TII and UXO-TIII are also UXOQP. 2. Graduate of an OSHA-compliant (29 CFR 1910.120) 40-hour HAZWOPER course. 3. Limited to performance of MEC-related activities as a UXOT or UXOQP or similar civilian government service (e.g., OESS). Conduct of activities performed as an SP or SW are not considered MEC-related experience and are not counted toward the experiential requirements for UXOQP. 4. Graduate of a military EOD School of the United States, Canada, Great Britain, Germany, or Australia. (See Paragraph 4.8. for EOD personnel who were terminated for gross negligence in the performance of assigned duties, a flagrant violation of EOD safety procedure or regulation or who are not discharged under honorable conditions will not be considered EOD qualified and will not be considered a military EOD School graduate. To obtain employment, such personnel must complete the training required for a UXO-TI. 5. Graduate of a UXO-TI Course (see Chapter 3), the EOD assistant’s course or pass a comprehensive assessment. 6. Graduate of an OSHA-compliant (29 CFR 1910.120(e)(4)) 8-hour Management and Supervisor Training course. 7. On-the-job training including, but not limited to familiarity with the process, procedures, and equipment (e.g., geophysical) used for conducting MEC-related activities. 8. Divers who are independently performing the duties of a UXOT or UXOQP must: a. Meet this TP’s criteria for the duties performed and the requirements of 29 CFR 1910, Subpart T. b. Possess the dive-related certifications required for the tasks they are to perform or supervise. (Note: Certifications (dive or training) must be from an accredited school and meet the requirements contained in ANSI/ACDE-01; be documented as valid by an ADC Commercial Diver Certification Card for the appropriate training level; and/or have documentation of successful completion of an appropriate level of training from an ACDE accredited school, or have completed the underwater portion of NAVSCOLEOD (or foreign equivalent) training.)</div> | | | |

Table 4.3. Minimum Qualifications for SP and SW¹

| Position Description | Training Required | Minimum MEC-related Experience ^{3, 4} |
|--|-------------------|--|
| SP | Note 2 | 0 years |
| SW | Note 2 | 0 years |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. Job- and site-specific training including, but not limited to, general and site specific safety (e.g., proper use of equipment and PPE, physical, biological, and chemical hazards); explosives safety training (e.g., recognition of military munitions, 3Rs 2. Personnel who are working at a hazardous waste site require successful completion of an OSHA-compliant (29 CFR 1910.120) HAZWOPER course. 3. Experience as an SP or SW is not required for UXO-TI certification. 4. Activities performed as an SP or SW are not counted toward the experiential requirements for a UXOT or UXOQP. | | |